

# OVERVIEW OF THE EU-27 BUILDING POLICIES AND PROGRAMS. FACTSHEETS ON THE NINE ENTRANZE TARGET COUNTRIES

## CROSS-ANALYSIS ON MEMBER-STATES' PLANS TO DEVELOP THEIR BUILDING REGULATIONS TOWARDS THE NZEB STANDARD



**Written by:**

Bogdan Atanasiu, Joana Maio, Dan Staniaszek, Ilektra Kouloumpi (chapters 2 to 4 and Annex A)

Buildings Performance Institute Europe (BPIE)

Tanja Kenkmann (chapter 5 and Annex B)

Öko-Institut e.V.

**With contributions and internal reviews from:**

Lukas Kranzl, Andreas Müller (chapters 2 to 4 and Annex A)

Energy Economics Group (EEG), Vienna University of Technology

Veit Bürger (chapters 2 to 4 and Annex A)

Öko-Institut (Oeko)

Eva Heiskanen, Juho Kiuru (chapters 2 to 4 and Annex A)

National Consumer Research Center (NCRC)

Clemens Rohde, Jan Steinbach (chapters 2 to 4 and Annex A), Judit Kockat (D5.1, D5.2 and chapter 5 and Annex B)

Fraunhofer Society for the advancement of applied research (ISI)

Maria Fernandez Boneta, Francisco Serna Lumbreras (chapters 2 to 4 and Annex A)

National Renewable Energy Center (CENER)

Paolo Zangheri, Lorenzo Pagliano (chapters 2 to 4 and Annex A)

end-use Efficiency Research Group, Politecnico di Milano (eERG)

Zdravko Georgiev, Diana Paunova (chapters 2 to 4 and Annex A)

Sofia Energy Agency (SOFENA)

Carine Sebi, Bruno Lapillone (chapters 2 to 4 and Annex A)

Enerdata (Enerdata)

Petr Zahradník, Zuzana Šestáková (chapters 2 to 4 and Annex A)

SEVEN, The Energy Efficiency Center (SEVEN)

Bogdan Atanasiu (chapter 5 and Annex B)


Buildings Performance Institute Europe (BPIE)

## ENTRANZE Project

|                                |   |
|--------------------------------|---|
| <b>Year of implementation:</b> | April 2012 – September 2014                                 |
| <b>Client:</b>                 | EACI  |
| <b>Web:</b>                    | <a href="http://www.entranze.eu">http://www.entranze.eu</a> |

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### Project consortium:

|   |                   |  |
|---|-------------------|--|
|    | <b>EEG</b>        | Energy Economics Group Institute of Power Systems and Energy Economics Vienna University of Technology |
|    | <b>NCRC</b>       | National Consumer Research Centre  |
|   | <b>Fraunhofer</b> | Fraunhofer Society for the advancement of applied research   |
|  | <b>CENER</b>      | National Renewable Energy Centre   |
|  | <b>eERG</b>       | end use Efficiency Research Group, Politecnico di Milano   |
|  | <b>Oeko</b>       | Öko-Institut   |
|  | <b>SOFENA</b>     | Sofia Energy Agency  |
|  | <b>BPIE</b>       | Buildings Performance Institute Europe   |
|  | <b>Enerdata</b>   | Enerdata   |
|  | <b>SEVEN</b>      | SEVEN, The Energy Efficiency Center  |

## **The ENTRANZE project**

The objective of the ENTRANZE project is to actively support policy making by providing the required data, analysis and guidelines to achieve a fast and strong penetration of nZEB and RES-H/C within the existing national building stocks. The project intends to connect building experts from European research and academia to national decision makers and key stakeholders with a view to build ambitious, but reality proof, policies and roadmaps.

The core part of the project is the dialogue with policy makers and experts and will focus on nine countries, covering >60% of the EU-27 building stock. Data, scenarios and recommendations will also be provided for EU-27 (+ Croatia and Serbia).

In the first section this report provides a brief overview of buildings policy frameworks in the EU-27 countries. It has been compiled based on the knowledge basis created by an EU-wide review undertaken by BPIE in 2011 and on the evaluation of the existing countries' definitions and initiatives for moving towards nZEBs. A particular focus has been given to the 9 target countries of the Entranze project. On the whole, in its annex the report comprises dedicated factsheets for each target country, presenting national and regional policies, energy standards in the building sector (e.g. building codes requirements), updates on implementation status of EPCs, nearly zero energy buildings, cost-optimality, as well as financial support programmes for new low energy buildings/passive houses and building retrofits.

The second section of this report was written to provide an overview of the planned or existing activities of the Member States to develop their building stock towards nZEB standard. The national plans for increasing the number of nZEB have been analysed and the containing measures and instruments structured and evaluated as far as possible. In the last part of the annex there is a list of measures and instruments of all available nZEB-national plans.

### Acknowledgement:

The authors and the whole project consortium gratefully acknowledge the financial and intellectual support of this work provided by the Intelligent Energy for Europe – Programme.



Co-funded by the Intelligent Energy Europe  
Programme of the European Union

with the support of the EUROPEAN COMMISSION

Executive Agency for Competitiveness and Innovation Intelligent Energy for Europe

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## 1. Introduction

The first part of this report provides a brief overview of buildings policy frameworks in the EU-27 countries, including building codes requirements, enforcement and compliance, renewable energy use in buildings, nearly zero energy buildings policies and main economic instruments in place in the EU-27 countries. The main sources of information for this part of the report are the followings:

- Detailed policy review in ENTRANZE target countries, carried out by all project partners within this project
- BPIE Europe wide survey from 2011 on buildings policies, regulations and building stock data
- The European buildings data hub from [www.buildingsdata.eu](http://www.buildingsdata.eu)
- BPIE study from 2011 'Europe's buildings under the microscope' [1]
- BPIE study from 2011 'Principles for nearly zero energy buildings' [2]
- BPIE report from 2012 on 'Energy Efficiency Policies in Buildings – The Use of Financial Instruments at Member State Level' [3]
- Second National Energy Efficiency Action Plans (NEEAPs) under Directive 32/2006/EC [4]
- First National Renewable Energy Plans (NREAPs) under the Directive 28/2009/EC [5]

A particular focus has been given to the 9 target countries of the ENTRANZE project. On the whole, the report comprises dedicated factsheets for each ENTRANZE target country, presenting national and regional policies, energy standards in the building sector (e.g. building codes requirements), updates on implementation status of EPCs, nearly zero energy buildings, cost-optimality, as well as financial support programs for new low energy buildings/passive houses and building retrofits. The country factsheets are built based on information provided by ENTRANZE consortium partners and on the CA-EPBD report from 2010 on implementing the Energy performance of Buildings Directive.

The second part of the report focuses on MS efforts to develop their building stock towards the nZEB standard. According to EPBD Article 9 Member States (MS) should ensure that by 31 December 2020 all new buildings are nearly Zero Energy Buildings (nZEB) and after 31 December 2018 all public new buildings are nZEB. Furthermore, MS should stimulate the transformation of buildings that are refurbished into nZEB. To report to the commission about their activities to reach this target MS are obliged to draw up national plans for increasing the number of nZEB.

One of the main three elements of the to provide "information on the policies and financial and other measures [...] for the promotion of nZEB ..., including national requirements and measures concerning the use of energy from renewable sources in new buildings and existing buildings undergoing major renovation". Furthermore, the national plans should include a detailed application in practice of the definition of nZEB and intermediate targets for improving the energy performance of new buildings by 2015. The national plans should have been published by July 2012, and by the end of

2012 a report of the European Commission on the progress of MS in increasing the number of nZEB was supposed to be available.

The aim of this deliverable is to give an overview of the policies and measures already planned or taken by the member states to promote nearly Zero Energy Buildings. A special focus will be given to new and innovative instruments and measures. The aim is to use these measures as examples for the policy sets to be created in task 5.3. The report is part of task 5.1 “Review of current policy frameworks” in workpackage 5 “Assistance in policy development” of the ENTRANZE work programme. Countries to be reviewed are EU-27.

The first part of the report, published within the ENTRANZE project, provides an extensive overview of existing building policies and programmes in EU-27 regarding energy efficiency. ENTRANZE deliverable D5.4 describes and analyses possible policy sets aiming at the nZEB standard. The analysis provides an in-depth understanding of the policies and instruments and their theoretical impact. Another new study on the topic of nZEB-policies is Ecofys et al (2013)<sup>1</sup>. This very voluminous study deals, among others, with the existing definitions for nZEB described in the national plans, and aims to analyse the link and consistency between the definition of nearly zero-energy performance of buildings and the cost-optimal levels of minimum energy performance requirements. Another study by BPIE<sup>2</sup> should be referred to if information about the definitions for nZEB is needed.

## 2. Building codes and energy performance certification in the European countries

Incorporating energy-related requirements during the design or retrofit phase of a building is a key driver for implementing energy efficiency measures which in turn highlights the role of building energy codes in reducing CO<sub>2</sub> emissions and reaching the energy saving potential of buildings. Several Member States introduced building code requirements (prescriptive-based<sup>3</sup>) associated with the thermal performance of buildings following the oil price increases in the 1970s while requirements in some Scandinavian countries have been in place since the mid-1940s.

The Energy Performance of Buildings Directive (EPBD, 2002/91/EC) was the first major attempt requiring all Member States to introduce a general framework for setting

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<sup>1</sup> Ecofys et al (2013) Towards nearly zero-energy buildings – Definition of common principles under the EPBD

<sup>2</sup> BPIE (2013): NZEB criteria for typical single-family home renovations in various countries”; Deliverable D2.1 in the IEE-project COHERNO “Collaboration for housing nearly zero-energy renovation” [http://www.cohereno.eu/fileadmin/media/Dateien/D2\\_1\\_BPIE\\_WP2\\_12092013\\_3\\_5\\_-final.pdf](http://www.cohereno.eu/fileadmin/media/Dateien/D2_1_BPIE_WP2_12092013_3_5_-final.pdf)

<sup>3</sup> Prescriptive-based requirements= energy requirements are set for each building component (windows, walls, roofs) as well as heating, ventilation and air conditioning and lighting equipment

building energy code requirements based on a “whole building” approach (so called performance-based<sup>4</sup>). Although subsidiarity applies to implementation of the EPBD, Member States were required to introduce a methodology at the national or regional level to calculate the energy performance of buildings based upon this framework and apply minimum requirements on the energy performance of new buildings and large existing buildings subject to major renovation.

Following the EPBD in 2002, requirements have gradually started shifting from prescriptive to a performance-based approach which is regarded as a major change in the building code trends.

Major changes are also expected through the application of the cost optimality concept in the energy performance requirements as introduced by the recast of the EPBD in 2010 (2010/31/EU). Member States are required to set their national requirements in accordance with cost optimal levels by applying a harmonised calculation methodology (Article 5 and annex III of EPBD recast). The introduction of cost optimality in building regulations is likely to have a significant impact in many countries, with requirements being improved and further strengthened. Moreover, Cost optimal levels should also gradually converge or harmonised to future nearly zero energy standards which would comprise a requirement for new buildings from 2020 onwards. Due to these foreseen changes, building codes are anticipated to be in a dynamic phase in the next decade.

Understanding building codes however requires specific technical expertise which makes monitoring and evaluating the progress of what is happening from the political level difficult. Given the environmental and climate mitigation impacts of building codes, it is crucial to keep track of all the key transformations happening in the field of building energy codes in a simple, understandable way.

Through its 2011 survey [1], BPIE has collected country-by-country information, making the first attempt to provide an overall picture of what is happening in Europe in the area of building codes. A summary of the key performance-based requirements and prescriptive criteria adopted by different countries is presented in Table 1. With the exception of a few countries, all countries have now embedded building regulations for both new and renovated buildings.

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<sup>4</sup> Performance-based requirements= energy requirements are set on a building's overall (primary or final) energy consumption.

**Table 1: Summary of building energy code requirement and prescriptive criteria (source: BPIE 2011 survey)**

|         | Building code requirements |             | Performance Based Requirements |             | Prescriptive/element-based criteria in building codes |                  |                          |                             |                     |  |
|---------|----------------------------|-------------|--------------------------------|-------------|---|------------------|--------------------------|-----------------------------|---------------------|--|
|         | New build                  | Renovations | New build                      | Renovations | Thermal Insulation                                    | Air permeability | Ventilation requirements | Boiler/AC system efficiency | Lighting Efficiency | Other requirements   |
| AT      | Y                          | Y           | Y                              | Y           | Y   | Y                | Y                        | Y                           | N                   | Summer comfort requirements  |
| BE - WI | Y                          | Y           | Y                              | N           | Y   | N                | Y                        | N                           | N                   | Overheating indicator should not exceed 17500kh. T <sub>in</sub> must be under 26°C for 90% of year in RE. K-values on global thermal insulation of entire building. Thermal bridges |
| BE -Br  | Y                          | Y           | Y                              | N           | Y   | N                | Y                        | N                           | N                   |  |
| BE -FI  | Y                          | Y           | Y                              | N           | Y   | N                | Y                        | N                           | N                   |  |
| BG      | Y                          | Y           | Y                              | Y           | Y   | Y                | N                        | Y                           | N                   |  |
| CH      | Y                          | Y           | Y                              | Y           | Y   | N                | N                        | Y                           | N<br>R<br>E         | Thermal bridges, solar shading, max 80% of demand for heating & DHW covered by non-RES   |
| CY      | Y                          | Y           | Y                              | Y           | Y   | N                | N                        | N                           | N                   | Solar collectors in new RE   |
| CZ      | Y                          | Y           | Y                              | Y           | Y   | Y                | N                        | BO                          | N                   | T <sub>in</sub> of 20°C in winter and 27°C summer  |
| DE      | Y                          | Y           | Y                              | N           | Y   | Y                | Y                        | Y                           | N<br>R<br>E         | T <sub>in</sub> (20-26°C), humidity, air change rate & air velocity requirements   |
| DK      | Y                          | Y           | Y                              | N           | Y   | Y                | Y                        | Y                           | N<br>R<br>E         | Max T <sub>in</sub> 26°C. Thermal bridges requirements   |
| EE      | Y                          | Y           | Y                              | Y           | Y   | Y                | Y                        | Y                           | N<br>R<br>E         | RE & office temperature requirements   |

|    | Building code requirements |             | Performance Based Requirements |                | Prescriptive/element-based criteria in building codes |                  |                          |                             |                     |   |
|----|----------------------------|-------------|--------------------------------|----------------|---|------------------|--------------------------|-----------------------------|---------------------|---|
|    | New build                  | Renovations | New build                      | Renovations    | Thermal Insulation                                    | Air permeability | Ventilation requirements | Boiler/AC system efficiency | Lighting Efficiency | Other requirements  |
| ES | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N<br>R<br>E         | Thermal comfort, $T_{in}$ 21°C (winter), 26°C (summer), mandatory RES use (solar collectors/PVs)                                    |
| FI | Y                          | P           | Y                              | P <sup>2</sup> | Y   | Y                | Y                        | BO                          | Y                   | Max $T_{in}$ applies (typically 25°C). Max CO <sup>2</sup> concentration in indoor air.   |
| FR | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N<br>R<br>E         | Max $T_{in}$ applies based on a number of factors   |
| GR | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N                   |   |
| HU | Y                          | Y           | Y                              | Y              | Y   | N                | N                        | N                           | N                   |   |
| IE | Y                          | Y           | Y                              | N              | Y   | Y                |                          | Y                           |                     | Thermal bridges   |
| IT | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N                   |   |
| LT | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N                   |   |
| LV | Y                          | Y           | N                              | N              | Y   | Y                | Y                        | N                           | N                   | Orientation, window size, air temperature, air humidity & air velocity, specific heat losses of whole building & per m <sup>2</sup> |
| MT | Y                          | N           | N                              | N              | Y   | N                | N                        | Y                           | N<br>R<br>E         | Window size, glazing  |
| NL | Y                          | Y           | Y                              | N              | Y   | Y                | Y                        |                             | N<br>R<br>E         | Daylight  |
| NO | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N                   | Window size, thermal bridges, ventilation fan power, heat recovery, summer/winter $t_{in}$  |
| PL | Y                          | Y           | Y                              | Y              | Y   | N                | Y                        | Y                           | Y                   | Solar shading, window area  |
| PT | Y                          | Y           | Y                              | Y              | Y   | Y                | NR<br>E                  | Y                           | N                   | Max g-value, thermal bridge, solar collectors, cooling, DHW reqs apply  |
| RO | Y                          | N           | N                              | N              | Y   | N                | N                        | N                           | N                   | Overall thermal coefficient g-value   |

|    | Building code requirements |             | Performance Based Requirements |                | Prescriptive/element-based criteria in building codes |                  |                          |                             |                     |  |
|----|----------------------------|-------------|--------------------------------|----------------|---|------------------|--------------------------|-----------------------------|---------------------|--|
|    | New build                  | Renovations | New build                      | Renovations    | Thermal Insulation                                    | Air permeability | Ventilation requirements | Boiler/AC system efficiency | Lighting Efficiency | Other requirements                                   |
| SE | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N                   |  |
| SI | Y                          | Y           | Y                              | Y <sup>3</sup> | Y   | Y                | Y                        | Y                           | N                   | Solar shading, max T <sub>in</sub>                   |
| SK | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | N                   | Max T <sub>in</sub> , humidity & air velocity apply. |
| UK | Y                          | Y           | Y                              | Y              | Y   | Y                | Y                        | Y                           | Y                   |  |

## 2.1 Performance based requirements for new buildings

For many countries the EPBD was the means of introducing new elements in their building codes prior to which there were no energy performance requirements concerning the building as a whole or specific elements. Nearly all countries have now adopted a national methodology which sets performance-based requirements for new buildings. For countries in which prescriptive requirements existed before 2002 (e.g. Czech Republic, Belgium, Estonia, Bulgaria, Hungary, Ireland, Poland), there was a shift towards a holistic-based (i.e. whole building) approach whereby existing single element requirements in many cases were tightened. In some cases, the single element requirements are just supplementary demands to the energy performance requirements ensuring the efficiency of individual parts of a building is sufficient (e.g. Denmark). In others, they act as alternative methods where the two approaches exist in parallel (e.g. Spain, Poland); the first based on the performance of single elements and the second on the overall performance of a building. In Switzerland, for example, the holistic approach is used mainly for new buildings and the single element approach for shallow or deep renovations while in deep renovation cases, the holistic approach is sometimes chosen. In countries where the performance-based approach is the main form of requirement, most of the elements listed in the prescriptive criteria of Table 1 are already integral parts of the methodology, while additional elements such as RES (solar collectors, PV, heat pumps), summer comfort, indoor climate are embedded in the methodology.



The EPBD mentions specifically that the energy performance of buildings should be calculated on the basis of a methodology, which may be differentiated at national and regional level. However, that methodology should take into account existing European standards<sup>5</sup>. While no country has directly and fully applied them in their methodology procedures, many countries have adopted an approach which is broadly compatible with the European standards [6] [7].

A variety of reasons were cited for not using the European standards, including difficulty of converting into practical procedures, timing and copyright issues. Most national procedures are applied as software programmes and many countries (but by no means all) have adopted a methodology based on a methodology recommended by the European standards (EN 15 603: Energy Performance of Buildings) and/or are using the EN 13 790 monthly calculation procedure, as the basis for the calculation “engine” for simple buildings. Others allow proprietary dynamic simulation (for more complex buildings), whilst others have developed their own national methods. The assessment of existing buildings (for building code or certification purposes) is often based on a reduced data-set model.

A detailed assessment of the energy performance requirements is provided in Table 1. It can be seen that many different approaches have been applied and no two countries have adopted the same approach. It is important not to attempt to compare the performance requirements set by Member States, given the variety of calculation methods used to measure compliance and major differences in definitions (e.g. definitions of primary and final energy, heated floor area, carbon conversion factors, regulated energy and total energy requirement etc.). The setting of building code requirements with legally binding performance targets, is normally based on either an absolute (i.e. not to exceed) value, generally expressed in kWh/m<sup>2</sup>a, or on a percentage improvement requirement based on a reference building of the same type, size, shape and orientation. Some countries (e.g. Belgium) express the performance requirement as having to meet a defined “E value” on a 0 to 100 scale, or on an A+ to G scale (e.g. Italy and Cyprus).

Most methodology procedures are applied as software programmes. Software quality assurance accreditation is undertaken in only about half of the countries, a finding which has been drawn by the Concerted Action 2010 Report. About 50% of Member States have already introduced changes to their methodology procedures to either to tighten requirements, achieve greater conformity with CEN standards, and include additional technologies and/or to correct weaknesses/gaps in earlier EPBD methodology procedures.

There is a growing interest in the harmonisation of methodology procedures. This is likely to become an increasingly important issue in the context of the EPBD recast Article 2.2 and Article 9 requirements associated with nearly Zero Energy Buildings (nZEB)

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<sup>5</sup> According to EPBD, ‘European standard’ means a standard adopted by the European Committee for Standardisation, the European Committee for Electrotechnical Standardisation or the European Telecommunications Standards Institute and made available for public use.

and cost optimality (EPBD recast Article 5) since the European Commission will need to demonstrate that all Member States are delivering equivalent outcomes. A harmonised approach to setting and measuring nZEB targets and cost-optimality implies that a broadly equivalent methodology will be required.

## **2.2 Prescriptive-based requirements for new buildings**

Member States have different prescriptive, element-based requirements associated with building energy codes such as maximum U values, minimum/maximum indoor temperatures, requirements for minimum ventilation rates and boiler and/or air conditioning plant efficiency.

### **2.2.1 Insulation**

Limiting the thermal conductivity of major construction elements is the most common thermal performance requirement for buildings. These are based upon U value requirements (expressed in W/m<sup>2</sup>K) for the main building envelope construction elements. These U values are worst acceptable standards which as a stand-alone measure would not necessarily mean that a building meets the overall performance-based requirements in the respective country. Given the diversity in climatic conditions, maximum U value requirements vary widely across different countries where Spain, France, Greece, Italy and Portugal have multiple maximum U values due to the considerable variation in climatic conditions within each country.

In some countries, variations also apply for different types of buildings (e.g. Latvia) and type of heating (e.g. Sweden). A comparison between the collected data and the cost optimal U values published by EURIMA/Ecofys [8] in 2007 confirm that Member State maximum U values are still higher than the cost-optimal requirements, suggesting that U value requirements in most Member States should be made more demanding. This was also one of the key findings of the IEA information paper on building codes [9] where it was shown that existing U value requirements for building components did not reflect the economic optimum.

### **2.2.2 Air tightness/permeability and ventilation requirements**

Most countries have introduced requirements to ensure minimum levels of ventilation within buildings.

These are generally based upon metabolic rates and activity within the building. The requirements associated with ventilation relate principally to health, comfort and productivity; however they do have direct impact on energy requirements. The thermal performance of buildings is directly related to airtightness and the requirements for ventilation. Excessive ventilation as a consequence of poor construction detailing, can lead to considerable energy wastage and for this reason a number of countries have introduced requirements to limit the air permeability of buildings. Air permeability is normally measured using a pressure test, typically at 50Pa (4Pa in France and 10Pa in The Netherlands) to determine the air leakage rate. The requirement is typically expressed in m<sup>3</sup>/h.m<sup>2</sup> (where m<sup>2</sup> is the external envelope area) or in the case of Denmark in l/s.m<sup>2</sup> (where m<sup>2</sup> is the floor area).

### **2.2.3 Other requirements**

A number of countries (e.g. Austria, Denmark, France, Estonia and Poland) have introduced minimum requirements for specific fan power (generally expressed in W/l.s or kW/m<sup>3</sup>.s.). Given the increasing use of mechanical ventilation system, the fan power requirement in low energy buildings is becoming an important issue.

Additionally most countries have requirements associated with the minimum performance of boilers and air-conditioning systems.

Most building codes require minimum levels of daylight to be achieved within buildings, whilst ensuring that solar gains do not result in significant overheating and/or the requirement for air conditioning. Building requirements associated with limiting solar gains vary from simple approaches (e.g. limiting window areas on building aspects exposed to solar gains) through to requirements for complex modeling and simulation to demonstrate that effective measures have been adopted to provide solar protection. The Concerted Action report 1 recommended that much greater attention should be given to the issue of estimating the impact of summertime overheating in the methodology in order to reduce the rapid increase in demand for air conditioning.

In addition to specifying maximum U values, several countries have also set limits for maximum permissible thermal bridging. This is generally expressed in W/mK. Thermal bridges can significantly increase the building energy demand for heating and cooling and in nearly Zero Energy Buildings thermal bridging can account for a significant proportion of the total heat loss or gain. Thermal bridging is specific to the design and specification and can be complex and time consuming to calculate. For this reason, some countries allow a default thermal bridging value to be used, based upon a percentage (typically 15%) of the overall heat loss calculation. However, if a detailed thermal bridging calculation has been undertaken, which demonstrates that thermal bridges have been reduced or eliminated, this value can be used instead of the default. ASIEPI estimate that “a third of EU Member States have no real ‘good practice’ guidance on thermal bridges, in the framework of their building energy regulations. The quality of guidance in the remaining States is very varied” [10].

### **2.2.4 Building codes requirements for existing buildings**

Despite being an EPBD requirement, not all countries have reported specific mandatory building codes associated with improving the energy performance of existing buildings. It is important to recognise that EPBD (Article 5) only applies to buildings over 1000 m<sup>2</sup> and most Member States have introduced requirements for consequential improvements associated with buildings over 1000 m<sup>2</sup>. It should be noted that these requirements may not be applied when they are not deemed to be “technically, functionally and economically feasible”.

Table 2 provides a summary of different approaches adopted by a number of Member States when a building undergoes major renovation. Switzerland has adopted a very progressive approach to improving the performance of existing buildings, where the thermal performance of renovated buildings must not exceed 125% of the new building

limit. A number of Member States have introduced minimum component performance standards when building elements (e.g. windows, doors etc.) or building's energy plants (boilers, a/c equipment etc.) are being replaced. Good examples include countries which have a performance-based requirement as well as requirements for any component that is replaced or refurbished.

**Table 2: Building code requirements for existing buildings (source: BPIE survey 2011)**

|    |   |
|----|---|
| AT | Specific maximum heating energy demand targets for major renovation of residential and non-residential buildings. Values for renovated buildings are around 25-38% higher than new build requirements. Heat recovery must be added to ventilation systems when renewed. Maximum permitted U values for different elements in case of single measure or major renovations. Prescriptive requirements to limit summer over-heating. |
| BE | Maximum U values and ventilation requirements apply depending on the region.  |
| BG | Regulations requiring performance-based standards of existing housing and other buildings after renovation. Requirements for new and renovated buildings are the same.  |
| CH | Renovated buildings are required to use no more than 125% of the space heating demand of an equivalent new building. A single element approach may also be applicable for renovations.  |
| CY | Minimum energy performance requirements (class A or B) for buildings over 1 000 m <sup>2</sup> undergoing major renovation.   |
| CZ | Performance-based requirements when a building over 1 000 m <sup>2</sup> is renovated. Requirements for new and renovated buildings are the same.   |
| DE | Conditional requirements apply in the case of renovation of components whereby requirements apply exclusively to those parts of the building surface and parts of the installation that are the subject of the measures. Alternatively, a holistic assessment can also be made where values for renovated buildings should not exceed new build requirements by more than 40%.  |
| DK | Component level requirements when existing buildings are refurbished for all improvements or extensions regardless of building size.  |
| EE | Performance-based requirements for all building types when buildings are major renovated. Values for renovated buildings are around 25-38% higher than new build requirements.  |
| ES | Existing buildings over 1 000 m <sup>2</sup> must comply with the same minimum performance requirements as new buildings if more than 25% of the envelope is renovated.   |
| FI | Register under development by ARA, the Housing Finance and Development Centre of Finland.   |
| FR | Performance-based requirements for buildings undergoing renovation apply for residential buildings and values depend on the climate and type of heating (fossil fuel/electricity). Requirements for components also apply during building renovation. New renovation requirements for all buildings from 2013.  |

|    |   |
|----|---|
| HU | Performance-based requirements (in terms of primary energy) apply for residential buildings, offices and educational buildings. Requirements for new and renovated buildings are the same.  |
| LT | Buildings over 1 000 m <sup>2</sup> undergoing major renovation must achieve the energy performance standard of a Class D building where D corresponds to 110 kWh/m <sup>2</sup> a for buildings > 3 000 m <sup>2</sup> ; 130 kWh/m <sup>2</sup> a for buildings from 501 to 3 000 m <sup>2</sup> ; 145 kWh/m <sup>2</sup> a for buildings up to 500 m <sup>2</sup> . |
| LV | Requirements on different elements are applicable.  |
| MT | U value requirements for existing renovated buildings.  |
| NL | The Energy Performance Standard (EPN) sets requirements for the energy performance of major renovations of existing buildings (expressed as an energy performance coefficient).   |
| NO | Building regulation requirements only apply when the purpose or use of the building is changed at renovation or if considered so extensive as to be equivalent to a new building.   |
| PT | Special requirements for buildings over 1 000 m <sup>2</sup> and over a specified threshold energy cost. A mandatory energy efficiency plan must be prepared and all energy efficiency improvement measures with a payback of less than 8 years must (by law) be implemented. The threshold is based upon 40% of the worst performing buildings by typology.          |
| SI | Minimum requirements apply to major renovations (i.e. if at least 25 % of the envelope is renovated). The requirements apply to buildings of all size (NB the 1 000 m <sup>2</sup> limit is not used). Min. requirements apply for the renovation of heating systems.   |
| SK | Requirements for improving the thermal performance of apartment by at least 20% when being renovated.   |
| UK | Specific requirements when replacing "controlled elements" such as windows, boilers and thermal elements in residential buildings. Consequential improvement requirements for buildings over 1 000 m <sup>2</sup> undergoing major renovation in so far as they are "technically, functionally and economically feasible".  |

### 2.3 Enforcement and Compliance

Building control requirements prior to, during and upon completion of the construction phase typically involve announcement to authority, application for permits, approval of plans, inspections by authority and completion of certificates. These requirements can be a critical step for ensuring regulation enforcement. Based on a comprehensive review of Building Control published in June 2006 [11] by the Consortium of European Building Control (CEBC), building control systems in Europe have undergone significant change over the past two decades. In many countries greater market liberalisation has resulted in a move away from government-run building control functions. There are growing calls for minimum quality assurance standards to be introduced in all countries to license, audit and regulate the activities of individuals (both public and private) involved in undertaking the building control function. This is particularly important in the context of the structural, fire protection and energy performance regulation requirements, where the issues are technically complex and specialist skills and expertise is required.



In the context of renovations, the BPIE survey has gathered information on the requirements, typical time period and main obstacles associated with obtaining a permit for carrying out renovation work. From the reported answers, it was clear that not all countries have permit requirements for renovations while, for the ones that do so, permits are typically necessary if major changes are undertaken in the facade of buildings (e.g. from modifying the roof to adding external insulation in case of France). Moreover, the time required to obtain a permit could vary substantially from one month (e.g. in Czech Republic) to several months (e.g. in Belgium) where the timeframe can be shorter if the project is supported by a renovation programme (e.g. in Germany this is the case with the KfW Programme).

In addition, many observers suggest that the compliance and enforcement of building energy codes is currently undertaken with less rigor and attention to detail, than other building regulation requirements such as structural integrity and/or fire safety. While there are few studies on compliance with building energy codes, there is a growing body of academic research suggesting that as building thermal requirements become more demanding (e.g. in the pursuit of nearly Zero Energy Buildings) there is increasing evidence of a performance gap between design intent (i.e. theoretical performance as modeled using national calculation methods) and the actual energy performance in-use. This suggests one or more of the following issues: the calculation methods are flawed, the enforcement regime is not being undertaken sufficiently rigorously or designers and builders are failing to satisfactorily deliver the outcome intended.

Closing the performance gap between design intent and regulatory requirement is likely to become an important issue over the next decade if countries are to deliver the climate and environmental targets related to buildings. The key findings of the PRC/Delft University of Technology review of National Building Regulations [11] found that there was “little attention yet to enforcing sustainable building regulations in most of the various countries analysed”. The report also suggested that, given the highly technical nature of the requirements associated with sustainability and energy, there was a serious shortage of individuals with appropriate expertise to undertake the building control function. This is resulting in poor enforcement of compliance associated with these important issues.

## **2.4 Energy Performance Certificates (EPCs)**

The implementation of the EPC schemes has been gradual in almost all Member States due to the nature of application of the certificates. While most countries set up the first certification relating to new buildings, the scheme for renovated, new and existing public buildings were usually left for later implementation.

Before the EPBD was created, both The Netherlands and Denmark had already set up energy certification schemes for buildings at national level (in 1995 and 1997 respectively). Germany started in 2002 (having recasted it in 2009) and from then on, most of the countries started the implementation and enforcement of the EPC schemes from 2007 to 2009. Generally, Member States found it easier to introduce requirements for new buildings, as there are already processes in place to approve new buildings. How-

ever, greater benefit can be derived from identifying and stimulating uptake of energy savings measures within the existing stock.

At the moment all countries have started the certification process but nine of them haven't, by the end of 2010, operating schemes for all buildings required by the EPBD back in 2002. Greece, Romania, Spain, Luxembourg, Lithuania and the Brussels Region of Belgium implemented the remaining requirements still in 2011.

Also, some countries already have an up and running database for the registered EPCs as can be seen on the table 3 below.

**Table 3: Existence of EPC register/database at national level (Source: BPIE survey 2011)**

|    |     |  |
|----|-----|--|
| AT | No  | Data held individually by each region. Centralized system to be introduced in 2011   |
| BE | No  | Database existing only for the Flemish and the Walloon regions   |
| BG | Yes |  |
| CH | No  |  |
| CY | No  |  |
| CZ | No  |  |
| DE | No  | There are data protection concerns   |
| DK | Yes | Offentlige Informationsserver  |
| EE | Yes | Building Register  |
| ES | No  | Only the Autonomous Communities of Andalucía, Galicia, Canarias, Extremadura, Navarra, Valencia and Cataluña have set registries.                      |
| FI | No  |  |
| FR | No  | Register under final development by ADEME  |
| GR | Yes | Database competency of the Ministry of Environment, Energy and Climate Change (YPEKA)  |
| HU | No  | Existing database not fully operational  |
| IE | Yes | National Administration System maintained by SEAI  |
| IT | No  | No national database, some at local/regional levels  |
| LT | Yes | Available at the Certification Center of Building Products (SPSC - Statybosprodukcijos sertifikavimocentras)   |
| LV | No  | A Construction Information System is to be introduced in 2012 to include an EPC register   |
| MT | No  |  |
| NL | Yes | Maintained by NL Agency ( <a href="http://www.ep-online.nl">www.ep-online.nl</a> or <a href="http://www.energiecijfers.nl">www.energiecijfers.nl</a> ) |
| NO | No  | There are plans to build a database which collects data on EPCs.   |
| PL | No  | Only hard copies are collected at the Poviats Building Inspectorates   |
| PT | Yes | Administered by ADENE  |
| RO | No  |  |

|    |     |   |
|----|-----|---|
| SE | Yes | The National Register of Energy Certificates (Griffon) administered by the National Board of Housing, Building and Planning   |
| SK | Yes | Administered by the Building Testing and Research Institute - TSUS  |
| SI | No  |   |
| UK | Yes | England & Wales: collected by Landmark<br>Scotland: the Home Energy Efficiency Database, maintained by the Energy Saving Trust ( <a href="http://www.epbniregister.com">www.epbniregister.com</a> )<br>Northern Ireland: <a href="http://www.epbnindregister.com">www.epbnindregister.com</a> |

### 3. Nearly Zero-Energy Buildings in the European Union

The EU legislative framework for buildings has been significantly strengthened in recent years by the recast of the Energy Performance of Buildings (EPBD, 2010/31/EU), the Energy Efficiency Directive (EED, 2012/27/EU) and to a lesser degree, the Renewable Energy Directive (RED, 2009/28/EC). Together, the three Directives set out a package of measures that create the conditions for significant, long term improvements in the energy performance of Europe's building stock.

Member States are required to draw up national plans for increasing the number of nearly Zero-Energy Buildings, with targets that may be differentiated according to different building categories. According to paragraph 3 of Article 9, these plans shall include:

- A definition of nearly Zero-Energy Buildings, reflecting national, regional or local conditions and include a numerical indicator of primary energy use, expressed in kWh/m<sup>2</sup> per year.
- Intermediate targets for improving the energy performance of new buildings by 2015.
- Information on policies, financial or other measures adopted for the promotion of nearly Zero-Energy Buildings, including details on the use of renewable sources in new buildings and existing buildings undergoing major renovation (Article 13(4) of Directive 2009/28/EC and Articles 6 and 7 of Directive 2010/31/EU).

Furthermore, paragraph 2 of Article 9 asks Member States to show a leading example by developing particular policies and measures for refurbishing public buildings towards nearly zero-energy levels and to inform the Commission of national plans.

The European Commission shall evaluate the national plans, notably the adequacy of the measures envisaged by Member States in relation to the objectives of this Directive. The Commission, taking due account of the principle of subsidiarity, may request further specific information regarding the requirements. In that case, the Member State concerned shall submit the requested information or propose amendments within nine months following the request from the Commission. Following its evaluation, the Commission may issue a recommendation.

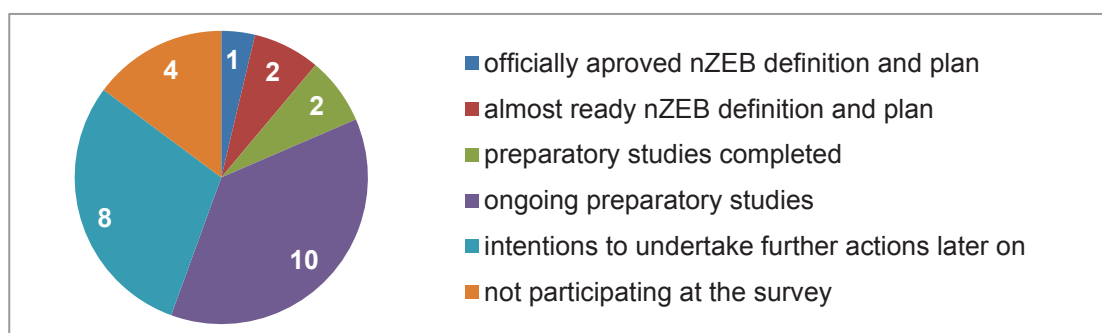
In addition to the requirements in EPBD, the Renewable Energy Directive (2009/28/EC) on the promotion of the use of energy from renewable sources requires Member States to introduce appropriate measures in their building regulations and codes in order to increase the share of all kinds of energy from renewable sources in the building sector (Article 13(4)).



According to an earlier survey [12] there are EU MSs such as Denmark, the UK, France, Germany and Belgium (Brussels Region) had been already established general strategies or aims on nZEB definitions.

The Concerted Action EPBD project has a regular survey on the implementation of the EPBD requirements in the EU MSs. According to their preliminary survey, at the beginning of 2012 only Denmark had an official commitment for an nZEB definition and plan. The rest of the EU MSs reported ongoing preparatory studies or the intentions to start working on the nZEB over 2012 or later (figure 1) [13]<sup>6</sup>. In addition to these, Belgium/Brussels Region published in September 2011 an amendment of the Energy Performance of Buildings Ordinance [14] which stipulates that from January 2015 onwards, all new public and residential buildings have to fulfill a primary energy need at level of Passive House standard.

Overall, at the Concerted Action EPBD, several national approaches to the nZEB application have been presented and it is clear that the approaches will be quite different from country to country. They vary from zero carbon to explicit maximum primary energy values. Besides the primary energy indicator required by the new EPBD, many countries also intend to include a list of additional indicators, dealing with the building envelope and also with the building service system efficiency as well as the generated renewable energy. A gradual approach in form of a roadmap towards the 2020 goals (nZEB) is planned in most countries.



**Figure 1: Overview of the status of nZEB implementation in the EU MSs as resulted from the CA-EPBD survey for 23 countries**

This chapter will be further updated and extended in April 2013, after the work on “cross-analysis on Member States’ plans to develop their building regulations towards the nZEB standard” within the project ENTRANZE will be completed.

In order to prepare the first progress report as requested by the EPBD, the EU Commission asked the EU MSs in autumn 2012 to show the status of the nZEB implementation. While the EU Commission report is still pending for publication, apparently only 9 MSs sent a feedback and out of these only up to 5 MSs declared a nZEB definition and plan.

<sup>6</sup> Hans Erhorn, Heike Erhorn-Kluttig: The Path towards 2020: Nearly Zero-Energy Buildings. Figures adjusted following a private communication with authors.

A more detailed analysis of the status of nZEB definitions in the EU MSs covered by the ENTRANZE project is provided in the country factsheets from following chapters. However, below are presented few examples of countries already adopted nZEB definitions and plans or having a general strategy and a indicative target by 2020.

▪ **Denmark** is one of the first EU countries that had already set-up their national nZEB definition and roadmap to 2020. The minimum energy performance requirements from set buildings regulations will gradually become stricter, starting from the actual standard, BR10 [15], with an interim milestone in 2015 and a final target in 2020 (table 1).

The minimum requirements are different for residential buildings (and other non-residential buildings with similar type of use such as hotels) and non-residential buildings. The energy scope is aligned to EPBD requirements and includes the energy need for heating, ventilation, cooling, domestic hot water and for the auxiliary equipment. For non-residential buildings, the energy for lighting is also included within the regulated energy.

The improvement of the energy performance is basically done by increasing the requirements for buildings insulation. In addition, the primary energy factors for electricity and district heating have to be improved by 2020 and the renewable energy supply from nearby and onsite will have to grow.

**Table 4: Evolution of the energy performance requirements towards nZEB levels in Denmark (source: REHVA) [12] <sup>7</sup>**

|                            |   | BR10                                     | 2015                                  | 2020                      |
|----------------------------|---|--|---------------------------------------|---------------------------|
| <b>Minimum requirement</b> | Residential buildings (housing sector and hotels)               | 52.5 + 1650/A*<br>kWh/m <sup>2</sup> /yr | 30 + 1000/A<br>kWh/m <sup>2</sup> /yr | 20 kWh/m <sup>2</sup> /yr |
|                            | Non-residential buildings (offices, schools, hospitals, others) | 71.3 + 1650/A<br>kWh/m <sup>2</sup> /yr  | 41 + 1000/A<br>kWh/m <sup>2</sup> /yr | 25 kWh/m <sup>2</sup> /yr |
| <b>Conversion factors</b>  | Electricity   | 2.5                                      | 2.5                                   | 1.8                       |
|                            | District heating  | 1.0                                      | 0.8                                   | 0.6                       |

Note: A=the heated gross floor area

<sup>7</sup> paper explaining the Building Class 2020 and also mentioning that Denmark has this Building Class 2020 as their NZEB (only in Danish): [http://www.ens.dk/da-DK/ForbrugOgBesparselser/IndsatsIBygninger/lavenergiklasser/Documents/baggrundsnotat\\_for\\_tyvetyve.pdf](http://www.ens.dk/da-DK/ForbrugOgBesparselser/IndsatsIBygninger/lavenergiklasser/Documents/baggrundsnotat_for_tyvetyve.pdf)

▪ **Belgium/Brussels Region** amended in 2011 the Energy Performance of Buildings Ordinance [14] stipulating that from January 2015 onwards, all new public and residential buildings have to fulfill a primary energy need at level of Passive House standard.

The requirement is different for residential and non-residential buildings, such as in the followings:

- all residential buildings will have a primary energy consumption for heating, DHW and auxiliary energy below 45kWh/m<sup>2</sup>/yr and heating need below 15kWh/m<sup>2</sup>/yr , the latter being equivalent to one of the passive house requirements.

- all office and education buildings will have a primary energy consumption below (90-2.5°C) kWh/m<sup>2</sup>/yr (C=Volume/area) and heating need below 15kWh/m<sup>2</sup>/yr and cooling need below 15kWh/m<sup>2</sup>/yr.

▪ **In France**, few years ago, 'Grenelle Environnement' (the Environmental Round Table) recommended the adoption of more ambitious requirements for all new constructions, i.e. at the same levels as BBC-effinergie (BBC= Bâtiment Basse Consommation), the voluntary low-energy standard in France. Consequently, low energy requirements were adopted in the recast of the French thermal regulation, RT 2012, which is already applied for new non-residential buildings and since January 2013 also for new residential buildings. The requirement addresses the building's energy need for space heating, domestic hot water, cooling, lighting and auxiliary energy (e.g. for fans and pumps). RT 2012 set the minimum performance requirements at 50 kWh/m<sup>2</sup>/yr in primary energy. The minimum energy requirement is adjusted by climatic zone and altitude and hence varies between 40 and 65 kWh/m<sup>2</sup>/yr. By 2020, the Grenelle -1 Law requires that all new building have to be energy positive, i.e. to produce more renewable energy than the building's need.

▪ **The United Kingdom** developed a roadmap for implementing zero carbon buildings by 2016/2019. Overall the ambition in England, Wales, Northern Ireland and Scotland has a strong focus on going for carbon neutral rather than nearly zero energy buildings. As there are some differences them, in the following we focus on England. The government has announced that from 2016 all new homes and from 2019 all new non-domestic buildings in England will be built to zero carbon standards. The process of nZEB definition has been finished and built on the voluntary certification system "Code

for Sustainable Homes (CSH)", where the 2016/2019 standard is equivalent to step 5 of CSH. Step 5 means carbon neutrality for heating, ventilation, DHW, cooling and lighting. For 2013 changes in the regulation ("close to Passive House") have been foreseen to act as an interim step on the trajectory towards achieving zero carbon standards from 2016/19. From 2016 the carbon compliance limits for the building performance should be 10 kg CO<sub>2</sub>(eq) /m<sup>2</sup>/year for detached houses or ~46 kWh/m<sup>2</sup>/year

- 11 kg CO<sub>2</sub>(eq) /m<sup>2</sup>/year for attached houses or ~46 kWh/m<sup>2</sup>/year
- 14 kg CO<sub>2</sub> (eq) /m<sup>2</sup>/year for low rise apartment blocks (four storeys and below) or ~39 kWh/m<sup>2</sup>/year.

However, there is not yet committed an official plan and the necessary provisions for gradually tightening of buildings requirements. In contrast to most other countries apart from taking into consideration onsite renewable generation it is also discussed how investments in off-site renewable energy ("allowable solutions") can be taken into account in the nZEB balance.

▪ **In Germany**, the government had been initiated a project [16] [17] to research the possible nZEB definition and determine the best solution. The project "Analysis of the revised EPBD" came up with the following concept that is similar to the approach in the energy savings ordinance EnEV. The project report mention that the EnEV method is generally suited to assess also nearly zero-energy buildings, with some amendments for including not only the electricity generated by renewables but also other renewable energy generated on-site. Moreover, the analysis identified that the new buildings in 2020 will have an energy performance by 50% better than the buildings performance nowadays, i.e. according to the EnEV2009 standard. For the residential sector, this correspond to a KfW Efficiency House 40 level and the project consortium recommends to communicate this level as being the future nZEB definition for Germany.

In addition, the actual legislation has to be changed for including the requirement for new buildings to comply with an nZEB standard. The changes of the energy efficiency act are likely to be enacted by the German government in February 2013 [17] [16] [18] and the new EnEV Regulation will probably come into force in the 2nd half of 2013. [19]

## 4. Measures for implementing Article 13(4) of the Renewable Energy Directive

The table below summarises MS plans to increase the deployment of RES in buildings. This information has been derived from the National Renewable Energy Action Plans<sup>8</sup>. However, should be noted that only few countries have renewable energy requirements in building regulations, many other having still to implement the Article 13(4) of the Renewable Energy Directive [20].

**Table 5: MSs plans to increase the use of renewable energy in buildings**

| Country | Description   |
|---------|---|
| BE      | There is currently no RES-H building obligation in the Brussels-Capital region. The Brussels legislation implementing the requirements of the European directive 2002/91/CE regarding the promotion of buildings' energy performance stipulates that the heating plants shall comply with several requirements aiming at improving their energy performance. To that purpose, heating installations shall be controlled by professionals accredited by the Brussels region (Art. 20, Ordonnance du 7 juin 2007; art. 24 Arrêté du 3 juin 2010). However no obligation concerning the installation of heating plants using renewable energy sources in buildings is mentioned. |
| BE      | The Walloon legislation "EPB-Energetic Performance of Buildings" (PEB- Performance énergétique des bâtiments), which entered in force on 1 May 2010, implements the requirements of the European directive 2002/91/CE regarding the promotion of buildings' energy performance.<br><br>Art. 237/32 of the CWATUPE introduces the obligation for certain new buildings as well as existing buildings with a floor area greater than 1000 m <sup>2</sup> to install thermal solar collectors or any other installation allowing an energy saving at least equivalent to thermal solar collectors.   |
| CY      | Decree No. 446/2009 contains the following regulations for buildings: <ul style="list-style-type: none"> <li>• Mandatory solar installations on every new residential building to satisfy domestic hot water requirements</li> <li>• RES installations on every new building for power generation</li> </ul>  |
| DK      | The 2010 Building Regulations oblige owners of new or renovated buildings with a hot water consumption of more than 2000 litre per day to install solar heating panels. These panels shall cover an energy demand equivalent to the hot water consumption under normal operating conditions. This obligation does not apply to buildings using direct heating (Building Regulations art. 8.6.2. par. 2)   |
| EE      | At present the statutory law provides no minimum norms or building obligations concerning RES-H. Nevertheless, minimum requirements and obligations apply concerning energy efficiency in construction.   |
| HU      | For new building projects with a surface of more than 1000 m <sup>2</sup> Decree No. 7/2006 recommends the consideration of using renewable energy sources for decentralised energy supply in the planning process (§ 5 Decree No. 7/2006).<br><br>Nevertheless, this is a recommendation rather than obligation. Further, the NREAP  |

<sup>8</sup> The EU Member States had notified their first national renewable energy action plans (NREAPs) to the European Commission by 30 June 2010 (some of them with a delay). In the NREAPs, Member States set out the sectoral targets, the technology mix they expect to use, the trajectory they will follow and the measures and reforms they will undertake to overcome the barriers to developing renewable energy [32].

| Country | Description  |
|---------|--|
|         | envisages obligations for minimum levels of renewable energy in new and newly refurbished buildings. However, according to the Energy Office such obligations have not been in place so far.   |
| IE      | <p>New buildings are required to comply with renewable energy requirements of Part L of the Building Regulations, contributing to the renewable heat target. According to S.I. 259 of 2011, for new dwellings, a reasonable proportion of the energy consumption to meet its energy performance shall be provided by renewable energy sources (regulation 5 L3 (b) S.I. 259 of 2011). Additionally, requirements in Part L shall be met by "providing energy efficient space and water heating systems with efficient heat sources and effective controls" (regulation 5 L3 (d) S.I. 259 of 2011). New buildings are also required to have a Building Energy Rating (BER) certificate, which assess the energy performance of the building.</p> <p>The Building Regulation Technical Guidance Document 2011 refers to the minimum level of renewable technologies to be used in order to comply with regulation L3 (b) as follows:</p> <ul style="list-style-type: none"> <li>• 10 kWh/m<sup>2</sup>/annum contributing to energy use for domestic hot water heating, space heating or cooling; or</li> <li>• 4 kWh/m<sup>2</sup>/annum of electrical energy; or</li> <li>• a combination of these which would have an equivalent effect.</li> </ul> <p>According to the Technical Guidance Document, renewable technologies means "products or equipment that supply energy derived from renewable energy sources, e.g. solar thermal installations, solar photovoltaic installations, biomass installations, installations using biofuels, heat pumps, aero generators and other small scale renewable installations".</p> |
| LV      | <p>When constructing a building with a total area of more than 1000 square metres it is recommended to evaluate the possibility to use renewable energy installations, for example decentralised energy supply installations, CHP installations, local heating and cooling installations or heat pumps (§ 7 Law on the Energy Performance of Buildings).</p> <p>According to the Ministry of Economy, local authorities' planning documents shall be such as to create conditions promoting the use of renewable energy in buildings. The government is planning a new law introducing a duty on local authorities to include a renewables obligation in their building regulations. The new law will be adopted on 9 July 2012.</p>   |
| LU      | Regarding building obligation in the field of renewable energy the government introduced in 2012 a schedule of due dates in order to reach the objectives defined in the European directive 2010/31/UE regarding energetic performance of buildings. The Grand Ducal decree of 5 May 2012 stipulates that from 1 July 2012, new buildings shall comply with the requirements of the energetic class B concerning energetic performance, which involves the need of an increased use of renewable energies (Art. 1, RGD du 5 mai 2005). The regulation takes into consideration renewable energies used for heat and cooling purposes as well as for the production of sanitary hot water. This includes the use of biomass as well as solar, geothermal and aero-thermal energy (Annex, RGD du 5 mai 2005).  |
| MT      | The building regulations in Malta do not impose minimum requirements for renewable energy. However, the support schemes introduced so far have strongly promoted renewable energy use in buildings, e.g. domestic water heating using solar technologies or electricity generation with roof-top PV systems or micro wind generators.  |
| PT      | DL 80/2006 on the Regulation for the Characteristics of the Thermal Behaviour of Buildings (RCCTE) introduces the obligation to use solar thermal collectors for heating water in buildings addressed under the RCCTE rules (art. 2 DL 80/2006). The obligation is applicable whenever there is "suitable solar exposure" (defined by art. 7(3) RCCTE) and relates to a minimum area of solar panels (1m <sup>2</sup> of panel per occupant according to art. 7(2) RCCTE). Annex II of DL 80/2006 defines sanitary hot   |



| Country   | Description  |
|-----------|--|
|           | <p>water as „potable water with a temperature above 35 ° C used for baths, cleaning, cooking and other purposes“.</p> <p>According to art. 7(4) RCCTE, other forms of renewable energy can be used as an alternative to the solar thermal collectors if they capture the equivalent amount of energy (measured in annual terms). In addition, these other forms of RE can be used for other purposes if they are more efficient or convenient.</p>   |
| <b>SK</b> | <p>The only requirement for renewable energy in buildings is Act No. 555/2005 on the energy performance of buildings, which imposes an obligation to consider the possibility of using renewable energy in new large buildings (over 1,000 square metres). The measures to be taken into account include:</p> <ul style="list-style-type: none"> <li>• Decentralised installations for the supply of energy from RES</li> <li>• CHP-plants</li> <li>• Block heating or district heating and cooling using energy from RES</li> <li>• Heat pumps</li> </ul> <p>The output of the energy assessment must be stated in the technical description of the project documentation (§ 4 par. 2 and 3 Act No. 555/2005).</p> <p>However, this requirement has rather recommending character and does not actually constitute an obligation for investors. This situation could change with an amendment to the current zoning law or the passage of a new renewable heating act which are being discussed in Parliament.</p>  |
| <b>SI</b> | <p>The terms set in RS52/2010 are used when constructing new buildings or when reconstructing buildings or one of its elements if this reconstruction affects at least 25 percent of the thermal envelope, and the change is technically possible. (§ 2 of RS 52/2010). Exceptions are listed in § 3 of RS 52/2010.</p> <p>These rules govern, when it comes to RES-H, that hot water is normally provided using solar panels or alternative installations using RES (§ 13 RS 52/2010). Furthermore it sets out (§ 16 RS 52/2010) that the energy efficiency of buildings is achieved if, in addition to the requirements of § 7 RS 52/2010 (which sets the energy efficiency technical parameters that buildings need to meet):</p> <ul style="list-style-type: none"> <li>• Either at least 25 percent of total energy consumption for the operation of facilities in a building is provided with the use of renewable energy in the building itself</li> <li>• or that the proportion of final energy consumption for heating and cooling and hot water production in the building is produced in one of the following ways: <ul style="list-style-type: none"> <li>○ At least 25 % of solar radiation,</li> <li>○ At least 30 % of gaseous biomass,</li> <li>○ At least 50 % of solid biomass,</li> <li>○ At least 70 % from geothermal energy,</li> <li>○ At least 50 % of the heat of the environment,</li> <li>○ At least 50 % of CHP plants with high efficiency</li> <li>○ The heating and cooling of the building is supplied to at least 50 % from energy-efficient installations.</li> </ul> </li> </ul> <p>Irrespective of the requirements stated above, single-family houses meet the criteria when using at least 6 m2 (bright areas) of solar collectors with an annual yield of 500 kWh.</p> |
| <b>SE</b> | <p>In Sweden there is no national, regional or local legislation that requires the use of renewable heating sources in the building sector. The use of renewable energy in the building sector is incentivised through direct subsidies for the use of such sources and energy-saving measures in buildings.</p>   |
| <b>UK</b> | <p>Feed-In Tariff for RES-E introduced in 2010 to encourage households, communities and small businesses investing in renewables</p>   |

| Country | Description   |
|---------|---|
|         | <p>The Renewable Heat Incentive (RHI), a bonus-type of support system for RES-H, opened for applications at the end of November 2011, to encourage installation of equipment like solar collectors, heat pumps and biomass boilers. Being restricted to non-domestic buildings in the beginning the scheme will be extended to residential buildings in summer 2013.</p> <p>The Renewable Heat Premium Payment provides financial support to households to encourage the deployment of renewables on residential properties.</p> <p>New homes (from 2016) and new non-domestic buildings (from 2019) to be Zero Carbon and not add extra carbon emissions to the atmosphere. This will stimulate greater uptake of on-site renewables</p> |

#### 4.1 Economic instruments for improving the energy performance of buildings

There is a major challenge to improve the energy performance of Europe's buildings stock. Policies and roadmaps are moving fast to a longer time horizon, focusing on the years 2020, 2030 and 2050. With Europe's overall policy aiming to significantly decarbonise its economy by 80 to 95 % by 2050, the building's sector, with 40% of the region's energy consumption and almost the same level of GHG emissions, must play a key role.

However, any strategy to tackle the challenge in the buildings sector will require significant economic support and mainly in terms of funding – funding that continues throughout the entire time period. In 2012, BPIE had undertaken a review of the financing instruments in Europe evaluating financial instruments in place [3] and their effectiveness and impact. This BPIE review leads to the following findings:

- In general, all 27 MS have on-going programmes to support the energy performance of buildings, in the form of conventional or innovative or through the help of external funding.
- Most of financial instruments have targeted existing buildings, mainly in the residential sector.
- Grants and subsidies are used more than other financial instruments. They are followed by preferential loans. Fiscal instruments (e.g. tax credits) are widely used but not to the extent of financial instruments such as grants.
- Many of the new Member States are more highly reliant on external funding (e.g. EU structural funds or support through international financial institutions such as the European Investment Bank) than most of the EU-15.
- While there are many programmes in place, the understanding of their overall effectiveness is unclear. Relevant information on different programmes evaluation is often hard to collect and even harder to compare because there is no standardised way to monitor and evaluate the individual programmes and Member States using different key performance indicators. Very few programmes have set ex-ante goals and objectives, and few have an evaluation of their effectiveness. Few of the programmes have identified an on-going monitoring (feedback) process along the programme implementation.



- Few financial instruments target deep renovations or low energy buildings in general.
- Many financial instruments target specific technologies or building aspects although about one-third of the financial instruments support a holistic approach.
- Non-government instruments such as Energy Performance Contracting and Energy Efficiency Obligations (white certificates) have important roles to play because they can mobilise private funding.
- European-wide and international funding streams (EU Structural Funds, European Investment Bank and the like) are increasingly important and can play an even greater role in the future. There is some concern that some Member States are almost entirely dependent on such funding for their “national” programmes.
- There is no single solution. Funding a major retrofit strategy will require the use and possible bundling of all of the financial instruments available because of the overall cost of a deep retrofit.
- There is much more to know and learn from existing programmes. New ways are needed to better understand the existing programmes in order to learn how to achieve better implementation and impact.

A great variety of economic instruments are available throughout Europe to support the improved energy performance of buildings. The way Member States use them vary from country to country, mostly depending on the political context.

These economic instruments can be divided into two broad categories: “**conventional**” and “**innovative**”. The conventional financial instruments that have been used since the oil crises of the 1970s include: grants and subsidies, loans, and tax incentives. Levies have been to a much lesser extent. There have also been funds (such as from international financial institutions) that often provide the financing for such as loans or grants. There are also funds coming from the selling of Assigned Amount Units (AAUs), also known as carbon credits, under the Kyoto Protocol that have been used for the funding of subsidy schemes<sup>9</sup>.

Each support instrument contributes in a different way to overcome the significant market barrier which is financing. As it was mentioned in several previous studies, while over the lifetime of the building it is cost-effective, the investments in low-energy buildings are high and this is very often a major barrier for undertaking major improvements of buildings’ energy performance. Overall, the most common economic instruments used in Europe are such as in the following:

- **Direct grants or subsidies:** can be offered from public funds and are directly allocated by the authorities or, more typical, accessed through banks or foundations.

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<sup>9</sup> Much of this comes from Energy Charter Secretariat [31]

- **Preferential Loans schemes** encourage energy efficient practices by subsidised interest rates or credit risk support. Typically, national and local authorities support these schemes by regulatory measures, by sharing the risks with the banks and/or by covering a share of the loan interest.
- **Value Added Tax (VAT)** normally affects the final consumer but not the producer – who passes the cost onto the consumer. Differential VAT rates can be used to influence the choice of energy efficient technology or energy performance upgrade measures by householders.
- **Taxes, tax incentives or tax rebates** which can take three forms: a tax on energy, sales tax incentives to promote market penetration, or tax rebates given in recognition of energy savings investments. These are accessed either through the tax office or at point of sale. The energy and/or climate taxes may be used for creating a fund for financing measures that contributes to the reduction of the energy consumption and associated GHG emissions (e.g. a levy on electricity sales to fund renewable energy schemes)

Less common economic instruments include energy supply obligations (white certificates) or energy performance contracting (and energy services companies-ESCOs). They are considered innovative but, for example, energy performance contracting has been around since the 1980s and energy supply obligations since the 1990s, at least in Europe. There is another distinction, which is important for policymakers. These innovative instruments normally rely on private financing and not government budgets, although there are exceptions.

The following chapters provide a general evaluation of varied support measures as resulted from BPIE survey from 2011 as well as from recent studies.

The analysis provide within this report is based on data collected in 2010-2011. However, another Entranze report<sup>10</sup> will investigate and describe more detailed new and innovative policy instruments. The impact of some of these policy instruments will be model in more detail for the target countries within this project.

## 4.2 Overview of financial instruments in place in 2011

The BPIE review has identified 132 major programmes on-going during 2011 in the European Union; 100<sup>11</sup> running as conventional programmes, 18 as innovative programmes, 8<sup>12</sup> supported through the EC Structural Funds, and 6 carried out by international institutions such as EBRD, United Nations Development Programme, etc<sup>13</sup>.

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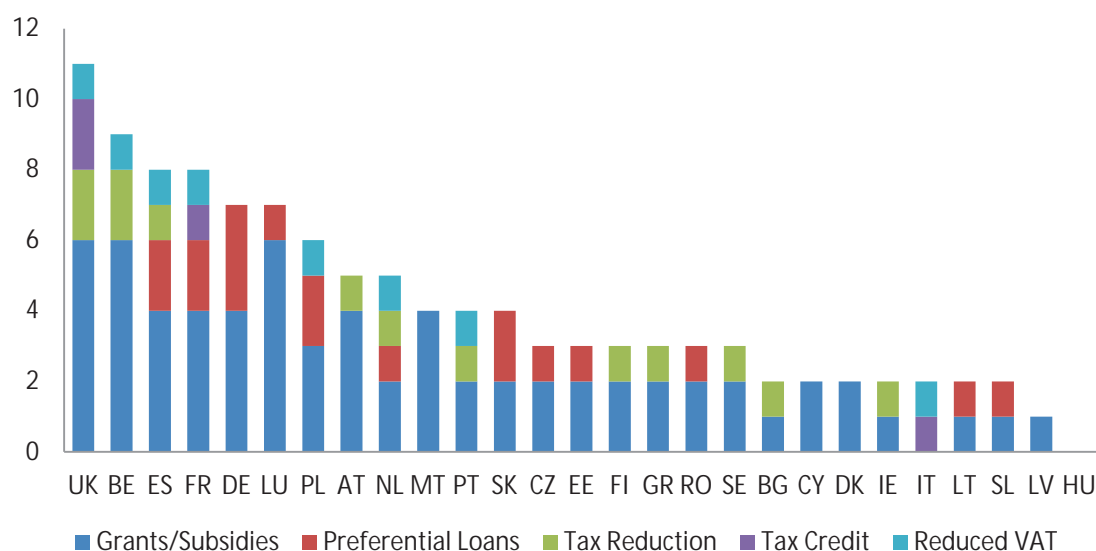
<sup>10</sup> A new ENTRANZE report provided an “Overview and assessment of new and innovative integrated policy sets that aim at the nZEB standard” will be available in April 2013 [33]

<sup>11</sup> 10 programmes using Structural Funds were included in conventional.

<sup>12</sup> Structural Funds reported by MS, excluded the 10 programmes in conventional.

<sup>13</sup> There can be some double counting but as much as possible, programmes funded under, for example, the Structural Funds, were categorised as conventional programmes of the Member States or programmes really led by Structural Fund support.

Considering the broad category of conventional programmes, 26 Member States out of 27 had on-going incentives in 2011 for a total of 100 running programmes using different type of instruments. The following figure depicts the number of identified programmes by type of instrument and country.

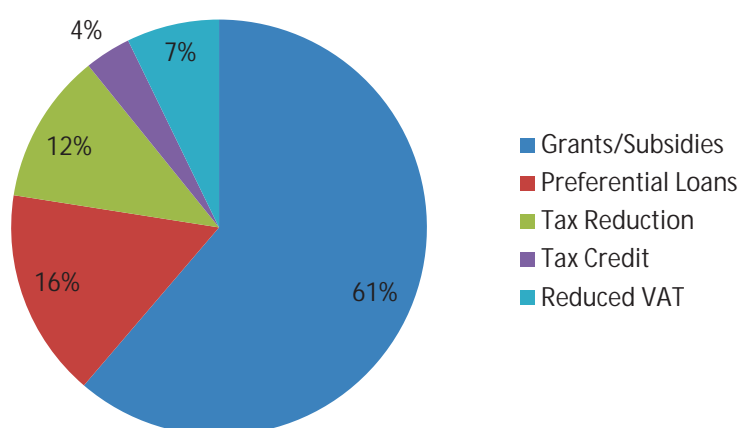


**Figure 2: Number of financial instruments in place in 2011 by country**

Source: BPIE 2012 [3]

In total, there are: 68 grant and subsidies schemes, 18 preferential loans, and 25 tax related instruments (13 Tax reduction, 4 Tax credit, 8 Reduced VAT). Ten programmes (CZ, 2 DE, ES, 1 LT, 2 PT, 2 SK, SL, UK) were implemented together with more than one type of instrument in place. Most commonly “grants and subsidies” were combined with “preferential loans”, and “tax reduction” with the “tax credit” measure. Grants and subsidies are apparently the most widespread type of schemes, followed by preferential loans and tax reduction. Reduced VAT is of growing importance while only a few Member States use a tax credit.

Belgium and the UK have (n.b. in 2010-2011) the greatest number of identified instruments in large part because the majority of the programmes in these countries are developed and implemented at the regional level. Italy had only fiscal programmes on-going nation-wide during 2011. The Italian regions developed a series of programmes through the support of EU Structural Funds.



**Figure 3: Share of different types of instruments**

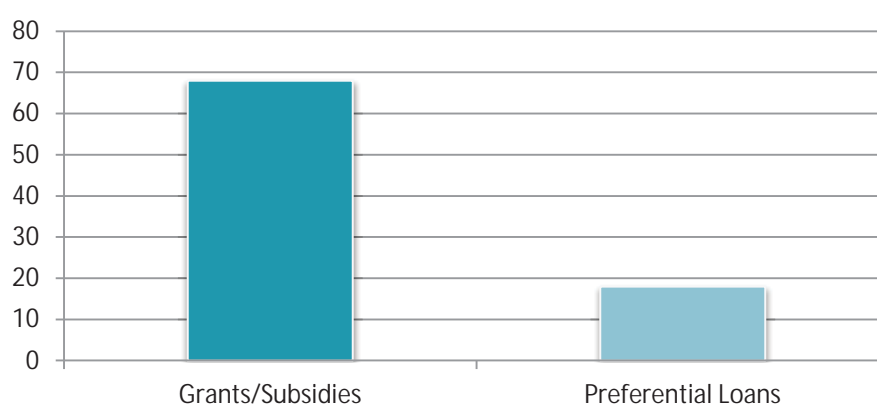
Source: BPIE 2012 [3]

However, it should be taken into account that this weighting has been carried out in terms of “number of programs”, not in terms of program budgets.

### 4.3 Financial incentives

Financial incentives for the energy efficiency in buildings are divided in two major categories that include *Grants/Subsidies* and *Preferential Loans*.

During 2011, 25 MS had on-going financial incentives specifically designed for works and investments for the energy efficiency in buildings for a total of 73 measures. The following figure shows the aggregated number of on-going financial incentives used in 2011 by MS.

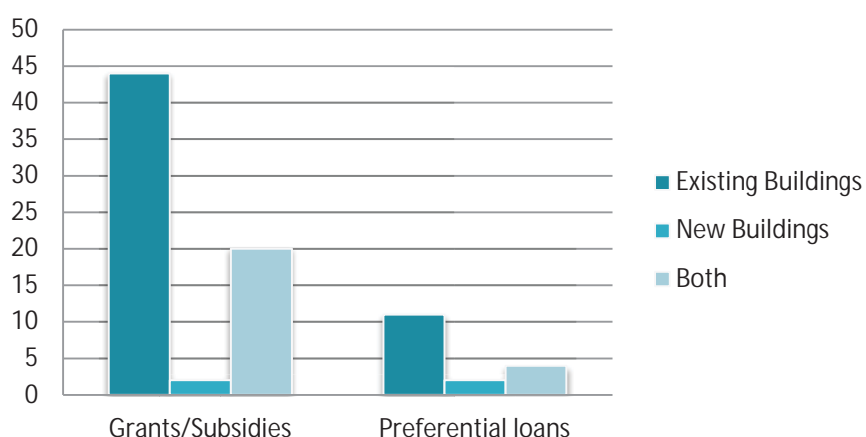


**Figure 4: Number of financial incentives by type**

Source: BPIE 2012 [3]

The upmost type of financial incentives used is in the form of grants and subsidies which count a total of 68, whereas there are only 18 preferential loans schemes.

The below figure shows the EU aggregate share according to the type of building the incentives cover (only new buildings, only existing buildings, both).

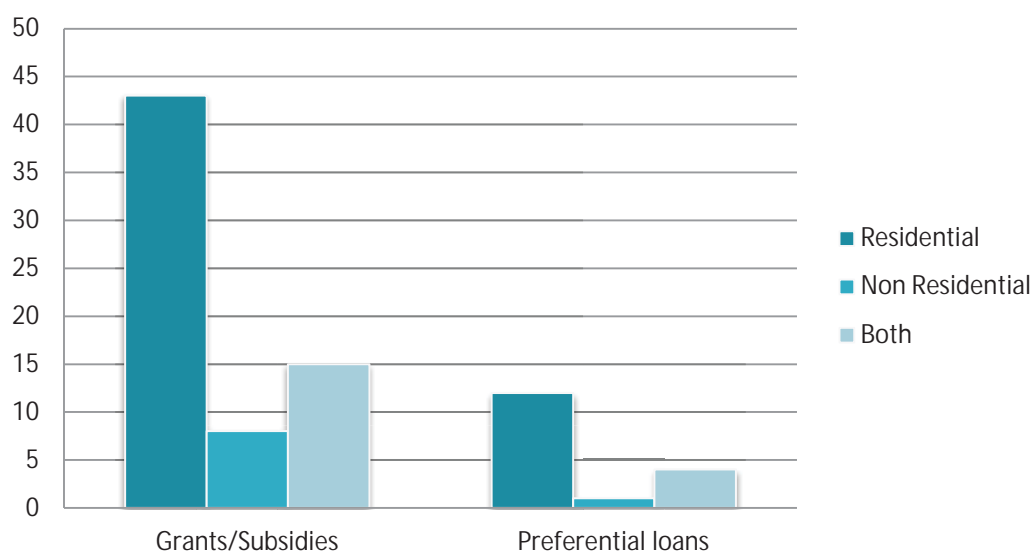


**Figure 5: Number of financial incentives by type of building (New buildings/Existing buildings)**

Source: BPIE 2012 [3]

Most of the financial programmes, grants/subsidies and preferential loans, are directed at existing buildings and few to exclusively new buildings. Many programmes cover both existing and new buildings.

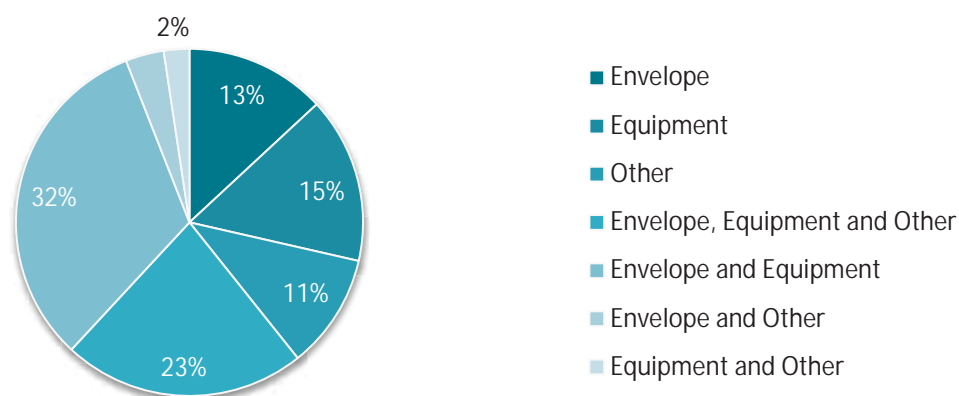
Residential buildings are the target for most financial incentives while the non-residential sector has received much less support (figure 7). This, in large part, is because in the EU-27, the non-residential buildings count for 25% of the floor space whereas the residential stock represents 75% of the floor space [1] and because it is felt that individual homeowners need more financial support to undertake the necessary measures.



**Figure 6: Number of financial incentives by type of building (Residential/Non-residential)**

Source: BPIE 2012 [3]

Figure 8 illustrates that a good part of the financial incentives support all three categories (envelope, equipment, others) in a holistic approach (32%). Envelope and equipment together receive good support (23%). Single categories are well supported too (envelope 13%, equipment 15% and other 11%).<sup>14</sup>

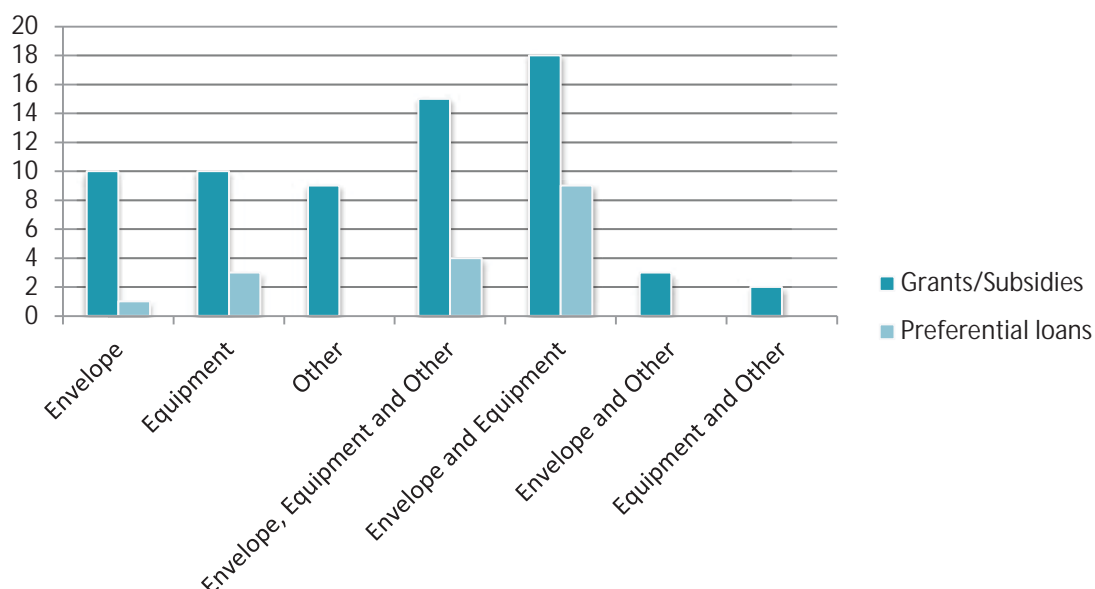


**Figure 7: Share of financial incentives by type of measures covered**

Source: BPIE 2012 [3]

<sup>14</sup> The "Other" category includes measures such as audits, education and training.

The above graph illustrates that grants, subsidies and preferential loans mainly target the “envelope” and “equipment”. However, the “other” category, which includes non-technological measures as energy audit and education and training activities, also receives strong support in terms of the number of instruments that provide support for such activities.



**Figure 8: Number of financial incentives by type of measures covered**

Source: BPIE 2012 [3]

It is important to know what level of support financial instruments give for specific investments. The level of support can be used to motivate consumers to take up actions. The following table (table 6) provides information on the level of support available from the different financial instruments. The information is divided by level of support in terms of percentage of the entire investment, the support per square metre and the total support available for an individual measure. Nevertheless, the table covers only countries that provided details on specific support programs.

**Table 6: Level of support given by financial instruments in Europe in 2010/2011**

|                              | Grants  | Preferential Loans   |
|------------------------------|---|--|
| Level of support             | [%]   | [value]  |
| <b>BE (Brussels Capital)</b> | 50% (envelope, energy audit)<br>30% to 50% (equipment)  |  |
| <b>BE (Walloon Region)</b>   | 50% (biomass heating system)<br>up to 60% (energy audit)<br>up to 75% (equipment)   |  |
| <b>BE (Flemish Region)</b>   | max 75% (equipment)<br>30% (envelope, equipment)  |  |
| <b>BG</b>                    | 20% (envelope, other)   |  |
| <b>CY</b>                    | 30% of eligible costs (envelope)<br>45/55% of eligible costs (equipment)  |  |
| <b>CZ</b>                    | up to 85% of a project's total eligible expenditures (envelope, equipment)  |  |
| <b>DE</b>                    | up to 20% of a project's investment costs (envelope, equipment);<br>max. 15.000 EUR   | 2,55/3% (envelope, equipment)<br>up to 50.000 euros with fixed interest rate (new)<br>up to 100.000 euro with a fixed interest rate for 5/10 y (2/3,35%) (envelope, equipment) |
| <b>DK</b>                    | 25% (or DKK 10 000 DKK/y per residence) (equipment)<br>20% (up to DKK 10 000 DKK) (envelope)  |  |
| <b>EE</b>                    | 10% (no more than 4000 EUR for the reconstruction project) (envelope)   | fixed interest for 10 years (not more than 4.4%) (envelope, equipment)   |
| <b>ES</b>                    |   | Up to 90% of costs is financed with fixed rate of 1,5% (envelope, equipment)   |
| <b>FI</b>                    | 15/25% (equipment, Energy audits)<br>40/50% (Energy audit)  |  |
| <b>FR</b>                    | 20/35% (envelope, equipment)<br>50% (Energy audit)  | up to 30.000 euros (per 10 or 15 years) (envelope, equipment, other)<br>tax-free interest of 2.5% a year (complementary to the 2005 tax credit scheme) (equipment)             |
| <b>LV</b>                    | up to 50% (envelope)  |  |
| <b>LT</b>                    | 50% (preparation technical project and construction supervision)<br>15% (envelope, equipment)<br>100% (of renovation costs for low income families and lonely (single) persons) | long-term loans with fixed interest rate of 3% (envelope, equipment, other)  |
| <b>LU</b>                    |   | reduction of 0.125% on the interest rate granted for the full duration of the loan (new)   |



|                      |  |   |
|----------------------|--|---|
| <b>MT</b>            | 20% (up to 233 euros) (envelope, equipment)  |   |
| <b>NL</b>            |  | green loans with lower interest (300/600 euros/m <sup>2</sup> ) (envelope, equipment) |
| <b>PL</b>            | 45% of the loan (equipment)  | 25% of the loan is subsidized by the State (envelope, equipment, other)               |
| <b>RO</b>            | 80% (envelope)   | 90% is financed through bank loans (envelope, equipment)                              |
| <b>SK</b>            | up to the 50 % of eligible costs (or max 500 SKK/m <sup>2</sup> of flat floor area) (envelope) |   |
| <b>SL</b>            | 25% of eligible costs (envelope, equipment)  |   |
| <b>SE</b>            | 25% (equipment)  |   |
| <b>UK (Scotland)</b> | 100 % (envelope, other)  |   |
| <b>UK (Wales)</b>    | 100% (other)   |   |

Policymakers are increasingly trying to encourage “deep” renovations. Deep renovations are defined differently. Often it is a percentage reduction in energy use. It can also be in terms of reaching an “A” category under the Energy Performance Certificate schemes. It can also be in terms of achieving a certain level of energy consumption per square metre per year.

The following table provides information on the level of ambition from the schemes that provided such information. The level of ambition varies significantly but there are several programmes that have a high level of ambition showing that it is possible to achieve “deep” improvements. In some countries, there can be different programmes or different support levels targeting different levels of ambition. Such is the case in Germany with the range of KfW offerings. However, the following table only illustrates the most ambitious levels, in order to show that the integration of such levels is feasible.

**Table 7: Level of ambition of financial instruments in Europe**

|                              | Level of ambition  |
|------------------------------|--|
| <b>AT</b>                    | <ul style="list-style-type: none"> <li>• high quality standards for thermal renovation, including the whole building shell (exterior walls, windows and doors, ceilings and roof);</li> <li>• maximum energy performance codes for newly constructed buildings that go well beyond standards that are foreseen in general construction codes;</li> </ul> |
| <b>BE (Brussels Capital)</b> | Low energy buildings (<30kW/m2a) (new/retrofit)  |
| <b>BG</b>                    | 25-35 kWh/m2 area / yr (retrofit)  |
| <b>CZ</b>                    | Class B (retrofit)   |
| <b>DE</b>                    | passive house (new), 45% below reference standard of a comparable new building (existing buildings)  |
| <b>EE</b>                    | improve energy efficiency by at least 20%. Must take an energy audit (retrofit)  |
| <b>ES</b>                    | Class A/B/C (new/retrofit)<br>Class A/B (new)<br>min annual reduction of 25% of electricity consumption for lighting interior (retrofit)   |
| <b>FR</b>                    | low consumption buildings (BBC) (new/retrofit)   |
| <b>GR</b>                    | overall reduction by 30% of existing municipal buildings or 11,14 GWh (958 toe) per year (retrofit)  |
| <b>LU</b>                    | low energy buildings and passive housing (new/retrofit)  |
| <b>NL</b>                    | Class B (retrofit)<br>the new building is 30% better than the required energy performance (new)  |
| <b>RO</b>                    | decrease energy consumption to 100kWh/m2 (retrofit)  |
| <b>SL</b>                    | very low energy consumption buildings (new)  |

#### 4.4 Fiscal Measures

Fiscal incentives for the energy efficiency in buildings include several measures to lower the taxes paid by consumers investing in buildings' energy efficiency. Measures include *tax reduction* (individual and corporate and on properties), *tax credit* and *reduced VAT*.

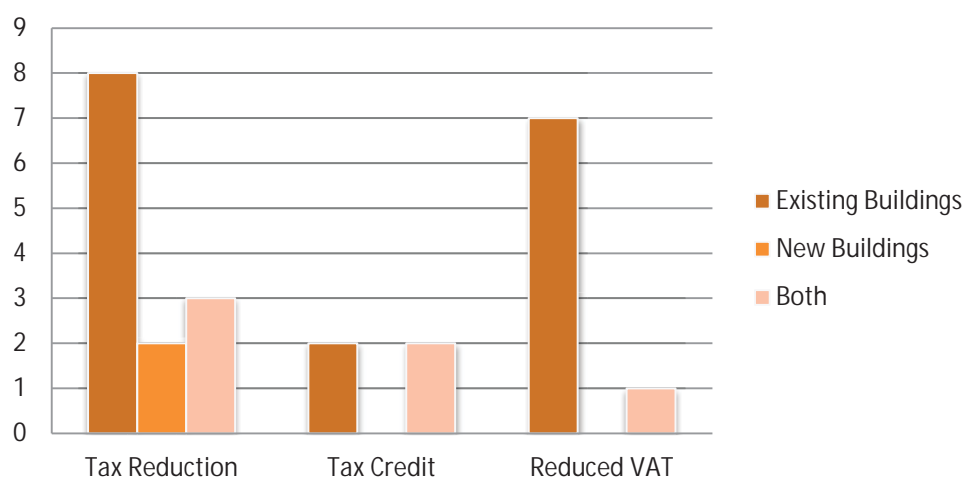
During 2011, 14 MS out of 27 had on-going fiscal incentives supporting works and investments for the energy efficiency in buildings for a total of 25 measures. The following figure (figure 9) shows the *total number of fiscal incentives by the type*. The figure illustrates that most fiscal incentives used are in the form of tax reductions (13), followed by reduced VAT (8) and tax credits (4).



**Figure 9: Number of fiscal incentives by type**

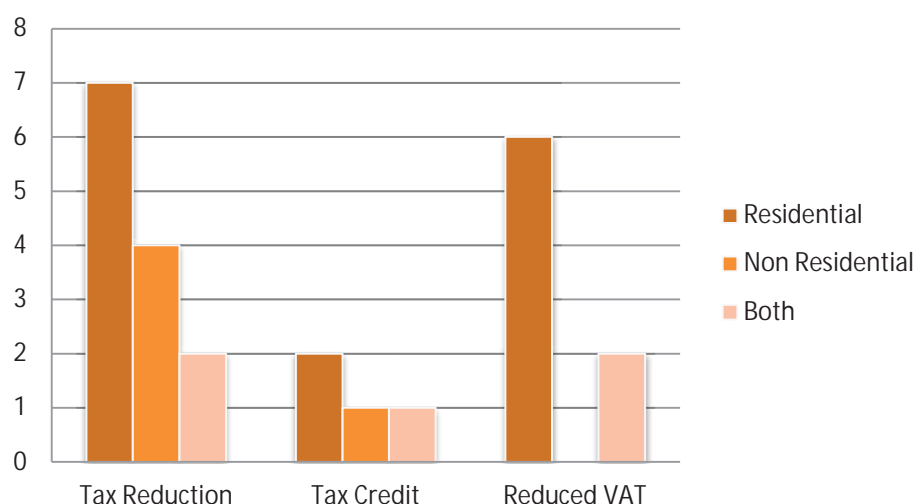
Source: BPIE 2012 [3]

Figure 10 shows the EU aggregate share according to the type of building the incentives cover (only new buildings, only existing buildings, both). Most of the fiscal incentives are for existing buildings, especially tax reduction and reduced VAT. Moreover, most of the fiscal instruments address the residential sector (figure 11).



**Figure 10: Number of fiscal incentives by type of building (New buildings/Existing buildings)**

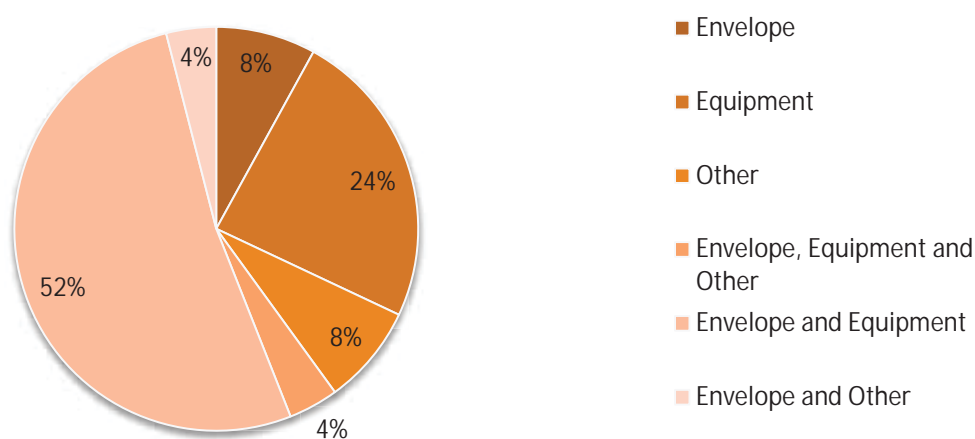
Source: BPIE 2012 [3]



**Figure 11: Number of fiscal incentives by type of building (Residential/Non-residential)**

Source: BPIE 2012 [3]

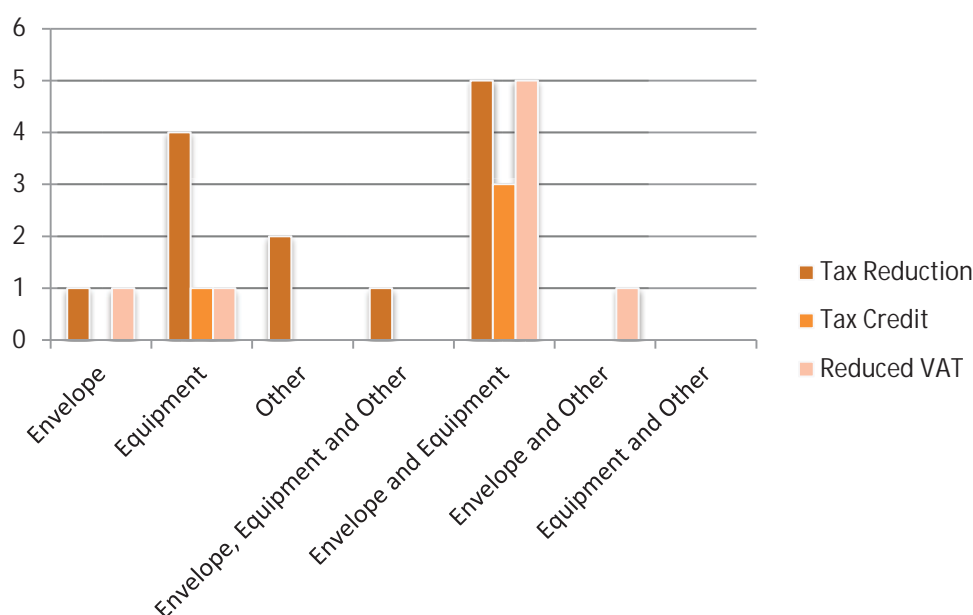
Both envelope and equipment are supported for the majority by fiscal incentives, representing more than half (52%) of the total support share (figure 12). Equipment itself also receives significant attention (24%). Envelope and other measures themselves are discretely supported (8%).



**Figure 12: Share of fiscal incentives by type of measures covered**

Source: BPIE 2012 [3]

Most fiscal measures cover a combination of investments in both the envelope and equipment. Tax reductions are also heavily used just for equipment (figure 13).



**Figure 13: Number of fiscal incentives by type of measure covered**

Source: BPIE 2012 [3]

Table 8 provides information made available through the BPIE survey on the level of support available from the different fiscal measures for the member states reporting such measures. Only those Member States providing any information are included.

**Table 8: Level of support given by fiscal instruments in Europe**

|                                | Tax reduction   |  |                      |                        | Tax credit          | Reduced VAT   |
|--------------------------------|---|--|----------------------|------------------------|---------------------|---|
|                                | Level of support  | on indi-<br>vidual/<br>house-<br>holds | on prop-<br>erty tax | on taxa-<br>ble profit | Level of<br>support | Level of<br>support   |
| <b>AT</b>                      | 25% (envelope, equip-<br>ment)                                  | x                                      |                      |                        |                     |   |
| <b>BE<br/>(Federe-<br/>al)</b> | 40% (envelope, equip-<br>ment, other)                           | x                                      |                      |                        |                     | 6% (enve-<br>lope,<br>equipment)<br>instead of<br>normal rate<br>of 21% |
| <b>BE (Brx)</b>                | 20% (new) E-level of E60<br>40% (new) E-level of E40<br>or less |  | x                    |                        |                     |   |
| <b>BG</b>                      | 100% (for 7/10 year Class<br>A)                                 |  | x                    |                        |                     |   |

|           | Tax reduction   |   |   |   | Tax credit  | Reduced VAT   |
|-----------|---|---|---|---|---|---|
|           | 3/5 y Class B) (building commissioned after January 1 <sup>st</sup> 2005)   |   |   |   |   |   |
| <b>ES</b> | up to 10% (envelope, equipment)   | x |   |   |   | 8% (envelope, equipment) instead of normal rate of 18%  |
| <b>FI</b> | 40% of labour costs (envelope, equipment)   | x |   |   |   |   |
| <b>FR</b> |   |   |   |   | 40% on the interest of the home for 7 yrs (complements the zero interest rate loan) (envelope, equipment) | 5,5% (7% from 1 <sup>st</sup> of January 2012) (envelope, equipment) instead of normal rate of 19,60% |
| <b>GR</b> | up to 700 euros (equipment)   | x |   |   |   |   |
| <b>IE</b> | write off 100% of the purchase value in the year of purchase (equipment)  |   |   | x |   |   |
| <b>IT</b> |   |   |   |   | 36/55% (envelope, equipment)  | 10% (envelope, equipment) instead of normal rate of 21%   |
| <b>NL</b> | 41,5% (of annual investment costs) (equipment)  |   |   | x |   | 6% (envelope) instead of normal rate of 19%   |
| <b>PL</b> |   |   |   |   |   | 8% (envelope, other) instead of normal rate of 23%  |
| <b>PT</b> | 25/50% property tax (Class A/A+)(equipment)<br>10% increase in the deduction related to house loans in the individual tax (Class A/A+)<br>30% (investment in RES) | x | x |   |   | 13% (equipment) instead of normal rate of 23%   |
| <b>SE</b> | 5.000 euros/y/building (labour costs)   | x |   |   |   |   |
| <b>UK</b> | n/a (equipment)<br>n/a (envelope)   |   | x | x | 100% tax relief on the cost (equipment)   | 5% (envelope, equipment) instead of   |

|  | Tax reduction |  |  |  | Tax credit                                       | Reduced VAT        |
|--|---------------|--|--|--|--|--------------------|
|  |               |  |  |  | 1.860 eu-ros/yr (£1500/yr) (envelope, equipment) | normal rate of 20% |

Table 9 provides information on the level of ambition from the fiscal schemes that provided such information.

**Table 9: Level of ambition of fiscal instruments in Europe**

|           | Level of ambition   |
|-----------|---|
| <b>BE</b> | The discount is 20% of the annual property tax for residential buildings with an E-level of E60 or less and 40% for residential buildings with an E-level of E40 or less. (new) |
| <b>BG</b> | Class A or B (building commissioned after January 1 <sup>st</sup> 2005)   |
| <b>FR</b> | Low consumption buildings (BBC < 50kWh EP/m <sup>2</sup> /y) (new/retrofit)   |
| <b>PT</b> | Class A/A+ (new/retrofit)   |

## 4.5 Innovative Economic Instruments

The two main types of innovative financial instruments include “**energy performance contracting**” and “**energy efficiency obligations**”. Both were designed and encouraged because they do not rely on government budgets and, thus, if used properly can provide long-term financial support that cannot be guaranteed by government budgetary priorities. While they have both been used for many years, their deployment has been limited for reasons that government policies are trying to overcome.

### 4.5.1 Energy Performance Contracting/Third Party Financing

Energy performance contracting (EPC) has been widely promoted by the Commission, the European Investment Bank and the European Bank for Reconstruction and Development (see below). Organisations such as the International Energy Agency support the instrument because it provides a framework to encourage private funding to support energy efficiency investments with a minimum role for governments. In the BPIE survey several Member States referred to some EPC activities in their countries, although there was limited data because many of the activities are solely within the private sector domain with only limited monitoring by governmental agencies.

The 2006 Energy Services Directive (Directive 2006/32/EC) defines energy performance contracting as “a contractual arrangement between the beneficiary and the provider (normally an ESCO) of an energy efficiency improvement measure, where in-



vestments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement”.

The association for energy performance contracting in Europe, the European Federation of Intelligent Energy Efficiency Services, defines EPCs as: The EPC involves the realisation of measures which lead to verifiable and measurable or (if the metering is not suitable) estimable energy savings. In addition, the contract includes a guarantee of results to be accomplished by the operator during the term of the contract.

The recently approved Energy Efficiency Directive encourages public bodies to promote the use of energy performance contracting. The first major promotion was as far back as 1993 in the Council Directive 93/76 but there is a view that EPC can play an even greater role.

While many Member States acknowledge there is significant activity by ESCOs within their borders, there are not much hard data. The European Commission Joint Research Centre reports regularly on the ESCO market in Europe. The most recent JRC's ESCO report from 2010 [21] mentions that despite the last years' progress, the energy service market in the European Union (EU) and neighbouring countries is far from utilizing its full potential even in countries with a particularly developed ESCO sector.

The European Commission states that the current EPC market in Europe is about €6 billion annually. This compares to a market of €30 billion in the United States. [22]

#### **4.5.2 Energy Efficiency Obligations/White Certificates**

Energy efficiency obligations (or often called white certificates scheme) have been used in the European Union for many years. The 2006 Energy Services Directive was thought to lead to the big breakthrough to get energy companies to play a major role in all Member States but such did not happen. However, over the past decade there has been important awareness creation and information gathering. Europe has benefited from the experience within several countries as well as in the United States. It was the US that has traditionally shown leadership in having energy companies play a significant role in promoting energy efficiency. This has been evolving since the 1970s.

There are five Member States that have ongoing energy efficiency obligations schemes: Belgium (Flanders Region), Denmark, France, Italy and the United Kingdom. Poland introduced very recently a similar scheme, but it is too early to have an evaluation of it. All five countries provided information to the BPIE 2011 survey on the use of white certificates. For the most part, the information has already been updated by other sources. This was important because energy efficiency obligations were included in the now approved Energy Efficiency Directive.

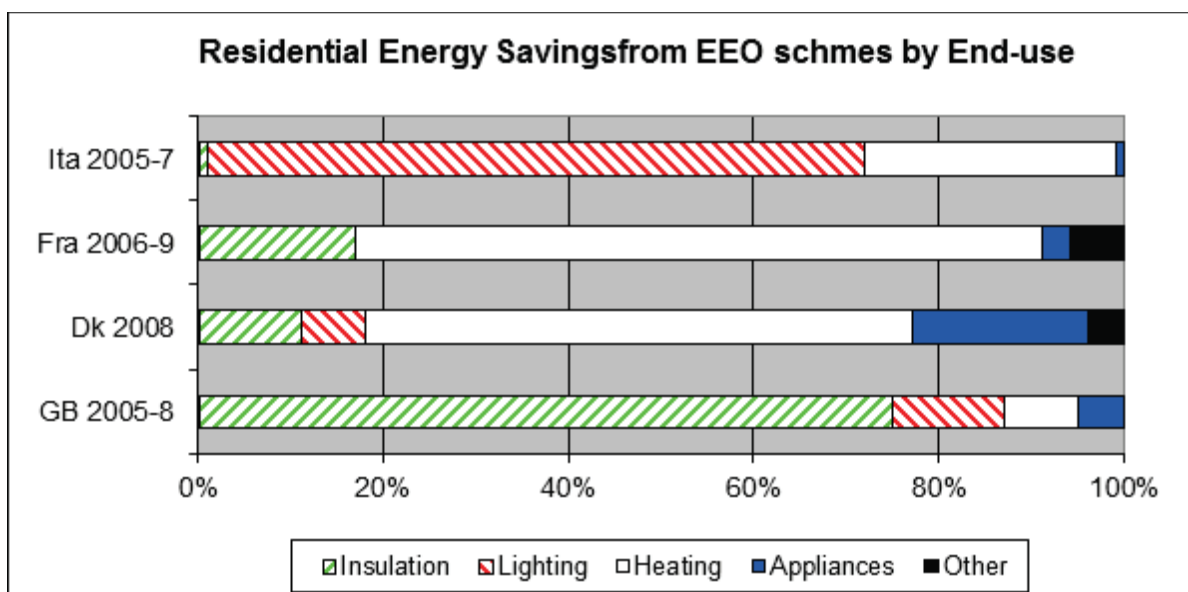
The most recent source of information on energy efficiency obligations comes from an eceee report from March 2012. [23] Table 11 shows the targets together with the annual expenditure by the energy companies for the countries with EEOs in the EU.

**Table 10: Comparison of the Target and the Size of the Energy Efficiency Obligation in the EU as of 2008**

| Country                 | Nature of saving target                 | Current size of target       | Estimated annual spend by companies, €M (€/person) |
|-------------------------|---|------------------------------|--|
| <b>Belgium-Flanders</b> | 1 <sup>st</sup> year primary energy     | 0.6 TWh annual               | 26 (4)   |
| <b>France</b>           | Lifetime delivered energy               | 54 TWh over 3 years          | 180 (3)  |
| <b>Italy</b>            | Cumulative<br><br>5 year primary energy | 2.2 Mtoe in 2008             | 190 (3)  |
| <b>GB</b>               | Lifetime CO2                            | 154 MtCO2 in 3 years to 2011 | 900 (15)   |
| <b>Denmark</b>          | 1 <sup>st</sup> year delivered energy   | 0.82 TWh annual              | 25 (5)   |

Source: Eoin Lees, *Energy efficiency obligations – the EU experience*, eceee, March 2, 2012 [23]

While the EEOs can be used in all sectors, the residential sector has received much of the attention. Within the residential sector, the following figure shows what the energy companies in the four countries have supported in previous compliance periods in order to meet their targets.



**Figure 14: Residential Energy Savings from EEO Schemes by End-Use**

Source: Eoin Lees, *Energy efficiency obligations – the EU experience*, eceee, March 2, 2012 [23]

The BPIE survey shows that other Member States also had energy companies playing a role to promote energy efficiency although they are not technically energy efficiency obligations. For example, in Slovakia, the Eko-Fund was funded by the Slovak Gas Industry in 2007 with measures including support for the efficient use of energy, and for dissemination and awareness building activities.

#### 4.6 European Union and International Financial Instruments

The multilateral financial organisations play a key role in financing improvements in energy performance in buildings in Europe. There are three key institutions to describe: the European Investment Bank and the European Union itself and the European Bank for Reconstruction and Development.<sup>15</sup>

The following is a brief summary of their activities related to supporting projects that improve the energy performance of buildings.

##### 4.6.1 The European Investment Bank

The European Investment Bank (EIB) provides the public and private sectors with a wide range of financial instruments for energy efficiency investments within and outside the EU [24] :

- Intermediated lending, including framework loans, available through financial intermediaries in the banking sector or through public authorities, energy service companies or public-private partnerships. It also provides indirect financing to energy effi-

<sup>15</sup> There are also programmes of the Global Environment Facility, the World Bank and the UN.

ciency projects via investment funds that have different geographical coverage and are established with the private sector and a range of international financial institutions.

- Risk-sharing instruments combining loans with grants and providing technical support, partnering with the European Commission or national authorities. For example, the EEEF (European Energy Efficiency Fund) launched jointly with the European Commission and other investors in 2011 to provide finance for sustainable energy projects. The Fund has a capital of €265 million and also includes technical assistance to projects financed by the Facility. The first project funded by the fund is the renovation of the Jewish Museum in Berlin, which also involved the use of energy performance contracting.

To support project preparation and operation, the EIB manages and participates in several initiatives and programmes:

- ELENA (European Local Energy Assistance) forms part of the EIB's broader effort to support the EU's climate and energy policy objectives. This initiative, managed by the Bank and funded by the Commission, helps local and regional authorities to prepare large-scale energy efficiency and renewable energy projects.
- JESSICA – Joint European Support for Sustainable Investment in City Areas – is also an innovative initiative that uses existing structural fund grant allocations to support urban development including energy efficiency projects. 11 Member States (BG, CZ, DE, EE, EL, SE, IT, LT, PL, PT and UK) have moved part of their ERDF 16 allocation into specific JESSICA projects (both for energy efficiency and renewable energy projects) for a global amount of €1558.7 million (of which 75% ERDF resources), resulting in the creation of 16 holding funds (of which 15 managed by the EIB), while 4 financial instruments are set up without a holding fund [25].

#### **4.6.2 The EU Structural and Cohesion Funds**

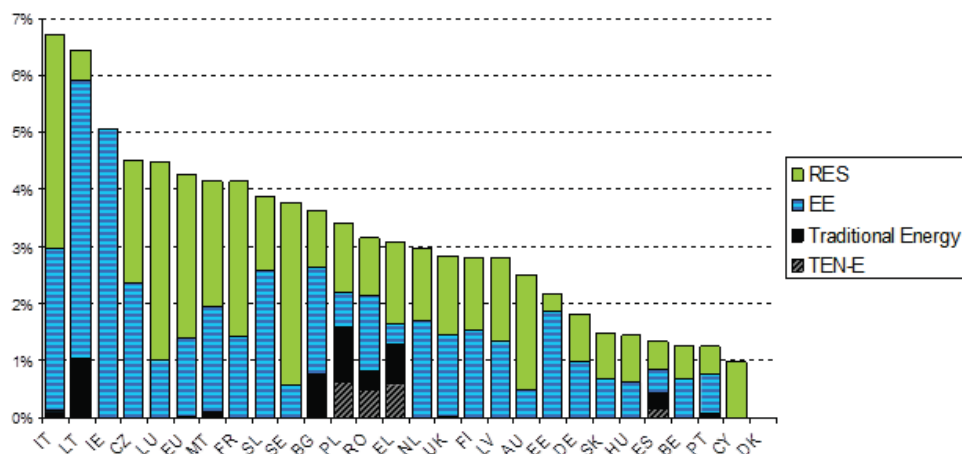
Structural and Cohesion Funds (2007-2013) may be used for energy-efficiency and renewable-energy investments not only in public and commercial buildings but also in existing housing. The new proposal for an EU Cohesion Policy for 2014-2020 places even greater emphasis on supporting investments related to EU energy targets and suggests nearly doubling the amount allocated to sustainable energy in the current period, including for building renovation.

Cohesion Policy Funds have helped to trigger more investments especially in the buildings sector, even though they have a wider remit than energy efficiency. In the 2007-2013 phase, around 4.6 billion euro is available for energy efficiency. Since 2009 up to

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<sup>16</sup> ERDF= The European Regional Development Fund

4% of the national ERDF allocations can be used for energy efficiency improvements and renewable energy investments in existing housing that supports social cohesion.



**Figure 15: Funding for 2007-2013 Period**

Source: Doubrava presentation at CECODHAS workshop, May 15, 2012 [25]

From the BPIE survey, 18 programmes<sup>17</sup> were identified from 13 Member States. This is undoubtedly understating the use of structural funds because all 27 Member States have access to the Structural Funds for such purposes. By the end of 2009, Member States allocated less than 1% of the ERDF funding for building renovation, while they can use up to 6% [26].

The proposals for the next phase (2014-2020) foresees about a doubling of funds available for energy efficiency and renewable energy to €17 billion.

The European Union also provides support funding for buildings through the 7<sup>th</sup> Framework Programme for R&D [27] as well through the Intelligent Energy Europe (IEE) programme [28]. Under the Horizon 2020 programme [29], the Commission proposes that €6.5 billion be allocated to energy research and innovation, including the continuation and reinforcement of current IEE Programme activities including continued and strengthened support through ELENA.

To assist Member States and other stakeholders with better targeting and use of the EU Funding towards energy efficiency, the Commission has been stepping up its capacity building and awareness rising efforts, focusing on National Authorities (i.e. the

<sup>17</sup> 10 programmes were analysed under conventional instruments.

European Public-Private Partnership's information campaign on Structural Funds and PPPs), Regional and Local Authorities (i.e. capacity building activities in the context of the Covenant of Mayors), and other actors (especially through the IEE Programme). Particular attention has been paid to the provision of technical assistance for the development of bankable projects [30].

#### 4.6.3 *European Bank for Reconstruction and Development*

The European Bank for Reconstruction and Development (EBRD) was created to support the development of market economies in the region following the widespread collapse of communist regimes. The principal forms of direct financing provided by the EBRD are loans, equity and guarantees:

- **loans** are tailored to meet the particular requirements of a project. The credit risk may be taken entirely by the Bank or partly syndicated to the market.
- an **equity** investment may be undertaken in a variety of forms. When the EBRD takes an equity stake, it expects an appropriate return on its investment and will only take a minority position.
- **guarantees** are also provided by the Bank to help borrowers gain access to financing.

It has, over the years, provided financing that has had an impact on buildings. It was very active in improving the performance of district heating systems. It helped fund third party financing companies in new MS, starting in the 1990s. Of the new MS, it has set up dedicated funds in Bulgaria, Romania and Slovak Republic that have helped fund renovation of buildings.

The EBRD has an initiative called the Sustainable Energy Initiative. From 2006 to 2011, the EBRD invested €8.8 billion in 464 sustainable energy projects in 29 countries. The total project value was 46.9 billion, showing a strong leveraging effect. This represented 30% of the EBRD's activities. The EBRD has been transitioning away from the new EU members, other than Bulgaria and Romania, where they remain quite active. The refurbishment of buildings has not been a distinct work area and many of the activities in buildings are integrated into the theme of industrial energy efficiency, which includes commercial buildings. Until recently, the EBRD saw a difficult business case for investing in energy efficiency in buildings because, in part, of the need for bundling and because of the difficulty to develop a bankable project that is interesting to investors.

## 5. Cross analysis of Member States' plans to develop their building stock towards the nZEB standard

### 5.1 Executive Summary

With the recast of the EPBD in 2010<sup>18</sup> the EU Member States are committed to increase the number of nearly zero energy buildings (nZEB). To report to the European Commission about their activities they are obliged to publish a national plan describing a detailed application of a definition of nZEB, and intermediate targets for improving the energy performance of new buildings by 2015. Furthermore the plan shall contain "information on the policies and ... measures ... for the promotion of nZEB, including national requirements and measures concerning the use of energy from renewable sources in new buildings and existing buildings undergoing major renovation".

This report was written to provide an overview of the planned and existing activities of the Member States to develop their building stock towards nZEB standard. The aim was to provide a selection of measures and instruments taken in different MS for the ENTRANZE project team and interested stakeholders to serve as examples in their policy process. Another target of this report was to give an assessment of the political approach of nZEB in the European building stock. Only 14 Member States have published the national plan so far, and only 12 MS did so in English language. The MS chose very different forms of reporting, so that the national plans are not comparable. All available national plans have been analysed, the containing measures and instruments have been classified and evaluated as far as possible. For that purpose a structure has been developed and implemented to classify instruments and measures to provide comparability. It bases on the template by Ecofys et al (2013), and ENTRANZE deliverable D5.4 (Bürger 2013).

The most often listed and partly explained measures in the existing plans are economic instruments for existing buildings, and information, motivation and advice-measures. There are some interesting approaches for funding programmes, with preferential loans being the most frequent economical instruments. Some Member States offer preferential loans depending on the family income or for low-income families only. In Germany the preferential loans will only be granted for ambitious energy standards which usually exceed cost-effectiveness. The "Green Deal"<sup>19</sup> in the United Kingdom only funds cost-effective refurbishment measures which have to be paid back by the occupier as part of the fuel bill. So far tax incentives and third party financing are rather rare instruments. There is a quiet big variety of information, motivation, and advice-measures, too. They reach from the implementation of energy accounting and management tools, energy

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<sup>18</sup> DIRECTIVE 2010-31-EU, EPBD 2010

<sup>19</sup> In detail the conditions for Green Deal-funding are not very good (e.g. very high interest rate of 7%), and only few loans had been committed so far this year.



audits, to the development of an energy monitoring and reporting system to facilitate public bodies.

Regulatory instruments for new and existing buildings are also named very often. They mainly target on the tightening of the requirements for the refurbishment of existing buildings in technical and building standards, and on the building standards for new buildings. The Netherlands introduce some interesting new instruments, such as the Rental House Assessment System, which makes the maximum rental price for a house or flat dependent on the energetic standard reached. They also implemented a number of voluntary agreements; unfortunately the impact of these agreements is not described. Instruments aiming at demonstration, capacity building, and supply side measures such as research and development have been implemented by half of the Member States with national plan. The support of the construction of pilot buildings to demonstrate the technical and economic feasibility is an often used instrument, too.

The instruments and measures listed in the national plans mainly don't focus on nZEB, but on energy efficiency in the building sector in general. The majority of these measures will be reasonable steps towards more nZEB in the future. However, in most evaluated countries the named measures by far will not be sufficient to increase the number of nZEB significantly. Some instruments even might create lock-in effects that hamper the transformation of buildings toward nZEB. This is might be true for funding energy efficiency refurbishment of buildings without combining the funding with a requirement to meet certain high energy standards, and is dependent on the ambition of the nZEB-definition<sup>20</sup>.

Altogether the analysis of the available national plans showed that there is still a long way to go to provide a suitable framework to increase the number nZEB in the EU Member States. Only three MS reported extensive measures and activities suitable to increase the energy performance of buildings towards the nZEB standard (Belgium, The Netherlands, and Germany). Generally it must be said that the information about instruments and measures are not detailed enough to be sufficient for a solid evaluation in most cases. That's why it was not possible to make general statements of the political approach of nZEB on a Europe wide scale. However, it can be stated that the described mix of instruments will be not sufficient to increase of the number of nZEB in the European building stock significantly, not to forget that only half of the Member States (representing more than half of the population) delivered a national plan. It also is of significant importance to provide a reporting template for future reports to improve the quality of the national plans, and to enable evaluating and cross-analysing.

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<sup>20</sup> Instruments might be sufficient in combination with low ambition.

## 5.2 Target, methodology and problems to draw up D5.3

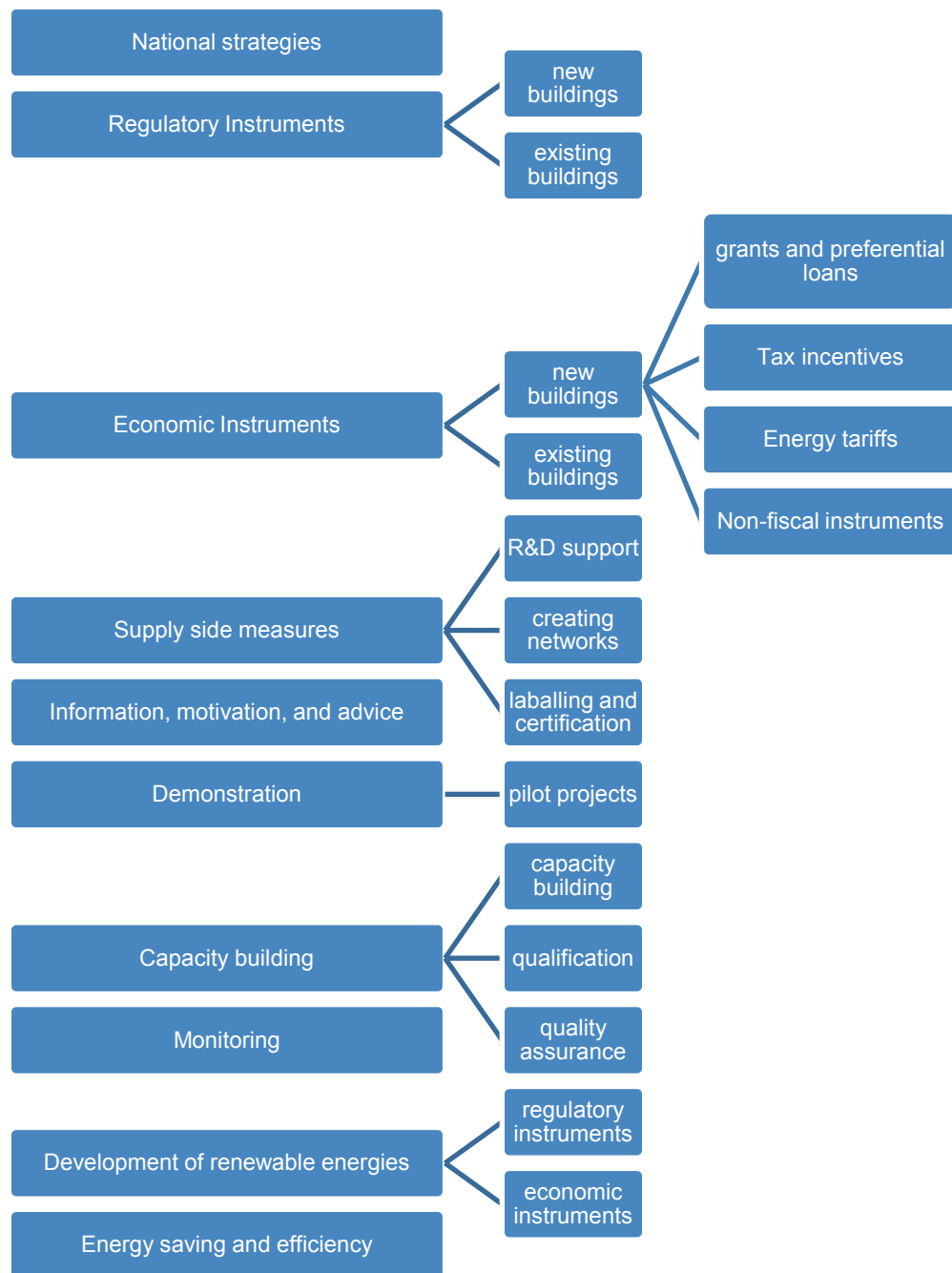
One target of this working paper was to give an overview of the policies, instruments and measures planned and implemented by the Member States to develop their building stock toward the nZEB standard. This deliverable should serve the ENTRANZE project team and other interested persons as collection of possible and already used measures in the EU. The second target was to enable a rough evaluation of the effectiveness of the existing policies in all Member States towards the goal achievement concerning the nZEB standard of the building stock.

The original intention was to analyse the above mentioned commission report on the progress by Member States towards nZEB. Up to now (September 2013) the report of the Commission was not published, and only 14 national plans have been available up to August 2013<sup>21</sup>. The following Member States (MS) did finish their plan: Belgium, Bulgaria, Cyprus, Denmark, Finland, France (national language only), Germany, Hungary (national language only), Ireland, Lithuania, Netherlands, Slovak Republic, Sweden, and United Kingdom. The content and the quality of these reports differ widely, and not all existing reports already contain the three required elements (which are definition, intermediate targets, policies and measures)

Article 9 of the EPBD does not give a reporting template for the national plans. For this reason every MS chose its own reporting structure. This makes it extremely difficult to provide the necessary comparability. To be able to deliver a coherent overview about existing instruments it was necessary to put the content of all national plans in a consistent structure. This was developed considering the content of the available national plans, the policy sets described in ENTRANZE-deliverable D5.4 and the draft of a reporting template by Ecofys et al (2013a). Figure 16 shows the classification of instruments used in this report.

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<sup>21</sup>The national plans to be found under the following web address have been evaluated:  
[http://ec.europa.eu/energy/efficiency/buildings/implementation\\_en.htm](http://ec.europa.eu/energy/efficiency/buildings/implementation_en.htm)



**Figure 16: Defined and used structure of instruments and measures**

|   |
|---|
| <b>Residential buildings</b>  |
| Relevant regulations  |
| Relevant economic incentives and financing instruments  |
| Energy performance certificates' use and layout in relation to nZEB standard  |
| Supervision (energy advice and audits)  |
| Information (tools)   |
| Demonstration   |
| Education and training  |
| <b>Non-residential buildings</b>  |
| Relevant regulations  |
| Relevant economic incentives and financing instruments  |
| Energy performance certificates' use and layout in relation to nZEB standard  |
| Supervision (energy advice and audits)  |
| Information (tools)   |
| Demonstration   |
| Education and training  |
| <b>From your point of view, how would you evaluate the current measures that are in force? Please also try to describe the existing gap between what is in force and what should be in force in order to ensure that after 31 December 2020, all new buildings are nearly zero-energy buildings. Are there precise measures planned for the future?</b> |
|   |

**Figure 17: Reporting Template for policies and measures for the promotion of all new buildings being nearly zero-energy buildings after 31 December 2020 according to Ecofys (2013b)**

| All new buildings occupied and owned by public authorities   |
|--|
| Relevant regulations   |
| Relevant economic incentives and financing instruments   |
| Energy performance certificates' use and layout in relation to nZEB standard   |
| Supervision (energy advice and audits)   |
| Information (tools)  |
| Demonstration  |
| Education and training   |
| From your point of view, how would you evaluate the current measures that are in force? Please also describe the existing gap between what is in force and what should be in force in order to ensure that after 31 December 2018, all new public buildings are nearly zero-energy buildings. Are there precise measures planned for the future? |
|  |

**Figure 18: Reporting template for Policies and measures for the promotion of all new buildings occupied and owned by public authorities being nearly zero-energy buildings after 31 December 2018 according to Ecofys (2013b)**

Ecofys et al (2013b) created a reporting template for the national plans in consultation with the European Commission. This might become obligatory in the future. By using this template all Member States could deliver comparable information about their activities towards nZEB that are easy to evaluate. According to the authors the selection of types of measures in the template has been adjusted to the requirements of the National Energy Efficiency Action Plans (NEEAP) and the National Renewable Energy Action Plans (NREAP). Since the content of the analysed national plans and the structure of policies and measures deviate significantly from the one used in the template, it was not reasonable to use the template without changes. Figure 16 to Figure 19 show the reporting template by Ecofys (2013b).

In this working paper the instruments and measures specified by the MS in their national plans are described with a focus on new and innovative instruments. The annex contains all instruments and measures ordered by country and with further explanations (if available). All measures are presented in a defined structure. Unfortunately usually the description of the instruments and measures is not detailed enough to allow any further statements or conclusions concerning the impact on the European building stock.

|   |
|---|
| <b>Residential buildings</b>  |
| Relevant regulations  |
| Relevant economic incentives and financing instruments  |
| Energy performance certificates' use and layout in relation to nZEB standard  |
| Supervision (energy advice and audits)  |
| Information (tools)   |
| Demonstration   |
| Education and training  |
| <b>Non-residential buildings</b>  |
| Relevant regulations  |
| Relevant economic incentives and financing instruments  |
| Energy performance certificates' use and layout in relation to nZEB standard  |
| Supervision (energy advice and audits)  |
| Information (tools)   |
| Demonstration   |
| Education and training  |
| <b>From your point of view, how would you evaluate the current measures that are in force? Please also try to describe the existing gap between what is in force and what should be in force in order to stimulate the transformation of buildings that are refurbished into nZEB. Are there precise measures planned for the future?</b> |
|   |

**Figure 19: Reporting template for policies and measures for the promotion of existing buildings undergoing major renovation being transformed to nearly zero-energy buildings according to Ecofys (2013b)**

## 5.3 Instruments and measures

### 5.3.1 Main results of the comparison of Member States' activities

As described above the MS used very different structures for their national plans. It should also be taken into account that the MS follow different definitions using the terms 'policies', 'instruments', 'measures' and 'actions'. Hence, in this chapter these terms are used synonymously.

The instruments and measures listed and/or described in the national plans mainly don't focus on nZEB, but on energy efficiency in the building sector in general. The majority of these measures will be reasonable steps towards more nZEB in the future. However, in most evaluated countries the named measures by far will not be sufficient to increase the number of nZEB significantly<sup>22</sup>. Some instruments even might create lock-in effects that hamper the transformation of buildings toward nZEB. This might be true for funding energy efficiency refurbishment of buildings without combining the funding with a requirement to meet certain high energy standards. Motivation and information measures also mainly focus on energy efficiency in buildings in general and not on a certain standard<sup>22</sup>.

Tab. 11 shows which instruments and measures are part of the national plans of each country. The most often implemented or planned activities concern regulatory and economic instruments and information, motivation, and advice measures. There are Member States that describe many measures and explain them in detail (e.g. Belgium with more than 100 measures in the three regions, The Netherlands, and Germany). Other Member States only list few, less detailed measures (e.g. Lithuania, Sweden). Among the more detailed described measures there are some innovative and interesting ones. This is true especially for economic instruments in Belgium and Germany, such as subsidies dedicated for low-income population, and rising subsidies for high energy standards in Germany.

In conclusion, some countries are on a good way providing instruments towards increasing the number of nZEB. In the majority of the countries there is more work to do. It may be assumed that in Member States without national plan the discussion on the right way towards nZEB is still at the beginning.

In the following chapters the instruments are listed and described if possible following the classification defined in chapter 5.1. Unfortunately most of the national plans do not provide detailed information about the measures, e.g. information about funding conditions for economic instruments etc. Often there is no information about the impact and the success of the measures. That's why there is no further evaluation of the instruments possible.

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<sup>22</sup> This is true with the restriction that the ambition for the definition of nZEB is different in each country. For "nZEB" with very low ambition the measures might be sufficient. In this case it should be discussed if the definition is ambitious enough. Altogether the information about single measures is not detailed enough to allow more precise evaluation.



**Tab. 11: Instruments and measures in Member States' national plans**

| Instruments and measures                            | Belgium | Bulgaria | Cyprus | Denmark | Finland | Germany | Ireland | Lithuania | Netherlands | Slovak Rep. | Sweden | United Kingd. |
|---|---------|----------|--------|---------|---------|---------|---------|-----------|-------------|-------------|--------|---------------|
| <b>National Strategies and programmes</b>           |         | xx       |        | x       | x       | x       | xx      | xx        |             |             |        |               |
| <b>Regulatory instruments</b><br>new buildings      | xx      |          | xx     | x       | x       | xx      | xx      |           | xx          | x           |        | xx            |
| <b>Regulatory instruments</b><br>existing buildings | x       | x        | x      |         | x       | x       | xx      |           | xx          | x           |        | x             |
| <b>Economic instruments</b><br>new buildings        | xx      | (x)      |        |         | (x)     | x       |         |           | x           | x           |        |               |
| <b>Economic instruments</b><br>existing buildings   | xx      | x        |        | x       | x       | xx      | x       | xx        | xx          | x           |        | x             |
| <b>Research, Development (supply side measures)</b> | xx      | x        | xx     |         | xx      | xx      | x       |           |             |             |        | x             |
| <b>Information, motivation and advice</b>           | xx      | x        | x      | x       | x       | x       | xx      | x         |             | xx          |        | x             |
| <b>Demonstration</b>                                | xx      | x        | x      |         |         | xx      |         |           | x           | x           | x      |               |
| <b>Capacity building</b>                            | xx      |          | xx     | x       |         |         | x       |           |             | x           | x      |               |
| <b>Monitoring</b>                                   | xx      |          | x      |         |         |         |         |           |             | x           | x      |               |

|  |    |   |  |    |   |  |  |  |   |   |  |   |
|--|----|---|--|----|---|--|--|--|---|---|--|---|
| <b>Development of renewable energies</b> | xx | x |  | x  | x |  |  |  | x | x |  | x |
| <b>Energy saving and efficiency</b>      | -  |   |  | xx |   |  |  |  | x |   |  |   |

x = one or two measures, xx = 3 and more measures; the number of measures has no influence on its extend and efficiency

### 5.3.2 National strategies and programmes

Half of the analysed national plans describe national strategies to achieve more energy efficiency in buildings.

The government of the Walloon Region of Belgium approved the “Sustainable Development Plan” targeting at the exemplarity of administration. Further strategic planning tools are existent, such as the Marshal 2.vert’plan, the Plan for sustainable control of Energy, and the Air-climate plan.

According to the Bulgarian plan legislation and regulations shall be revised in accordance with the EPBD. Denmark will prepare a strategy for energy renovation of the existing building stock, and the Lithuanian government adopted the energy efficiency plan I and II. Additionally Lithuania set up a programme for “Renovation of multi-apartment buildings with the primary aim of increasing their energy efficiency”.

Ireland states to develop an inventory of public sector buildings and a retrofit programme of local authority-owned stock of social housing. Furthermore they will work on a further upgrading of Building Regulations requirements, and on the preparation of cost-optimal calculations for new dwellings and new non-residential buildings.

It might be reasonable assumed that the national plans not mentioning national strategies also have implemented strategies towards energy efficiency of buildings or plan to do so.

None of the named strategies does focus on nZEB, at least this is not clarified.

### **5.3.3 Regulatory and economic instruments new buildings, including new public buildings**

#### **5.3.3.1 Regulatory instruments new buildings**

Nine out of twelve countries published regulatory instruments for new buildings in their national plans; six of them included three and more measures.

The published instruments mainly focus on the transformation of the EPBD into national legislation; often the energy performance requirements for new buildings are tightened. So several countries are planning to or already set up new building regulations. One example is Ireland: the building regulation already sets a high mandatory energy performance standard for new dwellings of 61 kWh/m<sup>2</sup> primary energy consumption/yr. Another example is the German Energy Conservation Regulation (EnEV). The EnEV regularly tightens the energetic minimum standards of new buildings. It is planned to further improve the standard for new buildings by an average of 12.5% in 2014 and 2016. Other examples are Finland (planning a roadmap for statutory provisions regarding energy performance of buildings), The Netherlands, Slovak Republic, and the United Kingdom. Ireland passed a special Building Control Regulation that shall ensure that all significant non-residential building projects comply with building regulations.

Another group of regulatory instruments for new buildings are instruments related to planning. The Belgium Capital Region evaluates the opportunity for derogations from town planning regulations in order to facilitate special, particularly energy efficient work. Denmark will allow local authorities to design certain areas for especially energy efficient buildings only with The Planning Act.

The Netherlands passed two voluntarily agreements on energy efficient new buildings. The “Spring agreement” between the national government and market parties such as the Builders and Developers Association aims at improving the energy efficiency of new buildings by 25% in 2011 and 50% in 2015 (base is 2007). The second voluntary agreement is the “Green Deal in the municipality of Amsterdam” between the government and the city of Amsterdam. Target is to ensure that all new buildings in the city will be climate-neutral from 2015 onwards.

There are few more instruments and measures to be mentioned in this category:

- In the Flemish region in Belgium a plan will be worked out describing the path toward nZEB in new social housing.
- Germany has decided that all new public buildings of the Federal Government from 2012 have to be constructed in line with the nZEB standard.
- The United Kingdom passed an obligation to install smart meters including in-home displays in every home by 2019.
- Belgium (Brussels Capital Region) describes an instrument to reduce the use of air conditioning in buildings and increase their energy performance.
- Ireland combines the regulations for the energy demand with a requirement for renewables to meet energy demand.

Three of the reviewed National plans do not mention any regulatory instruments for new buildings (Bulgaria, Lithuania, and Sweden).

### 5.3.3.2 Economic instruments new buildings

Economic instruments for new buildings are shown in two national plans only, in the Belgian and the German national plan (Tab. 12).

**Tab. 12: Economic instruments for new buildings**

| Instruments                   | Belgium | Bulgaria | Cyprus | Denmark | Finland | Germany | Ireland | Lithuania | Netherlands | Slovak Rep. | Sweden | United Kingd. |
|-------------------------------|---------|----------|--------|---------|---------|---------|---------|-----------|-------------|-------------|--------|---------------|
| grants and preferential loans | x       |          |        |         |         | x       |         |           |             |             |        |               |
| Tax incentives                | x       |          |        |         |         |         |         |           |             |             |        |               |
| Energy tariffs                | x       |          |        |         |         |         |         |           |             |             |        |               |
| Non-fiscal instruments        | x       |          |        |         |         |         |         |           |             |             |        |               |

In the Belgian national plan a variety of instruments including grants, tax incentives, energy tariffs, and non-fiscal instruments are described.

In the Brussels Capital Region there are “Energy subsidies” for high performance energy saving investments concentrating on most efficient reduction in energy and social terms. In the residential sector the subsidies are linked to social criteria (household income and composition of the household). Additionally, there are financing instruments dedicated for at-risk populations such as energy price setting (social rates), and social green loans. Other instruments focus on non-residential buildings. There are energy subsidies for non-residential buildings. They can be used for studies and audits, insulation and ventilation, high performance heating, renewable energies, etc.. Furthermore, investment aid for industrial enterprises supports companies in reducing costs and conduct studies as well as training, recruitment or investments.

In the Walloon Region there is a grant-programme for public housing companies for new-build projects that achieve the passive house standard.

The Belgium federal government created a tax deduction for dwellings with low energy consumption for individual investors. The energy standard to be reached had to be passive energy standard ( $<15 \text{ kWh/m}^2$ ), low energy ( $<30 \text{ kWh/m}^2$ ) and zero energy houses ( $<15 \text{ kWh/m}^2$  plus RES). This instrument has been abolished from 2013. The national plan contains no information about the reason to abolish it.

The Brussels Capital Region additionally introduced Occupation Cost Rationales: Public housing companies can pass on all energy efficiency investments as additional charge to the rent, as long as the monthly charge is lower than the savings from the energy consumption charge, so the occupation cost in the energy efficient home will be lower than in the less efficient home. Additionally, there are tax revenues for public housing companies to finance housing renovation.

In Germany there has been a programme for preferential loans for the construction of energy efficient residential buildings for 10 years. The support programme “Energy efficient construction” funds the creation and construction of energy-efficient residential buildings via the state owned KfW bank group. For the period 2012 to 2014 a total of € 4.5 bn in programme funds is available for measures in new as well as existing buildings. The financial funding within the programme increases with the energetic level achieved. The energy-efficient construction of approx. 463,000 apartments has been assisted since 2003.

#### **5.3.4 Regulatory and economic instruments existing buildings, including existing public buildings**

##### **5.3.4.1 Regulatory instruments existing buildings**

Nine out of 12 national plans describe regulatory instruments for existing buildings (compare Tab. 11). One of the main measures aiming at energy performance of existing buildings is the tightening of the requirements for the refurbishment of existing buildings in technical and building standards. This measure is described in the national plans of Cyprus, Slovak Republic, Finland, and Germany. The Conservation Regulation of Germany (EnEV section 9) already contains energy related minimum requirements for the components to be replaced or modified during refurbishment of a building.

Finland requires the issuance of a decree regarding energy performance regulations for major renovations of buildings. In detail these will be repairs that require a permit, change of intended use, and the repair of the technical systems. Energy performance improvements will not need to be implemented if these are not technically, operationally or economically feasible. Minimum requirements for the use of renewable energy in connection with major repairs shall be issued in 2015.

The Bulgarian government plans to create a new policy for large-scale renovation of concrete panel and other multi-occupancy residential buildings. The national Programme for housing renovation in Bulgaria for the period 2006-2020 will be adapted accordingly.

Moreover, there are two innovative Dutch instruments for rental homes: Firstly, the Netherlands have implemented another voluntary agreement. This “Agreement on Energy Conversation in the Rental Sector” between the national government and housing corporations includes a saving-target for the energy use of residential buildings of 33% from 2008 to 2020. The aim of the agreement is to safeguard the investments made by the housing corporations in achieving this energy efficiency target. As a result rental homes owned by housing corporations will have an average energy efficiency label B<sup>23</sup> by the end of 2020. A second Dutch instrument focusing on rental home is the “Rental Housing Assessment System”. This system uses certain features of the home to set a maximum rental price. The energy label will be included in the assessment. This way the energy standard (expressed in the energy label) is directly linked to the maximum rental price and energy-saving investments are promoted. Ireland considers the introduction of minimum thermal efficiency standards in the rental sector.

Non-residential buildings are in focus of the Dutch Environmental Management Act. Therefore large or medium-sized businesses have to implement all cost-effective measures that can be earned back within five years or less. This includes measures in non-residential buildings, such as offices, healthcare institutions, and schools.

There are two instruments targeting on public buildings: Ireland has an obligation for public bodies to develop and maintain energy management programmes. Germany wants to develop a roadmap for energy-efficiency refurbishment for existing federal buildings.

The Dutch “More with Less” – Programme is a voluntary agreement between the national government and housing corporations, builders, the installation sector and the power companies. At least 300,000 existing homes should have been improved every year by the end of 2011.

In The Netherlands several voluntarily agreements between public authorities and other stakeholders exist, which are, strictly speaking, not regulatory instruments. The national plan unfortunately does not give any information how successful these agreements are.

#### **5.3.4.2 Economic instruments existing buildings**

Eight out of 12 countries plan to or already did implement economic instruments to support the improvement of the energy standard of existing buildings. The most frequent instruments are preferential loans. Some Member States offer preferential loans depending on the family income or for low-income families only.

Belgium and The Netherlands additionally offer a variety of additional economic instruments from tax incentives to national mortgage guarantees.

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<sup>23</sup> Energy efficiency labels for buildings in The Netherlands reach from A to G

**Tab. 13: Economic instruments for existing buildings**

| Instruments existing buildings | Belgium | Bulgaria | Cyprus | Denmark | Finland | Germany | Ireland | Lithuania | Netherlands | Slovak Rep. | Sweden | United Kingd. |
|--------------------------------|---------|----------|--------|---------|---------|---------|---------|-----------|-------------|-------------|--------|---------------|
| grants and preferential loans  | x       | x        |        |         | x       | x       | x       | x         | x           |             |        | x             |
| Tax incentives                 | x       |          |        |         |         |         |         |           | x           |             |        |               |
| Energy tariffs                 | x       |          |        |         |         |         |         |           |             |             |        |               |
| Non-fiscal instruments         | x       |          |        |         |         | (x)     |         |           | x           |             |        |               |
| third party financing          |         |          |        |         |         |         |         |           |             |             |        |               |

### Preferential loans and grants for refurbishment

In the Brussels Capital Region of Belgium the refurbishment of residential buildings can be funded by “green loans”. The interest rates are, different according to the income of the applicant, e.g. low-income households will get an interest rate of 0%. The reimbursement period will depend on the time for return on the investment. The maximum amount will be 25,000 EUR. In the Walloon Region the 0% loan-programme “Ecopack” for Households has been introduced. It is capable for works reducing the energy consumption of the building in general, there is no energy standard demanded. Additionally, there are energy bonuses for private individuals to improve energy performance of existing buildings to assigned high energy standards and subsidies for renewable energy investments in public buildings. In the Flemish Region financial support for refurbishment will be linked to the overall improvement of the energy performance of the building. There is no definition given for “overall improvement of the energy performance”.

In Ireland the “Better energy homes” scheme and in the “Better energy warm homes scheme” provide grants for low income families. Also the “Pay as you Save (PAYS)” framework to incentivize homeowner investment in energy efficiency improvement was introduced.

Bulgaria plans to develop schemes to provide financial aid to support energy efficiency especially for multi-occupancy residential buildings.



Finland has implemented a scheme for energy grants for existing residential buildings. Grants are awarded for the following works: energy surveys, outer shell repairs and energy performance improvements, ventilation heat recovery construction and connection to district heating and heating with renewable energy sources.

The German development programme “Energy efficient refurbishing” by the KfW-bank group provides a range of financial support for refurbishment that satisfies ambitious energy-saving standards. Residential buildings and social and public infrastructure buildings are funded. The funding is provided as low-interest loan and through grants.

In Lithuania there is a programme for energy efficiency investments for multi-apartment buildings, state high schools and professional training establishments within the JESSICA-programme<sup>24</sup>. Another Lithuanian programme funds the renovating of two-apartment houses reducing energy consumption by at least 20%, and reaching the energy efficiency class C after refurbishment.

Within the “Green Deal” in the United Kingdom cost-effective energy efficiency measures for buildings are funded. The building occupiers pay the money back as part of their fuel bill. If the building occupier changes, the new occupier gets the responsibility for the payment. The key principle is that the repayment costs of the measures are covered by the savings on lower fuel bills. An additional financial support for low income and vulnerable households are energy company obligations.

### **Tax incentives**

Another economic instrument is a lower VAT rate for energy efficiency works. The Dutch government provides a lower VAT rate for certain works for the improvement of energy efficiency of buildings. Eligible measures are insulation of the floor, roof, and outer walls (material and labour costs), and labour costs for maintenance and renovation of residential buildings. The Belgian federal government also has been offering a tax deduction for individuals for a variety of measures to improve the energy standard of residential buildings for almost 10 years. Starting from 2013 the tax deduction is only granted for investments in roof insulation. Within the Dutch “Green projects scheme” investments in sustainable construction and energy conservation are tax deductible by homeowners.

### **Third party financing**

The Brussels Capital Region in Belgium wants to establish an energy service company that serves as a contractor for public buildings in municipalities or other regional authorities. The Flemish region also plans to develop a third party financing scheme for extensive energy renovations for social housing and public buildings. The Irish government works on a national energy performance contracting framework, within the framework model contracts will be developed.

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<sup>24</sup> JESSICA: Joint European support for sustainable Investment in City Areas

### Other economic instruments

The Dutch government additionally offers a national mortgage guarantee for homeowners to insure the risk that loan holders for green investments will not be able to pay the mortgage. Energy-saving measures such as wall and floor insulation, high-efficiency boilers, high efficiency++ glazing, heat pumps, and solar boiler and/or solar panels<sup>25</sup> are included up to maximum amount of 8,000 EUR.

Another innovative instrument is a revolving fund for energy-saving measures in existing buildings that is planned to be set up by the Dutch government. The fund is planned to be used for co-funding large-scale projects (e.g. for housing corporations, healthcare institutions, schools and swimming pools) and private projects.

The Flemish Region wants to develop a special credit policy which would support the financing of nZEB by improving the recognition of energy performance by the financial sector.

In Germany the KfW programme “Energetic urban renewal” wants to help to establish a refurbishment process beyond individual buildings on a broader urban development basis. It seeks to initiate comprehensive measures in the field of energy-efficiency for neighborhood buildings, especially for historical buildings neighborhoods in inner-cities. The programme provides grants for integrated neighborhood concepts and for refurbishment managers.

#### 5.3.5 Research, Development and other supply side measures (including certificates)

The main supply side measures described in the national plans are **Energy Performance Certificates (EPC)** for buildings. EPCs can be found or are to be introduced in the Brussels Capital and the Walloon Region of Belgium, in Finland, Cyprus, Germany, Ireland, and Bulgaria. Usually they are mandatory for all new buildings and if buildings are for sale or rent. In Finland the promotion of nZEB construction shall be taken into account in an upgraded energy classification. Cyprus also wants to certificate nZEB buildings. In Germany the new EnEV revision (EnEV 2013) contains an obligation to provide energy related key indicators from the certificate in real-estate advertisements; additionally the certificate has to be handed over to buyers and new tenants (instead of “make them available”). Bulgaria names energy certification of concrete panel and other multi-occupancy buildings only. Ireland introduced certificates that include an advisory report with recommendations for cost effective improvements of energy efficiency. In the United Kingdom the certificates have to include an A to G efficiency rating of the building, advice on energy efficiency measures to be carried out, and information about the Green Deal financing programme.

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<sup>25</sup> It is not exactly clear what technologies are meant.

The energy standard **labeling** of buildings is another supply side measure. Labeling of buildings is only described in the Belgium national plan. In the Brussels capital region the “Sustainable Building” quality labelling framework for public buildings is introduced as a tool to promote sustainable construction and renovation. Additionally a “sustainable building” label for small buildings or certification for larger buildings should be pursued at Belgian level.

For Member States claim to fund **research and development** projects concerning energy efficiency of buildings. Belgium (Brussels Capital Region) finances applied research for sustainable buildings, and various energy-related technical and non-technical initiatives will be supported. Cyprus and Finland also want to support research programmes for the improvement of energy efficiency of buildings. In Germany the research initiative “Future Building (Zukunft Bau)” supports the development of new materials and processes.

In Finland supporting the development of **clusters** of energy and environmental sector players and of property and construction sector players is an instrument towards the improvement of energy efficiency of buildings.

### 5.3.6 Information, motivation and advice

Almost all Member States (10 out of 12) list measures in the field of information, motivation and advice in their national plans. There is a great variety of activities described. Whilst some countries only name general measures like “Raising awareness of the public” (Cyprus), “Information Campaigns” (Denmark), and “Provide Guidance via energy agencies and online information tools” (Finland) some countries go more into detail. So the Belgian national plan describes the following 22 activities providing information and advice:

- Establishment of Local Action Plans for Energy Management (PLAGEs): control energy management by large owners and public authorities, PLAGEs provides a solid basis for monitoring and good management of the building (Brussels Capital Region BCR)
- Providing a tool for energy accounting and management for municipalities (“NRClick”): allows municipalities to monitor easily and in real time building energy consumption and enables them to identify most favorable actions in terms of saving energy (BCR)
- Special information activities to encourage the private sector to use third party financing (BCR)
- Establish an efficient, high quality system of energy audits (BCR)
- Communicate on and raise awareness of housing with nearly zero energy consumption through actions and events on a Region-wide scale (BCR)
- Communicate on and raise awareness of non-residential buildings with nearly zero-energy consumption (BCR)
- Supporting households to reduce energy consumption in nearly zero-energy homes (BCR)

- Develop a proactive support service for non-residential buildings (BCR)
- Energy newsletter by the Walloon government for public authorities (Walloon Region of Belgium WR)
- Voluntary energy audits (WR)
- Rational use of energy information in public buildings (WR)
- Communication campaigns conducted by the Department of Energy and Sustainable Building in the context of energy performance of buildings (WR)
- Energy Service Counters and Single Service Counters for refurbishment works (WR)
- Information Service Counter “Sustainable Living Home” (WR)
- “nZE” trademark branding (Flemish Region of Belgium FR) → this measure could also be part of supply side measures in chapter 5.3.8, there is no further explanation in the national plan
- Establishment of knowledge platforms (FR)
- Awareness & information campaigns directed at trendsetters (FR)
- Advice for residential and non-residential nZE-projects (FR)
- Manual for nZE-buildings (FR)
- Manual for extensive energy renovation (FR)
- Raising awareness among and providing information to governments, including development of a tendering standard for public nZEB and knowledge development projects for government personnel with technical responsibilities (FR)
- Using the Public Energy Services Company Fedesco as ‘federal knowledge centre for energy efficiency’: Its expertise consists in analyzing the needs, identifying and benchmarking of potential buildings, as well as following up the technical stages of projects (Federal Government)

Further measures with different target groups worth mentioning in this chapter are:

- **Condominiums:** Stimulating the establishment of owners' associations within the meaning of the Condominium Management Act and assistance with surveys of condominiums (Bulgaria)
- **Public bodies:** Develop an energy monitoring and reporting systems to facilitate public bodies in reporting energy efficiency in their own annual reports (Ireland)
- **Building owners:** Publication of the “Code of Practice for Retrofitting Energy Efficiency Measures in Dwellings” (Ireland)
- Publication of Building Energy Rating in advertising literature (Ireland) → no further information in the plan, if mandatory or voluntary
- Ensuring Small and Medium Enterprise sector has access to necessary supports to reap financial benefits of investment in energy management practices (Ireland)
- Extend Accelerated Capital Allowance products list and Triple E register to encourage energy efficient investment (Ireland)
- Information about the smarter use of heating controls (United Kingdom)

Lithuania claims to set the focus on the promotion of the renovation of multi-apartment buildings. There are two national plans that do not contain any information and motivation measures: the ones from The Netherlands and from Sweden.

### 5.3.7 Demonstration

The support of the construction of pilot buildings with very low energy consumption to demonstrate the technical and economically feasibility is an often used instrument towards low energy buildings.

Some Member States support the construction of pilot buildings in the public sector. E.g. the Belgian Capital Region is erecting one of the largest passive standard buildings in Europe: the 16,000 m<sup>2</sup> new Brussels Environment building. The Walloon Region supports pilot projects with school buildings, and the Slovak Republic plans to promote the introduction of a model solution for new construction or reconstruction of buildings owned by public authorities. In Cyprus residential and non-residential pilot project applications of nZEB-construction are planned. Furthermore the government of Brussels Capital Region launched a call for the construction of nZE buildings named “Exemplary Buildings: Energy & Eco Construction” targeting the real estate sector. In the Walloon Region there are project tenders called “Exemplary Buildings Wallonia”. Bulgaria wants to draw up a pilot programme for nZEB.

In the German national plan especially extensive pilot projects are described. About 450 pilot projects for highly energy efficient refurbishment of residential and non-residential buildings across Germany have been carried out by the German Energy Agency (dena) supported by funds from the CO<sub>2</sub> building programme. The findings and experience from the pilot buildings are made available to planners and craftsmen via information platforms. Additionally 42 innovative construction projects (new buildings and refurbishment) for buildings that are nearly carbon neutral are carried out in the programme “Roadmap to the EnergyEfficiencyPlus Building”. These projects are closely monitored in the planning and execution stages. There is a further pilot project named “EfficiencyBuildingPlus with electromobility”. It aims to demonstrate that a building can generate more energy with renewable energies than it is needed for room conditioning in the building and the charging of electrical vehicles with a yearly reach of 30,000 km.

There are two further pilot projects targeting on non-residential buildings in Germany: The project “Construction of new non-residential buildings as part of the municipal and social infrastructure” and the project “Zero-energy building for the Federal Environmental Agency” in Berlin.

In The Netherlands there has been introduced a large scale approach to the refurbishment of existing residential buildings, the Block by Block approach. The aim is to use standard packages at the local level and relying on market funding. During the three-year period of this project, the aim is to gain sufficient experience to develop a concept

that can be rolled out all over the country. This primarily concerns experience with various funding structures, marketing models and ways of guaranteeing quality.

Altogether 7 national plans contain instruments and measures for demonstration projects, Denmark, Finland, Ireland and Lithuania did not describe such measures.

### **5.3.8 Capacity building, including education and training of professionals**

There are two Member States that seem to put a special focus on capacity building instruments: Belgium and Cyprus. There are 21 measures named in the Belgian national plan and 7 measures named in the Cyprus' plan. Most measures and activities aim at the qualification of craftsmen and engineers, some more at ensuring the quality of work through accreditation and labeling of companies and material. There are listed some examples below.

Education and training of professionals:

- Preparation of teaching tools and practical guides (Walloon Region of Belgium WR)
- Organising energy performance of buildings training courses (WR)
- Ensuring an adequate training offering for professionals in sustainable building from design to implementation (BCR)
- Enhancing the knowledge in the building sector (Flemish Region of Belgium FR)
- Information of the qualified experts and the engineers of the building industry about the changes of the legal framework and the minimum energy performance requirements of nZEB (Cyprus)
- Training the construction companies personnel and the on site technicians (Cyprus)
- Draw up and provide building process guidelines for contractors, architects and engineers that wish to build energy efficiently (Denmark)
- Develop and start the Build Up Skills Initiative (BUSI, Ireland)
- Working with industry to build capacity and develop quality of energy efficiency products and practitioners (Training Schemes, Installer Schemes, Product Certification, etc., Ireland)
- Cooperate with professional chambers to increase the professionalism of designers (Slovak Republic)
- Participate in the international exchange of information and know-how in the area of building energy performance (Slovak Republic)
- Creating skill-enhancement schemes for key groups; project "Build up Skills (BUSS)" already in place (Sweden)
- Preparation of a Technical Guide with technical and construction guidance in order to facilitate the design and construction of buildings. The application of the Technical Guide will be on a volunteer basis and will be upgraded continually (Cyprus)
- Further upgrading the nZEB web platform (Cyprus)



- Education of selected groups of the industry (Cyprus)
- Implementing an employment-Environment Alliance to collaborate with the competent authorities to improve teaching in construction (BCR)

There are more capacity building measures aiming at ensuring the quality of work, systems and material through labeling and accreditation:

- Accreditation of liquid and gas fuel technicians and refrigeration engineers (Walloon Region of Belgium)
- Guarantee the quality of the procedure via an accreditation and recognition system for sustainable building professionals (Brussels Capital Region in Belgium BCR)
- ATG and ATG-E – Technical accreditation (energy) of construction products and systems with certification. (WR)
- Implement quality labels for companies and certification of SRE installers (WR)
- Creation of a quality framework for the building sector (Flemish Region of Belgium FR)
  - Individual certification of installers
  - Energy efficiency & renewable energy quality label for companies
  - Promoting construction teams with an energy consulting

50% of the analysed national plans do not name capacity-building-measures.

### 5.3.9 Monitoring

Monitoring measures to verify the success of the described measures towards energy efficiency of buildings are not necessarily part of the national plan, since according to EPBD only measures for the promotion of nZEB have to be described. Nevertheless monitoring of the success of the measures is of immense importance and some countries did describe monitoring activities.

One monitoring instrument is an energy balance that makes it possible to follow the evolution of energy consumption in the different sectors. E.g. in the Brussels Capital Region of Belgium there is an energy balance set up every year. Every second year there is published a report on the sustainable management of the buildings of the Brussels public authorities. Furthermore a collection of data on the quality of the building stock will be collected regularly. This database is necessary to evaluate the rate of building renovation. To collect these data either all Energy Performance of Buildings certificates or representative samples will be evaluated. Additionally the compliance with the regulatory instruments is being controlled. If necessary sanctions for disregarding these rules will be declared. Compliance monitoring is also planned by Cyprus.

The Slovak Republic claims to make interim evaluations of the fulfillment of the national plan targets and Sweden will work on a continuous follow up and assessment of both the technical requirements and cost aspects associated with energy-efficient buildings.

### **5.3.10 Development of renewable energies**

According to EPBD measures concerning the use of energy from renewable sources have to be part of the national plans. The measures can be divided into regulatory and economical instruments. Not all Member States describe measures focusing on renewable energy sources in their plans. Half of the analysed plans did not contain any measures concerning renewable energies.

#### **5.3.10.1 Regulatory instruments**

In Germany the Renewable Energies heat act regulates the mandatory use of renewable energies for new constructed private and public buildings.

The mandatory use may be met either by the use of solar heating (a minimum share of heating energy need of 15%), biomass (solid and liquid: at least 50%, gaseous: at least 30%), geothermal energy and environmental heat (at least 50%), but failing that, also by the use of waste heat, combined heat and power generation and energy conservation measures (15% better than the EnEV standard). Combinations of renewable energies and with substitute measures are permitted.

In addition, the recast version of the Renewable Energies Heat Act, which entered into force on 1 May 2011, also introduced a 'role model' function of existing public buildings. There is an obligation to cover part of the heating or cooling requirements of public non-residential buildings with renewable energies as soon as the buildings are refurbished.

The Renewable Energies Heat Act provides an escape clause for state regulations to adopt own provisions for existing buildings. The federal state of Baden Württemberg is the first one to adopt a heat act. The act aims to establish the use of renewable energies as a standard for heating and hot water preparation in residential buildings. Since January 2010, 10% of the heating consumption must be covered by renewable energies when replacing a heating system in an existing residential building. Alternatively, energy can be saved by improved thermal insulation of façades or roofs.

There is one further regulatory instrument concerning public buildings only. In new built public buildings in the Brussels Capital region of Belgium a 30% proportion of green energy has to be integrated in the consumption of the building. Public authorities are "encouraged to do so", so it is not clear if this is a mandatory rule.

In Ireland any new building commissioned with a floor area exceeding 1,000 m<sup>2</sup> is required by law to undertake a feasibility study to examine the potential for availing of alternative energy sources.

#### **5.3.10.2 Economical instruments:**

There are quite a few economical instruments to develop the use of renewable energies, all of them being grants.



In Denmark there is a grant scheme for the installation of solar panels with the focus on single family houses. It can be used as direct grant or as the possibility to sell extra energy to the grid. Additionally there used to be a 15-25% grant for the changeover of oil-fired central heating to geothermal, air-to-water heat pumps, solar panels or connection to district heating. The programme phased out in 2012.

There are funds granted for residential buildings in the form of energy grants in Finland. The 2012 State Budget allocated an appropriation of EUR 10 million to the introduction of modes of heating which utilise renewable energy in residential buildings. EUR 8.8 million have been reserved for other energy grants for residential buildings; of this, EUR 2 million is targeted on means-tested energy grants for single-family houses.

The German Market Incentive Programme (MAP) is the key funding instrument for renewable energies of the Federal Government. As far as existing buildings are concerned, it contributes towards meeting the target of a share of 14% of renewable energies in the heating and cooling supply in the heating sector by 2020 (as of 2011: 10.4 %). Funding is provided for solar heating systems, biomass systems and heat pumps. Since August 2012, especially innovative and not yet economically viable techniques for using renewable energies in new buildings are once again eligible for funding. This serves to increase the incentive to go beyond the minimum requirements of the Renewable Energies Heat Act and to construct buildings with high renewable energy fractions. In this way, a contribution is made to the development of new buildings with higher renewable energy fractions.

The fund to enable the renovation of public buildings and of one or two family houses in Lithuania will also encourage the use of renewable energy sources.

In the United Kingdom communities, charities, and public and private sector organisations can apply to receive a payment for generating heat using eligible low carbon heat technologies in the Renewable Heat Incentive (RHI). The quality of installations and the supply chain to support low carbon heat need to be first class to ensure consumer confidence. The Government is requiring all RHI installations (up to and including 45 kWh) be installed by an accredited Microgeneration Certification Scheme installer. Support for the domestic sector is expected to be introduced under the next phase of the scheme.

Another Instrument in UK focusing on private households is the Renewable Heat Premium Payment (RHPP): The RHPP provides a single payment to households that install low carbon heat and also includes competitions for social landlords and community groups. This measure is planned to be an interim measure until the RHI will be introduced for households.

In the Belgian Walloon Region there are project tenders for large solar thermal systems.

### **5.3.11 Measures focusing on energy saving and energy efficiency in general**

Measures towards energy saving and energy efficiency in general at last will also contribute to nearly zero energy buildings. That is why two countries listed some of these measures in their national plans. Probably more Member States will have introduced this kind of measures, but not describe them in the plan because the EPBD does not ask for them. In Annex I the listed measures are described.

## 5.4 Conclusion

The results conducted in the scope of these analyses can give an input to the discussion about the instruments and measures developed by the Member States towards the transformation of their buildings towards nZEB standard. The paper bases on the national plans by the Member States for increasing the number of nZEB. It was explained that only 14 Member States did publish a national plan at all, and only 12 MS published a national plan in English. This might be an indication that many of the MS do have problems to develop and implement suitable instruments and measures. Another reason for that is that the deadline for the national plan was too tight to many Member States. Only two years after publication of the recast EPBD MS had to report on a complex nZEB plan.

The MS that did report have chosen very different forms of reporting, so that the national plans are not comparable. That's why for this analyses an own template had been developed, basing on the template by Ecofys et al (2013), and ENTRANZE deliverable D5.4. It is of significant importance to provide a reporting template to the MS for future reports to enable evaluating and cross-analysing the national plans.

The most often listed and partly explained measures in the existing plans are economic instruments for existing buildings, and information, motivation and advice-measures. A more detailed evaluation of these instruments, especially of the impact of the economic instruments, is not possible by analysing the national plans. Data on the range of the funding or the number of buildings and the energetic standard reached is mainly not available<sup>26</sup>. Still some interesting approaches for funding programmes can be found. The most frequent economical instruments are preferential loans. Some Member States offer preferential loans depending on the family income or for low-income families only. In Germany the preferential loans will only be granted for ambitious energy standards which usually exceed cost-effectiveness. In the United Kingdom only cost-effective refurbishment measures will be funded over the "Green Deal"<sup>27</sup>. They have to be paid back by the occupier as part of the fuel bill. So far tax incentives and third party financing are rather rare instruments.

There is a quiet big variety of Information, motivation, and advice-measures. They reach from the implementation of energy accounting and management tools, energy audits, to develop an energy monitoring and reporting system to facilitate public bodies.

Regulatory instruments for new and existing buildings are also named very often. They mainly target on the tightening of the requirements for the refurbishment of existing buildings in technical and building standards, and on the building standards for new buildings. The Netherlands introduce some innovative instruments, such as the Rental

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<sup>26</sup> Not all listed measures really exist. Some are planned or already phased out.

<sup>27</sup> In detail the conditions for Green Deal-funding are not very good (e.g. very high interest rate of 7%), and only few loans had been committed so far this year.

House Assessment System, which makes the maximum rental price for a house or flat dependent on the energetic standard reached. The Netherlands also implemented a number of voluntary agreements. It would be interesting to learn more about the impact of these agreements.

Instruments aiming at demonstration, capacity building, and supply side measures such as research and development have been implemented by half of the Member States with national plan. The support of the construction of pilot buildings to demonstrate the technical and economic feasibility is an often used instrument.

This paper can only give an overview about existing measures in the EU, and give an input to the discussion and creating process of capable instruments. A comparison of different instruments and their impact cannot be given without further analysis.

## 6. References

- [1] BPIE, "Europe's buildings under the microscope," 2011. [Online]. Available: [http://www.bpie.eu/documents/BPIE/LR\\_%20CbC\\_study.pdf](http://www.bpie.eu/documents/BPIE/LR_%20CbC_study.pdf).
- [2] BPIE, "Principles for nearly zero energy buildings," 2011. [Online]. Available: [http://www.bpie.eu/documents/BPIE/publications/HR\\_nZEB%20study.pdf](http://www.bpie.eu/documents/BPIE/publications/HR_nZEB%20study.pdf).
- [3] BPIE, "Energy Efficiency Policies in Buildings- The Use of Financial Instruments at Member State Level," [Online]. Available: [http://www.bpie.eu/documents/BPIE/publications/BPIE\\_Financial\\_Instruments\\_08.2012.pdf](http://www.bpie.eu/documents/BPIE/publications/BPIE_Financial_Instruments_08.2012.pdf).
- [4] "Second National Energy Efficiency Action Plans (NEEAPs) under Directive 32/2006/EC," [Online]. Available: [http://ec.europa.eu/energy/efficiency/end-use\\_en.htm](http://ec.europa.eu/energy/efficiency/end-use_en.htm).
- [5] "NREAPs," [Online]. Available: [http://ec.europa.eu/energy/renewables/action\\_plan\\_en.htm](http://ec.europa.eu/energy/renewables/action_plan_en.htm).
- [6] Concerted Action, "Implementing the Energy Performance of Buildings Directive (EPBD)," 2010. [Online]. Available: [http://www.epbd-ca.org/Medias/Downloads/CA\\_Book\\_Implementing\\_the\\_EPBD\\_Featuring\\_Country\\_Reports\\_2010.pdf](http://www.epbd-ca.org/Medias/Downloads/CA_Book_Implementing_the_EPBD_Featuring_Country_Reports_2010.pdf). [Accessed 30 January 2013].
- [7] "IEE - CENSE," June 2011. [Online]. Available: <http://www.iee-cense.eu>.
- [8] Ecofys, "U –Values for better energy performance of buildings. Eurima," 2007.
- [9] J. Laustsen, "Energy efficiency requirements in building codes, energy efficiency policies for new buildings. Paris: IEA/OECD.," 2008.
- [10] P. G. B. P. Schild, "Good practice guidance on thermal bridges & construction details. ASIEPI," 2010. [Online]. Available: [http://www.asiepi.eu/fileadmin/files/Files/SummaryReports/ASIEPI\\_ThermalBridges\\_SummaryReport.pdf](http://www.asiepi.eu/fileadmin/files/Files/SummaryReports/ASIEPI_ThermalBridges_SummaryReport.pdf).
- [11] Consortium of European Building Control (CEBC), "Building Control Systems in Europe," 2006.
- [12] BPIE, "Principles for nearly Zero Energy Buildings," [Online]. Available: [http://www.bpie.eu/pub\\_principles\\_for\\_n\\_zeb.html](http://www.bpie.eu/pub_principles_for_n_zeb.html).
- [13] H. E.-K. Hans Erhorn, "The Path towards 2020: Nearly Zero-Energy Buildings.," *REHVA Journal*, 2012.
- [14] "Moniteur Belge no 264, 14 Sept 2011," [Online]. Available: [http://www.ejustice.just.fgov.be/cgi/article.pl?caller=list&numac=2011031430&pub\\_date=2011-09-14&language=fr&view\\_ann=1&urlimage=/mopdf/2011/09/14\\_1.pdf#Page1](http://www.ejustice.just.fgov.be/cgi/article.pl?caller=list&numac=2011031430&pub_date=2011-09-14&language=fr&view_ann=1&urlimage=/mopdf/2011/09/14_1.pdf#Page1).
- [15] Energistyrelsen, "BR10 (Danish Building Regulation, only in Danish) including the energy frame for 2020," [Online]. Available: [http://www.ebst.dk/bygningsreglementet.dk/br10\\_02\\_id5180/0/42](http://www.ebst.dk/bygningsreglementet.dk/br10_02_id5180/0/42).

- [16] "Investigations concerning the amendment of the European Directive 2010/31/EU on the energy performance of buildings (EPBD recast)," [Online]. Available: [http://www.bbsr.bund.de/cln\\_032/nn\\_340720/BBSR/EN/Publications/BMVBS/Online/2012/ON162012.html](http://www.bbsr.bund.de/cln_032/nn_340720/BBSR/EN/Publications/BMVBS/Online/2012/ON162012.html).
- [17] "Fraunhofer IRB," [Online]. Available: <http://www.irb.fraunhofer.de/tauforschung/projekte.jsp?local=en&p=20128035721>.
- [18] "BMVBS," [Online]. Available: <http://www.bmvbs.de/SharedDocs/DE/Artikel/SW/energieeinsparverordnung-aktuelles-novellierungsverfahren.html>.
- [19] I. ENTRANZE, "Report of the IEE ENTRANZE Project on: ' Overview of the EU-27 building policies and programs. Factsheets on the nine Entranze target countries. D5.1 and D5.2 of WP5 from Entranze Project," [Online]. Available: <http://www.entranze.eu/> . [Accessed February 2013].
- [20] "RES Directive- Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC," [Online]. Available: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009L0028:EN:NOT>.
- [21] JRC, " Energy Service Companies Market in Europe, Status Report 2010," 2010. [Online]. Available: <http://iet.jrc.ec.europa.eu/energyefficiency/publication/energy-service-companies-market-europe-status-report-2010>.
- [22] "Presentation by Ms. Marie Donnelly, Director, DG Energy, to EUSEW," 20 June 2012. [Online]. Available: <http://www.environmental-finance.com/news/view/2582>.
- [23] E. Lees, "Energy efficiency obligations – the EU experience, ECEE," 2 March 2012. [Online]. Available: [www.eceee.org](http://www.eceee.org).
- [24] "European Investment Bank," [Online]. Available: [http://www.eib.org/projects/publications/the\\_eib\\_supporting\\_energy\\_efficiency.htm](http://www.eib.org/projects/publications/the_eib_supporting_energy_efficiency.htm).
- [25] "Presentation by Roman Doubrava, DG ENER to CECODHAS workshop," 15 May 2012. [Online]. Available: From presentation by Roman Doubrava, DG ENER to CECODHAS workshop, May 15, 2012. <http://www.housingeurope.eu/event/2466..>
- [26] Topic 7, How to Renovate All Buildings by 2050, p. 30," [Online]. Available: <http://think.eui.eu>.
- [27] "European Commission- Energy- Technology & Innovation," [Online]. Available: [http://ec.europa.eu/energy/technology/fp7\\_en.htm](http://ec.europa.eu/energy/technology/fp7_en.htm). [Accessed 30 January 2013].
- [28] "Intelligent Energy Europe," [Online]. Available: <http://ec.europa.eu/energy/intelligent/>. [Accessed 30 January 2013].
- [29] "Research & Innovation - Horizon 2020," [Online]. Available: [http://ec.europa.eu/research/horizon2020/index\\_en.cfm](http://ec.europa.eu/research/horizon2020/index_en.cfm). [Accessed 30 January 2013].
- [30] European Commission, "European Commission non-paper on energy efficiency financing in the context of the Energy Efficiency Directive," [Online]. Available:

<http://energycoalition.eu/sites/default/files/20120514%20Non-paper%20financing%20EED.pdf>. [Accessed 30 January 2013].

- [31] ECS, "Fiscal Policies for Improving Energy Efficiency: Taxation, Grants and Subsidies, pp. 11-13.," Brussels, 2001.
- [32] "ENTRANZE," [Online]. Available: <http://www.entranze.eu>.
- [33] "European Investment Bank," [Online]. Available: [http://www.eib.org/projects/publications/the\\_eib\\_supporting\\_energy\\_efficiency.htm](http://www.eib.org/projects/publications/the_eib_supporting_energy_efficiency.htm).

## ANNEX A: Fact sheets for ENTRANZE target countries



### A1. Austria

#### A.1.1 Strategies and (action) plans for the building sector

Some Austrian regions (Bundesländer) have implemented visions for the building and energy sectors. In Upper Austria, for example, 100% of heating should come from renewables up to 2030, which is only achievable with a significant reduction of space heating energy demand. Currently (January 2013) a draft document of national plan for nZEB is available including targets for the heating energy needs, delivered energy, total efficiency factor, primary energy demand and CO<sub>2</sub>-emissions.

Regarding the EED requirement for the annual renovation rate of 3% in central Government buildings, no measures have been put in place yet. The responsible federal ministry of economy, family and youth is currently working on the issue.

#### A.1.2 Building Codes

In Austria, building related policies and legislation lies within the competence of the nine regions (Bundesländer). During the last the regions worked on harmonising their policies, building codes, etc. The OIB standard 6 from 2007<sup>28</sup> (OIB-Richtlinie 6 Energieeinsparung und Wärmeschutz, April 2007) is the current building code in place in Austria. The new version of OIB standard 6 (2011) includes stronger requirements. Up to now (January 2013) it is in place in Carinthia, Styria, Vorarlberg and Vienna, but will be implemented in all other regions probably until 2014.

The draft action plan for NZEB includes interim targets for the construction of new buildings and major building renovation for 2014, 2016, 2018 and 2020 (see details below).

##### A.1.2.1. Energy performance requirements

Energy performance requirements are only available on the level of heating and cooling energy demand (calculated energy consumption). For both new and renovated stock, there are no agreed conversion factors for primary energy or energy performance requirements regarding final energy. These are under discussion and being elaborated in the course of the necessary revisions due to the EPBD Recast.

OIB standard 6 (2007) allowed values depending on the building geometry up to an absolute limit which must not be exceeded. The limits are presented on Table 14 and are calculated for reference climate, in terms of useful energy.

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<sup>28</sup> [http://www.bauordnung.at/oesterreich/oib\\_richtlinie6.php](http://www.bauordnung.at/oesterreich/oib_richtlinie6.php)



**Table 14: Energy performance requirements**

|                 |         | Residential buildings |  | Non-residential buildings |   |
|-----------------|---------|-----------------------|--|---------------------------|---|
|                 |         | min                   | max  | min                       | max   |
| New stock       | Heating | Depending on geometry | 66.5<br>(2011: 54.4)<br>kWh/m <sup>2</sup> /yr | N/A                       | 22,75<br>(2011: 18.7)<br>kWh/m <sup>3</sup> /yr |
|                 | Cooling |                       | N/A  | N/A                       | 1 kWh/m <sup>3</sup> /yr                        |
| Renovated stock | Heating | Depending on geometry | 87.5<br>kWh/m <sup>2</sup> /yr                 | N/A                       | 30 kWh/m <sup>3</sup> /yr                       |
|                 | Cooling |                       | N/A  | N/A                       | 2 kWh/m <sup>3</sup> a/yr                       |

#### A.1.2.2. Thermal insulation requirements<sup>29</sup>

In Austria, there is a strong instrument for supporting residential building construction and renovation (Wohnbauförderung). All regions (Bundesländer) have implemented some type of this instrument with additional, stronger requirements regarding U-values and energy performance of buildings. These standards differ between regions (Bundesländer).

The table below (table 15) provides the maximum permitted U-values valid for new buildings and replacement and maintenance of a building component. Regarding these requirements, OIB standard 6 (2011) does not distinguish between the construction of new buildings, renovation of buildings or building components.

**Table 15: U-value requirements**

| Building component |                | U-value<br>[W/m <sup>2</sup> K] | U-value<br>[W/m <sup>2</sup> K] |      |              |      |         |      |           |      |        |      |
|--------------------|----------------|---------------------------------|---------------------------------|------|--------------|------|---------|------|-----------|------|--------|------|
|                    |                |                                 | Single family                   |      | Multi-family |      | Offices |      | Education |      | Health |      |
|                    |                |                                 | New                             | Ren  | New          | Ren  | New     | Ren  | New       | Ren  | New    | Ren  |
| Wall               | External walls | 0,35                            | 0,35                            | 0,35 | 0,35         | 0,35 | 0,35    | 0,35 | 0,35      | 0,35 | 0,35   | 0,35 |

<sup>29</sup> More information at <http://www.oib.or.at/> (in German language only)

|               |  |      |      |      |      |      |      |      |      |      |      |      |
|---------------|--|------|------|------|------|------|------|------|------|------|------|------|
|               | Internal walls between residential and non-residential use   | 0,9  | 0,9  | 0,9  | 0,9  | 0,9  | 0,9  | 0,9  | 0,9  | 0,9  | 0,9  | 0,9  |
|               | Internal walls to non-conditioned areas (except attic)       | 0,60 | 0,60 | 0,60 | 0,60 | 0,60 | 0,60 | 0,60 | 0,60 | 0,60 | 0,60 | 0,60 |
|               | Walls to non-conditioned attic                               | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 | 0,35 |
|               | Walls to other buildings                                     | 0,5  | 0,5  | 0,5  | 0,5  | 0,5  | 0,5  | 0,5  | 0,5  | 0,5  | 0,5  | 0,5  |
|               | Wall, basement in contact with the ground                    | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 |
| Windows       | Windows  | 1,40 | 1,40 | 1,40 | 1,40 | 1,40 | 1,40 | 1,40 | 1,40 | 1,40 | 1,40 | 1,40 |
|               | Other windows and doors                                      | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 |
|               | Roof windows   | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 | 1,70 |
|               | Other external transparent components horizontal or slope    | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 | 2,00 |
| Roof/Ceilings | Roof   | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 | 0,20 |
|               | Internal ceiling to unconditioned areas                      | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 | 0,40 |
|               | Internal ceiling between residential and non-residential use | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 | 0,90 |
| Floors        | In contact to ground   | 0,4  | 0,4  | 0,4  | 0,4  | 0,4  | 0,4  | 0,4  | 0,4  | 0,4  | 0,4  | 0,4  |

### A.1.2.3. Compliance

There are no official compliance statistics or evaluations. For new buildings, compliance is considered good, in particular for beneficiaries of the construction and renovation support programme “Wohnbauförderung”, through which energy efficiency criteria are checked. For renovation, no monitoring is in place and compliance is probably moderate. Also, probably more than half of all renovation activities do not include thermal renovation activities.

### A.1.3 Measures for implementing Article 13(4) of the RED

Up to now, no measures to fulfil the RED requirement to use minimum levels of energy from renewable sources in new and existing buildings have been taken.

However, in Austria, there is a strong instrument for supporting residential building construction and renovation (Wohnbauförderung) and all regions (Bundesländer) have implemented some type of requirement to make use of RES-H as a pre-condition to receive this support.

### A.1.4 Energy Performance Certificates

The federal law that regulates the obligations to present the energy certificate according to the EPBD went into force on January 1<sup>st</sup>, 2008.

The EPC energy classes are provided in the following table (they are not distinguished between different building types):

**Table 16: EPC Energy classes**

|                   | OIB standard 6,<br>version 2007:                            | OIB standard, version 2011 lists additional primary energy<br>classes |  |   |
|-------------------|---|---|--|---|
| <i>Class</i>      | <i>Energy for space<br/>heating (reference<br/>climate)</i> | <i>Primary energy</i>   | <i>CO2 emission</i>                    | <i>Final energy<br/>efficiency factor</i> |
| <b>Klasse A++</b> | HWBBGF,Ref ≤ 10<br>kWh/m <sup>2</sup> a                     | PEBBGF,SK ≤ 60<br>kWh/m <sup>2</sup> a                                | CO2 BGF,SK ≤ 8<br>kg/m <sup>2</sup> a  | fGEE ≤ 0,55                               |
| <b>Klasse A+</b>  | HWBBGF,Ref ≤ 15<br>kWh/m <sup>2</sup> a                     | PEBBGF,SK ≤ 70<br>kWh/m <sup>2</sup> a                                | CO2 BGF,SK ≤ 10<br>kg/m <sup>2</sup> a | fGEE ≤ 0,70                               |
| <b>Klasse A</b>   | HWBBGF,Ref ≤ 25<br>kWh/m <sup>2</sup> a                     | PEBBGF,SK ≤ 80<br>kWh/m <sup>2</sup> a                                | CO2 BGF,SK ≤ 15<br>kg/m <sup>2</sup> a | fGEE ≤ 0,85                               |
| <b>Klasse B</b>   | HWBBGF,Ref ≤ 50<br>kWh/m <sup>2</sup> a                     | PEBBGF,SK ≤ 160<br>kWh/m <sup>2</sup> a                               | CO2 BGF,SK ≤ 30<br>kg/m <sup>2</sup> a | fGEE ≤ 1,00                               |
| <b>Klasse C</b>   | HWBBGF,Ref ≤ 100<br>kWh/m <sup>2</sup> a                    | PEBBGF,SK ≤ 220<br>kWh/m <sup>2</sup> a                               | CO2 BGF,SK ≤ 40<br>kg/m <sup>2</sup> a | fGEE ≤ 1,75                               |
| <b>Klasse D</b>   | HWBBGF,Ref ≤ 150<br>kWh/m <sup>2</sup> a                    | PEBBGF,SK ≤ 280<br>kWh/m <sup>2</sup> a                               | CO2 BGF,SK ≤ 50<br>kg/m <sup>2</sup> a | fGEE ≤ 2,50                               |
| <b>Klasse E</b>   | HWBBGF,Ref ≤ 200<br>kWh/m <sup>2</sup> a                    | PEBBGF,SK ≤ 340<br>kWh/m <sup>2</sup> a                               | CO2 BGF,SK ≤ 60<br>kg/m <sup>2</sup> a | fGEE ≤ 3,25                               |
| <b>Klasse F</b>   | HWBBGF,Ref ≤ 250<br>kWh/m <sup>2</sup> a                    | PEBBGF,SK ≤ 400<br>kWh/m <sup>2</sup> a                               | CO2 BGF,SK ≤ 70<br>kg/m <sup>2</sup> a | fGEE ≤ 4,00                               |

|                 | kWh/m <sup>2</sup> a                     | kWh/m <sup>2</sup> a                    | kg/m <sup>2</sup> a                                |             |
|-----------------|--|---|--|-------------|
| <b>Klasse G</b> | HWBBGF,Ref > 250<br>kWh/m <sup>2</sup> a | PEBBGF,SK > 400<br>kWh/m <sup>2</sup> a | CO <sub>2</sub> BGF,SK > 70<br>kg/m <sup>2</sup> a | fGEE > 4,00 |

#### A.1.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD

HVAC inspections are regulated on regional level in different ways. In all regions there is some form of obligatory inspections of boilers and A/C systems. The details (e.g. periods) depend on the type and size of the boiler and AC system. The inspection of boilers are carried out by chimney sweepers and range from up to four times a year for large solid fuel boilers to every 4 years for small gaseous boilers. Both emissions and efficiency are monitored and minimum requirements for emissions (air pollutants) have to be achieved. Compared to heating systems, the inspection of air conditioning is still at an early stage. Only AC systems above a rated output of 12 kW have to be inspected. (Jilek 2011)

#### A.1.6 Cost optimality

Several studies are currently being carried out and commissioned by different institutions, which should be included in the communication of the Austrian government to the European Commission on Cost-Optimality in March 2013.

#### A.1.7 nZEB: requirements and roadmaps

Up to now the regions (Bundesländer) have agreed on a draft document for the definition of nZEB and interim targets in a national plan according to the EPBD (recast). This national plan foresees targets for the heating energy need, delivered energy, total efficiency factor of the building, primary energy demand and CO<sub>2</sub>-emissions for the years 2014 (start of implementation 1.1.2015), 2016 (1.1.2017), 2016 (1.1.2018) and 2020 (1.1.2021).

The following tables show the interim targets for new and existing residential buildings that undergo major renovation.

**Table 17: Interim targets for new residential buildings**

|             | HWB <sub>max</sub><br>[kWh/m <sup>2</sup> a] | EEB <sub>max</sub><br>[kWh/m <sup>2</sup> a] | f <sub>GEE,max</sub><br>[-] | PEB <sub>max</sub><br>[kWh/m <sup>2</sup> a] | CO <sub>2max</sub><br>[kg/m <sup>2</sup> a] |
|-------------|--|--|-----------------------------|--|---|
| <b>2014</b> | 16·(1+3/l <sub>c</sub> )                     | Using HTEB <sub>Ref</sub>                    | 0,9                         | 190  | 30  |
| <b>2016</b> | 16·(1+3/l <sub>c</sub> )                     | Using HTEB <sub>Ref</sub>                    | 0,85                        | 180  | 28  |
|             | or   |  |                             |  |   |
| <b>2018</b> | 14·(1+3/l <sub>c</sub> )                     |  | 0,8                         | 170  | 26  |
|             | 16·(1+3/l <sub>c</sub> )                     | Using HTEB <sub>Ref</sub>                    |                             |  |   |
|             | or   |  |                             |  |   |
|             | 12·(1+3/l <sub>c</sub> )                     |  |                             |  |   |

|      |                          |                           |      |     |    |
|------|--------------------------|---------------------------|------|-----|----|
| 2020 | 16·(1+3/l <sub>c</sub> ) | Using HTEB <sub>Ref</sub> | 0,75 | 170 | 26 |
|      | or                       |                           |      |     |    |
|      | 10·(1+3/l <sub>c</sub> ) |                           |      |     |    |

**Table 18: Interim targets for major renovations for residential buildings**

|      | HWB <sub>max</sub><br>[kWh/m <sup>2</sup> a] | EEB <sub>max</sub><br>[kWh/m <sup>2</sup> a] | f <sub>GEE,max</sub><br>[-] | PEB <sub>max</sub><br>[kWh/m <sup>2</sup> a] | CO <sub>2max</sub><br>[kg/m <sup>2</sup> a] |
|------|--|--|-----------------------------|--|---|
| 2014 | 23·(1+2,5/l <sub>c</sub> )                   | Using HTEB <sub>Ref</sub>                    | 1,1                         | 230  | 38  |
|      | or   |  |                             |  |   |
|      | 25·(1+2,5/l <sub>c</sub> )                   |  |                             |  |   |
| 2016 | 21·(1+2,5/l <sub>c</sub> )                   | Using HTEB <sub>Ref</sub>                    | 1,05                        | 220  | 36  |
|      | or   |  |                             |  |   |
|      | 25·(1+2,5/l <sub>c</sub> )                   |  |                             |  |   |
| 2018 | 19·(1+2,5/l <sub>c</sub> )                   | Using HTEB <sub>Ref</sub>                    | 1,0                         | 210  | 34  |
|      | or   |  |                             |  |   |
|      | 25·(1+2,5/l <sub>c</sub> )                   |  |                             |  |   |
| 2020 | 17·(1+2,5/l <sub>c</sub> )                   | Using HTEB <sub>Ref</sub>                    | 0,95                        | 200  | 32  |
|      | or   |  |                             |  |   |
|      | 25·(1+2,5/l <sub>c</sub> )                   |  |                             |  |   |

For non-residential buildings, corresponding requirements are under development.

### A.1.8 Other relevant topics

#### A.1.8.1. Permit requirements for renovation

Permits are only required for enlargements and additional construction activities.

#### A.1.8.2. Organisation of owners in multi-family buildings and their decision process on renovation of buildings

To carry out thermal renovation activities in a multi-family building, it is in general needed a simple majority of votes from the owners. However, there are several exemptions. In particular, in some old rental contracts there are quite strong rights for the tenants. For that reason, in some cases all tenants have to agree on activities involving measures within the dwellings (e.g. installation of central heating). In general, construction works within tenant's dwellings must not take longer than 3 days.

#### Residential property (Residential Property Act)

In order to manage the whole property (not the single residential property units), the total of residential owners constitute the owners corporation, which is a legal person with legal capacity (§2 subpar. 5 Residential Property Act). Measures for thermal refurbishment are regarded either as maintenance or as improvement measures. A single majority in co-ownership share, not in number, is sufficient to decide upon these measures. Depending on the kind of work, there are different ways to contradict the decision. However, in case that the owners corporation takes up a loan in order to finance the measures, resulting in a lien-related record in the land register (which de-

depends on the credit provider), then each residential property owner must agree to the entry of lien on his competency.

#### **Simple joint ownership (General Civil Code)**

In the case of simple joint ownership, there is no entry of residential property foundation in the land register. In order to carry out refurbishment measures, one needs the bare majority (more than half of the share of the property). The minority owner is not entitled any particular minority rights.

#### **A.1.8.3. National consultation processes**

There is no regular formal consultation process, but the regional governments (Bundesländer) are responsible for building issues and there are several organisations providing a platform for building-related discussions and information exchange among stakeholders.

#### **A.1.8.4. Buildings databases/registers**

Up to now, there is no publicly available building register. Statistics Austria currently sets up a building register but it will not be available before mid of 2013.

Statistics Austria regularly publishes Microcensus results including data on the building stock and heating systems. Currently (January 2013), the latest published data on a complete survey of the Austrian building stock dates from 2001.

#### **A.1.8.5. Landlord-tenant dilemma**

There is no systematic approach to tackle the landlord-tenant dilemma.

#### **A.1.8.6. Financial and fiscal support policies/programmes**

In Austria several financial programmes have been put in place to support the energy efficiency of buildings. Further, certain programmes at the “Additional substantial support programmes for residential building construction and renovation (Wohnbauförderung)”, have been established at different time period in the different Regions (Bundesländer).

The following tables provide an extract on the on-going programmes and/or a selection of some of past programmes<sup>30</sup>.

##### **Programme A**

|                          |   |
|--------------------------|---|
| <b>Programme name</b>    | <b>UFI 2014, Support of domestic environmental measures</b> |
| <b>Start – End Dates</b> | 2011 - 2014   |
| <b>Type of programme</b> | Grant   |

---

<sup>30</sup> Please note that other programmes exist.

|                            |  |                           |                      |                     |                        |                     |
|----------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Budget</b>              | EUR 90,24 Mio. per year  |                           |                      |                     |                        |                     |
| <b>Measures covered</b>    | Support of measures for energy efficiency and renewables (and other environmental measures) in the Austrian industry and service sector; energy efficiency measures in the building sector are included but are not specified in detail. |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>   | N/A  |                           |                      |                     |                        |                     |
| <b>Targeted buildings:</b> | <b>New build-ings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                            |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                            |  |                           |                      |                     | x                      | x                   |

## Programme B

|                            |   |                           |                      |                     |                        |                     |
|----------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>      | <b>Klima aktiv: consulting and information campaign for renewable energy and energy efficiency<sup>31</sup></b>           |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>   | 2004 - ongoing  |                           |                      |                     |                        |                     |
| <b>Type of programme</b>   | Grant   |                           |                      |                     |                        |                     |
| <b>Budget</b>              | Approx. EUR 7 million/year (annual budget of ab. 250.000 euros for non-residential and ab. 300.000 euros for residential) |                           |                      |                     |                        |                     |
| <b>Measures covered</b>    | Consulting and information campaign for renewable energy and energy efficiency  |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>   | N/A   |                           |                      |                     |                        |                     |
| <b>Targeted buildings:</b> | <b>New build-ings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                            |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                            | x   | x                         | x                    |                     | x                      |                     |

<sup>31</sup> <http://www.klimaaktiv.at/article/archive/29297/>

## Programme C

|                            |  |                           |                      |                     |                        |                     |
|----------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>      | <b>Additional substantial support programmes for renewable heating (solar thermal, biomass, heat pumps) and PV from the regional governments</b> |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>   | ongoing  |                           |                      |                     |                        |                     |
| <b>Type of programme</b>   | Grant  |                           |                      |                     |                        |                     |
| <b>Budget</b>              | Due to the split between the nine regions, this data is not available  |                           |                      |                     |                        |                     |
| <b>Measures covered</b>    | solar thermal, biomass heating, heat pumps, PV   |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>   | N/A  |                           |                      |                     |                        |                     |
| <b>Targeted buildings:</b> | <b>New build-ings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                            |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                            | x  | x                         | x                    | x                   | x                      | x                   |

## Programme D

|                            |   |                           |                      |                     |                        |                     |
|----------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>      | <b>Additional substantial support programmes for residential building construction and renovation (Wohnbauförderung)</b>  |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>   | ongoing   |                           |                      |                     |                        |                     |
| <b>Type of programme</b>   | Loan  |                           |                      |                     |                        |                     |
| <b>Budget</b>              | 2 billion euros, annually   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>    | support of residential building construction and renovation; partly budget for efficiency measures and renewables; stronger regulations than in the building codes and partly requirements to use renewable heating |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>   | N/A   |                           |                      |                     |                        |                     |
| <b>Targeted buildings:</b> | <b>New build-ings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                            |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                            | x   | x                         | x                    |                     |                        |                     |



## Programme E

|                            |   |                           |                      |                     |                        |                     |
|----------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>      | <b>Package thermal building renovation (measure from the federal government) 2009/2010</b>      |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>   | 20/02/2012 - 31/12/2012 (The package started in 2009 and budget is allocated on a yearly basis) |                           |                      |                     |                        |                     |
| <b>Type of programme</b>   | Loan  |                           |                      |                     |                        |                     |
| <b>Budget</b>              | 100 M€, of which 70 M€ residential, EUR 30 M€ non-residential                                   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>    | thermal renovation of buildings   |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>   | N/A   |                           |                      |                     |                        |                     |
| <b>Targeted buildings:</b> | <b>New build-ings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                            |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                            |   | x                         | x                    |                     |                        |                     |

## Programme F

|                          |   |
|--------------------------|---|
| <b>Programme name</b>    | <b>Tax Incentives<sup>32</sup></b>  |
| <b>Start – End Dates</b> | N/A   |
| <b>Type of programme</b> | Tax reduction   |
| <b>Budget</b>            | € 2,920 per year for ordinary tax payers. Additional deduction of € 2,920 for single income households, and € 1,460 granted if at least three children living in the household. Only 25% of the amount may be deducted from the income                                      |
| <b>Measures covered</b>  | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> </ul> |
| <b>Programme impacts</b> | N/A   |

<sup>32</sup> [http://www.bmf.gv.at/Publikationen/Downloads/BroschurenundRatgeber/STB\\_09\\_D\\_WEB\(2\).pdf](http://www.bmf.gv.at/Publikationen/Downloads/BroschurenundRatgeber/STB_09_D_WEB(2).pdf) (In German version)

| Targeted buildings: | New build-ings | Existing buildings | Residential   |              | Non Residential |              |
|---------------------|----------------|--------------------|---------------|--------------|-----------------|--------------|
|                     |                |                    | Private owned | Public owned | Private owned   | Public owned |
|                     |                | x                  | x             |              |                 |              |

## A2. Bulgaria



### A.2.1 Strategies and (action) plans for the building sector

In Bulgaria medium strategies are connected with consultations and developing of the EPBD requirements and their implementation at local level. However, the process will start next year, after the validation of the final definition for the nZEB.

Concerning the Energy Efficiency Law, amendments and additions have been provided and already introduced in the National Legislative Assembly. In this respect, endorsements are foreseen. The amendments are connected with the energy efficiency buildings and not exactly with the nZEB as no official definition of the nZEB exists yet.

The Bulgarian Government has the intention to reach 1.5% renovation target instead of the 3% renovation rate planned in the EED. The 3% renovation rate is seen too ambitious for the moment. This 1.5% should be done in the time frame defined in Brussels. At present, no barriers exist for implementing this rate.

### A.2.2 Building codes

In Bulgaria energy performance requirements are not defined in building norms. However, different Regulations are in place for the building sector. Regulation № 18 of 12.11.2004 on energy performance of objects regulates the improvement of the energy performance of existing housing through renovation, which will lead to reduction of heat losses through building envelope, increase of operational quality of dwellings and achievement of comfort of habitation. Regulation №7 of 15.12.2004 on heat saving and on energy efficiency of buildings regulates the implementation of high effective materials and technologies to housing and public construction and to refurbishing existing buildings. The latter, amended by the Bulgarian Ministry of Regional Development and Public Works in 2009, also specifies minimum U-values requirements for the building envelope

The requirements for the building elements are the same for new buildings and in case of energy renovation of existing buildings. Moreover, there is no difference between requirements for residential and non-residential buildings.

There are regulations for design of heating, ventilation and air conditioning systems (HVAC), domestic hot water supply and electrical installations and lighting. Some of ordinances refer to national and international standards in this field (mainly for calculation methods). There are different norms for the appliances which are harmonized with the EU legislation for the relevant product categories. Normally there are no requirements for purchasing and installation of systems and appliances with minimum technical requirements or rated with higher category of eco-labels (with the exception of some heating boilers). Using of highly efficient systems and appliances is optional and eco-labels and standards for efficient appliances are not obligatory in tenders for public buildings.

In case of new building with total floor area more than 1000 m<sup>2</sup> the possibilities for decentralized systems for production and consumption of energy from RES and heat pumps should be considered.

### A.2.3.1 Energy performance requirements

In Bulgaria energy performance requirements are not defined in building norms.

The following table (table 19) provides estimations for the final energy consumption of different building types. Maximum and minimum heating/cooling performance requirements of the buildings are also included.

**Table 19: Energy performance requirements (kWh/m<sup>2</sup>/year)**

|                 |              | Single family houses |      | Multi-family houses |     | Offices |     | Schools |     | Hospitals |     |
|-----------------|--------------|----------------------|------|---------------------|-----|---------|-----|---------|-----|-----------|-----|
|                 |              | min                  | max  | min                 | max | min     | max | min     | max | min       | max |
| New stock       | Final energy | 146                  | 122  | 146                 | 90  | 132     | 80  | 98      | 56  | 242       | 180 |
|                 | Heating      | 102,5                | 82,5 | 102,5               | 50  | 82      | 40  | 82      | 40  | 102,5     | 50  |
|                 | Cooling      | 102,5                | 82,5 | 102,5               | 50  | 82      | 40  | 82      | 40  | 102,5     | 50  |
| Renovated stock | Final energy | 146                  | 122  | 146                 | 90  | 132     | 80  | 82      | 40  | 102,5     | 50  |
|                 | Heating      | 102,5                | 82,5 | 102,5               | 50  | 82      | 40  | 82      | 40  | 102,5     | 50  |
|                 | Cooling      | 102,5                | 82,5 | 102,5               | 50  | 82      | 40  | 82      | 40  | 102,5     | 50  |

The evaluations of maximal and minimal performance values for all buildings are based on the following assumptions:

- Max performance assumptions – DD = 2100, A/V = 0,2 (for single-family houses A/V = 0,8), 32 % share of glazing,
- Min performance assumptions – DD = 3300, A/V = 1,2, 32 % share of glazing

DD – heating day-degree

A – area of building envelope in m<sup>2</sup>

V – volume of building in m<sup>3</sup>.

The method used for calculation of energy performance is BDS EN ISO 13790 (in English). In Bulgarian it can be found in Regulation № 7 /October 2009 “On energy efficiency, heat and energy saving in buildings”. The method is complex<sup>33</sup>. Values for specific energy consumption for heating of buildings, for minimal and maximal values of

<sup>33</sup> More information are available at the following link: <http://www.econ.bg/content/Naredba%20naredba.pdf>.

DD and A/V, derive from Regulation № RD-16-296 from 01.04.2008 r. for energy performances of sites.

### A.2.3.2 Thermal insulation requirements

The specific requirements (Maximum U-value, W/m<sup>2</sup>K) for building components are presented in the table below (table 17).

**Table 20: U-value requirements**

| Building component | U-value*<br>[W/m <sup>2</sup> K] |     |              |     |         |     |           |     |        |     |
|--------------------|----------------------------------|-----|--------------|-----|---------|-----|-----------|-----|--------|-----|
|                    | Single family                    |     | Multi-family |     | Offices |     | Education |     | Health |     |
|                    | New                              | Ren | New          | Ren | New     | Ren | New       | Ren | New    | Ren |
| <b>Walls</b>       | 0,35                             |     |              |     |         |     |           |     |        |     |
| <b>Windows</b>     | 1,7                              |     |              |     |         |     |           |     |        |     |
| <b>Roof</b>        | 0,28                             |     |              |     |         |     |           |     |        |     |
| <b>Floor</b>       | 0,4                              |     |              |     |         |     |           |     |        |     |

\*Remark: U-values depend also on the average indoor temperature (they defer for buildings with temperature less than 15°C and more than and equal to 15°C) and boundary conditions (border to the ground, air or heated space), there are also some exceptions for windows with aluminium frames.

### A.2.3.3 Compliance

Any new building must have a technical passport which also includes the energy passport. During the construction there are two types of control: one from the designer and one by the investor. There is no statistical information or studies for the compliance with the regulations valid in the year of construction.

In case an energy audit reveals non-conformity of more than 10% of the net energy in the energy passport and the calculated net energy based on the real building charac-

teristics and components, the auditor has to inform the national Agency for Sustainable Energy Development, which will start a procedure for paying penalties.

So far no information for such cases exists as energy audit of new building can be performed after the first 3 years of building exploitation and the legislation came in 2009.

### A.2.3 Measures for implementing Article 13(4) of the RED

The current renewable energy law in Bulgaria (last amendment on 28.03.2012) foresees simplification of the procedures in implementation of small windturbines and small PVs in private properties. Further, in case of new buildings with total floor area more than 1000 m<sup>2</sup> the possibilities for decentralized systems for production and consumption of energy from RES and heat pumps should be considered.

### A.2.4 Energy Performance Certificates

Up to now the requirements for EPC are for existing public buildings in exploitation (excluding closed and abandoned buildings and buildings for military, cultural, religious and other purposes) with total floor area more than 1000 m<sup>2</sup>.

The Energy classes for buildings in Bulgaria are defined in Ordinance RD-16-1058, issued by the Ministry of Economy, Energy and Tourism and Bulgarian Ministry of Regional Development and Public Works (2009).

The following table (table 21) shows the EPC energy classes which are the same for each building categories.

**Table 21: EPC energy classes**

| Energy class | Energy consumption band                                    |
|--------------|--|
| <b>A</b>     | $EP \leq 0.5 \cdot EP_{max,r}$                             |
| <b>B</b>     | $0.5 \cdot EP_{max,r} < EP \leq EP_{max,r}$                |
| <b>C</b>     | $EP_{max,r} < EP \leq 0.5 \cdot (EP_{max,r} + EP_{max,s})$ |
| <b>D</b>     | $0.5 \cdot (EP_{max,r} + EP_{max,s}) < EP \leq EP_{max,s}$ |
| <b>E</b>     | $EP_{max,s} < EP \leq 1.25 \cdot EP_{max,s}$               |
| <b>F</b>     | $1.25 \cdot EP_{max,s} < EP \leq 1.5 \cdot EP_{max,s}$     |
| <b>G</b>     | $1.5 \cdot EP_{max,s} < EP$                                |

Where:

*EP* – Energy performance characteristic (kWh/m<sup>2</sup>/yr) with the U-values of the building.

*EP<sub>max,r</sub>* – Energy performance characteristic (kWh/m<sup>2</sup>/yr) of the building calculated with the last issued U-values norms (i.e. the existing norms in accordance with the current legislation at the moment of the estimations).

*EP<sub>max,s</sub>* – Energy performance characteristic (kWh/m<sup>2</sup>/yr) of the building calculated with the U-values norms active in the moment of building commissioning.

A proposal for a new energy performance of buildings Law transposing the EPBD is in the Bulgarian Parliament for final vote. The obligations for EPC will include also buildings for rent and sale.

Up to now there are more than 5000 issued EPCs, however there is no publicly available evaluation of the issued EPCs. EPCSEPCs are usually issued in case of applying for grant for energy renovation and/or to apply for tax deduction in case the building falls into class A or B.

#### **A.2.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD**

Inspections of boilers and AC systems are performed according to the provisions of the Law on Energy Efficiency and Regulation № RD-16-932 of 23 October 2009 on the conditions and the order of executing inspections for energy efficiency of heat-only-boilers and air conditioning systems.

Requirements concerning the efficiency and the exhaust gases of boilers are regulated by the Ordinance RD-16-932 of the Bulgarian Ministry of Economy Energy and Tourism (2009). So far only penalties for not regular inspections and declaration of boilers were applied. The Ordinance is relatively new and there are no reports on the efficiency of the scheme in Bulgaria.

In accordance with the Law on Energy Efficiency:

Art. 27.

- (1) Subject of inspection are the existing newly introduced into use heat-only-boilers:
  - liquid and hard fuelled boilers with a rated capacity from 20 to 100 kW;
  - liquid and hard fuelled boilers with a rated capacity from over 100 kW;
  - gas fuelled boilers with a rated capacity from over 100 kW
- (2) Heat-only-boilers are subject of obligatory inspection for energy efficiency once per:
  - three years – for boilers as per par. 1(1);
  - two years – for boilers as per par. 1(2);
  - four year – for boilers as per par. 1(3)

Art. 28.

- (1) All AC systems with rated capacity above 12 kW are subject of inspection under this act.
- (2) AC systems are subject to obligatory inspection for energy efficiency once in 4 years.

#### **A.2.6 Cost optimality**

The requirements are currently being developed and they will be included in the national legislation. The first steps are expected to be done in the first half of 2013.

### **A.2.7 nZEB: requirements and roadmaps**

After consultation by the two responsible ministries (Ministry of Regional Development and Public Works and Ministry of Economy Energy and Tourism), the National Energy Efficiency Agency and several NGOs, the Bulgarian project definition for nZEBs have been sent to Brussels in December 2012 (acc. to article 9 of the Directive) for official approval.

Up to now, no “renovation maps” exist. However, the government has recommendations and a proposal for a roadmap on nZEB in Bulgaria. Negotiations with all stakeholders for developing such roadmaps for medium and long-term period are planned to start in 2013. Thus, concrete plans and measures for the increase of these buildings will be worked out in 2013 after the acceptance of the final definition for these buildings.

Amendments and additions in the Energy Efficiency Law connected with the energy efficiency buildings have been already introduced in the National Legislative Assembly.

### **A.2.8 Other relevant topics**

#### **A.2.8.1 Permit requirements for renovation**

A building permit is required in case of major renovation (when some of the essential requirements are affected as energy economy and heat retention). It is issued by the chief architect of the municipality where the building is constructed after proving the compliances with Ordinance 7<sup>34</sup> (2004, 2007) for heat retention of buildings. The requirement is the investment project to have part “Energy Efficiency” (apart from the others on construction, HVAC, electricity, water supply), where this compliance is declared and proved. It normally takes up to two months to get a building permit.

#### **A.2.8.2 Organisation of owners in multi-family buildings and their decision process on renovation of buildings**

In case of renovation of multi occupancy buildings, 75% of the owners must agree. However the issue for financing of the renovation of those owners that not agree is still open (they cannot be forced to pay) and still the decision process is blocked. Tenants can do energy renovations upon agreement with the owners.

#### **A.2.8.3 National consultation processes**

There are no consultations between the national and regional governments up to now. On national level there are only consultations and processes performed with NGOs and professors from Universities connected with the definition of the nZEB and the necessary changes in the national legislation.

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<sup>34</sup> Ordinance 7 from 15.12.2004 for Energy Efficiency, Heat Retention and Energy Savings in Buildings

<http://www.mrrb.government.bg/index.php?do=law&id=386&lang=bg&type=7>



#### **A.2.8.4 Buildings databases/registers**

In Bulgaria there are national statistics only for the residential buildings. Information is provided by years and by construction.<sup>35</sup> Non-residential buildings are not included into the national statistic and estimates are published in BPIE study: Europe's Buildings under the Microscope<sup>36</sup>. TABULA project also provides analysis on the building stock, however only for residential buildings<sup>37</sup>.

No statistics on the renovated buildings and their energy performance exist. An estimate could be received from the Census 2011 for residential buildings which includes information for dwellings with replaced windows and insulated dwellings.

#### **A.2.8.5 Landlord-tenant dilemma**

No particular actions are taken for the landlord-tenant dilemma.

In reference to other market barriers, a National Fund for Energy Efficiency has been created with main goals to support the business by improving the cooperation among bank credits and by providing additional guaranty for these credits.

#### **A.2.8.6 Financial and fiscal support policies/programmes**

In Bulgaria financial programmes have been set up by the National Government to support the energy efficiency in buildings. In particular programmes are set to boost the renovation of the existing building stock.

The National Programme for housing renovation in Bulgaria 2006-2020 (including the National Strategy for financing the building insulation) is a document for policy makers that analyses the housing stock and provides financial needs for the period. BGN 5295,842 millions are foreseen from 2006 to 2020 for all measures of which BGN 3234,795 millions for buildings insulation improvement (BGN 2490 millions for residential buildings (BGN 498 millions grant - 20 %) and BGN 744,795 millions for public buildings).

The following tables provide an extract on the ongoing programmes and a selection of some of past programmes<sup>38</sup>.

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<sup>35</sup><http://www.nsi.bg/otrasalen.php?otr=45>

<sup>36</sup>[http://www.bpie.eu/eu\\_buildings\\_under\\_microscope.html](http://www.bpie.eu/eu_buildings_under_microscope.html)

<sup>37</sup><http://www.building-typology.eu/>

<sup>38</sup>Please note that other programmes exist.

Programme A

|                                  |   |                           |                      |                     |                        |                     |
|----------------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>Energy Renovation of the Bulgarian Homes</b>   |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | 02.07.2012-2015   |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Grants (50%).Operational Programme “Regional Development”   |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | 50 million leva (around 25 million euro)  |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | Renovation of the homes – change of the windows, roofs, etc., energy renovation of the walls, etc.                |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | The main aim is to decrease the energy consumption in these buildings and to decrease the level of CO2 emissions. |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |   | x                         | x                    |                     |                        |                     |

Programme B

|                                  |   |                           |                      |                     |                        |                     |
|----------------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>Building Tax Exemption</b>   |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | 2005 -ongoing   |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Tax reduction   |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | N/A   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> <li>- Renewable energy sources</li> </ul> |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A   |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |   | x                         |                      |                     | x                      | x                   |

## A3. Czech Republic



### A.3.1 Strategies and (action) plans for the building sector

At the moment, the Second National Action Plan on Energy Efficiency (NEEAP-II) from 2011<sup>39</sup> is the main strategic document addressing energy performance in buildings. The document is set up to fulfil national indicative aim of 9% of energy savings in end-energy consumption by 2016 without synergy effects. The aims of the plan include high priority processes such as “maximizing of energy efficiency by GDP creation” and “maximizing of energy efficiency by energy transformation”. Maximizing of energy efficiency of heat savings is also an aim with the highest potential.

Programmes covered in the plan addressing the building sector are the following:

- State program for energy savings and RES;
- Operation program environment;
- Operation program enterprise and innovations;
- Green investment scheme;
- New panel program;
- Regional programs;

Renovations to highly efficient (nZEB) standard are still not included in the plan.

Once the nZEB detailed specification definition process in Czech Republic comes to an end, it is expected to strengthen and lower the primary energy requirements on the national building code. This is expected to result in the implementation of better energy efficiency measures and RES, lowering the overall consumption of the buildings in the long term.

No specific measures are planned yet to achieve the EED 3% renovation rate for central Governmental buildings. So far EPCs are mandatory for public buildings, as well as energy audits (based on national legislation and methodology) and both their recommendations are mandatory to be implemented in these buildings.

### A.3.2 Building codes

In Czech Republic there is a complex framework of legal and technical regulations, requirements and recommendations. The Energy Management Act 406/2000<sup>40</sup> has been updated to transpose the recast EPBD through the law 318/2012, coming into force on January 1<sup>st</sup> 2013. The providing decree No. 148/2007 on Energy Performance of Buildings transposing the EPBD into Czech law in 2007 is expected to be recast in February 2013 and coming into force in April 2013. In the period between January and April 2013, the requirements on buildings and certification shall be done on a basis of

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<sup>39</sup> <http://www.mpo.cz/dokument92353.html>

<sup>40</sup> <http://www.tzb-info.cz/pravni-predpisy/zakon-c-406-2000-sb-a-souvisejici-predpisy>

the existing decree. Also, the Standard ČSN 73 0540 on Thermal Protection of Buildings, defining especially U-values requirements was updated in November 2011.

### A.3.2.1 Energy performance requirements

Up to the end of April 2013 energy consumption requirements are set only for final energy. Table 22 shows the fixed maximum values for different building types.

**Table 22: Energy performance requirements (kWh/m<sup>2</sup>/year)**

|                 |              | Single family houses |     | Multi-family houses |     | Offices |     | Schools |     | Hospitals |     |
|-----------------|--------------|----------------------|-----|---------------------|-----|---------|-----|---------|-----|-----------|-----|
|                 |              | min                  | max | min                 | max | min     | max | min     | max | min       | max |
| New stock       | Final energy | N/A                  | 142 | N/A                 | 120 | N/A     | 179 | N/A     | 130 | N/A       | 310 |
|                 | Heating      | N/A                  | N/A | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |
|                 | Cooling      | N/A                  | N/A | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |
| Renovated stock | Final energy | N/A                  | 142 | N/A                 | 120 | N/A     | 179 | N/A     | 130 | N/A       | 310 |
|                 | Heating      | N/A                  | N/A | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |
|                 | Cooling      | N/A                  | N/A | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |

Starting in 2013, concrete requirements for both final and primary energy values will be calculated for each case (i.e. every evaluated building will have its own reference = required values). Roughly estimated, final energy requirements calculated on a basis of these reference buildings will be about 10-20% lower in average compared to existing requirements. As the primary energy is not calculated at present, comparison is not possible.

### A.3.2.2 Thermal insulation

U-values are defined by the Standard ČSN 73 0540 Thermal protection of buildings, which defines U-values requirements on a basis of prevailing indoor temperature and not on a basis of building type or new/renovated building. Further, the standard defines recommended U-values (better) and U-values recommended for passive houses. The following table (Table 23) shows the required and recommended U-values for prevailing indoor temperature 18-22°C.

**Table 23: U-value requirements**

| Building component |  | U-value<br>[W/m <sup>2</sup> K]                    |     |              |     |         |     |           |     |        |     |
|--------------------|--|--|-----|--------------|-----|---------|-----|-----------|-----|--------|-----|
|                    |  | Single family                                      |     | Multi-family |     | Offices |     | Education |     | Health |     |
|                    |  | New  | Ren | New          | Ren | New     | Ren | New       | Ren | New    | Ren |
| Walls              | External wall heavy (over 100 kg/m <sup>2</sup> of wall) | 0,30 (recommended 0,25; 0,18 – 0,12 passive house) |     |              |     |         |     |           |     |        |     |
|                    | External wall light                                      | 0,30(recommended 0,20; 0,18 – 0,12 passive house)  |     |              |     |         |     |           |     |        |     |
| Windows/Doors      | Windows  | 1,5 (recommended 1,2; 0,8 – 0,6 passive house)     |     |              |     |         |     |           |     |        |     |
|                    | Doors  | 1,7 (recommended 1,2; 0,9 passive house)           |     |              |     |         |     |           |     |        |     |
| Roof/Ceilings      | Roof   | 0,24 (recommended 0,16; 0,15 – 0,10 passive house) |     |              |     |         |     |           |     |        |     |
| Floors             | Floor  | 0,45 (recommended 0,30; 0,22 – 0,15 passive house) |     |              |     |         |     |           |     |        |     |

### A.3.2.3 Compliance

**Building Code compliance.** The Building authority (state authority related to municipality) issues building permits for planned new buildings and renovations of existing ones. This authority verify that the documentation meet all the requirements. During the final inspection, which takes place after the building is completed, the real shape of the building is controlled and compared with the planned one. If any substantial differences are found, legal mechanisms such as penalties or building use restriction till the correction is done can be applied by this authority.

**EPC compliance.** The State Energy Inspection (SEI) has the responsibility of the system of quality control. Possible penalties are described by the Energy Management Act. However, up to now, only very big project are controlled by SEI. With the new law in 2013, SEI should get more capacity to control the Certificates. Further, starting in 2016, SEI will have an obligation to issue official approval to the Certificate during building permit administration.

No effective data collection from Certificates exists.

Building Authorities verify whether the EP Certificate is a part of the building permit documentation. However, they are not in charge of verifying the Certificate reliability.

### A.3.3 Measures for implementing Article 13(4) of the RED

Starting from 2015, the Energy Management Act requires buildings to reach stronger primary energy requirements. These will be fulfilled with the support of RES installation. The concrete values and requirements shall be a part of the expected regulation.

### A.3.4 Energy Performance Certificates

The EPC certification scheme exists since 2007 and certification became mandatory in 2009 for new buildings and major renovations. The Energy Performance Certificate (EPC) has to be part of building permit documentation.

The existing Regulation 148/2007 on Energy Performance of Buildings<sup>41</sup> specifies the following energy classes for EPCs:

**Table 24: EPC Energy classes**

| Building type       | Energy classes (kWh/m2/year) |           |           |           |           |           |       |
|---------------------|------------------------------|-----------|-----------|-----------|-----------|-----------|-------|
|                     | A                            | B         | C         | D         | E         | F         | G     |
| Single family house | < 51                         | 51 - 97   | 98 - 142  | 143 - 191 | 192 - 240 | 241 - 286 | > 286 |
| Multi family house  | < 43                         | 43 - 82   | 83 - 120  | 121 - 162 | 163 - 205 | 206 - 245 | > 245 |
| Offices             | < 62                         | 62 - 123  | 124 - 179 | 180 - 236 | 237 - 293 | 294 - 345 | > 345 |
| Hospitals           | < 109                        | 109 - 210 | 211 - 310 | 311 - 415 | 416 - 520 | 521 - 625 | > 625 |
| Schools             | < 47                         | 47 - 89   | 90 - 130  | 131 - 174 | 175 - 220 | 221 - 265 | > 265 |

The new system, starting in 2013, will be based on reference = required value calculation specifically for each evaluated building instead of fixed values set by the existing decree (see table 21). This calculated requirement will always create a borderline between C and D classes. The other bands for classes A-G will be calculated on a basis of EN 15217.

### A.3.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD

The inspections and reporting for boilers and A/C plants are defined in the Energy Management Act 406/2000 Coll. on a basis of EPBD. This law introduced regular inspection of boilers (at regular intervals) and one-off inspection of boilers (over 15 years). However, due to wording of the law, an obligation exist to implement only regu-

<sup>41</sup> <http://www.zakonyprolidi.cz/cs/2007-148>

lar inspection of boilers that are located in buildings with power above 20 kW that are not used exclusively for heating and HW in family houses. The obligation to provide one-off inspection of boilers (over 15 years) is missing in the law.

Regular inspections are further divided to the inspection of boilers with a rated power (1) of less than 200 kW and more than 200 kW.

- **Boilers up to 200 kW:** 1 control per two years, gas boilers 1 control per 4 years. Inspection of boilers up to 200 kW has to be provided according to Regulation No. 276/2007 by persons approved by Ministry of Industry and Trade.
- **Boilers over 200 kW** should be controlled 1 time per year (due to amending Regulation 150/2001 cancellation). This inspection is being issued by energy auditors accredited by the Ministry of Industry and Trade.

For air conditioning systems, the owner or operator of a facility with a rated cooling output greater than 12 kW must ensure regular review every 4 years based on the Energy Management Act 406/2000 Coll. and its providing Regulation No. 277/2007 Coll. The law requires owners and operators of buildings to ensure the control since 1.1.2009.

Inspections include a visual inspection, system identification, system operation, energy intensity and efficiency of the facility, including verification of maintenance. The cost for a regular inspection of a boiler starts from 1850 CZK (74 EUR) per boiler. Experience shows that in many cases outputs without real added value and optimization opportunity can be provided for such costs. Due to the lack of quality control of these inspections (by authorities), and the pressure on price because of high competition, the price can be such low. Investors (e.g. building owners) do not stress on inspection quality as this is understood as bureaucracy more than a possibility to improve energy efficiency. Effective data collection from these inspections is missing.

### A.3.6 Cost optimality

In Czech Republic the implementation of the cost-optimal methodology is in progress and the official calculations are likely to be finalized soon. Briefly, there are already defined reference buildings for four building types, single-family houses, multi-family buildings, office buildings and “other public” buildings, represented by a school. For each of these building types, two reference buildings for the existing stock (i.e. for renovation activities) and one new reference building have been defined. As required by the EU cost-optimality Regulation, the sensitivity analysis is performed by considering several combinations of improvement packages and variants, private financial and societal (macro-economic) discount rates, varied investment costs and pre-defined energy prices scenarios. In Czech Republic it is decided that for checking/improving the requirements for both building elements (e.g. U-values) and the whole building’s energy performance, the results of cost-optimal calculations at the private financial level will be used.

### A.3.7 nZEB: requirements and roadmaps

The nZEB definition will be settled in the recast regulation coming into force in April 2013 (see section 2). Presumably the requirements on nZEB buildings will be set by



tightening requirement on specific primary energy and average U-value of a building. Adjustment of the requirements shall be made within the arranged consultation platform (see paragraph/section 8c) and shall apply to new buildings only.

At the moment, the Ministry of Environment is planning a subsidy program which will include informational campaigns and could already start in 2013. The program is being called “New Greenlight to savings” (see section 9).

### **A.3.8 Other relevant topics**

#### **A.3.8.1 Permit requirements for renovation**

All major renovations need a building permit issued by the Building authority (the same situation as in case of new building). Building authorities are related to municipalities (usually as a department of a municipality). Meeting the requirements shall be controlled by the authority with use of the Energy Performance Certificate as well.

The system of building permission is based on Building Law 183/2006 Coll. (i.e. Building Code). In general, the construction or systems that shall be renovated/ changed have to meet the same requirements as in newly built buildings.

After building's permit application and all required documents (including the EPC) are exhibited to the building authority, the based-on-law period is 30 days to give the permission. Usually there are some delays due to additional documents required by the authority.

#### **A.3.8.2 Organisation of owners in multi-family buildings and their decision process on renovation of buildings**

In Czech Republic, multi-family buildings are owned by housing cooperatives or home owners associations. Both these institutions are regulated by law and the voting system for any common issue (including building renovation) is defined accordingly within it. For a whole building renovation, usually, at least 75% of the members (flat owners) have to agree on it to make it happen.

#### **A.3.8.3 National consultation processes**

There are two main working groups related to energy efficiency in buildings, one is headed by the Czech Chamber of Commerce, and the other one by the Faculty of Civil Engineering of the Czech Technical University in Prague. Many expert companies, NGOs, independent experts take part in both groups (SEVEN, Passive House Center, Czech Green Building Council etc.) in order to cooperate with the Ministry of Industry and Trade on legislation preparation, including nZEB Czech definition.

#### **A.3.8.4 Buildings database/register**

The main data sources on the Czech building stock come from the project Tabula<sup>42</sup>, and the Czech Statistical Office<sup>43</sup> (especially from Public census – last in 2011 and

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<sup>42</sup> <http://www.building-typology.eu/country/typology-cz.html>



from Energo 2004 survey<sup>44</sup>). Today, there is limited data on energy consumption from these sources. The Public census is very brief and general in terms of housing and energy related quality. The Energo 2004 survey was based on a survey of several thousands of interviewees only.

There is not, at the moment, data being collected from the EPCs to be used as statistical information.

#### **A.3.8.5 Landlord-tenant dilemma**

The landlord-tenant problem can be identified as in other countries. In general, since the offer of flats to rent is higher than demand, there is some push on landlords to create quite favourable conditions for tenants in Czech Republic. Due to completed deregulation of tenancy in the country and energy market, the costs for energy and flats renting motivate tenants to find appropriate living for adequate costs. It motivates the landlords to improve quality of occupying their buildings and helps to tenants negotiate reasonable payments to the landlord. Obviously, the landlord can be motivated to improve his building by higher payments by tenants that can equal to tenants' savings on energy bills. Further, the landlords' investment can be supported by adequate subsidy system.

In general, overcoming the market barriers to increase energy efficiency measures investments has to be supported by information campaign that shows to citizens that the requirements are cost optimal in long term period (based on EPBD 2 as well). At present, owners are mostly focusing on investment costs than long-term view. Further, subsidized loans and direct subsidy for better quality renovations and new buildings shall be introduced (see section 9).

#### **A.3.8.6 Support policies/programmes (economic & financial instruments)**

Several financial programmes were put in place in Czech Republic to support the energy efficiency in buildings, especially measures under the European Structural Funds. However, at the moment past programmes reached to an end or were stopped due to funding allocation exceed (i.e. the subsidy program "Greenlight to savings" based on AAU units selling) and currently there are no new financial or fiscal programmes in place to support energy efficiency measures in buildings.

At the moment, the Ministry of Environment is planning a subsidy program which will include informational campaigns and could start in 2013. The program is being called now "New Greenlight to savings". It is not known yet, whether nZEB standard or passive house standard or some other "better than required" standard will be subsidized. Direct subsidies as well as interests for loans should be subsidized. Compared to previous "Greenlight to savings" subsidy program (based on AAU units selling as well), in

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<sup>43</sup> [http://www.czso.cz/sldb2011/eng/redakce.nsf/i/final\\_census\\_results](http://www.czso.cz/sldb2011/eng/redakce.nsf/i/final_census_results)

<sup>44</sup> [http://www.czso.cz/csu/tz.nsf/i/energo\\_2004](http://www.czso.cz/csu/tz.nsf/i/energo_2004)

the planned program not only residential buildings should be subsidized. Presumably, the direct subsidies for m<sup>2</sup> of energy efficient measure should be provided (and not per m<sup>2</sup> of floor area).

Up to now, the last call of Operational program Environment (EU Structural funding) for public buildings refurbishment was in 2012. It is expected that some new similar program should start in 2014 with new budgetary program period of EU.

The following tables provide an extract on the upcoming programmes and a selection of some of some of past programmes<sup>45</sup>.

#### Programme A

|   |   |                    |               |              |                 |              |
|---|---|--------------------|---------------|--------------|-----------------|--------------|
| <b>Programme name</b>                       | <b>New Greenlight to savings</b>  |                    |               |              |                 |              |
| <b>Start – End Dates</b>                    | foreseen to start in 2013   |                    |               |              |                 |              |
| <b>Type of programme</b>                    | direct subsidy (grant) and interest rate subsidy  |                    |               |              |                 |              |
| <b>Budget</b>                               | N/A   |                    |               |              |                 |              |
| <b>Measures covered</b>                     | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> </ul> |                    |               |              |                 |              |
| <b>Programme impacts</b>                    | Presumably both ex-ante and ex-post   |                    |               |              |                 |              |
| <b>Targeted buildings:<br/>(presumably)</b> | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|   |   |                    | Private owned | Public owned | Private owned   | Public owned |
|   | x   | x                  | x             | x            | x               | x            |

#### Programme B

|                          |  |
|--------------------------|--|
| <b>Programme name</b>    | <b>National Environment Fund: Operational Programme Environment (OPZP in Czech)<sup>46</sup></b> |
| <b>Start – End Dates</b> | 2007-2013  |
| <b>Type of programme</b> | Grants   |

<sup>45</sup> Please note that other programmes exist.

<sup>46</sup> <http://en.opzp.cz/sekce/509/priority-axis-3/>

|   |   |                    |               |              |                 |              |
|---|---|--------------------|---------------|--------------|-----------------|--------------|
| <b>Budget</b>                               | Total EUR 673 million   |                    |               |              |                 |              |
| <b>Measures covered</b>                     | ENVELOPE (including insulation, windows & glazing, exterior wall, doors, ceiling, etc.)<br><br>EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.) |                    |               |              |                 |              |
| <b>Programme impacts</b>                    | N/A   |                    |               |              |                 |              |
| <b>Targeted buildings:<br/>(presumably)</b> | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|   |   |                    | Private owned | Public owned | Private owned   | Public owned |
|   | x   | x                  |               |              |                 | x            |

Programme C

|   |  |                    |               |              |                 |              |
|---|--|--------------------|---------------|--------------|-----------------|--------------|
| <b>Programme name</b>                       | <b>Building Retrofit Subsidies: PANEL programme</b>                            |                    |               |              |                 |              |
| <b>Start – End Dates</b>                    | 2004 (amended in 2009)   |                    |               |              |                 |              |
| <b>Type of programme</b>                    | Grants, Preferential loans, Third Party financing                              |                    |               |              |                 |              |
| <b>Budget</b>                               | CZK 4.1 billion (2009)   |                    |               |              |                 |              |
| <b>Measures covered</b>                     | Envelope, technical equipment (heating, ventilation systems, RES in buildings) |                    |               |              |                 |              |
| <b>Programme impacts</b>                    | N/A  |                    |               |              |                 |              |
| <b>Targeted buildings:<br/>(presumably)</b> | New buildings  | Existing buildings | Residential   |              | Non Residential |              |
|   |  |                    | Private owned | Public owned | Private owned   | Public owned |
|   |  | x                  | x             | x            |                 |              |

## A4. Finland



### A.4.1 Strategies and (action) plans for the building sector

In Finland, the ERA 17 Action Plan<sup>47</sup> for an Energy-Smart Built Environment 2017 sets out a long-term vision for the energy performance of the building sector. The plan's ambitious goal is to reach the efficiency requirements set for 2020 three years earlier, in 2017. The main objectives of the plan are:

- the rapid reduction of energy use and emissions in communities and buildings;
- that Finland becomes a pioneer in sustainable building;
- increased use of renewable energy;
- that the built environment is viewed as whole: spatial planning, community planning, construction, living environments.

Renovation is one part of the ERA-17 roadmap, which also includes energy efficiency in new construction, land use planning and energy efficient operations. The main measure is to develop energy efficiency standards for renovation, as well as competency requirements for renovation contractors.

Also, the planning for the achievement of the EED 3% renovation rate for central government buildings has just started. A working group has been set up, including the Ministry of Finance (which is in charge of state administration), Senate Properties (which owns most of the building stock) and the National Board of Antiquities. They will be reviewing the options of renovating 3% of the building stock or achieving the same savings with other measures.<sup>48</sup>

### A.4.2 Building codes

The energy standards in the Finnish Building Code (part D3)<sup>49</sup> were recently revised and the new requirements entered into force on July 1, 2012. The main feature is a shift from requirements concerning the heat loss of individual components to one figure (the E index) describing the total calculated energy use of the building. This index refers to the product of the energy purchased into the building and the primary energy factor for each energy source.

The aim of the newest revision is to move away from regulating individual components and to allow builders the flexibility to choose the ways in which the standards are met. The purpose is also to place emphasis on primary energy use; this influences especially the use of electricity.

The regulations only concern new buildings. Requirements for existing have been prepared and are planned to enter into force in early 2013. They are likely to require that

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<sup>47</sup> More information on: [http://era17.fi/en/files/2010/11/ERA17\\_presentation.pdf](http://era17.fi/en/files/2010/11/ERA17_presentation.pdf)

<sup>48</sup> [http://energia.fi/sites/default/files/dokumentit/energia-ja-ymparisto/esitys\\_vaisanen.pdf](http://energia.fi/sites/default/files/dokumentit/energia-ja-ymparisto/esitys_vaisanen.pdf)

<sup>49</sup> [http://www.finlex.fi/data/normit/37188-D3-2012\\_Suomi.pdf](http://www.finlex.fi/data/normit/37188-D3-2012_Suomi.pdf) (In Finnish version only)

the energy use of components or of the entire building is cut by 50% compared to the previous situation when renovations are undertaken.

#### A.4.2.1 Energy performance requirements

The E index, i.e., the total primary energy consumption, is to be calculated when applying for a building permit. The maximum calculated energy use for different building types is shown in table 25.

**Table 25: Energy performance requirements (kWh/m<sup>2</sup>/year)**

|                 |                | Single family houses |  | Multi-family houses |     | Offices |     | Schools |     | Hospitals |     |
|-----------------|----------------|----------------------|--|---------------------|-----|---------|-----|---------|-----|-----------|-----|
|                 |                | min                  | max  | min                 | max | min     | max | min     | max | min       | max |
| New stock       | Primary energy | N/A                  | < 120m <sup>2</sup> = 204;<br>>120m <sup>2</sup> = 130-204 <sup>50</sup> | N/A                 | 130 | N/A     | 170 | N/A     | 170 | N/A       | 450 |
|                 | Heating        | N/A                  | N/A  | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |
|                 | Cooling        | N/A                  | N/A  | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |
| Renovated stock | Primary energy | N/A                  | N/A  | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |
|                 | Heating        | N/A                  | N/A  | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |
|                 | Cooling        | N/A                  | N/A  | N/A                 | N/A | N/A     | N/A | N/A     | N/A | N/A       | N/A |

The above requirements are specified in terms of primary energy use. The following conversion factors are used for primary energy from different sources:

- fossil fuels: 1
- electricity: 1,7
- district heat: 0,7
- renewable energy: 0,5

#### A.4.2.2 Thermal insulation

There are no longer fixed requirements for individual components. Instead, the heat loss of the building envelope is calculated on the basis of the sum of the heat losses of individual building components multiplied by their area.

<sup>50</sup> depends on the size of the building

The next table shows the reference U-values for heated ( $\geq +17^{\circ}\text{C}$ ) and semi-heated spaces (from  $+5^{\circ}\text{C}$  to  $+17^{\circ}\text{C}$ ).

**Table 26: U-value requirements**

| Building component |   | U-value for heated spaces<br>[W/m <sup>2</sup> K] | U-values for the semi-heated spaces [W/m <sup>2</sup> K] |
|--------------------|---|---|--|
| Walls              | Wall  | 0,17  | 0,26   |
|                    | Log wall                                    | 0,40  | 0,60   |
| Windows            | Window, door, skylight                      | 1,0   | 1,4  |
| Roof/Ceilings      | Roof  | 0,09  | 0,14   |
| Floors             | Base floor on ground                        | 0,16  | 0,24   |
|                    | Floor when there are ventilated foundations | 0,17  | 0,26   |

#### A.4.2.3 Compliance<sup>51</sup>

The main form of control is the submission of the energy analysis, which is a requirement for application for a building permit. This calculation establishes the calculated energy use for the building. The municipal building inspector monitors compliance with these requirements and ensures that the energy analysis is correctly performed before issuing a building permit. There are also requirements concerning the main building designer's competence.

A final inspection is required before the building is approved for use and sale. This must be completed within a period defined in the building permit. The building inspector inspects that the requirements of the building code have been fulfilled.

#### A.4.3 Measures for implementing Article 13(4) of the RED

The new energy regulations in the national Building Code offer an advantage to energy produced using renewable energy sources (primary energy conversion factor 0.5).

There have also been plans to mandate a share of renewable energy in new buildings; these have been postponed to the next revision of the energy requirements in the national Building Code.

<sup>51</sup> More information at <http://www.finlex.fi/data/normit/28238-A1su2006.pdf> (In Finnish version only)

#### A.4.4 Energy Performance Certificates

EPC energy classes for each building category in Finland are included in the following table.

**Table 27: EPC Energy classes**

| Energy class | Energy consumption band (kWh/gross m <sup>2</sup> /year) |                  |         |                       |           |
|--------------|--|------------------|---------|-----------------------|-----------|
|              | Single-family houses                                     | Apartment Blocks | Offices | Educational buildings | Hospitals |
| A            | < 150  | < 100            | < 90    | < 120                 | < 160     |
| B            | 151-170  | 101-120          | 91-110  | 121-150               | 161-200   |
| C            | 171-190  | 121-140          | 111-130 | 151-190               | 201-260   |
| D            | 191-230  | 141-180          | 131-170 | 191-230               | 261-340   |
| E            | 231-270  | 181-230          | 171-230 | 231-300               | 341-450   |
| F            | 271-320  | 231-280          | 231-320 | 301-400               | 451-600   |
| G            | > 321  | > 281            | > 321   | > 401                 | > 601     |

Since 2008, the owner of newly constructed building needs to obtain an energy performance certificate when the building or a part of it is utilised, sold or rent. Since 2009, the legislation is also covering buildings constructed before 2008; however the certificate has been optional for single-family houses or buildings with less than six apartments that have been built prior 2008 and certificates will not be required for holiday homes or smaller buildings, industrial premises, protected buildings and churches.

#### A.4.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD<sup>52</sup>

Since 1997 there has been a voluntary inspections scheme approach for oil-heated properties instead of mandatory boiler inspections. From 2013, also bio boilers, including boilers with a nominal capacity of less than 20 kW, are inspected alternatively by giving further information about more energy efficient heating systems and renovation of older systems. It is estimated that at least the same savings in energy can be gained by alternative guidance than by obligatory regular inspections.

There has also been a grant provided for residential buildings for converting heating systems to renewable energy sources. This grant has covered 20% of the investment costs but it is no longer included in the state budget for 2013.

<sup>52</sup> More information at

[http://www.ideal-epbd.eu/index.php?option=com\\_content&view=article&id=20&Itemid=4&lang=en](http://www.ideal-epbd.eu/index.php?option=com_content&view=article&id=20&Itemid=4&lang=en)

Inspection of air-conditioning systems has been compulsory since the beginning of 2008. It concerns equipment of at least 12 kW of power and is only mandatory, where cooling systems are based on the use of compressors. However, in 2013 the legislation will be overruled and there will be a switch to alternative regime similar to the case of the heating boilers.

#### **A.4.6 Cost optimality**

The cost optimality method is being developed in a research project involving several major universities and research institutes. The first results will be available in March 2013.

#### **A.4.7 nZEB requirements and roadmaps**

The technical specifications on nZEB are being prepared. The overall roadmap involves several stages, such as the new energy performance certificate classification and other provisions, the provision of energy standards for existing buildings that are renovated, and the development of requirements for the use of renewable energy sources and specifications on how this is integrated into the calculation of the E index. Technical specifications of nZEB are expected in 2015 and will be integrated in these preceding developments.<sup>53</sup>

#### **A.4.8 Other relevant topics**

##### **A.4.8.1 Permit requirements for renovation<sup>54,55</sup>**

Building permits are required for renovation and alteration works that are comparable to new construction, including extensions and essential changes of usage purpose, as well as for works that have an impact on health and safety of building users. Examples include: changes to rooms with a floor gully, essential changes in heating, water or ventilation systems; façade changes especially in areas covered by the town plan; energy efficiency improvements by adding insulation; changes to load-bearing structures; changes to roof shape; installation of a new elevator; renewal or construction of a chimney or fireplace (except when approved products and installers are used, in which cases a notification is sufficient); changes in apartments, which can influence other residents.

Construction permits are issued and monitored by the municipalities (building inspectors). The definition of major renovations and the extent to which the current energy standards are applied to the renovations is done by the building inspectors on a case-by-case basis.

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<sup>53</sup> More information at <http://web.finnexpo.fi/Sites1/FinnBuild/MaterialBank/RoadMap%202012-2020.pdf> (In Finnish version only)

<sup>54</sup> <http://www.korjaustieto.fi/viranomaistieto/saadokset-ja-maaraykset/luvat-kuntoon/milloin-tarvitaan-lupaa.html> (In Finnish language)

<sup>55</sup> <http://www.korvo.fi/11lammaneristysenergia/114> (In Finnish language)



#### **A.4.8.2 Organisation of owners in multi-family buildings and their decision process on renovation of buildings<sup>56</sup>**

Owner-occupied apartment buildings and terraced houses are owned by housing companies, i.e., the owners own shares giving them right to a certain dwelling or dwellings in the building, in which they usually live themselves (but can - and often do - also rent). Owners make decisions about the building collectively, in the residents' general assembly. A simple majority of more than 50% of the shares is needed to decide on a renovation. The decisions are prepared and legal responsibility is borne by the residents' board elected by this assembly. The housing company is responsible for the maintenance of building structures and insulation, as well as for heating, electricity, data communications, water, sewage and ventilation systems (Housing Companies Act 2010). The Housing Companies Act also requires housing companies to make long-term renovation plans, which is expected to facilitate the financing of major renovations. Operative management is the responsibility of the house manager; these are today usually contracted professional companies.

Compared to some countries, the decision making is facilitated by the fact that the housing company is a legal entity and the owner of the property. It can hence take out a loan for the renovation once a decision has been reached.

#### **A.4.8.3 National consultation processes**

The already mentioned ERA 17<sup>57</sup> Action Plan for an Energy-Smart Built Environment 2017 resulted from the gathering of a broad-based group of experts to map out the best ways to take further energy-smartness back in January 2010.

The Government has regular consultations with representatives of industry and other stakeholder groups, through the relevant national associations. For example, the Ministry of Environment organized an electronic consultation survey in 2012 on the Road Map for building regulations for NZEB construction by 2020. A total of 346 experts and stakeholders participated and gave their views on the schedule for reaching various NZEB milestones as well as on the need for accompanying measures<sup>58</sup>.

#### **A.4.8.4 Buildings database/register<sup>59</sup>**

The Building Registry (RH registry) is a database that stores data on all measures related to building permits, as well as several other kinds of data on all Finnish buildings. It is maintained by the Population Register Centre and the Local Register Offices. Some of these data are publicly available in aggregated form via the Statistics Finland.

As part of an updating of the energy performance certification legislation, work is underway to develop a register that can receive also the most important data from energy

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<sup>56</sup> <http://www.finlex.fi/fi/laki/ajantasa/2009/20091599> (In Finnish language)

<sup>57</sup> [http://era17.fi/en/files/2010/11/ERA17\\_presentation.pdf](http://era17.fi/en/files/2010/11/ERA17_presentation.pdf)

<sup>58</sup> Säteri, H. (2012). Rakennusten energiavaatimusten RoadMap – moottoritie kohti 2020. Energiasta kestävyteen – seminaari, Finlandia-talo, 7.6.2012.

<sup>59</sup> <http://era17.fi/rakentamisen-ohjaus/rakennusten-energiatodistus-ja-kiinteistötietojen-rekisteri/> (In Finnish language)

performance certificates issues. The data will be entered in connection with the building permit process or when energy performance certificates are drawn up for existing buildings. The work is being done under the leadership of the Ministry of Environment and the Ministry of Finance.

The preparation of a registry that conforms to the EPBD started in spring 2011 and the plan is to take the registry into use during 2013, at the latest. The registry will be hosted by ARA, the Housing Finance and Development Centre of Finland.

#### **A.4.8.5 Landlord-tenant dilemma**

The landlord-tenant issue has not until now been a problem in Finland, because heating energy costs are usually charged as part of the rent. Hence, it is as much in the landlords' as much as in the tenants' interests to reduce energy costs.

#### **A.4.8.6 Support policies/programmes (economic & financial instruments)**

Numerous supporting programmes exist in Finland to encourage the energy efficiency in buildings. Further, to support the long-term strategy to improve the energy efficiency by 20% by 2020, voluntary agreements with targets to reduce energy consumption have been put in place.

The following tables provide an extract on the on-going programmes and a selection of some past programmes<sup>60</sup>.

##### **Programme A**

| <b>Programme name</b> | <b>Grant for renewable energy</b>  |
|-----------------------|--|
| Start – End Dates     | 2006-2008, 2011-2012   |
| Type of programme     | Grant  |
| Budget                | Varies: a total of 10 million € were allocated in 2012.  |
| Measures covered      | The grant is managed by the Housing Finance and Development Centre of Finland (ARA) on the basis of annual allocations from the government budget and handed out and monitored by the municipalities. The contents change somewhat every few years: In 2012, grants are awarded for ground-source heat, air-water source heat pumps, pellet and wood-chip burners, wood-based central heating, and hybrid systems including solar heat and power. Grants are only available for existing buildings and recipients can receive 20% of the investment costs. The grant can be combined with a general tax deduction from work conducted in the household, which can be used for e.g. installment and drilling of bore-holes for ground source heat. In addition, grants are also available for |

<sup>60</sup> Please note that other programmes exist.

|                           |   |                           |                      |                     |                        |                     |
|---------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
|                           | other energy efficiency investments by low-income households. In addition, grants are also available for other energy efficiency investments by low-income households.                                    |                           |                      |                     |                        |                     |
| Programme impacts         | The programme was used by about 10 000 households between 2006-2008. The estimated CO <sub>2</sub> reductions are about 25 000 t CO <sub>2</sub> e/year. The most recent term has not yet been evaluated. |                           |                      |                     |                        |                     |
| Targeted buildings types: | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                           |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                           |   | x                         | x                    |                     |                        |                     |

## Programme B

|                           |  |                           |                      |                     |                        |                     |
|---------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>     | <b>Tax deduction for household work<sup>61</sup></b>   |                           |                      |                     |                        |                     |
| Start – End Dates         | Has been applicable to renovations since 2005  |                           |                      |                     |                        |                     |
| Type of programme         | Tax deduction  |                           |                      |                     |                        |                     |
| Budget                    | N/A  |                           |                      |                     |                        |                     |
| Measures covered          | The tax deduction is not specific to energy renovations, but covers several categories of work performed in the household (since 2001). Since 2005, this has included home improvements and renovations (including energy renovations) made in permanently occupied homes. In the case of energy renovations, this is mainly relevant for single-family homes, where renovations are made individually by the household. The maximum amount of the tax deduction in 2012 is 2000 € per person (this can change annually) of the labor costs. Since a court decision in 2009, the tax deduction can be used for also for e.g. installment and drilling of boreholes for ground source heat. |                           |                      |                     |                        |                     |
| Programme impacts         | Evaluations are not available. The tax authority does not register for which purpose the tax deduction is used, so the instrument is impossible to evaluate.   |                           |                      |                     |                        |                     |
| Targeted buildings types: | <b>New buildings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                           |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                           |  | x                         | x                    |                     |                        |                     |

<sup>61</sup> <http://www.soininvaara.fi/2010/12/30/verotyoryhman-kommentointia-3-kotitalousvahennys/>

## Programme C

| Programme name            | Energy grant for multifamily buildings  |                    |               |              |                 |              |
|---------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2003 - ongoing (with somewhat different criteria and grant levels annually)   |                    |               |              |                 |              |
| Type of programme         | Grant   |                    |               |              |                 |              |
| Budget                    | Varies annually: 57 million EUR in 2010, 8.8 million in 2012  |                    |               |              |                 |              |
| Measures covered          | The grant covers a maximum of 40% of the costs of an energy audit and a maximum of 15% of the costs of various approved energy efficiency measures (e.g. window replacement, insulation, heating and ventilation system adjustment and valve replacement, heat recovery, connection to district heat) |                    |               |              |                 |              |
| Programme impacts         | According to an evaluation conducted in 2007, the energy saving impacts of this instrument as concerned the measures completed were about 180 GWh/a. No impacts were estimated for the energy audits.   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                           |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |   | x                  | x             |              |                 |              |

## Programme D

| Programme name            | Voluntary agreement for rental housing organizations   |                    |               |              |                 |              |
|---------------------------|--|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2010 – 2016 (as part of the voluntary agreement of the real estate sector)   |                    |               |              |                 |              |
| Type of programme         | Voluntary agreement  |                    |               |              |                 |              |
| Budget                    | N/A  |                    |               |              |                 |              |
| Measures covered          | Targets to reduce average specific energy consumption in rental estates by 20% by 2020. All kinds of measures can be used (new construction, renovation, operational measures) |                    |               |              |                 |              |
| Programme impacts         | Measures taken by signatories are reported and monitored annually, but no evaluation is available.   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings  | Existing buildings | Residential   |              | Non Residential |              |
|                           |  |                    | Private owned | Public owned | Private owned   | Public owned |
|                           | x  | x                  | x             | x            |                 |              |

## Programme E

| Programme name            | Voluntary agreement for service buildings   |                    |               |              |                 |              |
|---------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2010 – 2016 (as part of the voluntary agreement of the real estate sector)  |                    |               |              |                 |              |
| Type of programme         | Voluntary agreement   |                    |               |              |                 |              |
| Budget                    | N/A   |                    |               |              |                 |              |
| Measures covered          | Target to reduce energy use by members by 6% from 2010 levels by 2016. Long term target to improve energy efficiency by 20% by 2020. All kinds of measures can be used (new construction, renovation, operational measures) |                    |               |              |                 |              |
| Programme impacts         | Measures taken by signatories are reported and monitored annually, but no evaluation is available.  |                    |               |              |                 |              |
| Targeted buildings types: | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                           |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |   |                    |               |              | x               | x            |

## Programme F

| Programme name            | Grants for low-income single-family homeowners  |                    |               |              |                 |              |
|---------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2006 - ongoing  |                    |               |              |                 |              |
| Type of programme         | Grant   |                    |               |              |                 |              |
| Budget                    | 2 million EUR in 2012   |                    |               |              |                 |              |
| Measures covered          | The grant is managed by the Housing Finance and Development Centre of Finland (ARA) on the basis of annual allocations from the government budget and handed out and monitored by the municipalities. Grants of a maximum of 25% are awarded for several kinds of energy improvements that are deemed sensible and necessary. The income limits are 1 355 EUR/month for households of one person and 2 260 EUR/month for households with two persons. |                    |               |              |                 |              |
| Programme impacts         | No evaluation exists.   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                           |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |   | x                  | x             |              |                 |              |



## A5. France

### A.5.1 Strategies and (action) plans for the building sector

In France, there is a long term objective established by the French energy law in 2005, known as *Facteur 4*, to reduce greenhouse gas emissions by a factor of four by 2050, when compared with the emissions level of 1990.

As the construction sector accounts for 44% of France's final energy consumption, the Environment Round Table (Grenelle) has set very ambitious targets for new and existing building. New buildings should be energy positive by 2020 (BEPOS, primary energy average consumption lower or equal to 0 kWh<sub>ep</sub>/m<sup>2</sup>/year<sup>62</sup>), whilst for existing building stock, a 38% reduction in primary energy consumption has been set with the objective to achieve an average specific energy consumption of 150 kWh<sub>ep</sub>/m<sup>2</sup>/year in primary energy terms by 2020, compared with a current average of 240 kWh<sub>ep</sub>/m<sup>2</sup>/year. To achieve this goal a massive programme of major renovation must be implemented and the target is to achieve 400 000 renovations per year over the period 2013-2020. Further, a range of diversified instruments is being mobilized such as regulations, financial incentives, training, information and awareness-raising.<sup>63</sup>

Regarding the EED requirement for the annual renovation rate of 3% in central Government buildings, the Grenelle 1 has already set, back in 2009, to subject all of the state buildings, as well as those of its public establishments, to an energy audit by the end of 2010. The aim was to begin renovation of these buildings by 2012, at a rate of 3% per year, using the diagnosis produced. This renovation should achieve a reduction of at least 40% in energy consumption and 50% in greenhouse gas emissions in the State building stock by 2020.

More information on plans and programs is available on the NEEAP 2<sup>64</sup>.

### A.5.2 Building codes

In France the building code reference document is the 2012 Thermal Regulation (RT)<sup>65</sup> which replaces the RT 2005. The new document strengthens requirements concerning the thermal performance of new buildings. In particular, all new buildings with a building permit lodged after 1 January 2013 must have a specific energy consumption in primary terms below a threshold of 50 kWh<sub>ep</sub>/m<sup>2</sup>/year, including space heating, cooling, lighting, domestic hot water and auxiliary equipment (pumps and fans). This requirement applied earlier, from 28 October 2011, in the case of public and service buildings.

For major renovation<sup>66</sup> of buildings more than 1000 m<sup>2</sup>, the global Thermal Regulation sets a global energy performance target for renovated buildings, built after 1948. The

<sup>62</sup> kWh<sub>ep</sub>= primary equivalent of 1 kWh of electricity; 1 kWh<sub>ep</sub>=2,58 kWh

<sup>63</sup> Source : NEEAP II

<sup>64</sup> National energy efficiency action plan for France, pursuant to Articles 4 and 14 of Directive 2006/32/EC, available on [http://ec.europa.eu/energy/efficiency/end-use\\_en.htm](http://ec.europa.eu/energy/efficiency/end-use_en.htm)

<sup>65</sup> <http://www.rt-batiment.fr/batiments-neufs/reglementation-thermique-2012/presentation.html>

<sup>66</sup> Only apply to renovation that costs more than 25% of the value of the building, excluding land cost, ie 322 €/m<sup>2</sup> for dwellings and 275 €/m<sup>2</sup> for non residential buildings (cost without taxes).

target is for dwellings to reach a consumption between 80 and 195 kWh/m<sup>2</sup>/yr between 2005 and 2010 and a range of 80-165 kWh/m<sup>2</sup>/year since 2010 compared to an average of 240 kWh/m<sup>2</sup>/yr for the existing stock. The range depends on the climatic zone and heating fuel. For non-residential buildings the savings should be of 30%.

For major renovation of buildings less than 1000 m<sup>2</sup>, or buildings more than 1000 m<sup>2</sup> undergoing minor renovation, the element-by-element Thermal Regulation sets a minimum performance level for elements replaced or installed: this concerns, in particular, insulation, heating, hot-water production, cooling and ventilation equipment.

In case of existing buildings, the Thermal Regulation aims to ensure significant improvement in the energy performance when a contracting authority undertakes work with potential for such an improvement. The applicable measures, the global Thermal Regulation and the element-by-element Thermal Regulation, differ according to the scale of the work undertaken.

#### A.5.2.1 Energy performance requirements

The thermal performance is expressed in primary energy kWhep: for all fossil fuels 1 kWh= 1 kWhep; for electricity 1 kWh= 2.58 kWhep.

Table 28 shows the maximum values for different building types.

**Table 28: Energy performance requirements (kWhep/m<sup>2</sup>/year)**

|   |   | Single family houses |     | Multi-family houses |                   | Offices |     | Schools |     | Hospitals |     |
|---|---|----------------------|-----|---------------------|-------------------|---------|-----|---------|-----|-----------|-----|
|   |   | min                  | max | min                 | max               | min     | max | min     | max | min       | max |
| New stock   | Primary energy (kWhep/m <sup>2</sup> /year) | N/A                  | 50  | N/A                 | 50                | N/A     | 50  | N/A     | 50  | N/A       | 50  |
| Renovated stock (>1000 m <sup>2</sup> , built after 1948) | Final energy (kWh/m <sup>2</sup> /year)     | N/A                  | N/A | 80                  | 165 <sup>67</sup> | 80      | 165 | 80      | 165 | 80        | 165 |

The threshold varies according to geographical location, altitude, nature of use of the building, average surface area of the dwellings and greenhouse gas emissions.

<sup>67</sup> The range 80-165 kWh/m<sup>2</sup>/ye depends on the climatic zone and heating fuel/

### A.5.2.2 Thermal insulation requirements

The reference value coefficient for heat losses through the building envelope is noted « Ubât-réf », and is expressed according to the following formula:

$$\frac{a1 * A1 + a2 * A2 + a3 * A3 + a4 * A4 + a5 * A5 + a6 * A6 + a7 * A7 + a8 * L8 + a9 * L9 + a10 * L10}{A1 + A2 + A3 + A4 + A5 + A6 + A7}$$

With:

A1: Area of opaque vertical walls including vertical walls from attic but exclusive of opaque areas accounted for as A5, A6 and A7;

A2: area of upper floors and roofs exclusive of areas accounted for as A3;

A3: Area of terraces and metallic roofs in non-residential buildings;

A4: Area of ground floors;

A5: Door area except for totally glazed doors;

A6: Area of windows, totally glazed doors, French windows and transparent or translucent walls in residential buildings;

A7: Area of windows, totally glazed doors, French windows and transparent or translucent walls in non-residential buildings;

L8: length of peripheral link between ground floor and walls;

L9: length of peripheral link between intermediate floors and walls;

L10: length of peripheral link between roofs, or terraces and walls

Areas are measured on the inside; and L8 to L10 are evaluated from the interior dimensions of the rooms. For these lengths and areas, are only considered the surfaces of a heated volume in contact with outside or a non-heated volume.

Coefficients a1 to a10 are indicated in table 29:

**Table 29: Reference value coefficients for thermal regulation of buildings**

| Coefficient a1 | Zones H1, H2 and H2>800m | Zone H2≤800m |
|----------------|--------------------------|--------------|
| a1 (W/m²K)     | 0.36                     | 0.40         |
| a2 (W/m²K)     | 0.20                     | 0.25         |
| a3 (W/m²K)     | 0.27                     | 0.27         |
| a4 (W/m²K)     | 0.27                     | 0.36         |
| a5 (W/m²K)     | 1.50                     | 1.50         |
| a6 (W/m²K)     | 2.10                     | 2.30         |



|                               |   |   |
|-------------------------------|---|---|
| <b>a7 (W/m<sup>2</sup>K)</b>  | 1.80  | 2.10  |
| <b>a8 (W/m<sup>2</sup>K)</b>  | 0.40  | 0.40  |
| <b>a9 (W/m<sup>2</sup>K)</b>  | 0.55 for single family dwellings and 0.60 for other type of dwellings | 0.55 for single family dwellings and 0.60 for other type of dwellings |
| <b>a10 (W/m<sup>2</sup>K)</b> | 0.50 for single family dwellings and 0.60 for other type of dwellings | 0.50 for single family dwellings and 0.60 for other type of dwellings |

### A.5.2.3 Compliance

The global compliance monitoring is not defined in the building code requirements. Further, no official statistics exist. However, some penalties occur in case construction rules are not applied (i.e. penalties up to 45 000€, and to 75 000€ in case of recurrence (+6 months jail)). In the frame of RT 2012 new buildings are now required to have two certificates: one at the time of deposit of the construction permit attesting RT 2012 has been considered, and the other at the building completion. The latter is established only by a qualified professional and has a measurement of the air tightness of the building.<sup>68</sup>

No official control exists so far on nZEB (or BEPOS in French with primary energy average consumption lower or equal to 0 kWh/m<sup>2</sup>/year).

### A.5.3 Measures for implementing Article 13(4) of the RED

No measures for implementing Article 13(4) of the RED currently are in place.

### A.5.4 Energy Performance Certificates<sup>69</sup>

The Energy Performance Diagnosis in buildings (DPE) has been mandatory when selling any dwelling or building in metropolitan France, for both private individuals and professionals, since 1 November 2006. From 1 July 2007, DPE was extended to rental agreements as well. Public buildings must display the Diagnosis in the reception area. Since 1 January 2011, it has been mandatory to display the energy class of a dwelling in any property advertisement concerning the sale or rental of a property. In addition, auditors are required to forward all Energy Performance Diagnoses undertaken to the French Environment and Energy Management Agency (ADEME).

The certificate should display the specific energy consumption in primary energy terms (kWh/m<sup>2</sup>) and CO<sub>2</sub> emissions. The energy class are the same for all types of dwellings.

<sup>68</sup> More information available at <http://www.architectes.org/actualites/le-respect-de-la-rt-2012-les-modalites-de-contrôle-avant-et-après-les-travaux/>

<sup>69</sup> <http://www.rt-batiment.fr/batiments-existants/dpe/presentation.html>

Table 30 shows the different EPC energy classes and the relevant energy consumption.

**Table 30: EPC Energy classes**

| Energy class | Specific energy consumption for dwellings |  |
|--------------|---|--|
|              | kWh <sub>ep</sub> /m <sup>2</sup> year    | kg <sub>eqCO2</sub> /m <sup>2</sup> year |
| <b>A</b>     | ≤ 50                                      | ≤ 5                                      |
| <b>B</b>     | 51 – 90                                   | 6 – 10                                   |
| <b>C</b>     | 91 – 150                                  | 11 – 20                                  |
| <b>D</b>     | 151 – 230                                 | 21 – 35                                  |
| <b>E</b>     | 231 – 330                                 | 36 – 55                                  |
| <b>F</b>     | 331 – 450                                 | 56 – 80                                  |
| <b>G</b>     | > 450                                     | > 80                                     |

#### **A.5.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD**

In France, the requirement of the Directive 2002/91/EEC to establish at MS level a periodic inspection of air-conditioning systems of an effective rated output of more than 12 kW was transposed within the framework of a decree on 31 March 2010. The decree specifies the main inspection stages: inspection of documentation, evaluation of system performance, evaluation of system dimensions in relation to building cooling requirements, provision of necessary recommendations on proper use of the system in place, possible improvements to the installation, possible benefit from its replacement and other potential solutions. Inspections take place every five years and cover 300 000 installations in France (10% of installed stock).

Boilers between 4 and 400 kW are required for annual maintenance to be carried out by a qualified professional. A maintenance certificate informing the client about the state of his or her boiler and central heating system must be given to the client no later than 15 days after the visit and kept for two years by the client to produce in the event of a check.

#### **A.5.6 Cost optimality**

In respect of Article 5 of the EPBD 2010 version France is currently developing a study on RT 2012 and on thermal regulation on existing buildings to determine the energy performance requirements-optimal levels in terms of overall costs. The report will be provided to the European Commission by the end of April 2013.

### A.5.7 nZEB: requirements and roadmaps

In France there is not an official definition of nZEB yet. However, the definition of nZEB currently used corresponds to the BEPOS with primary energy average consumption lower or equal to 0 kWh/m<sup>2</sup>/year.

Plans to increasing nZEB in the existing building stock (Art 9(1) of EPBD) include:

- **Exemption from property tax** on existing buildings for BBC Dwellings: local authorities and public establishments grant 50% or 100% exemption from property tax on existing buildings and construction of new dwellings completed from 1 January 2009 and having a BBC label.
- **Targeting of Scellier aid** for rental investment towards BBC Dwellings: The Finance Law for 2010 provided for 'greening' of the so-called 'Scellier' tax relief for rental investment, that is to say, tax reduction rate applicable to dwellings without a 'BBC - low energy consumption building' label. The applicable tax reduction rate decreased from 25% in 2010 to 10% in 2012; the rate applicable to dwellings with a BBC label, was maintained at 20% in 2012.
- **Targeting of aid for housing purchase towards BBC Dwellings:** zero rate eco-loans and CITEPA ('greening' of tax credit on interest on loans contracted for purchase or construction of a permanently occupied dwellings ('TEPA tax credit', dwellings with a 'low consumption building, BBC 2005' label).

### A.5.8 Other relevant topics

#### A.5.8.1 Permit requirements for renovation

No permit is required for renovation as long as the building envelope external outlook is not modified.

A simplified declaration scheme is obligatory for some building envelope modifications when the concerned area is limited (sunspaces or sun houses of less than 20 m<sup>2</sup>), for use of renewable energy (solar collectors (<4 m<sup>2</sup> per dwelling), PV panels (<20 m<sup>2</sup>)).

Building permit is necessary when the building features are modified: new windows (different size or material than previously), modification of roof, of building height, external insulation, etc. The minimum delay for building permit delivery is 3 months and the average amount of time it takes is around 5-6 months.

#### A.5.8.2 Organisation of owners in multi-family buildings and their decision process on renovation of buildings<sup>70</sup>

Decisions about renovations in owner-occupied multi-family are made by the owners collectively (the condominium association). According to ARC17 (2006), the condominium association is a legal entity represented by a collective decision (syndic in French), which can be one of the owners or a professional mandated representative. The collective decision is supported and controlled by a board of trustees. Decisions about reno-

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<sup>70</sup> <http://ecocitoyens.ademe.fr/mon-habitation/en-copropriete/renover-en-copropriete>

ventions are taken by an absolute majority (i.e, more than half of all shareowners need to agree and be represented in the meeting). However, there is no requirement for a renovation fund, although these are strongly advocated by ARC (2012).<sup>71</sup>

Grenelle 2 (Article 7) provides for amendment of the condominium decision-making rules to introduce:

1. A majority vote of condominium for major retrofitting;
2. A majority vote of condominium on installation of thermal energy meters or heating cost distributors;
3. Mandatory inclusion of the energy performance contract on the agenda of the condominium's general meeting that follows the drawing-up.

#### **A.5.8.3 National consultation processes**

In the building sector, each review of the energy regulations (which occurs every 5 years) is associated with a regular consultation of national stakeholders. A progress review is presented every 6 months and a large number of technical and non-technical working groups are set up and animated by the Department of Housing.

For other subjects, the Grenelle de l'Environnement national debate launched in mid 2007 and lasted until end of 2008, was the first national consultation ever with such a large array of stakeholders.

#### **A.5.8.4 Buildings databases/registers**

The main data source on the French building stock is the OPEN Observatory (Observatoire Permanent de l'amélioration ENergétique du logement<sup>72</sup>) which is financed and created by the French Environment and Energy Management Agency (ADEME) and provides quantitative data on residential financial efforts to improve the energy performance of their dwelling. CEREN, a private company, surveys the building stock and thus data are collected on a continuous basis.

Also, the population general census collects a number of information related to buildings which allow for the general knowledge on the residential sector. The database contains the information on all the main residences of the French population with some technical information (area, heating system, construction period, energy carrier, etc.).

#### **A.5.8.5 Landlord-tenant dilemma**

Rallying Law No 2009-323 on Housing and Combating Exclusion, adopted on 25 March 2009, established a new system of distribution of energy savings between owner/landlord and tenants. Due to inequalities between landlords and tenants (because tenants benefit from energy savings outcomes while retrofit burden costs are paid by landlords) and in order to encourage a 'win-win' relationship, landlords are now able to require tenants to contribute half of the retrofit burden cost. This contribution will be

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<sup>71</sup> D2.4. of WP2 of the Entranze Project

<sup>72</sup> <http://ademe.typepad.fr/files/2012-syntheseopen2011-2.pdf>

available only if landlords carry out a mix of efficiency retrofit involving at least two actions.<sup>73</sup>

#### A.5.9 Financial and fiscal support policies/programmes

Several programmes are in place in France to support the energy efficiency in the building sector. In fact, in order to achieve its targets, France is mobilising a range of diversified instruments which include, within others, financial incentives. The Sustainable Development Tax Credit and the Zero-Rated Eco-loan are two major measures supporting refurbishment of the existing dwelling stock.

The following tables provide an extract on the on-going programmes and/or a selection of some of past programmes<sup>74</sup>.

##### Programme A

| Programme name            | Zero-rated eco-loan (eco-PTZ) <sup>75</sup>  |                    |               |              |                 |              |
|---------------------------|--|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2009 - ongoing   |                    |               |              |                 |              |
| Type of programme         | Soft loan  |                    |               |              |                 |              |
| Budget                    | €75 million for 2009-2011  |                    |               |              |                 |              |
| Measures covered          | Major renovation work: <ul style="list-style-type: none"><li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li><li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, control systems, etc.)</li><li>- OTHER (including energy audits, consultancy costs, education and training activities, etc.)</li></ul> |                    |               |              |                 |              |
| Programme impacts         | Implementation of zero-rated eco-loans enables annual final energy consumption to be reduced by 0.06 Mtoe in 2010 and 0.81 Mtoe in 2016 and 2020 <sup>76</sup>   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings  | Existing buildings | Residential   |              | Non Residential |              |
|                           |  |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |  |                    |               |              |                 |              |
|                           |  | x                  | x             |              | x               |              |

<sup>73</sup> French NEEAP 2, English version, At page 192, Distribution of energy savings between owner/landlord and tenant (Measure B.20)

<sup>74</sup> Please note that other programmes exist.

<sup>75</sup> <http://www.developpement-durable.gouv.fr/L-eco-pre-a-taux-zero-en-13.html>

<sup>76</sup> Source: SceGES evaluation (see paragraph I.3.1.3 and Annex 2, Chapter III).

## Programme B

| Programme name            | Lower VAT rate for renovation work  |                    |               |              |                 |              |
|---------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2009 - ongoing  |                    |               |              |                 |              |
| Type of programme         | Tax exemption   |                    |               |              |                 |              |
| Budget                    | N/A   |                    |               |              |                 |              |
| Measures covered          | <p>Works for dwellings completed more than two years ago related to improvement, conversion, upgrading and maintenance of dwellings are eligible for a lower VAT rate (5.5% instead of 19.6% until January 2012 and 7% now). Although this measure is not specific to energy-saving work, it allows, in particular, support for energy renovation of dwellings.</p> <p>Measures covered are related to the:</p> <ul style="list-style-type: none"> <li>- Building envelope (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- Installation of equipment (including efficient heating, efficient lighting systems, ventilation, control systems, etc.)</li> </ul> |                    |               |              |                 |              |
| Programme impacts         |   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                           |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |   | x                  | x             |              |                 |              |

## Programme C

| Programme name    | Social housing eco-loans  |
|-------------------|---|
| Start – End Dates | 2009 - ongoing  |
| Type of programme | Soft loans  |
| Budget            | Estimation 110 M€/year.   |
| Measures covered  | They are available to HLM agencies, SEMs or communes owning or managing social housing in the context of thermal renovation of poorly insulated housing |
| Programme impacts | At the end of February 2011 more than 75 000 social housing eco-loans (éco-PLS) had been issued, enabling annual final energy sav-                      |

|                           |                   |                    |               |              |                 |              |
|---------------------------|-------------------|--------------------|---------------|--------------|-----------------|--------------|
|                           | ings of 0.07 Mtoe |                    |               |              |                 |              |
| Targeted buildings types: | New buildings     | Existing buildings | Residential   |              | Non Residential |              |
|                           |                   |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |                   | x                  |               | x            |                 |              |

## Programme D

|                           |   |                    |               |              |                 |              |
|---------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| <b>Programme name</b>     | <b>eco-subsidies for low-income owner-occupiers and eco premium</b>   |                    |               |              |                 |              |
| Start – End Dates         | 2009 - ongoing  |                    |               |              |                 |              |
| Type of programme         | subsidies   |                    |               |              |                 |              |
| Budget                    | (500 M€ for 2010-2017)  |                    |               |              |                 |              |
| Measures covered          | <p>The National Housing Improvement Agency (ANAH) helps owner-occupiers, subject to an income ceiling, and social landlords to carry out housing improvement work. Measures covered are:</p> <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, control systems, etc.)</li> </ul> |                    |               |              |                 |              |
| Programme impacts         | N/A   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                           |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |   | x                  | x             |              |                 |              |

## Programme E

|                       |  |  |  |  |  |  |
|-----------------------|--|--|--|--|--|--|
| <b>Programme name</b> | <b>The sustainable development account: Livret de Développement Durable: Preferential loans for energy saving measures</b> |  |  |  |  |  |
| Start – End Dates     | 2007 - ongoing   |  |  |  |  |  |
| Type of programme     | Preferential loans, Reduced interest rates (soft loans)  |  |  |  |  |  |
| Budget                | Total 60 billion euros   |  |  |  |  |  |
| Measures covered      | EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)           |  |  |  |  |  |
| Programme impacts     | N/A  |  |  |  |  |  |

|                     |                |                    |               |              |                 |              |
|---------------------|----------------|--------------------|---------------|--------------|-----------------|--------------|
| Targeted buildings: |                |                    |               |              |                 |              |
|                     | New build-ings | Existing buildings | Residential   |              | Non Residential |              |
|                     |                |                    | Private owned | Public owned | Private owned   | Public owned |
|                     | x              | x                  | x             |              | x               |              |

## Programme F

|                       |   |                    |               |              |                 |              |
|-----------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| <b>Programme name</b> | <b>Realisation of low consumption buildings (AAP PREBAT)</b>  |                    |               |              |                 |              |
| Start – End Dates     | 2006 - ongoing  |                    |               |              |                 |              |
| Type of programme     | Grants  |                    |               |              |                 |              |
| Budget                | from 2006 to 2009, a total support of 47M€, 53% from Ademe's budget, the complement from Regional budgets |                    |               |              |                 |              |
| Measures covered      | N/A   |                    |               |              |                 |              |
| Programme impacts     | promote NZEB building diffusion   |                    |               |              |                 |              |
| Targeted buildings:   | New build-ings  | Existing buildings | Residential   |              | Non Residential |              |
|                       |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                       | x   |                    | x             | x            | x               | x            |

## Programme G

|                       |  |  |  |  |  |  |
|-----------------------|--|--|--|--|--|--|
| <b>Programme name</b> | <b>Energy efficiency tax credit (including exoneration of land tax for BBC buildings)</b>  |  |  |  |  |  |
| Start – End Dates     | 2005 - ongoing   |  |  |  |  |  |
| Type of programme     | Subsidies, co-financing  |  |  |  |  |  |
| Budget                | Total cost of 2.7 billion Euros from 2005 to 2009 (instead of predicted 1 billion Euros)   |  |  |  |  |  |
| Measures covered      | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, control systems, etc.)</li> </ul> |  |  |  |  |  |
| Programme impacts     | N/A  |  |  |  |  |  |



| Targeted buildings: | New build-ings | Existing buildings | Residential   |              | Non Residential |              |
|---------------------|----------------|--------------------|---------------|--------------|-----------------|--------------|
|                     |                |                    | Private owned | Public owned | Private owned   | Public owned |
|                     | x              | x                  | x             |              |                 |              |

## Programme H

| Programme name      | Energy efficiency of residential and tertiary buildings - Program OPATB <sup>77</sup>  |                    |               |              |                 |              |
|---------------------|--|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates   | 2002 - 2010  |                    |               |              |                 |              |
| Type of programme   | Subsidies, co-financing  |                    |               |              |                 |              |
| Budget              | 16 Communities, 20 M€ retrofit works with various supports from ANAH, Ademe, local authorities,...   |                    |               |              |                 |              |
| Measures covered    | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, control systems, etc.)</li> </ul> |                    |               |              |                 |              |
| Programme impacts   | MWh/y saved; Tons of CO2 saved; increase of financial investment   |                    |               |              |                 |              |
| Targeted buildings: | New build-ings   | Existing buildings | Residential   |              | Non Residential |              |
|                     |  |                    | Private owned | Public owned | Private owned   | Public owned |
|                     |  | x                  | x             | x            | x               | x            |

## Programme I

| Programme name    | Grants for energy audits in buildings  |
|-------------------|--|
| Start – End Dates | 2000 - ongoing   |
| Type of programme | Grants   |
| Budget            | in 2010, 24500 buildings have been audited with a financial support (50% of energy audit cost) from Ademe of 9.5 M€. |
| Measures covered  | Energy audits  |

<sup>77</sup> <http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=16908>

|                     |                |                    |               |              |                 |              |
|---------------------|----------------|--------------------|---------------|--------------|-----------------|--------------|
| Programme impacts   | N/A            |                    |               |              |                 |              |
| Targeted buildings: | New build-ings | Existing buildings | Residential   |              | Non Residential |              |
|                     |                |                    | Private owned | Public owned | Private owned   | Public owned |
|                     |                | x                  | x             | x            | x               | x            |

## A6. Germany



### A.6.1 Strategies and (action) plans for the building sector

The energy concept of the German government, decided and published in 2010, sets various targets in the field of rational energy use, energy savings and increasing the use of renewable energy. One of the main targets concerning the building stock is to have an almost climate neutral building stock by 2050, mainly by reducing heat demand and providing the remaining energy through renewable sources. To achieve such a reduction in energy demand the rate of building renovation shall be doubled and the heating demand shall be reduced by 20 % by 2020. In addition by 2050 Germany aims to reduce overall primary energy demand by around 80 %.<sup>78</sup>

Also, the energy concept of the German Government has established that *“In this context, the German government will [...] develop a renovation roadmap for existing buildings which starts in 2020, builds on the current renovation cycles for existing buildings and maps out a step-by-step approach for the building stock to reach the target of an 80% reduction of primary energy demand by 2050.”* Furthermore, the roadmaps shall build on existing investment cycles where renovation would be necessary. It is also acknowledged that measures shall pay off within a reasonable period of time. There is no information available on when the renovation roadmap shall be established<sup>79</sup>.

In order to achieve a public buildings' renovation rate of 3 % as defined by the Energy Efficiency Directive (EED), the federal authority for real property administration (Bundesanstalt für Immobilienaufgaben, BImA) holding more than 4.700 civil and military properties has decided to work with the German Energy Agency (dena) to establish a renovation roadmap for the federal properties. The roadmap shall be available in 2013 and comprise the order and the technical level of the renovations until 2050. Furthermore for the timeframe up to 2015 the planning will be detailed.<sup>80</sup>

In terms of proposed or scheduled legislation affecting requirements for energy performance of buildings, the draft of the Energy Savings Ordinances (EnEV) recast comprises an average reduction of maximum primary energy demand by 12.5 % for new buildings compared to the previous standard<sup>81</sup>. The revised EnEV is scheduled to be affective from 2014 onwards. Requirement on existing buildings as well as on maximum heat transfer are not tightened. Distribution and control mechanisms around the energy certificate shall also be enhanced in the revised ordinance.

<sup>78</sup> More information available on:

[http://www.bmu.de/english/energy\\_efficiency/doc/46733.php](http://www.bmu.de/english/energy_efficiency/doc/46733.php)  
<http://www.bmwi.de/English/Navigation/Service/publications.did=241986.html>

<sup>79</sup> [http://www.bmu.de/english/energy\\_efficiency/doc/46733.php](http://www.bmu.de/english/energy_efficiency/doc/46733.php)

<sup>80</sup> [http://www.dena.de/index.php?id=5831&L=1&no\\_cache=1](http://www.dena.de/index.php?id=5831&L=1&no_cache=1)

<sup>81</sup> <http://www.zukunft-haus.info/de/planer-handwerker/fachwissen-bauen-und-sanieren/gesetze-und-verordnungen/enev-2013-und-energiekonzept.html?up=1&cHash=9c4269a35f>

### A.6.2 Building codes

The minimum energy requirements for residential and non-residential buildings, both in terms of new buildings and the rehabilitation of existing ones, are regulated by the German Energy Saving Ordinance<sup>82</sup> (Energieeinsparverordnung, hereafter EnEV).

For **new buildings**, the EnEV lays down maximum building-specific levels of primary energy demand and the required energy performance of the building envelope (expressed in maximum values of the specific transmission heat loss related to the heat transmitting surface area). The requirements (maximum levels) are defined by means of a reference building which corresponds to the real building in terms of geometry, net floor area, orientation and utilisation, but whose technical structure is defined according to Appendix 2 of the EnEV.

For the **renovation of buildings** the EnEV sets component-specific minimum efficiency requirements which have to be complied with when it is necessary to change or modernize a building component (e.g. the roof, the windows or the exterior wall). However, there is no obligation to conduct upgrade measures. This means where no renovation takes place there is no requirement to fulfil any performance standard at all (with the exemption of some obligatory refurbishment measures such as the insulation of the heat distribution and hot water pipes as well as fittings or the insulation of top floor ceilings)..

Major renovations meet the EnEV standard if the refurbished building (residential and non-residential) does not exceed the annual primary energy demand of the corresponding (new) reference building (see above) and the maximum value of the specific transmission heat loss related to the heat-transmitting surface area of the reference building by more than 40%. In case of single measures modifications are to be designed in such a way that specific heat transfer coefficients of the exterior components are not exceeded (see Appendix 3 of the EnEV).

#### A.6.2.1 Energy performance requirements

Requirements set by the German building code refer to primary energy.

No direct energy consumption requirements are defined in the EnEV.

#### A.6.2.2 Thermal insulation requirements

The following table (table 31) shows the component based maximum U-values of the different reference buildings according to type of building and construction work (new construction or renovation).

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<sup>82</sup> <http://www.zukunft-haus.info/index.php?id=11883> (incl. an English version of the EnEV)

**Table 31: U-value requirements**

| Building component |                               | U-value<br>[W/m²K] |           |              |           |           |           |           |           |           |           |
|--------------------|-------------------------------|--------------------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|                    |                               | Single family      |           | Multi-family |           | Offices   |           | Education |           | Health    |           |
|                    |                               | New                | Ren       | New          | Ren       | New       | Ren       | New       | Ren       | New       | Ren       |
| Walls              | External wall                 | 0,28               | 0,24      | 0,28         | 0,24      | 0,28      | 0,24      | 0,28      | 0,24      | 0,28      | 0,24      |
|                    |                               | –                  |           | –            |           | –         | –         | –         | –         | –         | –         |
|                    |                               | 0,35               |           | 0,35         |           | 0,35      | 0,35      | 0,35      | 0,35      | 0,35      | 0,35      |
| Windows/Doors      | Windows and French doors      | 1,30               | 1,30      | 1,30         | 1,30      | 1,30      | 1,30      | 1,30      | 1,30      | 1,30      | 1,30      |
|                    |                               |                    |           |              |           | –         | –         | –         | –         | –         | –         |
|                    | Skylights                     | 1,40               | 1,40      | 1,40         | 1,40      | 1,40      | 1,40      | 1,40      | 1,40      | 1,40      | 1,40      |
|                    |                               |                    |           |              |           | –         | –         | –         | –         | –         | –         |
|                    | Dome lights                   | 2,70               |           | 2,70         |           | 2,7       |           | 2,7       |           | 2,7       |           |
|                    | Outside doors                 | 1,80               |           | 1,80         |           | 1,8 – 2,9 |           | 1,8 – 2,9 |           | 1,8 – 2,9 |           |
|                    | Light bands                   |                    |           |              |           | 2,4       |           | 2,4       |           | 2,4       |           |
| Roof/Ceilings      | Roof and/or top floor ceiling | 0,2                | 0,20      | 0,2          | 0,20      | 0,20      | 0,20      | 0,20      | 0,20      | 0,20      | 0,20      |
|                    |                               |                    | –<br>0,24 |              | –<br>0,24 | –<br>0,35 | –<br>0,35 | –<br>0,35 | –<br>0,35 | –<br>0,35 | –<br>0,35 |
|                    | Glass roofs                   |                    | 2         |              | 2         | 2,70      | 2,00-2,70 | 2,70      | 2,00-2,70 | 2,70      | 2,00-2,70 |
| Floors             | Basement                      | 0,30               |           | 0,30         |           |           |           |           |           |           |           |

Please note that in the case of **new residential buildings**, in addition to the specific component based characteristics above, the overall maximum heat loss related to the heat transmitting surface area of the building to be constructed may not exceed the maximum values given in the following table:

**Table 32: Maximum values of transmission heat loss for residential buildings**

| Building type       | Maximum value of the specific transmission heat loss (W/m <sup>2</sup> K) |
|---------------------|---|
| Single family house | 0,40 – 0,50   |
| Multi-family house  | 0,65  |

### A.6.2.3 Compliance and control

Compliance with building codes is under the responsibility of the regions (Bundesländer) which generally transfer the responsibility to the local building authorities. Due to a lack of human resources, but also due to the fact that most modernisation measures are not subject of any form of licensing procedure, there are hardly any controls whether building owners comply with the requirements set by the EnEV. However there are no statistics about the magnitude of the compliance deficit in the building stock. A detailed evaluation of the EnEV is also missing whereas the preparation of an evaluation of the EEWärmeG (Act on the Promotion of Renewable Energies in the Heat Sector) is currently in process.

### A.6.3 Measures for implementing Article 13(4) of the RED

New buildings are subject to a minimum RES-H share obligation. On the basis of the Act on the Promotion of Renewable Energies in the Heat Sector<sup>83</sup> (Erneuerbare-Energien-Wärmegezet EEWärmeG) new building projects are subject to an obligation to use renewable energies for heat supply. Since 2011, the revised act also includes existing public buildings. This regulation covers both residential buildings and non-residential buildings. New buildings have to draw a minimum percentage of the building's heat and cooling supply from renewable energies. The minimum shares are fixed according to technology. In the case of solar thermal the minimum share is 15%, 30% in the case of biogas, and 50% if bio-oils, solid biomass (e.g. wood pellets) or geothermal energy are used or a heat pump is installed.

However this obligation does not apply to major renovations. Currently there is a debate on how to support the use of RES-H in existing buildings, but it is not foreseeable yet which instrument will be opted for.

### A.6.4 Energy Performance Certificates

The EPC requirements are regulated in the EnEV (section 16-21). EPCs can optional be issued on the basis of the calculated energy demand or the recorded energy consumption. Instead of working with discrete efficiency classes in Germany the EPC is

<sup>83</sup> <http://www.erneuerbare-energien.de/doc/42351.php> (incl. an English version of the EEWärmeG)

based on a continuous scale<sup>84</sup>. EPC samples are provided by Appendix 7 (residential buildings) and Appendix 8 (non-residential buildings) of the EnEV.

#### **A.6.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD**

The inspection of boilers<sup>85</sup> is regulated in the First Ordinance on the Implementation of the Federal Immission Control Act (1. BImSchV). Boilers based on oil or natural gas needs to be inspected every two or three year (depending on their age).

The inspection of AC is regulated in the EnEV (on section 12). Operators of air-conditioning systems installed in the building with a cooling capacity of more than 12 kilowatts must have energy inspections of these systems performed by authorised persons. After the initial inspection the system must undergo a repeat inspection at least every ten years. The inspection includes measures to check components affecting the level of efficiency of the system and the size of the system in relation to the cooling needs of the building. The operator must present upon request the certification on performance of the inspection to the authority responsible according to state law.

#### **A.6.6 Cost optimality**

The Federal Institute for Research on Building, Urban Affairs and Spatial Development has initiated a project to assess the impact of the European calculation method of the “cost-optimal level” of energy efficiency. The goal of the project is to assess whether the development of the requirements of energy efficiency ordinance fulfil EPBD conditions. In that context the German requirement for profitability according to the energy efficiency act needs to be considered. The Institut für Wohnen und Umwelt GmbH (IWU) treating the project reviews different calculation methods and identifies the differences of possible calculation methods to comply with the directive and the current national profitability calculations. Subsequently the cost optimal levels for existing and new buildings are being calculated. The project is planned to be finished by the end of 2012.<sup>86</sup>

#### **A.6.7 nZEB: requirements and roadmaps**

The German government has initiated a project to research the possible nZEB definition and determine the best solution. The project “Analysis of the revised EPBD” came up with the following concept that is similar to the approach in the energy savings ordinance EnEV:

*“The analysis shows that the EnEV method is generally suited to assess also nearly zero-energy buildings. However it is recommended to enlarge the very restrictively defined balancing room of Paragraph 5 of the EnEV in order to include not only the electricity generated by renewables but also other renewable energies generated on-site.”*

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<sup>84</sup> German EPC samples at <http://www.zukunft-haus.info/index.php?id=11883>

<sup>85</sup> [http://www.bmu.de/english/air\\_pollution\\_control/general\\_information/doc/4352.php](http://www.bmu.de/english/air_pollution_control/general_information/doc/4352.php).

<sup>86</sup> <http://www.bmu.de/luftreinhaltung/downloads/doc/39616.php> (download of 1. BImSchV)  
<http://www.iwu.de/forschung/energie/laufend/kostenoptimales-niveau-eu/>

Also, “making the legitimate assumption that [the trend of the past 30 years][will continue for the next years, it can be derived that new buildings in 2020 will have an energy performance of 50% better than the performance of current buildings. This corresponds in the residential sector to a KfW Efficiency House 40 level. The study consortium therefore advises to communicate this level as target for the nearly zero-energy buildings so that the market development can refer to it.”

This project has only recently been finished and the report was published in October 2012. Policy processes integrating the projects results are currently in progress.<sup>87</sup>

In addition, current legislation shall be changed to include the requirement of new buildings to comply with an nZEB standard. These changes of the energy efficiency act shall be enacted by the German government in February 2013.<sup>88</sup> The new EnEV will probably come into force in the 2<sup>nd</sup> half of 2013.

## **A.6.8 Other relevant topics**

### **A.6.8.1 Permit requirements for renovation**

Most renovation projects do not underlie any form of permit requirements which means that generally local building authorities lack any form of overview about how many buildings are currently subject to a modernisation measure. However new fossil and biomass boilers need to be approved by the chimney sweeper. Article 7 of the EPBD (on achieving minimum energy performance requirements for buildings undergoing major renovation) is enforced by the EnEV.

### **A.6.8.2 Organisation of owners in multi-family buildings and their decision process on renovation of buildings**

For renovation measures that aim at decreasing the energy consumption of the building in multi-occupancy buildings a minimum of 75% of the apartment owners need to be in favour of such measure. The detailed requirements are regulated in the German residential property law (Gesetz über das Wohnungseigentum und das Dauerwohnrecht (Wohnungseigentumsgesetz)).<sup>89</sup>

### **A.6.8.3 National consultation processes**

Stakeholders are organised within the building council **DGNB** (Deutsche Gesellschaft für nachhaltiges Bauen, German Sustainable Building Council). The members of the German Sustainable Building Council represent the entire value chain of the construction and real estate sectors: architects, planners, industry, investors and science.

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<sup>87</sup> [http://www.bbsr.bund.de/cln\\_032/nn\\_340720/BBSR/EN/Publications/BMVBS/Online/2012/ON162012.html](http://www.bbsr.bund.de/cln_032/nn_340720/BBSR/EN/Publications/BMVBS/Online/2012/ON162012.html);  
<http://www.irb.fraunhofer.de/tauforschung/projekte.jsp?local=en&p=20128035721>

<sup>88</sup> More information on:  
[http://www.bbsr.bund.de/cln\\_032/nn\\_340720/BBSR/EN/Publications/BMVBS/Online/2012/ON162012.htm](http://www.bbsr.bund.de/cln_032/nn_340720/BBSR/EN/Publications/BMVBS/Online/2012/ON162012.htm)  
<http://www.irb.fraunhofer.de/tauforschung/projekte.jsp?local=en&p=20128035721>  
<http://www.bmvbs.de/SharedDocs/DE/Artikel/SW/energieeinsparverordnung-aktuelles-novellierungsverfahren.html>  
(german only)

<sup>89</sup> Wohnungseigentumsgesetz under <http://www.gesetze-im-internet.de/woeigg/BJNR001750951.html>



Also, all responsible ministries, both at national and regional levels, maintain regular working groups on energy policies in buildings. As energy is a cross-sectional field several ministries are involved in stakeholder consultation processes. On the national level the Federal Ministry for the Environment, the Ministry of Economics and the Federal Ministry of Transport, Buildings and Urban Affairs maintain overlapping working groups. On the regional level ministries and their competences are not uniformly structured among the different States (“Länder”). However, they also maintain regular working groups including the relevant stakeholders.

#### **A.6.8.4 Buildings databases/registers**

Currently, no registers covering all renovated buildings or holding all issued EPCs exist.

The most relevant sources of data and information on the energy performance of buildings and on buildings data in general are:

- Statistisches Bundesamt;
- Datenbasis Gebäudebestand<sup>90</sup>, Datenerhebung zur energetischen Qualität und zu den Modernisierungstrends im deutschen Wohngebäudebestand: empirical data collection based on a sample of around 7500 residential buildings (this is the most in depth database providing an overview of the current energetic characteristics of the residential building stock);

#### **A.6.8.5 Landlord-tenant dilemma**

Since Germany has one of the lowest home ownership rates within the EU, the landlord-tenant dilemma is a major barrier for modernisation measures in the building stock.

#### **A.6.9 Financial and fiscal support policies/programmes**

Germany has been implementing several financial and fiscal programmes supporting the energy efficiency in the building sector, in particular through the promotional bank (KfW Bankengruppe) and the Federal Office of Economics and Export Control (Bafa).

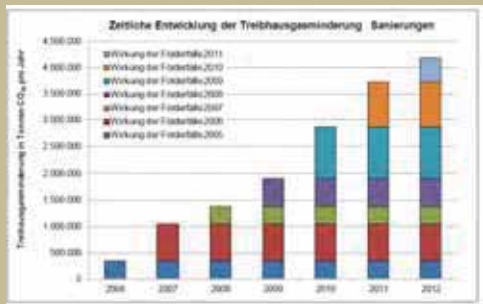
The following tables provide an extract on the on-going programmes and/or a selection of some of past programmes<sup>91</sup>.

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<sup>90</sup> [http://datenbasis.iwu.de/dl/Endbericht\\_Datenbasis.pdf](http://datenbasis.iwu.de/dl/Endbericht_Datenbasis.pdf)

<sup>91</sup> Please note that other programmes exist.

## Programme A

|                                   |   |                           |                      |                     |                        |                     |
|-----------------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>             | <b>KfW Energy-Efficient Refurbishment<sup>92</sup></b>  |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>          | 2001- ongoing   |                           |                      |                     |                        |                     |
| <b>Type of programme</b>          | grants, low-interest loans including redemption grants  |                           |                      |                     |                        |                     |
| <b>Budget</b>                     | 2012-2014: 1,5 billion per year (incl. the budget of Programme C)   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>           | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> </ul>   |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>          | <p>Evaluation 2011:</p> <p>Coverage: 181.000 apartments</p> <p>Induced reduction final energy: 1.250 GWh/a</p> <p>Induced reduction of primary energy: 1.680 GWh/a</p> <p>Induced reduction of CO<sub>2</sub>: 0,46 mio. t/a</p> <p>Accumulated CO<sub>2</sub>-savings since 2006:</p>  <p>Evaluation report 2011:<br/> <a href="http://www.kfw.de/kfw/de/II/II/Download_Center/Fachthemen/Research/PDF-Dokumente_Evaluationen/Monitoring_EBS_2011.pdf">http://www.kfw.de/kfw/de/II/II/Download_Center/Fachthemen/Research/PDF-Dokumente_Evaluationen/Monitoring_EBS_2011.pdf</a> </p> |                           |                      |                     |                        |                     |
| <b>Targeted build-ings types:</b> | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                   |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                   |   | <b>x</b>                  | <b>x</b>             | <b>x</b>            |                        |                     |

<sup>92</sup> [http://www.kfw.de/kfw/en/Domestic\\_Promotion/Our\\_offers/Housing.jsp](http://www.kfw.de/kfw/en/Domestic_Promotion/Our_offers/Housing.jsp)

Programme B

| Programme name            | Market Incentive Programme (MAP) for renewable energies in the heat market  |                     |               |              |                 |              |
|---------------------------|---|---------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2000 – ongoing  |                     |               |              |                 |              |
| Type of programme         | Grants, soft loans  |                     |               |              |                 |              |
| Budget                    | Approx. 500 mio EUR/a   |                     |               |              |                 |              |
| Measures covered          | Renewable heating and cooling installations   |                     |               |              |                 |              |
| Programme impacts         | <p>Evaluation 2010:</p> <p>Induced generation of RES-H final energy: 1,5 GWh</p> <p>Induced reduction of CO<sub>2</sub>: 0,4 mio. t CO<sub>2</sub>/a</p> <p>Evaluation report 2010: <a href="http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/evaluation_map_2010.pdf">http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/evaluation_map_2010.pdf</a></p> |                     |               |              |                 |              |
| Targeted buildings types: | New build-ings  | Existing build-ings | Residential   |              | Non Residential |              |
|                           |   |                     | Private owned | Public owned | Private owned   | Public owned |
|                           |   | x                   | x             | x            | x               | x            |

Programme C

| Programme name            | KfW Energy-Efficient Construction   |                     |               |              |                 |              |
|---------------------------|---|---------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2009 – ongoing  |                     |               |              |                 |              |
| Type of programme         | Soft loans  |                     |               |              |                 |              |
| Budget                    | 2012-2014: 1,5 billion per year (incl. the budget of Programme A)                                     |                     |               |              |                 |              |
| Measures covered          | New buildings reaching a primary energy standard which is 30% below the reference standard or better. |                     |               |              |                 |              |
| Programme impacts         | N/A   |                     |               |              |                 |              |
| Targeted buildings types: | New build-ings  | Existing build-ings | Residential   |              | Non Residential |              |
|                           |   |                     | Private owned | Public owned | Private owned   | Public owned |
|                           | x   |                     | x             |              |                 |              |

## Programme D

| Programme name                            | On-site energy advice (Vor-Ort-Beratung) / Energiesparberatung vor Ort (BAFA)  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
|---|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|--|----------------------|--|--|--|--|--|--|--|--|---|----|--|--|--|--|--|--|--|---|----|--|--|--|--|--|--|--|---------------------------|--|--|--|--|--|--|--|--|---|-----|--|--|--|--|--|--|--|---|-----|--|--|--|--|--|--|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|--|--|--|--|--|--|--|--|---|----|----|----|-----|-----|-----|-----|--|
| Start – End Dates                         | 1991 – ongoing   |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Type of programme                         | Grants   |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Budget                                    | around 3.5 million Euro in 2005  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Measures covered                          | Funding is provided for an on-site consultation by accredited energy advisors dealing comprehensively with structural thermal insulation as well as heat generation and distribution including water heating and use of renewable energies.  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Programme impacts                         | <p>An ex-ante evaluation of the advice programme was carried out by a group of research institute on behalf of the Umweltbundesamt (2008). The impact calculation in this study is based on a space heating model including a representative sample of the building stock, which is characterized by specific building types. The total CO2 reductions which are calculated with the heating model are extrapolated to the number of buildings which are energetically improved due to the advice given by this programme. According to a survey by BAFA (2000) it is assumed that around 64% of the advice services were followed by energy saving investments which were strongly influenced by the programme. When the programme is extrapolated to 2030, cumulative gross savings of 0.57 Mt CO2 could be achieved. But these savings cannot be only assigned to the advice programme, since many owners use financial incentive programmes for the implementation of the suggested saving measures. The share of the financial incentive programmes in the gross savings is estimated at about 60 % in this impact evaluation.</p> <table><caption>Table 2: Cumulative CO<sub>2</sub> and energy savings due to the On-site Energy Advice Programme in the household sector</caption><tr><th>Ex-post evaluation</th><th>2005<sup>2)</sup></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr><tr><td>CO<sub>2</sub> (kt)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Incl. interaction with financial measures</td><td>22</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Savings concerned by interaction (62 %)</td><td>14</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Energy (TJ)<sup>1)</sup></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Incl. interaction with financial measures</td><td>350</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Savings concerned by interaction (62 %)</td><td>217</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><th>Ex-ante evaluation</th><th>2006<sup>2)</sup></th><th>2007<sup>2)</sup></th><th>2008<sup>2)</sup></th><th>2009<sup>2)</sup></th><th>2010<sup>2)</sup></th><th>2020<sup>3)</sup></th><th>2030<sup>3)</sup></th><th>2016<sup>4)</sup></th></tr><tr><td>CO<sub>2</sub> (kt)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Incl. interaction with financial measures</td><td>44</td><td>66</td><td>88</td><td>110</td><td>132</td><td>350</td><td>570</td><td></td></tr></table> | Ex-post evaluation | 2005 <sup>2)</sup> |                    |                    |                    |                    |                    |  |  | CO <sub>2</sub> (kt) |  |  |  |  |  |  |  |  | Incl. interaction with financial measures | 22 |  |  |  |  |  |  |  | Savings concerned by interaction (62 %) | 14 |  |  |  |  |  |  |  | Energy (TJ) <sup>1)</sup> |  |  |  |  |  |  |  |  | Incl. interaction with financial measures | 350 |  |  |  |  |  |  |  | Savings concerned by interaction (62 %) | 217 |  |  |  |  |  |  |  | Ex-ante evaluation | 2006 <sup>2)</sup> | 2007 <sup>2)</sup> | 2008 <sup>2)</sup> | 2009 <sup>2)</sup> | 2010 <sup>2)</sup> | 2020 <sup>3)</sup> | 2030 <sup>3)</sup> | 2016 <sup>4)</sup> | CO <sub>2</sub> (kt) |  |  |  |  |  |  |  |  | Incl. interaction with financial measures | 44 | 66 | 88 | 110 | 132 | 350 | 570 |  |
| Ex-post evaluation                        | 2005 <sup>2)</sup>   |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| CO <sub>2</sub> (kt)                      |  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Incl. interaction with financial measures | 22   |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Savings concerned by interaction (62 %)   | 14   |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Energy (TJ) <sup>1)</sup>                 |  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Incl. interaction with financial measures | 350  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Savings concerned by interaction (62 %)   | 217  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Ex-ante evaluation                        | 2006 <sup>2)</sup>   | 2007 <sup>2)</sup> | 2008 <sup>2)</sup> | 2009 <sup>2)</sup> | 2010 <sup>2)</sup> | 2020 <sup>3)</sup> | 2030 <sup>3)</sup> | 2016 <sup>4)</sup> |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| CO <sub>2</sub> (kt)                      |  |                    |                    |                    |                    |                    |                    |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |
| Incl. interaction with financial measures | 44   | 66                 | 88                 | 110                | 132                | 350                | 570                |                    |  |  |                      |  |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |   |    |  |  |  |  |  |  |  |                           |  |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |   |     |  |  |  |  |  |  |  |                    |                    |                    |                    |                    |                    |                    |                    |                    |                      |  |  |  |  |  |  |  |  |   |    |    |    |     |     |     |     |  |

|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|---|---|---|---|--|-----------------|--|--|--|---------------------------------|---|---|--|----|--|--|--|--|---------------------------|--|--|--|--|--|--|--|---|-----|------|------|------|------|------|------|-------|---|-----|-----|-----|------|------|------|------|-------|--|--|--|--|--|--|--|--|--|-------------------------|--|--|--|--|--|--|--|--|-------------------------|--|--|--|--|--|--|--|--|--------------|--|--|--|--|--|--|--|--|---------------------------------|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|
|   | <table><tr><td>Savings excl. interaction (62%)</td><td>130<sup>3)</sup><br/>28<br/>50<sup>3)</sup></td><td>210<sup>3)</sup><br/>42<br/>80<sup>3)</sup></td><td>300<sup>3)</sup><br/>56<br/>110<sup>3)</sup></td><td>70</td><td>470<sup>3)</sup><br/>84<br/>180<sup>3)</sup></td><td>1310<sup>3)</sup><br/>133<br/>500<sup>3)</sup></td><td>2150<sup>3)</sup><br/>217<br/>820<sup>3)</sup></td><td></td></tr><tr><td>Energy (TJ) <sup>1)</sup></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Incl. interaction with financial measures</td><td>700</td><td>1050</td><td>1400</td><td>1750</td><td>2100</td><td>5570</td><td>9063</td><td>25000</td></tr><tr><td>Savings concerned by interaction (62 %)</td><td>434</td><td>650</td><td>868</td><td>1085</td><td>1300</td><td>2115</td><td>3444</td><td>50000</td></tr><tr><td colspan="9">1) Assuming a CO<sub>2</sub> factor of 63 kt/PJ</td></tr><tr><td colspan="9">2) Kleemann/Hansen 2005</td></tr><tr><td colspan="9">3) Umweltbundesamt 2008</td></tr><tr><td colspan="9">4) BMWi 2007</td></tr><tr><td colspan="9">5) Umweltbundesamt 2009, S.101,</td></tr><tr><td colspan="9">Sources Kleemann/Hansen 2005; Umweltbundesamt 2008; BMWi (2007)</td></tr></table> |   |   |  |                 |  |  |  | Savings excl. interaction (62%) | 130 <sup>3)</sup><br>28<br>50 <sup>3)</sup> | 210 <sup>3)</sup><br>42<br>80 <sup>3)</sup> | 300 <sup>3)</sup><br>56<br>110 <sup>3)</sup> | 70 | 470 <sup>3)</sup><br>84<br>180 <sup>3)</sup> | 1310 <sup>3)</sup><br>133<br>500 <sup>3)</sup> | 2150 <sup>3)</sup><br>217<br>820 <sup>3)</sup> |  | Energy (TJ) <sup>1)</sup> |  |  |  |  |  |  |  | Incl. interaction with financial measures | 700 | 1050 | 1400 | 1750 | 2100 | 5570 | 9063 | 25000 | Savings concerned by interaction (62 %) | 434 | 650 | 868 | 1085 | 1300 | 2115 | 3444 | 50000 | 1) Assuming a CO <sub>2</sub> factor of 63 kt/PJ |  |  |  |  |  |  |  |  | 2) Kleemann/Hansen 2005 |  |  |  |  |  |  |  |  | 3) Umweltbundesamt 2008 |  |  |  |  |  |  |  |  | 4) BMWi 2007 |  |  |  |  |  |  |  |  | 5) Umweltbundesamt 2009, S.101, |  |  |  |  |  |  |  |  | Sources Kleemann/Hansen 2005; Umweltbundesamt 2008; BMWi (2007) |  |  |  |  |  |  |  |  |
|   | Savings excl. interaction (62%)   | 130 <sup>3)</sup><br>28<br>50 <sup>3)</sup> | 210 <sup>3)</sup><br>42<br>80 <sup>3)</sup> | 300 <sup>3)</sup><br>56<br>110 <sup>3)</sup> | 70              | 470 <sup>3)</sup><br>84<br>180 <sup>3)</sup> | 1310 <sup>3)</sup><br>133<br>500 <sup>3)</sup> | 2150 <sup>3)</sup><br>217<br>820 <sup>3)</sup> |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | Energy (TJ) <sup>1)</sup>   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | Incl. interaction with financial measures   | 700   | 1050  | 1400   | 1750            | 2100   | 5570   | 9063   | 25000                           |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | Savings concerned by interaction (62 %)   | 434   | 650   | 868  | 1085            | 1300   | 2115   | 3444   | 50000                           |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | 1) Assuming a CO <sub>2</sub> factor of 63 kt/PJ  |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | 2) Kleemann/Hansen 2005   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | 3) Umweltbundesamt 2008   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | 4) BMWi 2007  |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   | 5) Umweltbundesamt 2009, S.101,   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
| Sources Kleemann/Hansen 2005; Umweltbundesamt 2008; BMWi (2007) |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   |   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
| Targeted buildings types:                                       | New buildings   | Existing buildings                          | Residential                                 |  | Non Residential |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   |   | Private owned                               | Public owned                                 | Private owned   | Public owned                                 |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |
|   |   | x   | x   |  |                 |  |  |  |                                 |   |   |  |    |  |  |  |  |                           |  |  |  |  |  |  |  |   |     |      |      |      |      |      |      |       |   |     |     |     |      |      |      |      |       |  |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |                         |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |                                 |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |

## A7. Italy



### A.7.1 Strategies and (action) plans for the building sector

With regard to energy efficiency Italy aims to overcome the 20% European target with an expected savings of up to 24% (approximately 20 Mtoe of primary energy compared to today).

In order to implement the recast EPBD (Directive 2010/31/EU), it is expected the adaptation of the energy requirements in force. The adoption process was rejected in late June 2012 and the revisions of Parliament are still in progress. However, as in the New National Energy Strategy document the latest measures implemented (new energy requirements, EPC scheme, incentives for building refurbishment and RES systems, White Certificate mechanism) are emphasized as almost sufficient to achieve the general objectives, no paradigmatic revolutions are foreseen.

In accordance with the current version of the New National Energy Strategy, the Italian Government aims to:

- reinforce the actions that can affect the high energy saving potential unexploited (building included) and to strengthen the control and sanction mechanisms, making them consistent across all regions;
- introduce instruments for the direct stimulation of energy efficiency measures in public administration (which, by the well-known budget constraints and lack of access to tax deductions, it is not able to exploit the full potential of energy savings);
- stimulate actions on energy planning and sustainable urban development, with the aim to enable innovative models of urban planning and energy flows, grid efficiency, mobility and upgrading of the building stock;
- adopt plans for sustainable development of renewable energy sources.

Regarding the development and implementation of renovation roadmaps (or long-term strategies), there has been, in recent years (Finance Act 2007 and following Finance Acts) a national incentive mechanism for the renovation of residential building (covering large part of the energy consumption of the Italian building stock). It allows building owners to recover 55% of the investment costs (with maximum limits) in 10 years within the income declaration procedure. This mechanism, positively judged by ENEA, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (in charge for the management), has been renewed for 2013 but there are no guarantees about further renewals<sup>93</sup>.

Concerning the EED target to renovate 3% of public central building, no specific and well defined measures are there. Given the historical value of many of these buildings it will be complicate to implement effective renovation actions.

<sup>93</sup> <http://efficienzaenergetica.acs.enea.it/doc/rapporto%20mercato%20v3p.pdf> (Italian Version only)

### A.7.2 Building codes

The Decree law 192/2005 was updated by the Decree Law 311/2006 which proposes (for five Italian climatic zones):

- revised values for maximum U-values for the various opaque and transparent components of the building envelope;
- minimum average seasonal thermal efficiency of the heat generation system;
- maximum annual total primary energy consumption for space heating expressed as a function of S/V ratio and HDD and referred to heated net floor area for residential building (while to heated net volume for other building uses). These requirements are applied to new buildings and major renovation of buildings with a floor area greater than 1000 m<sup>2</sup>.

With the D.P.R. of 24 February 2009, maximum annual total primary energy consumptions for space cooling have been introduced.<sup>94</sup>

Additional requirements for new buildings and major refurbishment:

- for new buildings and refurbishment is obligatory to install a solar thermal plant designed to cover at least 50% of the thermal energy consumed annually to produce DHW;
- Since June 2012 (Dlgs n. 28/2011) it is mandatory to cover 20% of thermal energy uses with thermal RES systems and to install 1 kW of electric renewable systems for every 80 m<sup>2</sup> of floor area. These requirements will be increased in the coming years.

#### A.7.2.1 Energy performance requirements

The building code requirements are specified in terms of primary energy. Table 33 shows the minimum and maximum values for different building types.

**Table 33: Energy performance requirements**

|           |              | Single family houses<br>(kWh/m <sup>2</sup> /year) |       | Multi-family houses<br>(kWh/m <sup>2</sup> /year) |       | Offices<br>(kWh/m <sup>3</sup> /year) |      | Schools<br>(kWh/m <sup>3</sup> /year) |      | Hospitals<br>(kWh/m <sup>3</sup> /year) |      |
|-----------|--------------|--|-------|---|-------|---------------------------------------|------|---------------------------------------|------|---|------|
|           |              | min  | max   | min   | max   | min                                   | max  | min                                   | max  | min                                     | max  |
| New stock | Final energy | N/A  | N/A   | N/A   | N/A   | N/A                                   | N/A  | N/A                                   | N/A  | N/A                                     | N/A  |
|           | Heating      | 8,5  | 116,0 | 8,5   | 116,0 | 2,0                                   | 31,0 | 2,0                                   | 31,0 | 2,0                                     | 31,0 |
|           | Cooling      | 30   | 40    | 30  | 40    | 10                                    | 14   | 10                                    | 14   | 10                                      | 14   |

<sup>94</sup> [http://www.aivc.org/medias/pdf/Workshop032009/Wednesday\\_Session4\\_11.15/P5\\_Italy\\_Pagliano.pdf](http://www.aivc.org/medias/pdf/Workshop032009/Wednesday_Session4_11.15/P5_Italy_Pagliano.pdf)

|                 |              |     |     |     |     |     |     |     |     |     |     |
|-----------------|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Renovated stock | Final energy | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|                 | Heating      | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
|                 | Cooling      | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

### A.7.2.2 Thermal insulation requirements

The Decree Law 311/2006 sets the following U-values (see Table 34) applying to the various components of the building envelope and according to the climatic zone.

**Table 34: U-value requirements**

| Building component | U-value [W/m <sup>2</sup> K] |     |              |     |             |     |             |     |             |     |
|--------------------|------------------------------|-----|--------------|-----|-------------|-----|-------------|-----|-------------|-----|
|                    | Single family                |     | Multi-family |     | Offices     |     | Education   |     | Health      |     |
|                    | New                          | Ren | New          | Ren | New         | Ren | New         | Ren | New         | Ren |
| Walls              | 0,33 – 0,62                  |     | 0,33 – 0,62  |     | 0,33 – 0,62 |     | 0,33 – 0,62 |     | 0,33 – 0,62 |     |
| Windows            | 2,00 – 4,60                  |     | 2,00 – 4,60  |     | 2,00 – 4,60 |     | 2,00 – 4,60 |     | 2,00 – 4,60 |     |
| Roof               | 0,29 – 0,38                  |     | 0,29 – 0,38  |     | 0,29 – 0,38 |     | 0,29 – 0,38 |     | 0,29 – 0,38 |     |
| Basement           | 0,32 – 0,65                  |     | 0,32 – 0,65  |     | 0,32 – 0,65 |     | 0,32 – 0,65 |     | 0,32 – 0,65 |     |

### A.7.2.3 Compliance

Nominally the control task is delegated to the municipal technical, but the self-declaration of compliance with the building code requirements by designers and builders is a very common practice. In general the municipalities do not have sufficient resources to establish and manage effective monitoring and control mechanisms in order to apply the existing sanctions for infringement.

### A.7.3 Measures for implementing Article 13(4) of the RED

According to the Dlgs. 28/2011, from 2017 the consumption of thermal energy (heating, DHW and cooling) should be covered by renewable sources to 50%. Today this requirement is 20% and it will be increased to 35% from the beginning of 2014. These obligations cannot be fulfilled by renewable energy plants that produce only electricity for the operation of devices or equipment for the production of domestic hot water, heating and cooling. Regarding electricity, it is necessary to install a renewable power that varies based on the area of the building multiplied by a factor that increases in 3 steps between now and 2017: 1 kW per 80 m<sup>2</sup> of building up to the end of 2013, 1 kW for every 65 m<sup>2</sup> up to the end of 2016, 1 kW for every 50 square meters by 2017. In addition to new buildings, existing buildings with a surface area greater than 1000m<sup>2</sup> undergoing complete renovation (as well as existing buildings subject to demolition and



reconstruction) are subject to these obligations. For public buildings the obligations of integration of RES have increased by 10%.

#### A.7.4 Energy Performance Certificates

At national level, Italian law allows building owners themselves to make a self-declaration for the energy performance of the building if they state that the energy level of the building is of the lowest class (G) and that the energy costs for the prospective tenant or buyer are going to be very high. However, in the last years, more effective EPC schemes have been set up in more than half of the regions. In general this allows a better management of the mechanism, but it implies an important heterogeneity of definition (e.g. about general rules, energy classes, calculation procedures/tools) and application.<sup>95</sup>

On the tables below (tables 35, 36) the energy performance classes set through the national scheme level are presented.

**Table 35: EPC Energy classes**

**National Level - D.M. 26/06/09: Primary energy classes for space heating as a function of energy requirements for new buildings**

| Class | ALL BUILDINGS                  |
|-------|--------------------------------|
| A+    | $EP_H < 0.25 EP_L$             |
| A     | $0.25 EP_L < EP_H < 0.50 EP_L$ |
| B     | $0.50 EP_L < EP_H < 0.75 EP_L$ |
| C     | $0.75 EP_L < EP_H < 1.00 EP_L$ |
| D     | $1.00 EP_L < EP_H < 1.25 EP_L$ |
| E     | $1.25 EP_L < EP_H < 1.75 EP_L$ |
| F     | $1.75 EP_L < EP_H < 2.50 EP_L$ |
| G     | $EP_H < 2.50 EP_L$             |

**Table 36: EPC Energy classes**

**National Level - D.M. 26/06/09: Primary energy classes for DHW**

| [kWh/m <sup>2</sup> /year] | ALL BUILDINGS        |
|----------------------------|----------------------|
| Class                      |                      |
| A                          | $EP_{DHW} < 9$       |
| B                          | $9 < EP_{DHW} < 12$  |
| C                          | $12 < EP_{DHW} < 18$ |
| D                          | $18 < EP_{DHW} < 21$ |

<sup>95</sup> [http://efficienzaenergetica.acs.enea.it/doc/attuazione\\_certificazione\\_energetica-rapporto\\_CTI.pdf](http://efficienzaenergetica.acs.enea.it/doc/attuazione_certificazione_energetica-rapporto_CTI.pdf) (Italian only)

|          |                      |
|----------|----------------------|
| <b>E</b> | $21 < EP_{DHW} < 24$ |
| <b>F</b> | $24 < EP_{DHW} < 30$ |
| <b>G</b> | $EP_{DHW} < 30$      |

#### **A.7.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD**

Transposing the EPBD Directive, the Legislative Decree 192/2005 introduced obligations for regular inspections of boilers. The periodicity of the controls depends by the type and power of the boiler.

Italy has not adopted any measures regarding the requirement to carry out regular inspections of air-conditioning systems in order to evaluate their performance.

#### **A.7.6 Cost optimality**

Official Cost-optimal calculation procedure is not still available. The Energy Department of the Economic Development Ministry commissioned the Italian energy agency (ENEA), supported by some CTI Commissions, to prepare a first proposal.

#### **A.7.7 nZEB: requirements and roadmaps**

Italy does not have an official nZEB definition yet. Currently, the Energy Department of the Economic Development Ministry commissioned the Italian energy agency (ENEA) to prepare a first nZEB proposal, with the support of some CTI Commissions and through the Regional Authorities consultation. However, the adoption of the Italian nZEB definition is expected to be a long process. While nothing is officially assumed at the moment, the plan for implementing the nZEB in Italy is likely to come with a gradual strengthening of the energy performance requirements for both new buildings and major renovation of the existing ones.

At regional level, Regione Lombardia is currently analysing how to bring forward the nZEB target to 2015 (this analysis is foreseen in the recent Development Plan of the Region).

As support measures for enhancing the energy performance of buildings, the intention of Italian authorities is to extend/reinforce the existing incentive schemes of 55% tax deduction for residential sector (“Conto Energia”) and the White Certificates scheme. In addition, it is planned to introduce a new mechanism (“Conto Energia Termico”) for stimulating the adoption of RES-heating systems.

#### **A.7.8 Other relevant topics**

##### **A.7.8.1 Permit requirements for renovation**

The permit requirements for renovations change according to the type of interventions.

- The “Certificate communication for the start of the works (so called SCIA)”, is presented by a professional (engineer, architect, quantity surveyor) on behalf of his client, by which he assumed the responsibility that the renovation will be in line with all the urban regulations (urban plan, urban buildings regulation...).

Without it is not allowed to start any kind of work. The Municipality could deny the regularity and stop the works by 60 days from the communication. After the 60 days, the Municipality could intervene only in presence of for the serious damage for the public interest. This procedure could be used only for the renovations that not comply with change of the surface, volume or outline of the building.

- The “Permit to build”, is submitted by a professional (engineer, architect...) to the urban office of the municipality. Without it is not allowed to start any kind of work.

These rules can change at regional level.

All requirements in force for new buildings are extended to complete refurbishment of the existing building envelope elements with useful area > 1000 m<sup>2</sup> and in the case of demolition and reconstruction of existing buildings with maintenance usable area > 1000 m<sup>2</sup>.

#### ***A.7.8.2 Organisation of owners in multi-family buildings and their decision process on renovation of buildings***

To renovate the building envelope or replace components of the thermal plants it is necessary to achieving an agreement of owners who representing the 51% of the building value. The building administrator is the guarantor of the decisional process.

#### ***A.7.8.3 National consultation processes***

A public consultation at national level has opened on the 16<sup>th</sup> October 2012 (ending 30 November) for the New National Energy Strategy with the following general objectives:

- reducing energy costs;
- full satisfaction of all European environment objectives (in particular with reference to “20-20-20” plan);
- greater security of supply ;
- industrial development of the energy sector.

At the end of the consultation phase a public meeting will be held in order to share the results and define the implementation process<sup>96</sup>.

#### ***A.7.8.4 Buildings databases/registers***

The EPC databases at national and regional level are managed by public companies. However, data are not publically available.

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<sup>96</sup> More information on:  
[http://www.sviluppoeconomico.gov.it/?option=com\\_content&view=article&idmenu=806&idarea2=0&sectionid=4&andor=AND&idarea3=0&andorcat=AND&partebassaType=4&MvediT=1&showMenu=1&showCat=1&idarea1=0&idarea4=0&idareaCalendario1=0&showArchiveNewsBotton=1&id=2024875&viewType=0](http://www.sviluppoeconomico.gov.it/?option=com_content&view=article&idmenu=806&idarea2=0&sectionid=4&andor=AND&idarea3=0&andorcat=AND&partebassaType=4&MvediT=1&showMenu=1&showCat=1&idarea1=0&idarea4=0&idareaCalendario1=0&showArchiveNewsBotton=1&id=2024875&viewType=0)

### A.7.8.5 Landlord-tenant dilemma

In order to overcome the tenant-landlord barrier, the following general measures should be considered:

- establish a link between rentals and building energy consumption;
- in case of efficiency actions in condominiums, provide to the building administrator remuneration proportional to the savings achieved.

Presidential Decree no. 59 of 2 April 2009 provides that in case of renovation or installation of new heating systems in existing buildings with a number of housing units greater than 4, (where technically possible) actions necessary to allow the heat accounting and thermoregulation for single housing unit must be made.

Other general measures should be also taken into account to tackle other market barriers for investing in improving the energy performance of buildings.

### A.7.9 Financial and fiscal support policies/programmes

Within the financial and fiscal programmes developed in Italy to support the energy efficiency of the building sector, the existing incentive schemes of 55% tax deduction for residential sector has been positively evaluated by ENEA, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development. In addition, a new mechanism (“Conto Energia Termico”) for stimulating the adoption of RES-heating systems is planned to be introduced.

The following tables provide an extract on the new, on-going programmes and/or a selection of some of past programmes<sup>97</sup>.

Programme A

| Programme name    | 55% of tax deduction <sup>98</sup>  |
|-------------------|---|
| Start – End Dates | 01/01/2012 – 30/06/2013   |
| Type of programme | Tax related   |
| Budget            | Around 2,5 billion of euro (of lower tax revenue)   |
| Measures covered  | Insulation, new window system, condensing boiler, thermal solar panels, overall renovations.                              |
| Programme impacts | Energy savings in the period 2008-2012: 9 500 GWh<br>Emissions reduction in the period 2008-2012: 2 000 ktCO <sub>2</sub> |

<sup>97</sup> Please note that other programmes exist.

<sup>98</sup> [http://efficienzaenergetica.acs.enea.it/doc/rapporto\\_2010\\_publicato.pdf](http://efficienzaenergetica.acs.enea.it/doc/rapporto_2010_publicato.pdf)

| Targeted buildings types: | New buildings | Existing buildings | Residential   |              | Non Residential |              |
|---------------------------|---------------|--------------------|---------------|--------------|-----------------|--------------|
|                           |               |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |               |                    | x             |              |                 |              |

## Programme B

| <b>Programme name</b>     | <b>“V ContoEnergia”</b>  |                    |               |              |                 |              |
|---------------------------|--|--------------------|---------------|--------------|-----------------|--------------|
| <b>Start – End Dates</b>  | 27/08/2012 – 26/02/2015  |                    |               |              |                 |              |
| <b>Type of programme</b>  | incentive  |                    |               |              |                 |              |
| <b>Budget</b>             | 700 million of euro(+ 6 billion of euro of previous programmes)  |                    |               |              |                 |              |
| <b>Measures covered</b>   | Photovoltaic systems<br><br>In case of installation on a building roof, to obtain the maximum incentive rate it is necessary to install completely integrated PV systems and to renovate (insulate) the building roof. |                    |               |              |                 |              |
| <b>Programme impacts</b>  | Expectation of total power installed at the end of 2013: 6600 MWp  |                    |               |              |                 |              |
| Targeted buildings types: | New buildings  | Existing buildings | Residential   |              | Non Residential |              |
|                           |  |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |  |                    | x             | x            | x               | x            |

## Programme C

|                          |  |
|--------------------------|--|
| <b>Programme name</b>    | <b>WhiteCert Scheme<sup>99</sup></b>                         |
| <b>Start – End Dates</b> | 01/06/2005 – 31/05/2013 (extensions expected until 2020)     |
| <b>Type of programme</b> | white certificates   |
| <b>Budget</b>            | 531 million of euro in the period 2005-2009                  |
| <b>Measures covered</b>  | Envelope, technical equipment                                |
| <b>Programme im-</b>     | Energy consumption reduction in the period 2005-2010: 2 Mtep |

<sup>99</sup> <http://www.autorita.energia.it/allegati/docs/12/070-12.pdf> (Italian Version only)

|                                  |   |                    |               |              |                 |              |
|----------------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| <b>pacts<sup>100</sup></b>       | Expectation of energy consumption reduction in the period 2011-2020: 5 Mtep |                    |               |              |                 |              |
| <b>Targeted buildings types:</b> | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                                  |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                                  |   | x                  | x             | x            | x               | x            |

## Programme D

|                                  |   |                    |               |              |                 |              |
|----------------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| <b>Programme name</b>            | <b>“ContoTermico” (NEW)</b>   |                    |               |              |                 |              |
| <b>Start – End Dates</b>         | 2013 - 2020   |                    |               |              |                 |              |
| <b>Type of programme</b>         | incentive   |                    |               |              |                 |              |
| <b>Budget</b>                    | 900 million of euro   |                    |               |              |                 |              |
| <b>Measures covered</b>          | Thermal RES system  |                    |               |              |                 |              |
| <b>Programme impacts</b>         | Expectation of energy consumption reduction in the period 2013-2020: 2,5 Mtep |                    |               |              |                 |              |
| <b>Targeted buildings types:</b> | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                                  |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                                  | x   | x                  | x             | x            | x               | x            |

## Programme E

|                          |   |
|--------------------------|---|
| <b>Programme name</b>    | <b>VAT Reduction</b>  |
| <b>Start – End Dates</b> | 2010 - 2015   |
| <b>Type of programme</b> | Tax reduction   |
| <b>Budget</b>            | N/A   |
| <b>Measures covered</b>  | - ENVELOPE (including insulation, windows & glazing, exterior wall, doors, ceiling, etc.) |

<sup>100</sup> <http://www.sviluppoeconomico.gov.it/images/stories/documenti/20121016SEN-Documento-di-consultazione-vOnlinexxx.pdf> (Italian Version only)

|                                  |  |                    |               |              |                 |              |
|----------------------------------|--|--------------------|---------------|--------------|-----------------|--------------|
|                                  | - EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.) |                    |               |              |                 |              |
| <b>Programme impacts</b>         | N/A  |                    |               |              |                 |              |
| <b>Targeted buildings types:</b> | New buildings  | Existing buildings | Residential   |              | Non Residential |              |
|                                  |  |                    | Private owned | Public owned | Private owned   | Public owned |
|                                  |  | x                  | x             |              |                 |              |



## A8. Romania

### A.8.1 Strategies and (action) plans for the building sector

Romania has several energy and specific energy efficiency and renewable energy strategies<sup>101</sup> such as in the followings:

- The energy roadmap for Romania (GD 890/2003) aiming at a final electricity consumption of 57,59TWh in 2015;
- The strategy on renewable energy sources (GD 1535/2003) reinforced by the Renewable energy Action Plan under the RE Directive;
- The national strategy on energy efficiency (GD 163/2004) integrating the National Energy Efficiency Action Plan under the ESD;
- The national strategy on the heating supply of localities through district generation and distribution systems (GD 882/2004);
- The national program “Heating 2006 - 2015 heat and comfort” (GD 462/2006) aiming at important energy savings by the rehabilitation of the DH systems and thermal rehabilitation of buildings;
- The National Development Plan 2007-2013, in conjunction with ERDF sectorial programmes and with three major sub-programmes on efficient and sustainable energy, renewable energy sources and interconnection networks;
- Romania’s national energy strategy 2007-2020 (GD 1069/2007) aiming to reach a primary energy intensity of 0,32 in 2015 and 0,26 in 2020;
- The national strategy on the sustainable development of Romania - Horizons 2013-2020-2030 (GD 1460/2008).

Romania’s energy strategy for 2007-2020 (GD 1069/20071) includes forecast of the energy consumption made in 2007. However, such forecasts do not consider the influence of the economic crisis. The main measures of the strategy related to buildings are such as in the followings:

- intensifying the information campaigns of the population and of the business environment;
- continuing the “Heating 2006-2015 heat and comfort” program;
- continuing the Program for the thermal retrofitting of blocks of flats;
- expanding the National program for energy efficiency (retrofitting the heating system, retrofitting public buildings and increasing the efficiency of public lighting) for 2011 – 2015;
- the compulsory acquirement of the energy efficiency certificate, starting with 2010, for residential buildings (i.e. single family homes and apartments) that are sold or leased out;
- the enforcement by the central and local public authorities of GO no. 22/2008 on energy efficiency and the promotion of the final consumer use of energy from renewable sources.

<sup>101</sup> The Second Romanian Energy Efficiency Action Plan under Directive 2006/32/EC



In the second National Energy Efficiency Action Plan under the Energy Services Directive (32/2006/EC) is estimated an annual reduction of 823 ktoe in primary energy consumption in the residential sector.

### **A.8.2 Building codes**

As a general statement it is important to notice that there are no explicit minimum requirements for energy performance of buildings neither for new build nor renovations, i.e. maximum values for final energy consumption. Instead, there are minimum requirements for thermal quality of building envelope.

#### **A.8.2.1 Energy performance requirements**

In Romania there are no energy performance requirements at the moment, expressed in final or primary energy indicator. However, for thermal rehabilitation of block-of-flats in the national rehabilitation program (OUG 18/2008) a requirement is set on the energy demand for space heating after the thermal insulation of the building envelope, which has to be less than 100 kWh/m<sup>2</sup>year.

#### **A.8.2.2 Thermal insulation requirements**

For new buildings, the amended regulation C107/2010<sup>102,103</sup> of the Order 2055/2005 indicates the minimum requirements for thermal resistance values. The requirements for new buildings depend on building type and on the envelope of the building. Therefore, the regulation indicates the minimum thermal requirements for:

- Minimum thermal resistance corrected with thermal bridges  $R'$  – value;
- Maximum thermal transmittance corrected with thermal bridges  $U'$ -value;
- Maximum overall thermal coefficients G-values.

For upgrading / major renovations of existing buildings, no minimum requirements are imposed, but the values for new buildings are recommended and a combined technical and economical assessment is conducted (energy audit). There are no specified requirements for renovations for any type of building (residential and non-residential). However, if public money is somehow involved (e.g. National program for rehabilitation), then a maximum value of 100kWh/m<sup>2</sup>year is specified for space heating final consumption.

Otherwise, the use of U-values required for new buildings are generally recommended. Moreover, for the existing buildings, the actual building characteristics are compared with a reference building having the same shape and the  $U'_{max}$ -values provided in table 37.

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<sup>102</sup> Ordinul 2055 din 29 noiembrie 2005 (Ordinul 2055/2005) pentru aprobarea Reglementarii tehnice "Normativ privind calculul termotehnic al elementelor de construcție ale clădirilor", indicativ C 107-2005. Published in the Official Monitor 1124 from 13 December 2005 (M. Of. 1124/2005)

<sup>103</sup> Ordinul 2513 din 22 noiembrie 2010 (Ordinul 2513/2010) pentru modificarea Reglementarii tehnice "Normativ privind calculul termotehnic al elementelor de construcție ale clădirilor", indicativ C 107-2005, aprobată prin Ordinul ministrului transporturilor, construcțiilor și turismului nr. 2.055/2005. Published in the Official Monitor 820 from 8 December 2010 (M. Of. 820/2010).

**Table 37: Reference U-values required for residential buildings**

| ENVELOPE ELEMENTS                  | Residential buildings  |                            |
|------------------------------------|--|----------------------------|
|                                    | Maximum Thermal transmittances (corrected with the influence of thermal bridges)<br>C107/2010<br>$U'_{max}$ [m <sup>2</sup> K/W] |                            |
|                                    | New built*   | Existing to be renovated** |
| External walls                     | 0.56   | 0.71                       |
| External windows                   | 1.30   | 2.50                       |
| Terraces                           | 0.20   | 0.33                       |
| Floors above unheated basement     | 0.35   | 0.60                       |
| Ground floors (no basements)       | 0.22   | 0.33                       |
| Floors of heated basements         | 0.21   | 0.24                       |
| External walls of heated basements | 0.35   | 0.50                       |

(C107-2005 – amended in 2010)

\*mandatory for new buildings and recommended for thermal rehabilitations

\*\* values for reference buildings

For non-residential buildings there are no explicit minimum thermal resistance values, instead a global maximum reference G-value (overall thermal transmittance coefficient) is defined, based on the following “a” to “e” coefficients, where:

- a - Thermal resistance value of external walls [m<sup>2</sup>K/W],
- b - Thermal resistance value of terraces [m<sup>2</sup>K/W],
- c - Thermal resistance value of floors above unheated basement [m<sup>2</sup>K/W],
- d - Thermal linear resistance value of building perimeter to the ground [m<sup>2</sup>K/W]
- e - Thermal resistance value of external windows [m<sup>2</sup>K/W]

**Table 38: Reference G values for non-residential buildings**

| Non-residential buildings with full-time occupation or part-time occupation and high thermal inertia |               |                        |                        |                        |                        |                        |
|--|---------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| Building Type  | Climatic Zone | a [m <sup>2</sup> K/W] | b [m <sup>2</sup> K/W] | c [m <sup>2</sup> K/W] | d [m <sup>2</sup> K/W] | e [m <sup>2</sup> K/W] |
| Hospitals, kindergarten and Clinics  | I             | 1.70                   | 4.00                   | 2.10                   | 1.40                   | 0.69                   |
|  | II            | 1.75                   | 4.50                   | 2.50                   | 1.40                   | 0.69                   |
|  | III, IV       | 1.80                   | 5.00                   | 2.90                   | 1.40                   | 0.69                   |
| Educational and sports   | I             | 1.70                   | 4.00                   | 2.10                   | 1.40                   | 0.50                   |
|  | II            | 1.75                   | 4.50                   | 2.50                   | 1.40                   | 0.50                   |
|  | III, IV       | 1.80                   | 5.00                   | 2.90                   | 1.40                   | 0.50                   |
| Offices, commercial and hotels   | I             | 1.60                   | 3.50                   | 2.10                   | 1.40                   | 0.50                   |
|  | II            | 1.70                   | 4.00                   | 2.50                   | 1.40                   | 0.50                   |
|  | III, IV       | 1.80                   | 4.50                   | 2.90                   | 1.40                   | 0.50                   |
| Other types (normal conditions)  | I             | 1.10                   | 3.00                   | 1.10                   | 1.40                   | 0.40                   |
|  | II            | 1.10                   | 3.00                   | 1.20                   | 1.40                   | 0.40                   |
|  | III, IV       | 1.10                   | 3.00                   | 1.30                   | 1.40                   | 0.40                   |

(C107-2005 – amended in 2010)

**Table 39: G-value reference**

| Non-residential buildings with part-time occupation but no high thermal inertia |               |                           |                           |                           |                           |                           |
|---|---------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Building Type   | Climatic Zone | a<br>[m <sup>2</sup> K/W] | b<br>[m <sup>2</sup> K/W] | c<br>[m <sup>2</sup> K/W] | d<br>[m <sup>2</sup> K/W] | e<br>[m <sup>2</sup> K/W] |
| Hospitals, kindergarten and Clinics   | I             | 1.50                      | 4.00                      | 2.00                      | 1.40                      | 0.69                      |
|   | II            | 1.60                      | 4.50                      | 2.30                      | 1.40                      | 0.69                      |
|   | III, IV       | 1.70                      | 5.00                      | 2.60                      | 1.40                      | 0.69                      |
| Educational and sports  | I             | 1.50                      | 4.00                      | 2.00                      | 1.40                      | 0.50                      |
|   | II            | 1.60                      | 4.50                      | 2.30                      | 1.40                      | 0.50                      |
|   | III, IV       | 1.70                      | 5.00                      | 2.60                      | 1.40                      | 0.50                      |
| Offices, commercial and hotels  | I             | 1.50                      | 3.50                      | 2.00                      | 1.40                      | 0.50                      |
|   | II            | 1.60                      | 4.00                      | 2.30                      | 1.40                      | 0.50                      |
|   | III, IV       | 1.70                      | 4.50                      | 2.60                      | 1.40                      | 0.50                      |
| Other types (normal conditions)   | I             | 1.00                      | 2.90                      | 1.00                      | 1.40                      | 0.40                      |
|   | II            | 1.00                      | 2.90                      | 1.10                      | 1.40                      | 0.40                      |
|   | III, IV       | 1.00                      | 2.90                      | 1.20                      | 1.40                      | 0.40                      |

(C107-2005 – amended in 2010)

### A.8.2.3 Compliance

The proof of compliance must be made in two stages: (1) when requesting the building permit and (2) after completion of the building. The main responsible body for compliance control in construction is the State Inspectorate in Constructions (SIC), a public institution with a legal personality, subordinated to the Ministry of Regional Development and Tourism (MDRT).

If a construction is built without a permit or infringes its permit, the control authorities may order the demolition of those elements which are not compliant with the permit or were built without a permit. In such cases, the construction works can be suspended. The administrative fine to be paid by the investor is up to approximately 2 300 Euro in addition to indemnities for the damage caused by the construction.

### A.8.3 Measures for implementing Article 13(4) of the RED

Concerning the implementation of Article 13(4) of the RED, no requirements for using renewable energy and DHW in buildings are introduced yet in the Romanian building regulations.<sup>104</sup>

Even if the market can offer adequate technology, there are neither clear mandatory actions, nor provisions stimulating the increase of renewable energy use in buildings yet in place.

The Government proposal for a legal act to transpose the EPBD recast (2010/31/EU) is pending for approval in the Parliament. This proposal foresees that a feasibility study concerning the potential use of renewable energy in the designed building has to be

<sup>104</sup> BPIE (2012). Implementing nearly Zero-Energy Buildings (nZEB) in Romania. Towards a definition and roadmap. [http://www.bpie.eu/low\\_energy\\_buildings\\_east\\_eu.html](http://www.bpie.eu/low_energy_buildings_east_eu.html)

provided for each new building at the authorising stage. However, without any incentives for the owner, there is no guarantee that the proposed technologies will be actually applied.

The use of renewable energy technologies in buildings is not a usual practice yet but started to grow significantly over the last years. The main driver for the installation of renewable energy technology in buildings is the “Casa Verde” (Green House) Programme, coordinated by the Environment Fund Administration, which applies to residential and public buildings (for details, see the sub-chapter below on support schemes).

Overall, the most popular technologies are solar thermal systems. According to EurObserv'ER<sup>105</sup> renewable energy barometer, the total installed solar-thermal collectors area in 2010 in Romania was approx. 144.000 m<sup>2</sup> with a thermal capacity of around 101MWhth. The Romanian solar thermal industry reported for 2010 a turnover 20 million Euro and 250 direct and indirect jobs. Solar photovoltaic and heat pumps are also used, but their market share is still very small (below 1%).

#### A.8.4 Energy Performance Certificates

In January 2007 the energy certification of building came into force for all new buildings, existing public buildings and major renovation works. The Romanian EPC shows the final energy consumption of the building and of the reference building (except for flats). The energy classes in EPC are from A (the most efficient) to G (the most energy consuming). The EPC also includes ‘sub-energy classes’ for the specific annual energy consumption for heating, cooling, ventilation, DHW and lighting (these are the “utilities”, i.e. energy uses). The energy consumption for a building which has no cooling system and no mechanical ventilation system, the energy use class A is below 125 kWh/m<sup>2</sup>/yr.

The table 40 shows the EPC energy classes in Romania.

**Table 40: EPC Energy classes**

| Energy class | Total: (heating, DWH, lighting) | Heating                  | DWH                      | Lighting                 | Air-conditioning         | Mechanical Ventilation   |
|--------------|---------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|              | [kWh/m <sup>2</sup> /yr]        | [kWh/m <sup>2</sup> /yr] | [kWh/m <sup>2</sup> /yr] | [kWh/m <sup>2</sup> /yr] | [kWh/m <sup>2</sup> /yr] | [kWh/m <sup>2</sup> /yr] |
| <b>A</b>     | <125                            | <70                      | <15                      | <40                      | <20                      | <5                       |
| <b>B</b>     | 125<E<201                       | 70<E<117                 | 15<E<35                  | 40<E<49                  | 20<E<50                  | 5<E<8                    |
| <b>C</b>     | 201<E<291                       | 117<E<173                | 35<E<59                  | 49<E<59                  | 50<E<87                  | 8<E<11                   |

<sup>105</sup> EurObserv'ER (2011): The state of renewable energy in Europe. 11<sup>th</sup> EurObserv'ER Report, available at: [http://www.energies-renouvelables.org/observ-er/stat\\_baro/barobilan/barobilan11.pdf](http://www.energies-renouvelables.org/observ-er/stat_baro/barobilan/barobilan11.pdf)

|                    |              |           |           |           |          |           |         |
|--------------------|--------------|-----------|-----------|-----------|----------|-----------|---------|
| D                  |              | 291<E<408 | 173<E<245 | 59<E<90   | 59<E<73  | 87<E<134  | 11<E<15 |
| E                  |              | 408<E<566 | 245<E<343 | 90<E<132  | 73<E<91  | 134<E<198 | 15<E<21 |
| F                  |              | 566<E<820 | 343<E<500 | 132<E<200 | 91<E<120 | 198<E<300 | 21<E<30 |
| G                  |              | 820<E     | 500<E     | 200<E     | 120<E    | 300<E     | 30<E    |
|                    |              |           |           |           |          |           |         |
| Reference building | Class        | B         | B         | D         | A        | -         | -       |
|                    | [kWh/m2/yr ] | 194.94    | 96.43     | 87.25     | 11.26    | -         | -       |

#### A.8.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD

Romania opted to implement alternative measures having similar effect as the regular inspections for heating and air conditioning systems. These measures are such as in the followings:

- **For new buildings** – the requirement to elaborate a study concerning the feasibility of using highly efficient alternative systems, as a pre-condition to obtain the construction permit issued by the competent local/county public administration authorities;
- **For existent buildings** – in case of a major renovation of the buildings, their owners/administrators may implement alternative systems for generating energy, as far as the project establishes that this is technically, functionally and economically possible.

For all new and existing buildings, their owners/administrators may request, under legal conditions, the installation of smart meters, active control systems, as well as automation and control and/or monitoring systems.

The inspection of heating systems in buildings is performed by authorised experts that are obliged to fill detailed reports, including recommendations for improving the energy efficiency of the system.<sup>106</sup>

#### A.8.6 Cost optimality

The cost-optimality methodology is not yet developed in Romania. The Ministry for Regional Development and Tourism (responsible with buildings policies in Romania) launched a call for tender on December 20<sup>th</sup> for the elaboration of a preparatory study on applying cost-optimality in Romania. The contract is likely to be allocated in February 2013 and to be finalised in 9 months after the kick-off.

<sup>106</sup> The Second Romanian Energy Efficiency Action Plan under Directive 2006/32/EC

### **A.8.7 nZEB: requirements and roadmaps**

Romania did not define yet the nZEB levels nor the implementation plan by 2020. The Ministry for Regional Development and Tourism (responsible with buildings policies in Romania) launched a call for tender on December 20<sup>th</sup> for the elaboration of a preparatory study for the implementation of nZEB in Romania. The contract is likely to be allocated in February 2013 and to be finalised in 9 to 18 months after the kick-off.

### **A.8.8 Other relevant topics**

#### **A.8.8.1 Permit requirements for renovation**

For undertaking major renovation measures that may have an impact of the building structure, it is necessary to have a permit attesting that the renovation project fulfil all the requirements. If the building is listed or is located in a historical area, an additional permit confirming that the renovation of the façade does not change the main characteristics of the building and/or area is required.

#### **A.8.8.2 Organisation of owners in multi-family buildings and their decision process on renovation of buildings**

Owners living in multifamily buildings are organised in Owners Associations which are legally created according to Romanian Law [no. 230/2007](#) regarding the creation, the organisation and the operation of Residential Multifamily Buildings Owners Associations. The owners association will be represented by a committee formed of several representatives.

According to the Government Emergency Ordinance no. 69/June 2010 the decision for the building renovation can be taken based on the agreement of two thirds of the owners.

#### **A.8.8.3 National consultation processes<sup>107,108</sup>**

The consultation process of government with national stakeholders is not quite regular. There are meetings with the occasion of conferences and seminars organised by the professional associations or building councils. More than ten events are scheduled all year long.

In many counties/localities associations (NGOs) have been created associations for energy efficiency with county/local councils as founder members. Many commercial companies (especially SMEs) are members of these associations. Many of these associations were founded with an initial financial support from the European Union. These organisations generally undertake the following activities:

- Offer technical advice and consultancy to public local authorities and subordinated institutions as well as to companies for initiating and implementing measures for energy management.

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<sup>107</sup> The Second Romanian Energy Efficiency Action Plan under Directive 2006/32/EC

<sup>108</sup> BPIE private communication with local experts

- Carry out activities for disseminating information at a local level (including in schools).
- Organize fairs and expositions with a specific thematic, etc.

A representative association is “Energy Cities Romania” (ECR). The association gathers 31 municipalities interested in improving energy efficiency in public urban services (heating, public illumination, water and gas supply, collection, storage and transport of domestic waste, etc.), in promoting renewable energy sources and environment protection. The main activities carried out by the association are:

- Support to local authorities in preparing and implementing energy efficiency and environmental policies at local level;
- Information on best practices, new and energy efficient technologies;
- ***Facilitate the exchange of experience between members of the network and with associations and other similar organisations;***
- Policy consultancy;
- Training for representatives of local authorities;
- Defend the members’ interest to the national administration and energy operators;
- Organize conferences, seminars at regional, national and international level;
- Participate in regional, national and European projects;
- Newsletters and other publications;
- Elaboration of databases at local and national level.

There are also some other relevant national organisations of local authorities such as:

- Association of Romanian Municipalities (all the 103 municipalities in the country, as well as the 6 Districts from Bucharest);
- Association of Romanian Cities (185 members and aims to also represent the interests of small towns);
- Association of Romanian Communes (more than 2000 members);
- Federation of Romanian Local Authorities (comprising the three above mentioned associations);

All these associations carry out significant activities regarding the management and administration of energy.

Currently, 30 communities from Romania adhered to the Covenant of Mayors and implement SEAPs and Sustainable Mobility Action Plans.

There are also several associations of main building industries or offering services for buildings such as:

- The Romanian Association of Construction Entrepreneurs (A.R.A.C.O.) - [www.araco.org](http://www.araco.org)
- Employers organization for window panes, windows and facades
- Employers organization for cold and air conditioning
- The Romanian Industry Employers’ Confederation (C.O.N.P.I.R.O.M.) - [www.conpirom.ro](http://www.conpirom.ro)
- The Concrete Manufacturers Association in Romania



- The Employers Organization from the Cement Industry and of other Mineral Products for Constructions – C.I.R.O.M.
  - The Employers Organization for Prefab and BCA Materials Manufacturers B.C.A.-P.R.E.F.A.R.O.M.
  - The Employers Association of Constructors
  - The Association of the Construction Materials Manufacturers in Romania (A.P.M.C.R.) [www.apmcr.org](http://www.apmcr.org)
  - The Construction Companies Employers Organization [www.ugir.ro](http://www.ugir.ro)
  - Renewable Energies Employers Organization (RENERG)- [www.ugir1903.org](http://www.ugir1903.org)
  - The Federation of Environment Employers Organizations
  - Employers Association for New Energy Sources ( SUNE)
  - Employers Association for the Thermal Insulation Carpentry Manufacturers (PPTT)
  - The Association of Buildings Energy Auditors- [www.aaec.ro](http://www.aaec.ro)
- The Romanian Association of Installation Engineers –[www.aiiro.ro](http://www.aiiro.ro)

#### **A.8.8.4 Buildings databases/registers**

According to law 372/2005, the auditors have the obligation to send the EPCs to the “URBAN-INCERC” National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development institution established following the Decision of the Romanian Government No. 1398 of 18 November 2009, published in “Monitorul Oficial” No. 816 of 27 November 2009<sup>109</sup>. URBAN-INCERC has the role of collecting the certificates and creating a national data base after the statistical analysis of data. The process of energy performance certification is not yet controlled. However, every energy auditor has to keep a register with all EPCs issued, mentioning the date, the beneficiary, the certified objective address etc. The Romanian law stipulates that the energy auditor is the only responsible for the compliance with requirements of the certification and for the correctness of the energy audit.

Some data about multi-family residential buildings characteristics in main Romanian cities still exists in the archives of former Design Institutes like Proiect Bucuresti and IPCT Bucharest, or the County’s Design Institutes (Institutele de Proiectare Judetene).

#### **A.8.8.5 Landlord-tenant dilemma**

No specific actions are taken for the landlord-tenant dilemma issue, also because the ownership rate of residential buildings in Romania is very high (at around 96%).

#### **A.8.9 Financial and fiscal support policies/programmes**

For residential buildings two thermal rehabilitation programs are active: one established by Government Emergency Ordinance (GEO) no. 18/2009 applied block of flats built in the period 1950-1990 and the other one established by GEO no. 69/2010 for all residential buildings.

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<sup>109</sup> <http://www.incd.ro/>



In 2002, in Romania had been launched a National thermal rehabilitation programme for block of flats. After years of hesitation the programme was re-launched in 2007 as part of the first National Energy Efficiency Action Plan (under the 2006/32/EC Directive). The programme was extended in 2009 by the Government Ordinance GEO 18/2009.

Further, GEO 18/2009 sets a Multiannual National Programme for increasing of the energy performance of condominium type buildings built between 1951 and 1990 (with high energy consumption for space heating) by renovation.

The aim of the programme was to decrease heating energy consumption in renovated buildings from an actual estimated energy consumption of 180-240 kWh/m<sup>2</sup> to below 100 kWh/m<sup>2</sup>. The measures could comprise thermal rehabilitation of the external walls, basement floors and roofs, the replacement of the existing windows and external doors with double-glazed ones, the thermal insulation of the basement pipes and painting of the exterior walls (for aesthetic reasons). The programme uptake happened in 2008/2009 and the renovation costs are divided between central budget (50% grant), local budgets (30% grant) and apartments' owners (20% contribution).

Few local administrations decided to also cover the owner's contribution (e.g. District 1 Bucharest) and, in this case, the thermal renovation was a cost-free measure for the owners. In addition, the renovation contracts were agreed between the contractors and public authorities, without the involvement of the buildings' owners.

In November 2012, GEO 63/2012 introduced a pilot scheme, similar to the above one but using EU Cohesion Funds (under the Regional OP, Priority 1: Sustainable development of cities). The scheme addresses renovation of block of flats built between 1951 and 1990 and having more than 50% low-income households (i.e. income < 500Euro/month). Same measures as in National Programme from above are eligible. This new financing scheme has an overall budget of 304 Mln Euro where 150 Mln Euro are coming from the EU and the other from national sources. The projects have to be committed in 2013, while the execution of the works may continue afterwards. The financing is shared between central budget and EU funds (60% grant), local authorities budgets (10% to 30% according to income of owners) and owners (30% to 10% co-financing, according to income).

In 2010 a Government Ordinance (GEO 69/2010) introduced a new financing scheme offering dedicated loans over a 5 year period for thermal renovation of the residential buildings (houses and blocks of flats) built by 2000, with 100% state guarantees and up to 100% subsidized interest rates. Moreover, local authorities may finance up to 30% of the eligible costs. The value of the loan shall account for 90% of the value of the works to be executed but not be above the following thresholds:

- the equivalent amount in RON of EUR 1 850/room (VAT incl) for blocks,
- the equivalent amount in RON of EUR 7 400/room (VAT incl) for houses.

Casa Verde Programme managed by the National Authority for Environment offered grants supporting renewables introduction in buildings, both residential and public.

Nevertheless, the programme operated only in 2010 and 2011 and the budget was at 200mn RON/yr (aprox 23,6 mn Euro/yr) out of which 50% had been for residential and 50% for public buildings.

For non-residential buildings, only the pilot thermal rehabilitation program for public buildings exists in the framework of the financial assistance offered by the Swiss Government for energy efficiency projects in buildings was applicable (33 buildings).

The following tables provide an extract on the on-going programmes and/or a selection of some of past programmes<sup>110,111</sup>.

#### Programme A

|                                  |   |                           |                      |                     |                        |                     |
|----------------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>Multiannual National Programme for increasing the energy performance of the block of flats (GEO 18/2009 and GEO 63/2012)</b>   |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | Since 2002, continuously operational  |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Grants  |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | In 2011 alone: RON 150 million (≈EUR 35,4 million). Around 204 Mln Euro cumulative budget between 2008-2011. A similar pilot scheme is added for 2013 by using EU cohesion funds with an overall budget of 304 Mln EURO   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | <ul style="list-style-type: none"> <li>- Envelope: exterior walls, roof, double glaze of windows and exterior doors, construction works and painting of the external walls and other structural and non-structural parts of the building shell.</li> <li>- Other energy-efficiency related measures: works for reducing the thermal losses of the pipes and furniture from the basement of the building.</li> </ul> |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | 2008-2011:<br>Cumulative energy savings (BPIE est): approx 0,6 TWh/yr<br>Aprox 80.000 apartments thermo-renovated (up to 3% of the existing dwellings in block of flats)<br><br>Potential energy savings of the extension: aprox 1 TWh/yr   |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |

<sup>110</sup> BPIE survey on buildings data 2011.

<sup>111</sup> BPIE (2012). Implementing nearly Zero-Energy Buildings (nZEB) in Romania. Towards a definition and roadmap. [http://www.bpie.eu/low\\_energy\\_buildings\\_east\\_eu.html](http://www.bpie.eu/low_energy_buildings_east_eu.html)

|  |  |   |   |  |  |  |
|--|--|---|---|--|--|--|
|  |  | x | x |  |  |  |
|--|--|---|---|--|--|--|

## Programme B

|                                  |  |                           |                      |                     |                        |                     |
|----------------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>Direct reduction of energy consumption through community based retrofits and market development - Component 3 of the LGGE Improving Energy Efficiency in Low-Income Households and Regions of Romania</b>   |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | 2011 - 2015  |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Grants   |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | <p>(values in USD) GEF financing: 2,027,100 2%; Co-financing (Ministry of Regional Development and Tourism + Ministry of Environment and Forest): 118,701,500 98% ; Total: 120,728,600</p> <p>Volume of investments in EE buildings leveraged (cumulative USD by EOP): baseline = 0, targets end of project = USD 10 741 000</p>   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | <p>Envelope: Energy efficient buildings reconstructed (and potentially new buildings constructed) with reduced fuel costs or using improved sustainable energy technologies in low income communities; INSULATION</p> <p>sustainable heating systems in buildings</p>  |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | <p>Ex-ante: Tonnes CO<sub>2</sub>eq per year reduced (direct reductions) by end-of-project (EOP): baseline=849, targets end of project=22227; Tonnes CO<sub>2</sub>eq reduced over the lifetime of the EE measures introduced (direct reductions): baseline = 25456, targets end of project = 666800. MWh in heat energy per year saved as a direct result of this project by end of project: baseline = 2197, Targets End of Project = 43374. No. of people living in EE buildings by the end of project: baseline = 4500, targets end of project = 110616.</p> |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |  | x                         | x                    | x                   |                        | x                   |

## Programme C

|                       |   |
|-----------------------|---|
| <b>Programme name</b> | <b>Thermal rehabilitation of housing stock financed by bank loans with Government guarantee (GEO 69/2010)</b> |
|-----------------------|---|

|                                  |  |                           |                      |                     |                        |                     |
|----------------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Start – End Dates</b>         | Since 2010   |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Loans  |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | Available budget, for 2011 alone: RON 143,1 million (≈EUR 33,7 million)  |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | - Envelope: exterior walls, roof<br><br>- Technical equipment (HVAC, RES, etc.): installation, if appropriate, of alternative systems for partially/totally providing energy for heating water, lighting and/or heating. |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A  |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |  | x                         | x                    |                     |                        |                     |

## Programme D

|                                  |  |                           |                      |                     |                        |                     |
|----------------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>Program Casa Verde for individuals</b>  |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | Since 2010   |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Grants   |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | For 2011 alone: RON 100 million (≈EUR 23,6 million)  |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | Technical equipment (heating, ventilation systems, RES in buildings, etc.): installing of heating systems that use renewable energy. The scope is that of replacing the traditional methods (such as burning wood and fossil fuels) used to produce thermal energy for domestic use. |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A  |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  | x  | x                         | x                    |                     |                        |                     |

## Programme E

|                          |   |  |  |  |  |  |
|--------------------------|---|--|--|--|--|--|
| <b>Programme name</b>    | <b>Program Casa Verde for public bodies</b> |  |  |  |  |  |
| <b>Start – End Dates</b> | Since 2010                                  |  |  |  |  |  |

|                                  |  |                           |                      |                     |                        |                     |
|----------------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Type of programme</b>         | Grants   |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | For 2011 alone: RON 100 million (≈EUR 23,6 million)  |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | Technical equipment (heating, ventilation systems, RES in buildings, etc.): installing of heating systems that use renewable energy. The scope is that of replacing the traditional methods (such as burning wood and fossil fuels) used to produce thermal energy for domestic use. |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A  |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  | x  | x                         |                      |                     |                        | x                   |

## A9. Spain



### A.9.1 Strategies and (action) plans for the building sector

The main strategy developed for the improvement of the energy efficiency of the building stock in Spain was drafted by the Ministry of Industry, Tourism and Commerce, along with the IDAE (Institute for Energy Diversification and Savings). The resulting **Energy Saving and Efficiency Action Plan 2011-2020**<sup>112</sup> includes, among others, measures to boost the ESCOs market (**Plan to Promote Energy Service Contracts, known as Plan 2000 ESCO**) and the proposal of actions to guarantee the necessary exemplary role of the public sector (**Energy Saving & Efficiency Activation Plan in the buildings of the State's General Administration**) which will also support meeting EED requirement on achieving 3% renovation rate for central Government buildings. This plan directed to public buildings was approved in Cabinet Meeting as of 1st December 2009 with the objective of achieve energy savings of 20% in 2016 in 330 of energy consumers centres of the State's General Administration, by carrying out saving and energy efficiency measures implemented by ESCOs. The Plan to Promote Energy Service Contracts (approved in Cabinet Meeting as of 16th July 2010), involves the extension to the rest of the Regional Public Administrations of the former plan, affecting 1000 energy-consuming centres belonging to the Regional and Local Administration and other 1000 ones belonging to the state's general administration.

The specific measures to intensify energy savings in buildings sector which have been taken place in last Action Plans are:

- As regards the energy saving measures affecting buildings, one key measure is the restriction on indoor temperatures in climate-controlled non-residential buildings and other public spaces, with the exception of hospitals and other centres requiring special indoor environments.
- In the framework of the renewal plan for tourism infrastructure, which has been given a budget of 500 million euros for 2009, part of this line will be set aside to finance investments promoting energy savings in tourism facilities.
- Amendment of the Royal Decree on Energy Efficiency in New Buildings to make it obligatory for new national administration buildings to achieve a high energy rating.

The specific measures to intensify energy savings in buildings sector which are detailed in **Energy Saving and Efficiency Action Plan 2011-2020** are:

- Energy refurbishment of thermal envelope of existing buildings
- Energy efficiency improvement of thermal installations for existing buildings
- Energy efficiency improvement of lighting indoor systems for existing buildings
- Promoting of high EPC for new and existing buildings (at refurbishment context)

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<sup>112</sup> <http://www.idae.es/index.php/id.663/reلمenu.332/lang.uk/mod.pags/mem.detalle>

- Promoting of nZEB buildings (new buildings or refurbishment of existing buildings)
- Energy efficiency improvement of cooling systems for tertiary sector
- Energy efficiency improvement of appliances stock

Regarding meeting the EED article 4 requirement for developing a long term strategy for mobilising investment in the renovation of the national building stocks, there is, so far in place, the *National Housing and Refurbishment Plan 2009-2012* which promotes the refurbishment of residential building sector. This plan grants subsidies in order to improve the energy performance of dwellings. Within the Energy Savings and Efficiency Action Plan 2011-2020, there are other plans like this planned to be developed until 2020.

### A.9.2 Building codes

The main legislation referred to energy performance of buildings for Spain are: the Technical Building Code 2006<sup>113</sup> (TBC), the Regulation for Buildings' Thermal Installations 2007<sup>114</sup> and Regulation for Energy Efficiency Certification 2007.

#### A.9.2.1 Energy performance requirements

The Technical Building Code is organised in 6 sections. DB HE is the section referred to energy performance. DB HE is divided in 5 sections: HE1 (energy need limitation), HE2 (efficiency in HVAC), HE3 (efficiency in lighting), HE4 (minimum contribution of RES: solar thermal energy for DHW) and HE5 (minimum contribution of RES: solar photovoltaic in tertiary buildings).

HE1 Section of TBC 2006 which is related to minimum energy requirements has been reviewed in order to follow the EPBD recast from 2010. The draft is already available and it is looking forward its approval.

The Technical Building Code 2006 defines 12 climatic zones in Spain, according to winter and summer severity indexes. The minimum energy requirements are coherent with each climatic zone (A4, A3, B4, B3, C4, C3, C2, C1, D3, D2, D1 and E1).

Existing buildings have to comply with the same minimum requirements as new ones, when building rehabilitation, enlargement or renovation are carried out, if the floor area exceeds 1000 m<sup>2</sup>, and more than 25% of the building envelope undergoes renovation.

Current Spanish regulations (TBC 2006) do not oblige to reach a certain energy performance for any kind of building. Those regulations only establish some minimum values for thermal transmittance to be reached within each climate area.

Energy performance requirements depend on each case (reference building) and climatic zone. The minimum energy performance requirement used to match with energy certification D.

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<sup>113</sup> <http://www.codigotecnico.org/ingles/introduction/>

<sup>114</sup> <http://www.idae.es/index.php/mod.pags/mem.detalle/relcategoria.1030/id.27/relmenu.53>

### A.9.2.2 Thermal insulation

Although the regulation is much more complex, the main minimum requirements (U-values) according to Winter Severity Index are:

**Table 41: U-value requirements**

| Building component |   | U-value<br>[W/m²K] |     |              |     |         |     |           |     |        |     |
|--------------------|---|--------------------|-----|--------------|-----|---------|-----|-----------|-----|--------|-----|
|                    |   | Single family      |     | Multi-family |     | Offices |     | Education |     | Health |     |
|                    |   | New                | Ren | New          | Ren | New     | Ren | New       | Ren | New    | Ren |
| Walls              | Façade, inner walls in contact with no inhabitable spaces, first meter of floor in ground contact and first meter on wall in ground contact | 0,74 – 1,22        |     |              |     |         |     |           |     |        |     |
|                    | Wall in contact with another building   | 1,00 – 1,22        |     |              |     |         |     |           |     |        |     |
|                    | Frames and windows  | 3,10 – 5,70        |     |              |     |         |     |           |     |        |     |
|                    | Roof  | 0,46 – 0,65        |     |              |     |         |     |           |     |        |     |
|                    | Floors  | 0,62 – 0,69        |     |              |     |         |     |           |     |        |     |

N.B. Spanish Standard does not have different criteria according to building's typology.

### A.9.2.3 Compliance

The TBC is dependent on the Architecture and Housing Policy Directorate of Ministry for Housing, with the cooperation of Eduardo Torroja Construction Sciences Institute (IET cc) which belongs to the Higher Council for Scientific Research (CSIC). The mechanisms to ensure the compliance with the Building Code requirements are competence of each Spanish Region. The Professional Associations (Architects and Engineers) are responsible to check that design projects contain all documents according to the TBC. Besides, each Administration should check these documents before they grant works licences.



Ultimately the professional, who sign the design project, is responsible for TBC enforcement because otherwise the end user could complaint and this professional must respond from the legal point of view. Therefore and overall, the control mechanisms are considered adequate and effective.

### A.9.3 Measures for implementing Article 13(4) of the RED

In order to meet the Renewable Energy Directive requirement of using minimum levels of energy from renewable sources in new buildings and in existing buildings that are subject to major renovation, the Technical Building Code 2006 includes an obligation to consider a minimum RES share. In particular, the HE4 Section of the Code requires that a share (that can range from 30 to 70%) of domestic hot water shall be covered by thermal solar energy according to consumption, climatic zone and technology system.

Also, the HE5 Section of the Code imposes minimum shares of photovoltaic power that non-residential buildings must incorporate when above a certain size/area.

### A.9.4 Energy Performance Certificates

At the moment, EPC legislation is fully into force for new buildings and these must be certified. The draft of energy certification regulation for all buildings already exists and shall be approved in 2013.

For residential buildings, the EPC grading is based on heating, cooling and domestic hot water consumptions while for non-residential buildings, lighting and auxiliary systems consumptions are also taken into account.

**Table 42: EPC Energy classes**

|       | Energy efficiency classification indexes (kgCO <sub>2</sub> /m <sup>2</sup> year) |                           |
|-------|---|---------------------------|
| Class | Residential buildings   | Non-residential buildings |
| A     | $C1 < 0,15$   | $C < 0,40$                |
| B     | $0,15 \leq C1 < 0,50$   | $0,40 \leq C < 0,65$      |
| C     | $0,50 \leq C1 < 1,00$   | $0,65 \leq C < 1,00$      |
| D     | $1,00 \leq C1 < 1,75$   | $1,00 \leq C < 1,3$       |
| E     | $C1 > 1,75$ and $C2 < 1,00$   | $1,3 \leq C < 1,6$        |
| F     | $C1 > 1,75$ and $1,00 \leq C2 < 1,5$  | $1,6 \leq C < 2$          |
| G     | $C1 > 1,75$ and $C2 \geq 1,50$  | $C \geq 2$                |

Parameter C in the table 39 represents CO<sub>2</sub> global emission and it is calculated as follow<sup>115</sup>:

$$C1 = \frac{\left( \frac{I_o}{I_r} R \right) - 1}{2(R-1)} + 0.6$$

$$C2 = \frac{\left( \frac{I_o}{I_s} R' \right) - 1}{2(R'-1)} + 0.5$$

$I_o$ , CO<sub>2</sub> emissions of the building in question.

$I_r$ , CO<sub>2</sub> emissions of a building that strictly meets the enforced regulation.

$I_s$ , CO<sub>2</sub> average value of the building of the existing housing stock in 2006.

$R$ , ratio between  $I_r$  and CO<sub>2</sub> emissions of the 10% percentile of the buildings strictly meeting the regulation.

$R'$ , ratio between  $I_s$  and CO<sub>2</sub> emissions of the 10% percentile of the existing housing stock in 2006

And

$$C = \frac{I_{objeto}}{I_{reference}}$$

$I_{objeto}$ , CO<sub>2</sub> emissions of the building in question.

$I_{referencia}$ , CO<sub>2</sub> emissions of the reference building.

The following table includes the sum of associated emissions (kgCO<sub>2</sub>/m<sup>2</sup>year) to heating, cooling and DHW for residential buildings, according to the 12 climatic zones. No data for tertiary sector are developed as the scale of each building is referred itself.<sup>116</sup>

<sup>115</sup> CA-EPBD Spain November 2010

<sup>116</sup> The definition of tertiary buildings scale is based on referenced itself methodology. This means the scale is developed at the moment of evaluation of the project, based on a reference building according to each project (i.e. a building modelled from geometry of target building but meeting minimum energy requirements). Hence, an infinite scales' number exists.

**Table 43: Associated emissions to heating, cooling and DHW for residential buildings, according to the 12 climatic zones in Spain**

| Climatic Zone |                   | Total emissions (kg CO <sub>2</sub> /m <sup>2</sup> ) |      |      |      |       |       |
|---------------|-------------------|---|------|------|------|-------|-------|
|               |                   | A-B   | B-C  | C-D  | D-E  | E-F   | F-G   |
| <b>E1</b>     | Single dwelling   | 16,9  | 26,0 | 38,7 | 57,7 | 101,0 | 118,2 |
|               | Block of dwelling | 11,6  | 17,9 | 26,7 | 39,7 | 74,1  | 86,7  |
| <b>D1</b>     | Single dwelling   | 14,7  | 22,6 | 33,8 | 50,3 | 77,2  | 95,0  |
|               | Block of dwelling | 10,0  | 15,4 | 23,0 | 34,3 | 62,0  | 74,4  |
| <b>D2</b>     | Single dwelling   | 11,9  | 19,2 | 29,8 | 45,8 | 97,2  | 127,3 |
|               | Block of dwelling | 8,1   | 13,1 | 20,3 | 31,2 | 78,4  | 91,7  |
| <b>D3</b>     | Single dwelling   | 10,1  | 16,3 | 25,3 | 38,9 | 66,0  | 79,2  |
|               | Block of dwelling | 6,8   | 11,1 | 17,2 | 26,4 | 59,1  | 70,9  |
| <b>C1</b>     | Single dwelling   | 9,1   | 14,7 | 22,8 | 35,1 | 62,0  | 78,1  |
|               | Block of dwelling | 6,0   | 9,8  | 15,1 | 23,2 | 48,0  | 57,6  |
| <b>C2</b>     | Single dwelling   | 8,0   | 12,9 | 20,0 | 30,8 | 54,0  | 64,8  |
|               | Block of dwelling | 5,4   | 8,7  | 13,5 | 20,7 | 40,8  | 47,7  |
| <b>C3</b>     | Single dwelling   | 8,2   | 14,2 | 23,2 | 36,5 | 71,0  | 91,6  |
|               | Block of dwelling | 5,6   | 9,7  | 15,9 | 24,9 | 53,2  | 60,1  |
| <b>C4</b>     | Single dwelling   | 9,3   | 16,0 | 26,2 | 41,1 | 72,3  | 88,9  |
|               | Block of dwelling | 6,3   | 10,9 | 17,8 | 28,0 | 61,6  | 69,6  |
| <b>B3</b>     | Single dwelling   | 5,4   | 10,3 | 17,4 | 27,9 | 52,2  | 61,1  |

| Climatic Zone |                   | Total emissions (kg CO <sub>2</sub> /m <sup>2</sup> ) |      |      |      |      |      |
|---------------|-------------------|---|------|------|------|------|------|
|               |                   |   |      |      |      |      |      |
|               | Block of dwelling | 3,5   | 6,5  | 11,1 | 17,7 | 38,2 | 43,2 |
| <b>B4</b>     | Single dwelling   | 6,3   | 10,9 | 17,9 | 28,0 | 54,5 | 67,0 |
|               | Block of dwelling | 4,2   | 7,2  | 11,7 | 18,4 | 41,0 | 44,7 |
| <b>A3</b>     | Single dwelling   | 3,9   | 7,4  | 12,5 | 20,0 | 37,3 | 44,8 |
|               | Block of dwelling | 1,3   | 1,5  | 1,8  | 2,3  | 4,7  | 5,5  |
| <b>A4</b>     | Single dwelling   | 4,4   | 8,3  | 14,0 | 22,5 | 39,4 | 42,9 |
|               | Block of dwelling | 2,8   | 5,3  | 9,0  | 14,4 | 28,8 | 31,4 |

Residential scale is based on comparative scenarios (i.e. based on reference energy need values). As a consequence these limits or bands are different in each climatic zone and according to building typology (single family house or apartment block). Therefore, a total of 24 different scales were defined for residential buildings.<sup>117</sup>

#### **A.9.5 Inspections (for boilers and/or air conditioning systems): article 8 of first EPBD**

To meet the EPBD requirement on inspections of heating and AC system, the Regulation for Buildings' Thermal Installations 2007 establishes inspections' frequencies that range from once a month (for heating and cooling systems with power above 1000kW) to a quarterly frequency (for heating and AC systems between 70 and 1000kW of power) and once every two years (for heating systems between 20 and 70 kW of power).

#### **A.9.6 Cost optimality**

Architecture and Housing Policy Directorate of Ministry for Housing, with the cooperation of Eduardo Torroja Construction Sciences Institute (IET cc) is working on the cost-effective analysis report which should be submitted to the Commission before April 2013. This report will be based on the energy certification methodology. Therefore, same energy consumes according to each building typology will be taken into account.

<sup>117</sup> More information available at <http://www.minetur.gob.es/ENERGIA/DESARROLLO/EFICIENCIAENERGETICA/CERTIFICACIONENERGETICA/Paginas/certificacion.aspx>

### A.9.7 nZEB: requirements and roadmaps

Spain does not have an nZEB definition yet. However, in the Energy Savings and Efficiency Action Plan 2011-2020 and in the Second National Energy Efficiency Action Plan under the EU Energy services Directive<sup>118</sup>, Spanish authorities has been defined and presented a preliminary roadmap for implementing nZEB. The nZEB definition is likely to be based on the energy performance certification methodology and the energy classes as they are defined in the Energy Performance Certificates (see the detailed description of the EPCs at the above related section). Therefore, the Spanish nZEB definition is likely to be at the level of A Class from the EPCs, which means that all buildings constructed in by 2021 onwards will have a primary energy consumption 70% less than current building codes requirements (Technical Building Code-TBC2006) and 85% less than reference buildings for 2006 building stock.

The measure 5 from the Energy Saving and Efficiency Action Plan 2011-2020 and from the 2nd NEEAP is specifically tailored on the promotion of nZEB buildings (both for new buildings or refurbishment of existing buildings)<sup>119</sup>. This measure mentions that the Spanish nZEB plan will foresee several provisions, including the followings:

- nZEB will be defined for primary energy need (kWh/m<sup>2</sup>/yr), climate adjusted for each of the 12s climate zones of Spain;–
- intermediate goals in order to improve the energy performance of new buildings will be defined by 2015;–
- a package of policies and financial tools for the nZEB implementation will be established.

IDAE (Institute for Energy Diversification and Savings) will support the implementation of nZEB in Spain by coordinating several support mechanisms such as:

- Subsidies for nZEB projects allocated on annual call basis;
- Communication campaign for promoting selected nZEB

### A.9.8 Other relevant topics

#### A.9.8.1 Permit requirements for renovation

Major renovations must meet the same requirements as new buildings have to comply with in the Technical Building Code 2006 (TBC). In particular, a renovation must meet the requirements of BTC 2006 if more than 25% of the building envelope undergoes renovation and the floor area exceeds 1000 m<sup>2</sup>.

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<sup>118</sup> For more information: <http://www.idae.es/index.php/id.663/mod.pags/mem.detalle>

<sup>119</sup> For more information: <http://www.idae.es/index.php/id.663/reImenu.332/lang.uk/mod.pags/mem.detalle>

### **A.9.8.2 Organization of owners in multi-family buildings and their decision process on renovation of buildings**

In multi-apartment blocks, decisions that concern the whole building are made collectively by the residents. Any investment or renovation must be put to the vote of owners and a majority is necessary in order to achieve approval.

#### **A.9.8.3 National consultation processes**

In Spain several consultation platforms exist for the energy efficiency in buildings.

IDAE (Institute for Energy Diversification and Savings) is the most important communication platform for energy performance of buildings. It has a Public Information Service on Energy Efficiency and Renewable Energy Sources (SICER).<sup>120</sup>

The Spanish Technology Platform of Energy Efficiency (PTE-EE) aims innovation in energy efficiency technology, generating new solutions through the promotion of research and development of new technologies, products and services that contribute to reducing energy demand through energy efficiency.<sup>121</sup>

Finally, the Association of Energy Efficiency Companies (A3E) is a non-profit organisation that currently brings together 60 companies which work wholly or partially in the field of energy efficiency, in local, national or international context.<sup>122</sup>

The Ministry of Environment has also its own platform to inform about climatic change.

The Government launched the Council for Sustainability, Innovation and Quality of Construction (Royal Decree 315/2006 of 17 March), which among other things, reports of regulatory proposals, promotes adaptation to EU regulatory provisions in terms of building and promotes the development and ongoing updating of the Technical Building Code. Several stakeholders, such as associations of developers and builders, the Superior Council of Colleges of Architects and the Institute of Engineering among other professional associations, testing laboratories, insurers, suppliers of construction products and others institutions.

#### **A.9.8.4 Buildings database/register**

The National Institute of Statistics (INE) collects information through the Census mainly on the existing residential building stock every ten years (last time in 2011). No other database or register covering information on characteristics of the building stock exist.

The registration of EPCs is competence of each Spanish Region and therefore the registration system has been developed in different ways. At the moment, IDAE (Institute

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<sup>120</sup> <http://www.idae.es/index.php/lang.uk/mod.global/mem.formEnvioInfo>  
<sup>121</sup> <http://www.idae.es/index.php/id.67/reImenu.333/mod.pags/mem.detalle>

<sup>122</sup> <http://www.ptee.org/>

<sup>122</sup> <http://www.asociacion3e.org/>

for Energy Diversification and Savings from the Ministry of Industry, Energy and Tourism) is working on developing a national database of EPCs.<sup>123</sup>

#### A.9.8.5 Landlord tenant-dilemma

No specific information is available on the landlord tenant-dilemma issue.

#### A.9.9 Support policies/programmes (economic & financial instruments)

Spain has developed several financial and fiscal programmes to support the energy efficiency of buildings, especially for the renovation of existing ones.

The following tables provide a snapshot on the ongoing programmes and a selection of some of past programmes<sup>124</sup>.

##### Programme A

| Programme name            | National Housing and Refurbishment Plan 2009-2012  |                    |               |              |                 |              |
|---------------------------|--|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2009 – 2012  |                    |               |              |                 |              |
| Type of programme         | Subsidies  |                    |               |              |                 |              |
| Budget                    | N/A  |                    |               |              |                 |              |
| Measures covered          | <p>Improving energy efficiency performance, hygiene, health and environmental protection in housing buildings:</p> <ul style="list-style-type: none"> <li>▪ Solar panels installation</li> <li>▪ Efficiency improvement of heating and/or cooling systems</li> <li>▪ Efficiency improvement of heating and/or cooling systems</li> <li>▪ Supply facilities improvement of water network</li> </ul> <p>Actions to ensure the safety and sealing of buildings:</p> <ul style="list-style-type: none"> <li>▪ Structural elements: walls, columns, beams, etc.</li> <li>▪ Electrical installations</li> <li>▪ Interventions on roofs and walls affected by humidity</li> </ul> <p>Accessibility improvement:</p> <ul style="list-style-type: none"> <li>▪ Lifts, ramps or access devices</li> <li>▪ Information elements allow orientation</li> <li>▪ Adjustment needs of people with disabilities and people over 65 years</li> </ul> |                    |               |              |                 |              |
| Programme impacts         | Important reduction of primary energy consumption for residential sector   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings  | Existing buildings | Residential   |              | Non Residential |              |
|                           |  |                    | Private owned | Public owned | Private owned   | Public owned |
|                           | x  | x                  |               | x            |                 |              |

<sup>123</sup> <https://administracionelectronica.navarra.es/webCertificacionesEnergeticas/Default.aspx>

<sup>124</sup> Please note that other programmes exist.

## Programme B

| Programme name            | Energy Savings and Efficiency Action Plan 2011-2020  |  |   |                      |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
|---------------------------|--|--|---|----------------------|-----------------|--------------|------|--------------------|--|---|----------------------|------|-----|---|---|---|------|-----|------|------|------|------|-----|-------|------|-------|------|-----|-------|------|-------|
| Start – End Dates         | 2011 - 2020  |  |   |                      |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| Type of programme         | Subsidies  |  |   |                      |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| Budget                    | 27.322 M€ goes to building sector (2.883 M€ from Public Sector + 24.439 M€ from Private Sector)  |  |   |                      |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| Measures covered          | INDUSTRY<br>TRANSPORT<br>BUILDINGS <ul style="list-style-type: none"><li>▪ Thermal envelope</li><li>▪ Thermal systems</li><li>▪ Lighting</li></ul> EQUIPMENTS<br>PUBLIC SERVICES<br>AGRICULTURE<br>CHP GENERATION  |  |   |                      |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| Programme impacts         | <p>The final &amp; primary energy savings of Action Plan 2011-2020 have been established for years 2016 &amp; 2020, in accordance with the same methodological criteria and the indicators for year 2010. The measures included in this Action Plan 2011-2020 will involve savings of final energy for 2020 worth 17,842 ktoe and of primary energy worth 35,585 ktoe, calculated with reference to year 2007 and in accordance with the methodology proposed by the European Commission.</p> <div><p><b>Chart 2. Consumption and saving in primary energy (ktoe)</b></p><table><caption>Data for Chart 2: Consumption and saving in primary energy (ktoe)</caption><thead><tr><th>Year</th><th>Consumption (ktoe)</th><th>Energy savings in Transformation sector (ktoe)</th><th>Primary e. savings due to final e. savings (ktoe)</th><th>Total Savings (ktoe)</th></tr></thead><tbody><tr><td>2007</td><td>145</td><td>0</td><td>0</td><td>0</td></tr><tr><td>2010</td><td>135</td><td>4.9%</td><td>2.8%</td><td>7.7%</td></tr><tr><td>2016</td><td>105</td><td>10.5%</td><td>5.6%</td><td>16.1%</td></tr><tr><td>2020</td><td>105</td><td>13.7%</td><td>6.4%</td><td>20.1%</td></tr></tbody></table></div> |  |   |                      |                 |              | Year | Consumption (ktoe) | Energy savings in Transformation sector (ktoe) | Primary e. savings due to final e. savings (ktoe) | Total Savings (ktoe) | 2007 | 145 | 0 | 0 | 0 | 2010 | 135 | 4.9% | 2.8% | 7.7% | 2016 | 105 | 10.5% | 5.6% | 16.1% | 2020 | 105 | 13.7% | 6.4% | 20.1% |
| Year                      | Consumption (ktoe)   | Energy savings in Transformation sector (ktoe) | Primary e. savings due to final e. savings (ktoe) | Total Savings (ktoe) |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| 2007                      | 145  | 0  | 0   | 0                    |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| 2010                      | 135  | 4.9%   | 2.8%  | 7.7%                 |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| 2016                      | 105  | 10.5%  | 5.6%  | 16.1%                |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| 2020                      | 105  | 13.7%  | 6.4%  | 20.1%                |                 |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
| Targeted buildings types: | New buildings  | Existing buildings                             | Residential                                       |                      | Non Residential |              |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |
|                           |  |  | Private owned                                     | Public owned         | Private owned   | Public owned |      |                    |  |   |                      |      |     |   |   |   |      |     |      |      |      |      |     |       |      |       |      |     |       |      |       |



|  |   |   |   |   |   |   |
|--|---|---|---|---|---|---|
|  | x | x | x | x | x | x |
|--|---|---|---|---|---|---|

## Programme C

| Programme name            | Grants for Energy Efficiency in Buildings  |                    |               |              |                 |              |
|---------------------------|--|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2008 - 2012  |                    |               |              |                 |              |
| Type of programme         | Grants   |                    |               |              |                 |              |
| Budget                    | From the Government: EUR 1 billion subsidies for the refurbishment of existing residential buildings   |                    |               |              |                 |              |
| Measures covered          | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> <li>- OTHER (including energy audits, consultancy costs, education and training activities, etc.)</li> </ul> |                    |               |              |                 |              |
| Programme impacts         |  |                    |               |              |                 |              |
| Targeted buildings types: | New buildings  | Existing buildings | Residential   |              | Non Residential |              |
|                           |  |                    | Private owned | Public owned | Private owned   | Public owned |
|                           |  | x                  |               | x            |                 |              |

## Programme D

| Programme name            | Support for Energy Efficiency in Buildings (included in the EE Action Plan)   |                    |               |              |                 |              |
|---------------------------|---|--------------------|---------------|--------------|-----------------|--------------|
| Start – End Dates         | 2009 - 2012   |                    |               |              |                 |              |
| Type of programme         | Grants, preferential loans  |                    |               |              |                 |              |
| Budget                    | €804bn from 2008 to 2012  |                    |               |              |                 |              |
| Measures covered          | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> </ul> |                    |               |              |                 |              |
| Programme impacts         | N/A   |                    |               |              |                 |              |
| Targeted buildings types: | New buildings   | Existing buildings | Residential   |              | Non Residential |              |
|                           |   |                    | Private owned | Public owned | Private owned   | Public owned |
|                           | x   | x                  | x             |              | x               |              |

## Programme E

|                                  |   |                           |                      |                     |                        |                     |
|----------------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>Renove Tourism Plan 2009</b>   |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | 2009 - 2021   |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Preferential loans  |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | EUR 1 billion   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> </ul> |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A   |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |   | x                         |                      |                     | x                      |                     |

## Programme F

|                                  |  |                           |                      |                     |                        |                     |
|----------------------------------|--|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>Action Plan 2008-2012: Studies, feasibility analyses and audits to improve the energy efficiency in installations</b> |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | 2008 - 2012  |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Subsidies  |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | 0.6 Million euros from 2008-2012   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | OTHER (including energy audits, consultancy costs, education and training activities, etc.)                              |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A  |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>   | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |  |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |  | x                         | x                    | x                   | x                      | x                   |

## Programme G

|                                  |   |                           |                      |                     |                        |                     |
|----------------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>RD 5/2011, April 29<sup>th</sup></b>   |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | 2010 - ongoing  |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Personal income taxes reduction (Tax reduction)   |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | N/A   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> <li>- Refurbishment in general</li> </ul> |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A   |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |   | x                         | x                    |                     |                        |                     |

## Programme H

|                                  |   |                           |                      |                     |                        |                     |
|----------------------------------|---|---------------------------|----------------------|---------------------|------------------------|---------------------|
| <b>Programme name</b>            | <b>VAT reduction</b>  |                           |                      |                     |                        |                     |
| <b>Start – End Dates</b>         | 2010 - ongoing  |                           |                      |                     |                        |                     |
| <b>Type of programme</b>         | Fiscal incentive (VAT reduction)  |                           |                      |                     |                        |                     |
| <b>Budget</b>                    | N/A   |                           |                      |                     |                        |                     |
| <b>Measures covered</b>          | <ul style="list-style-type: none"> <li>- ENVELOPE (including insulation, windows &amp; glazing, exterior wall, doors, ceiling, etc.)</li> <li>- EQUIPMENT (including efficient heating, efficient lighting systems, ventilation, cooling, control systems, etc.)</li> </ul> |                           |                      |                     |                        |                     |
| <b>Programme impacts</b>         | N/A   |                           |                      |                     |                        |                     |
| <b>Targeted buildings types:</b> | <b>New buildings</b>  | <b>Existing buildings</b> | <b>Residential</b>   |                     | <b>Non Residential</b> |                     |
|                                  |   |                           | <b>Private owned</b> | <b>Public owned</b> | <b>Private owned</b>   | <b>Public owned</b> |
|                                  |   | x                         | x                    |                     |                        |                     |

## **Annex B: Policies, instruments and measures in national plans**

The Annex contains the policies, instruments, measures, and the description to be found in the national plans. All instruments are put in the structure created and described in chapter 5.1.

### **A.1 Belgium**

#### **A.1.1 Preliminary remarks**

In the Belgium national plan the three regions Brussels-Capital Region, Walloon Region and Flemish Region are described separately, additionally there are Federal-Government-measures. Actions and measures in the Brussels-Capital-Region and the Walloon-Region are differentiated into demand-side and supply-side-measures. All together there are 107 measures listed and explained. Many of the measures described are planned measures that do not yet exist.

#### **A.1.2 National strategies and programmes**

##### **Walloon Region**

- Sustainable Development Plan (SPW)

The “SPW Sustainable Development Plan” (SPW = Service public de Wallonie, Wallonia Public Service) is the practical expression of the SPW’s desire to go down the path of exemplary administration, being more ecoresponsible and more sustainable. The plan was approved by the Strategic Committee at the end of 2011 as part of the Walloon Government’s “Plan Marshall 2.vert”. Among other targets and objectives, it includes reducing the consumption of energy, supplies and paper, rationalising travel, reducing the quantity of waste produced and reinforcing the policy on making sustainable purchases by inserting environmental, social and ethical clauses in public procurement contracts.

- Further strategic planning tools: Regional Policy statement, Marshal 2.vert’ Plan, Plan for sustainable Control of Energy, Air-Climate Plan / future Air-Climate-Energy Plan

#### **A.1.3 Regulatory and economic instruments new buildings, including new public buildings**

##### **A.1.3.1 Regulatory instruments new buildings**

##### **Brussels-Capital-Region**

- As of 2015, apply PEB requirements comparable to the passive concept for all new constructions
- Reduce the use of air conditioning and increase performance of air conditioning systems

Regulations on air conditioning are dealt with through two approaches. On the one hand, requirements in terms of needs and energy consumption related to air conditioning are currently taken into account in the EPB requirements via the calculation of the E level - the level of primary energy consumption of the EPB unit – for overall performance. Given the level of requirements imposed starting in 2015 (Action 1), use of air conditioning will automatically be reduced. On the other hand, EPB regulations on technical facilities for airconditioning are treated in the decree of the Government of the Brussels-Capital Region of 15 December 2011 and deal mainly with observance of good practices in installation and management of air-conditioning systems in order to improve their energy efficiency.

- The Brussels-Capital Region is considering the opportunity of defining guidelines for derogations from the town planning regulations of the Region and the municipalities in order to facilitate certain work especially efficient from the energetic point of view.

### **Walloon Region**

- Regulations on the Energy Performance of Buildings

In Wallonia, the 2002 EPB Directive has been transposed into the CWATUPE regulations and into legislation on the environment: Framework Decree dated 19/04/2007, WGD dated 17/04/2008 and 18/06/2009, WGD dated 12/07/2007. The EPB requirements have already been tightened twice (on 01/09/2011 and 01/06/2012) and will continue to be so more and more in the future, aimed at achieving the NZEB target by 2020.

### **Flemish Region**

- Establishing a timeline for tightening energy performance regulations for new buildings
- Describe a path to nearly zero-energy for new social housing

#### **A.1.3.2 Economic instruments new buildings**

### **Brussels Capital Region**

- Revise the investment rationale for public housing (“SDRB”, “SLRB”, Housing Fund, etc.) by incorporating occupation cost rationales

All future social housing construction and renovation projects will include consideration of reduction of energy consumption (Action 10) and improvement of the quality of life of the residents (thermal comfort, good air quality, etc.). After the adoption of the “COBRACE”, these construction or renovation projects related to public investments will be founded on minimisation of the occupation cost. The occupation cost of a building consists of the sum of the amount of rent or reimbursement of the mortgage loan for the building and the amount of the charges resulting from energy consumption relating to use of this building.

By adopting the idea of cost of occupation, public housing companies can pass on all or part of the energy saving investment in the form of an additional charge to the rent. However, this additional “energy saving investment” charge must be less than the savings from “energy consumption” charge. Subsequently, by respecting this principle, the cost of occupation of a renovated home will be less than the cost of occupation of the same non-renovated home, which is to the social tenants’ advantage. At the same time, the public housing companies have additional tax revenues to finance this housing renovation.

This system is already operational for new passive housing constructions.

- Pursue and improve support for the investment “energy subsidies”

Subsidies are allocated for high-performance energy-saving investments and consequently concentrate on the most efficient energy savings in energy and social terms.

Subsidies are grouped into various classes. In addition, since 2011, the amount of the subsidy is modulated depending on household income for work on a building in the residential sector. Income ceilings are also increased depending on the composition of the household.

This policy will also encourage applicants to opt for the actions with the greatest long-term impact on the quality of their living space and reduction of the energy bill. The establishment of a roadmap for the subsidies granted (with possibly a progressive reduction in and discontinuation of some subsidies) will allow market participants to plan their investments in the medium term. Social and environmental criteria will continue to be linked to the grant of subsidies, especially with regard to impact on air (interior and exterior), as, for example, reinforcement of the subsidies for installing a green roof or facade, which among other things improves the micro-climate and the local air quality.

- Provide special guidance and financing for at-risk populations

Several actions are being taken to support the at-risk population: energy price setting (social rate), social energy guidance, special energy activities, social green loans, differentiation of the amount of subsidies, etc. These actions will be constantly reviewed and strengthened so that the greatest number will benefit. The aim of this action is to place everyone in Brussels, both those with a high and a low income, on an equal footing in terms of energy consumption (URE measure) and energy-saving works.

Synergies will also be sought with other actions supporting this target public, especially through the Energy House, which ultimately will coordinate these actions.

With regard to the social green loan in particular, its revision should take into account the new initiatives for support and financing offered by the Region and the federal government.

- Improve support to the non-residential sectors via the financial incentive policy

Aid in the form of energy subsidies (subsidies for studies and audits, insulation and ventilation, high performance heating, renewable energies, energetically high-performance investments, etc.) is available for buildings in the tertiary sector and industrial buildings.

Aid for production (green certificates) is also available for the tertiary and industrial sector (cogeneration, solar panels, biomass, etc.).

The Brussels-Capital Region also offers (via aid in promoting economic expansion) investment aid with regard to energy savings, energy production from renewable sources or rational production of energy, intended in particular for industrial enterprises. Aid is granted to support companies in reducing costs and consequently support studies, training, recruitment or investments.

### Walloon Region

- Grant for Public Service Housing Companies

An additional grant is provided for new-build projects that achieve the passive standard.

### Federal government

- Tax deduction for dwellings with low energy consumption

Since fiscal year 2008 (income 2007) a tax deduction has been granted to individuals investing in passive houses (= dwellings consuming less than 15 kWh/m<sup>2</sup> and with excellent airtightness), amounting to € 600 (non indexed amount) for 10 successive taxable periods. As from fiscal year 2011 (income 2010) low energy houses (=dwellings consuming less than 30 kWh/m<sup>2</sup>) also entitled to a tax deduction amounting to € 300 for 10 successive taxable periods and the tax deduction for zero energy houses (=passive houses in which the remaining demand for energy is compensated by renewable energy produced in situ) was doubled to € 1.200. The tax deduction has been abolished as from fiscal year 2013.

## A.1.4 Regulatory and economic instruments existing buildings, including existing public buildings

### A.1.4.1 Regulatory instruments existing buildings

#### Brussels Capital Region

- As of 2015, apply PEB requirements comparable to the very low energy level for all major renovations
- Reduce the use of air conditioning and increase performance of air conditioning systems (for explanation see “regulatory instruments new buildings” above)

#### **A.1.4.2 Economic instruments existing buildings**

##### **Brussels Capital Region**

- Establish an energy services company that acts in financing the thirdparty investor system for buildings of the municipalities and other regional authorities (contracting for public buildings)

The municipalities as well as other regional authorities constitute a major group of owners of tertiary buildings that often have a poor level of energy performance. And yet, owing to the financial burden that some of them have to bear, these owners do not have sufficient resources to make energy-saving investments, even though they would be (highly) profitable. Furthermore, some public owners have already reached their borrowing limit or do not wish to put a strain on their borrowing power to invest in saving energy, often considered secondary compared with the main missions of the municipalities and other regional authorities.

To meet this lack of financial means among the municipalities and other regional authorities, the Region intends to set up a company offering energy services (ESCO) that will finance energy-saving investments; this will be reimbursed through a lease, the amount of which will be less than or equal to the financial saving made on the energy bill by the owner. This way, the public owner of a building can benefit from the renovation of his building without having to invest himself, while also benefiting from a reduction on his energy bill after the period of reimbursement to ESCO.

Hence, ESCO plays the role of a third-party “public” investor. While ESCO’s priority would be the municipalities and other regional authorities, it could also offer its financing services to other private owners of large buildings. Furthermore, ESCO could invest in green electricity production means located in Brussels or elsewhere.

- Revise the investment rationale for public housing (“SDRB”, “SLRB”, Housing Fund, etc.) by incorporating occupation cost rationales (for further explanation see “Economic instruments new buildings” above)
- Pursue and improve support for the investment “energy subsidies” (for further explanation see “Economic instruments new buildings” above)
- Continuation and general implementation of the financial help “loan with a reduced rate”

The Region is exploring the possibility of offering pre-financing, a so-called “green loans”, to all Brussels residents in order to stimulate energy renovations of the residential building stock. The loan envisaged would be an instalment loan, the amount of which remains to be determined, for pre-financing energy-



saving work; currently the maximum amount of 25,000 Euros is envisaged. The reimbursement period would depend on the time for return on the investment. In addition, depending on the public and its income, the rate could be differentiated:

- the rate would be 0% for a low-income population;
- an "at cost" rate would be set, while remaining advantageous (e.g.: 4.5%) for a business public.

Currently, a "social green loan" with a 0% rate is allocated to low-income population.

- Provide special guidance and financing for at-risk populations (for details see "Economic instruments for new buildings" above)

### Walloon Region

- Energy bonuses for private individuals to improve the energy performance of existing buildings and to install efficient equipment

The bonus is only granted when a certain energy standard is reached, e.g. insulation of the wall: R coefficient rating 1.5 m<sup>2</sup> K/W inside-insulation and 2 m<sup>2</sup> K/W for outside-insulation

- 0% loan-Ecopack for households

The works covered by Ecopack must above all be aimed at the energy performance of the building (insulation, heating system, etc.), but it may be possible to link it with associated works (upgrading of the roof, for example) or minor energy-saving works. No energy standard is demanded.

- Subsidies for rational use of energy investments in public buildings

Assistance with audits, feasibility studies and the setting up of energy metering, works to improve the energy performance of the building. The conventional and exceptional RUEPB programmes are both indirectly part of the NZEB approach. In fact, they support the energy upgrading of public buildings – upgrades that by their visibility to the public must serve as examples and encourage visitors to take action.

- Project tenders "Sustainable Home"
  - to support experiments in innovative homes, with a definite bias towards sustainable development
  - In parallel with marked and controlled social and economic dimensions, these calls for tender encouraged the winning projects to think very carefully about energy usage, in particular in terms of the performance of buildings through advanced energy quality capable of going as far as passive or zero-energy standards.
  - 27 projects were given a budget of more than € 5 million

## **Flemish Region**

- Linking support to an overall improvement in energy performance  
 Support for energy renovations aimed at achieving the NZE level will no longer be based on individual subsidies per measure, but instead on the overall improvement in energy performance that is realised. The assessment that is carried out of the overall improvement, based perhaps on the EPC, must be extremely reliable. For extensive renovations, the issue of whether or not a complete E-level calculation is still going to be possible must be revisited.
- Recognition of energy performance by the financial sector  
 Developing a credit policy which would support the financing of NZE buildings
- Developing a third party financing scheme for extensive energy renovations for social housing and public buildings

## **Federal government**

- Tax deduction for investments in energy efficiency and renewable energy in dwellings  
 Since fiscal year 2004 (income 2003), the Belgian federal government offers a tax deduction for individuals undertaking energy efficiency and certain renewable energy investments in their homes. As from fiscal year 2006 (income 2005) renters can also apply for the tax deduction. The deductions were offered for expenses for a variety of measures, e.g. replacement of old heating boilers, the installation of double-glazed windows, roof, floor and wall insulation, and the installation of thermostatic valves and a thermostat with clock. As from 2012 (fiscal year 2013) the tax deduction is only granted for investments in roof insulation.

## **A.1.5 Research, Development and other supply side measures (including certificates)**

### **Brussels Capital Region**

- Continue implementation of the energy certificate for buildings built, rented or sold  
 For all newly built buildings (residential, tertiary or public) for which the town planning permit was introduced as of 2 July 2008, a “new building” type EPB certificate is mandatory. It is issued by Brussels Environment on the basis of the EPB declaration submitted by the EPB advisor who has supervised the worksite. Buildings put up for sale or rental follow another process. They must have a EPB certificate drawn up by a certifier approved by the Region. The seller or lessor of a property is bound to have a EPB certificate drawn up prior to putting his property up for sale (since 1 May 2011) or rental (since 1 November 2011).
- Use the “Sustainable Building” quality labelling framework as a tool to promote sustainable construction and renovation of buildings of the public authorities

The “Sustainable Building” quality labelling framework aims to encourage the entire Brussels building sector to adopt exemplary standards with regard to sustainable construction and renovation. This reference system will allow an objective assessment of the sustainability aspects of the building assessed and a rapid comparison between different buildings, just like the EPB certificate.

In particular, it takes into account the following aspects:

- primary energy needs, energy sources and carbon dioxide emissions related to use of the building;
- consumption of non-renewable resources in the construction, renovation or management of the building and the impact of this consumption on the environment;
- emissions of atmospheric pollutants related to use of the building, and their impact on the immediate environment;
- the quality of life that the building offers its occupants.

The Brussels-Capital Region plans to impose certification or “Sustainable Building” quality labeling of their buildings on the public authorities. Brussels legislation (“COBRACE”) moreover provides for the possibility of imposing certain requirements on any public authority occupying a building on the territory of the Region. These requirements will be based on criteria related to “Sustainable Building” quality labeling and allow the quality of the buildings of the regional public authorities to be assessed and improved.

In addition, the Region intends to impose a minimum score on the basis of the “Sustainable Building” reference framework for any real estate project with public participation. The various regulations on available aid with regard to real estate investments (neighborhood contracts, subsidised investments, etc.) will be analysed and their legislative support will be changed as necessary to add criteria for sustainability in the form of a total minimum score. Standard special specifications will have to be prepared for public contracts (call for proposal, negotiated procedure, etc.) from the intended bodies.

Finally, the Brussels-Capital Region is considering the opportunity of progressively imposing the requirement that public authorities occupy buildings recognised as “Sustainable Buildings” (for rental as well as construction and renovation). In the long term, any public authority would, within the limits of constraints related to preservation of building heritage, occupy buildings with a high rating in the certification/quality labeling system as defined in the reference framework.

- Award a “Sustainable Building” label and certificate

Development of a system for quality labelling (for small buildings) or certification (for larger buildings) should now be pursued at the Belgian level with a view to international recognition. The function of this “Sustainable Building” label will be complementary to that of exemplary buildings and will allow good practices in

exemplary construction and renovation with regard to eco-construction to be generalised to the entire Brussels building sector. The label will moreover be tested on the exemplary buildings by incorporating the criteria for this label into them. Start-up of the system will be financed by the three Regions and should ultimately be self-financing. This recognition will be incorporated into Brussels legislation (“COBRACE”).

- Finance applied research in the area of sustainable buildings, in particular with regard to the flexibility and adaptability of the buildings and the reuse of construction materials

Various energy-related initiatives will be supported. These initiatives will involve technical themes like cogeneration, intelligent technologies (electrical network, sustainable materials, energies from renewable sources in the urban environment<sup>43</sup>, etc.), and non-technical themes like flexibility and adaptability of buildings and behavioural changes by business and individuals. The innovative materials and techniques on the market are essentially oriented toward new buildings. Consequently, applied research in Brussels will be essentially oriented toward adaptation of these materials and techniques to the issue of urban renovation.

Through promotion and support of pilot and innovative projects specifically adapted to the Brussels context, the Region will encourage development of activities in the public and private research centres of the Region active in the sustainable building sector. Aside from development of a Brussels skills cluster, this dynamism is capable of generating jobs and added value that is “exportable” outside the Region. In particular, the Region is forming a network of the various research centres and stimulating exchanges and sharing of research results.

## **Walloon Region**

- Introduction of energy performance certificates of buildings

The introduction of energy performance certificates in the event of a building being sold or leased enables the energy quality of buildings to be displayed.

The certificates feature a performance scale that incorporates the equivalent passive level, as well as the NZEB level. This enables the certified building to be positioned in relation to these references.

- Passiv building certification and reference system for sustainable buildings

## **A.1.6 Information, motivation and advice**

### **Brussels Capital Region**

- Establish an efficient, high-quality system of energy audits

The “COBRACE” contains a provision to establish efficient, high-quality systems for energy audits. The methodology for the energy audits as well as their man-

datory or optional nature will vary according to the allocation or area of the buildings. These audits will be performed by accredited auditors.

- Control energy management by large owners and public authorities through establishment of Local Action Plans for Energy Management (“PLAGEs”)

In the context of buildings with nearly zero-energy consumption, the “PLAGE” provides a solid basis for monitoring and good management of the building to maximise the design advantages of this building in the daily use of energy.

Only precise monitoring will help detect these unfavourable differences in order to correct them; at the same time, it will also help to adopt a more efficient cycle of occupation than the standardised cycle so that the actual consumption is lower than the theoretical consumption. A period of mandatory monitoring by specialists in the new sustainable techniques will ensure that the results are up to the stated ambitions. This monitoring will avoid cases of “greenwashing” and propagation of non-reliable techniques.

- Energy accounting service available to municipalities via “NRClick”

Since 2005, Brussels municipalities benefit from an assistance for work linked to the rational use of energy. Since 2008, after the audit of their main buildings, municipalities asked for information regarding energy accounting solutions.

The NRCLICK tool is an energy accounting service made available to each municipality (as far as the municipality ratifies the agreement with Sibelga, the only distribution network operator for electricity and natural gas in Brussels-Capital Region).

In concrete terms, the NRCLICK tool is an energy accounting software with a service which follows-up and analyses energy consumptions of the municipalities’ real estate. The software lists first:

- Consumption data (water, gas, electricity, heat, fuel) ;
- Other information (temperature, timetables, etc.) ;
- Billing data.

The software allows furthermore :

- To analyse data ;
- To identify possible problems ;
- To quantify the effects which follow investments or other measures ;
- To compare buildings on similar data (<< benchmarking >>).

The follow-up and analyse service allows municipalities to monitor easily and in real time building energy consumption so that they may identify the most favourable actions in terms of energy savings.

- Encouraging the private sector (tertiary and industrial) to make the most of ESCO

Just like the municipalities and other regional authorities, the private sector (tertiary and industrial) doesn’t always have the financial means to make energy-saving investments. Banks have become extremely cautious as a result of the

financial crisis and, especially now, companies are holding onto their funds to ensure their core business and not to make long-term investments in energy conservation.

However, a third-party investor can take on the burden of a loan of an energy-saving investment for his tertiary or industrial customer. This customer will then reimburse the third-party investor through monthly payments that are less than or equal to his energy bill savings. Thus, the third-party investor recuperates his initial investment and the customer can take advantage of an energy-saving investment without having to invest or take care of the design, realisation or management of this investment. The customer will make 100% savings on the energy bill after the contract with the third-party investor has ended. At best, if the monthly reimbursement is less than the savings on the bill, the customer can already benefit from a reduction on his bill as of year 1.

Despite these advantages, the private sector is still reluctant about choosing the third-party investor (ESCO) option. The Brussels-Capital Region will therefore encourage and accompany office owners and companies to turn to Energy Services Companies (ESCO) in order to consent to energy-saving investments or to renewable energies.

Public authorities have the role of encouraging the ESCOs to issue offers proposing rapid improvements or “quick wins” to building owners wanting to renovate the shell of their buildings and/or make use of energies from renewable sources. Various experiments conducted in other countries, in particular in Germany, demonstrate that public intervention is highly profitable if it involves groups of buildings under a single contract.

To aid owners of tertiary buildings in renovating via a third-party investor, the Region intends to designate a company that:

- will aid in launching calls for tenders involving groups of buildings with similar characteristics;
- will aid in drawing up specifications;
- will aid in concluding third-party investor contracts with private ESCOs that finance and carry out work in lots of uniform buildings on the basis of contracts concluded with the owners.

This operator could be the Brussels-based ESCO (Action 13). If the Brussels-based ESCO performs this support mission, it obviously won't be able to meet the requirements it has compiled.

- Establish a technical, financial and administrative support service involving Rational Use of Energy (RUE) and eco-construction for households

The Government of the Brussels-Capital Region has set up the Energy House which brings together 6 local branches. This service is addressed to both owners and tenants. It targets all the social categories and aims to contribute to and accelerate the change in behaviour of households in their relation to energy and



eco-construction, in order to allow them to improve the environmental quality of their residence and reduce their energy consumption significantly.

The key to this project lies in the accessibility of the services at the local level and the pro-active nature of the actions developed in order to be able to reach the entire Brussels public. These are local structures autonomously managed with an information desk that constitutes the entryway to several services offered:

- support for households in their relation with providers of gas and electricity;
- home visits to carry out a simplified energy diagnosis of the residence that will result in identification and technical/financial evaluation of the investments to be made;
- personalised advice for improving energy consumption habits;
- immediate performance of small procedures allowing quick energy savings;
- support in ordering and supervising simple renovation work;
- support in assembling the administrative files necessary for access to existing public assistance;
- preparation of the technical/financial files for households with a view to a request that credit be granted and constitution of credit files (technical, financial and social information).

The Energy House will also pay special attention to concern for the quality of interior air. In fact, as an intermediary for the various existing thematic support structures, this structure seems the best placed to resolve any conflicts between energy savings and certain emissions harmful to air quality and health, taking account of the specific features of the building in question.

The missions of the House will be progressively expanded: they will include specific actions for the occupants of housing with especially high-performance systems (i.e. buildings with nearly zero-energy consumption) so that new techniques are correctly incorporated and used; they will also include more complete support for use of energies from renewable sources, etc.

This action is similar to the previous one above but focus is on the residential sector.

- Communicate on and raise awareness of housing with nearly zero energy consumption through actions and events on a Region-wide scale

Beyond local actions, actions to communicate and raise awareness will be available to all Brussels residents. Communication will be reoriented toward raising awareness of new techniques for particularly high performance housing in terms of energy and the importance of ensuring the high quality of interior air.

Sustainable construction materials and use of renewable energies will also be highlighted. There is a great variety of means of communication: brochures, seminars, fairs, communication campaigns, site visits, open door days, etc.

- Communicate on and raise awareness of non-residential buildings with nearly zero-energy consumption

The already-existing tools and instruments (exemplary buildings, “PLAGE”, sustainable building certificate, etc.) for non-residential buildings will be promoted in a cross-disciplinary way. There is a great variety of means of communication: brochures, seminars, fairs, communication campaigns, site visits, open-door days, etc.

- Supporting households to reduce energy consumption (use) in nearly zero-energy homes

The public are encouraged to change their behaviour in terms of energy management thanks to the “Energy Challenge”. Launched in 2005, this challenges any resident, tenant or owner to learn to change his behavior (without an investment) both at home and in travelling to consume less energy and emit less CO<sub>2</sub>. The way the challenge works is simple: those interested send their energy consumption data to the IBGE and in return receive personalised advice on reducing consumption. For households that have measured the change in their consumption, savings amount to 18% on average, which represents an annual average savings of 380 € per household, as well as one ton less of CO<sub>2</sub>.

A “passive housing ambassador” service will be set up to support households who live in passive or even zero energy consumption accommodation to adopt the appropriate actions so that actual consumption is equal to or less than the calculated theoretical consumption.

- Develop a proactive support service for non-residential buildings

The Region offers a series of free advisory services by means of Facilitators. Facilitators are energy specialists recognised for their expertise resulting from implementation of numerous projects both in Brussels and outside the country. Their mission is to guide contracting clients and building managers independently and impartially with regard to control of energy consumption, RUE and promotion of energies from renewable sources at any stage of advancement of a project.

In order to genuinely support in-depth renovation of non-residential buildings, the Brussels-Capital Region intends to improve this Facilitator service to make it more proactive.

### Walloon Region

- Energy newsletter by the Walloon government for public authorities
- Voluntary EAP energy audits
- RUE information in public buildings



- Communication campaigns conducted by the Department of Energy and Sustainable Building in the context of EPB
- Energy Service Counters and Single Service Counters for refurbishment works
- Information Service Counter “Sustainable Living Home”

### **Flemish Region**

- “NZE” trademark branding
- Establishment of knowledge platforms
- Awareness & information campaigns directed at trendsetters
- Advice for residential and non-residential NZE-projects
- Manual for NZE-buildings
- Manual for extensive energy renovation
- Raising awareness among and providing information to governments
  - Creation of awareness about the timely requirements
  - Information about best practice
  - Knowledge development projects for government personnel with technical responsibilities
  - Develop NZE tendering standard for public NZE buildings

### **Federal government**

- Public Energy Services Company (ESCO) Fedesco

Fedesco carries out energy saving projects in the federal government buildings. It applies the principle of third-party financing. Its expertise consists in analyzing the needs, identifying and benchmarking of potential buildings, as well as following up the technical stages of projects. For some of these projects Fedesco works with the Belgian Buildings Agency, the estate expert of the Federal Government, which also sees energy efficiency as a priority. Both organizations pursue the realization of the lowest possible energy consumption in federal government buildings. Fedesco also plays an essential role as the ‘federal knowledge centre for energy efficiency’.

## **A.1.7 Demonstration**

### **Brussels Capital Region**

- Continue implementation of strict energy performance requirements for public buildings

The Government of the Brussels-Capital Region has committed itself in the governmental statement to observing strict energy performance requirements for public buildings, both in new construction (requirements comparable to the passive concept) and major renovation (very low energy concept).

Material aid in the form of training, assessment and methodology is proposed for implementing this action. Various actions by the Brussels public authorities are already underway, like the construction of the new Brussels Environment building; with 16,000 m<sup>2</sup>, it will be among the largest passive buildings in Europe. The Brussels Regional Development Agency (“SDRB”), the Brussels-Capital Region Housing Company (“SLRB”) and the Housing Fund have been

subject to these requirements in the framework of their management contracts concluded with the Government since 2010. The Ministry of the Brussels-Capital Region has also been committed to such requirements since 2010.

These strict energy performance requirements for public buildings exert a significant knock-on effect on local authorities and on the market in general.

- Support market development toward construction of buildings with nearly zero-energy consumption thanks to “Exemplary Buildings”

This “Exemplary Buildings: Energy & Eco-construction” call for projects allows the Region to demonstrate that very high energy and environmental performance in the real estate sector are fully accessible to the market both in technical and economic terms.

There are four requirements to be selected as “exemplary building”:

- Energy: the project should seek to minimise needs for primary energy and use of conventional energy sources (fuel oil, gas, electricity), and tend toward a zero-energy building (very high performances with compensation of the balance by renewable energies).
  - Eco-construction: the project should include measures to limit the impact of the building on humans and their environment with regard to water management, comfort and health, waste management, materials choice, etc.
  - Profitability and reproducibility: existing techniques and innovative solutions should be combined in a project that is ambitious but still accessible from the technical and financial point of view for the Brussels market. Furthermore, solutions should demonstrate profitability.
  - Architectural quality and visibility: the visibility of the project, its location in the public space and its architectural quality (especially with regard to living comfort, aesthetics and the well-studied use of materials) are also evaluated.
- Allow the concrete application of research results in sustainable buildings

The SOIB, “Spin Off in Brussels”, programme aims to transpose results from scientific research into specific applications with a view to creation of new businesses in the Brussels-Capital Region. The programme is addressed to both academic spin-offs (universities and colleges) and industrial spin-offs (businesses and research centres). The projects introduced in the framework of this action aim to economically develop research results, mainly by development of a marketable product, process or service. Each project must imperatively result in creation of a business located in the Brussels-Capital Region. The possibility of including sustainable construction in the strategic foci of this programme is being explored. Projects linking research, business creation and creation of jobs will be pursued. This involves in particular the Emovo and Greenbizz projects and calls for projects of the “technological innovation partnership” type, as well as work in collaboration with the European, federal, regional and community levels.

## Walloon Region

- Pilot projects with school buildings
- Project tenders “Exemplary Buildings Wallonia”  
Exemplarity will be assessed on four criteria: energy performance, lowest impact on the environment, the ability to reproduce the solutions planned cost effectively, architectural quality

## Flemish Region

- Development of residential and non-residential demonstration projects

## A.1.8 Capacity building (including education and training)

### Brussels Capital Region

- Guarantee the quality of the procedure via an accreditation and recognition system for sustainable building professionals

Accreditation allows the quality of work to be monitored. Once granted, it can still be withdrawn. There is accreditation when the action is legally required (EPB, energy audit in the environmental permit, etc.). Brussels legislation, via the “COBRACE”<sup>40</sup>, provides for five classes of accreditations; in the EPB, for production of energy from renewable sources<sup>41</sup>, involving the “PLAGE” programme, for the energy audit and for the “Sustainable Building” reference framework. When professional intervention is not legally required, but financed partially by public money (for example in the energy advice procedure), the professional will have official recognition (aside from the protected trades) obtained via adequate training.

The Government will assess the opportunity to develop - or expand - the list of accredited or recognized professionals depending on the market response and the new techniques available.

- Ensure an adequate training offering for professionals in sustainable building from design to implementation

It is necessary to ensure that there is a correspondence –in quality and in quantity- between the training offered by the market and the ambitions of the Region with regard to sustainable buildings that tend toward the standards of nearly zero-energy consumption. Consequently, the market for training in sustainable building is supported, depending on promotional needs and the demands of the sector both in terms of content and target public (decision-makers or building trades). Attention is constantly given to guaranteeing that professionals are up to date faced with constantly evolving techniques.

Seminars, colloquia, informative visits and training (regulatory and voluntary ) are organised on themes of sustainable building, energy, the EPB, etc for the attention of sustainable buildings sector professional. The training is in cycles (for example, a “sustainable building” training cycle) including several sessions taking place over several months and resulting in a certificate after all the ses-

sions have been attended. They are addressed to a restricted public, specialised and wanting to acquire more advanced knowledge in the technical field in question. As an illustration, with regard to production of energy from renewable sources, decision-makers and building designers are trained in the design and incorporation of high-performance systems into new and renovated buildings.

With regard to required training, up to the present over 1500 authorised heating technicians have been trained; over 1000 residential certifiers, and finally, over 700 EPB advisors have also been trained. On average, 250 EPB advisors are trained each year, with 40 hours of training per person. Since the entry into effect of the regulations on residential certification in May 2011 (Action 2), over 1000 certifiers have been trained, with 40 hours of training per person, which totals 40,000 hours of training. As for excellence training (i.e. the “sustainable building” cycle; themes relating to energy, materials, construction waste, etc.) they represent 18,882 man-hours of training\* in 2012 and 15,251 man-hours of training\* in 2011.

- Employment-Environment Alliance: collaborate with the competent authorities to improve teaching in construction

The first “sustainable construction” focus of the Employment-Environment Alliance aims on the one hand to develop an offering of local businesses in the construction sector capable of responding to the challenge of the new energy ambitions for buildings, and on the other hand to adapt the training offering (continuing training, qualifying training, integration of the unemployed through work) so as to have workers also trained in these new challenges.

This first focus of the Employment-Environment Alliance consists of developing a multi-sectorial pact between public authorities, companies, social partners and those involved in the sector so as to enable Brussels businesses to take advantage of this growth and to realise the significant potential for jobs, including those for the less-qualified, in this sector.

Identification of the recognised needs of businesses and/or the job center for development/creation/improvement of training to offer. Coordination of the “oversight” function is thus essential. The Reference Centre carries out this function by centralising information/indicators and relaying them to the companies in the network for possible use.

- Develop and consolidate the technical reference and the tools available to professionals in sustainable building

Before 2004, when a designer or decision-maker wanted to set up a sustainable building project, they had few tools (books, references, case studies, specification sheets, standard clauses, training, etc.) to achieve their objective. In addition, the definition of a sustainable building – what is and what isn’t one – wasn’t always universally recognised, which led to several projects that were close to “greenwashing”...

That is why a large number of tools, training courses and services have been developed in order to fulfil the need for awareness and training of sustainable building professionals. Practical and evolving tools such as the practical guide to sustainable building and the quality labelling and certification system will continue to be updated and promoted. A friendly-user computer version of the handbook “Sustainable Building” is underway.

The energy and eco-construction content will be more and more interwoven with each other and new content will be developed, in particular involving technical details of design and performance of work. More specifically, standards for designing facilities for energy production from renewable sources and methods for profitability calculations will be developed to specify the facility corresponding to an economic optimum as a function of the technical characteristics of the building. Harmonisation of the methods for design and profitability calculations will allow the quality of facilities producing energy from renewable sources to be assessed objectively.

To simplify access to information, standard specifications and tools to aid in decision-making will be developed. Special attention will be paid to transmission of this information to very small companies and SMEs.

Finally, to generalise these achievements, the Region will pursue its policy of openness and partnership with the French and Flemish Communities, the construction sector and its reference and training centers so as to ensure development and then dissemination of technical guides and training tools to the various target publics.

- Facilitate the creation of - or the transition toward – businesses active in sustainable construction and offer them support structures

The Employment-Environment Alliance constitutes an important support in creation and transition of construction enterprises toward the sustainable construction sector, and in particular toward the sector of construction of buildings with nearly zero-energy consumption. In the framework of this Alliance, a whole series of business needs has been identified (knowledge of and competence in the techniques and materials of sustainable construction, a vision of the market, the competition, and the actual risks, worker training, selling, etc.). Specific and expanded actions fulfilling these needs have then been formulated on the basis of the budgetary and human resources available according to the priority of the measures set by the Government. For example, public authorities and those involved can support businesses in their sales approaches, notably by the introduction of special clauses in public contracts or by providing them with sales arguments intended for contracting clients.

Aside from the Employment-Environment Alliance, support for the creation of innovative businesses will be pursued in particular in the canal zone of the Region listed in the “FEDER” Structural Fund programme 2007-2013. The Greenbizz incubator is a good example. It aims to support the environmental economics sector in urban surroundings (an important aspect of the EPB) and takes

advantage of the creation of new companies in this booming sector to offer jobs to a less-skilled workforce. This involves a host structure (personnel and buildings) that supports businesses in terms of logistics and the search for financing. This project is steered by the “SDRB” in partnership with the Brussels Enterprise Agency (“ABE”), Brussels Environment – IBGE and the Scientific and Technical Centre for construction. After evaluation, new spin-off business incubators resulting from research findings will be developed. Establishment of a management canopy for the incubators will also be studied.

Finally, businesses already active in sustainable construction are supported by the ECO-BUILD cluster. This cluster has the purpose of structuring and forming a network in the eco-construction sector with high potential for growth and creation of jobs. This platform favours synergies between the various parties in the sector; it increases the capacity for innovation and job creation through a series of individual and collective advantages. The cluster will continue to be supported.

### Walloon Region

- Organising EPB training courses
- Build up skills
- Quality labels for companies and certification of SRE installers
- Accreditation of liquid and gas fuel technicians and refrigeration engineers
- Training of Energy Officers in public institutions
- Teaching Tools and practical guides
- ATG and ATG-E – Technical accreditation (energy) of construction products and systems with certification.
- Facilitators by the Walloon Region:
  - to conduct information and advisory campaigns with building professionals to help them to implement new regulations and to provide guidance to accredited certifiers and to provide standby telephone backup to answer their questions
- Research and Innovation
  - E.g. Development of systems and buildings innovative in EPB using the equivalence principle
  - SAFE (Suburban Areas Favouring Energy Efficiency) Programme
  - Aid for energy research and development, e.g. WARE: Virtual Energy Research Centre

### Flemish Region

- Optimisation of research and development into innovation
- An innovation policy will strengthen the support and encouragement of the development of/research into innovative systems, technologies or services which improve the energy performance of buildings. The Government of Flanders will continue to increase the budget for innovation in the years to come as well.

Conduct analysis of trendsetter target groups (supply-side and demand-side)



- EPB framework for valorisation of innovative systems or technologies

A flexible mechanism must be incorporated into the calculation method for the energy performance of new and existing buildings which facilitates and valorises innovative systems or technologies in a thorough yet smooth way (for both new construction as well as existing buildings).

- Promote and study airtightness and ventilation
- Support the transition from a demo market to a volume market

A partnership is being set up with consortium partners from the building sector, each of which is planning to build a large number (approx. 50) of demo NZE homes over a short period of time (max. 5 years). As part of this effort, it will be important to pursue collaboration with supply-side trendsetters – mainly SMEs – so as to provide them with sufficient opportunity to participate.

- Knowledge enhancement in the building sector
- Creation of a quality framework for the building sector
  - Developing a vision for an integrated quality framework in the building sector
  - Individual certification of installers
  - Energy efficiency & renewable energy quality label for companies
  - Promoting construction teams with an energy consulting
- Development of an integrated calculation method for the energy performance of new and existing buildings

## A.1.9 Monitoring

### Brussels Capital Region

- Monitoring thanks to the Brussels-Capital Region's energy balance

The Brussels-Capital Region has had an energy balance since 1990. The regional energy balance describes the amounts of energy that are imported, produced, transformed and consumed in the Region over a given year. This annual data is put into a table with twelve entries with the amounts consumed per energy vector (oil, natural gas, electricity, coal, butane or propane, wood, etc.) in columns, and the consumer categories (industry, residential, tertiary, transport) in rows.

The energy balance is established on the basis of consumption inventories provided by the energy suppliers, the professional gas and electricity federations and according to surveys carried out among end-customers such as large companies in Brussels.

By drawing up these balances, it is possible to follow the evolution of energy consumption in the different sectors of activity. This information is useful for setting the priorities of the regional energy policy.

- Every second year, publish a report on the sustainable management of the buildings of the Brussels public authorities

Several actions involving buildings held or occupied by the regional public authorities exist, among them the “PLAGE” mechanism aiming to improve energy management in large holdings of public buildings. It is important to analyse these actions and report the results via a biennial report to the public and the European bodies attentive to the exemplary role of the public authorities.

It is henceforth mandatory to display the energy consumption of all existing public buildings in the Region. This process allows an energy cadaster of the regional buildings to be built up at the same time. Analysis of these data will allow the efficacy of the energy saving policies of the public authorities in the Region to be verified, simplify communication within the administration and to the public, allow the best prices for energy provision in the Region to be negotiated by including environmental clauses (minimum percentage of green energy, etc.) and finally, will allow group purchases to be made, for example of facilities for energy production from renewable sources.

- Establish a collection of data on the quality of the building stock

It is essential to follow the variation in the rate of building renovation, through in particular the data obtained notably via EPB certificates, the work of the Energy House, via the database on exemplary buildings monitoring or via green energy production facilities monitoring.

This evaluation will be made either on all the certificates issued or on a representative sample. Currently all the data are being collected and centralised. This tool should be complementary to the Brussels housing atlas.

- Monitor proper implementation of the regulatory and incentive actions and, if necessary, sanction

For the various actions, a system of penalties is planned; for example, for “PLAGEs”, fines are planned in the event of non-observance of legislation, or, with regard to subsidies, the penalty is the withdrawal of subsidies.

With regard to the EPB, there are two types of penalties: withdrawal of approval from professionals who do not observe the rules imposed by legislation (notably based on the control of their work quality), and issuing fines to consumers who have not complied with regulation.

### Walloon Region

- Monitoring of EPB regulations + energy certification
- PAEE monitoring, monitoring of bonuses, etc.
- Monitoring of proper implementation of the EEA



## **A.1.10 Development of renewable energies**

### **Brussels Capital Region**

- Green certificates quotas obligation for the electricity suppliers

Every identified producer of green electricity (production of renewable energy and high-quality cogeneration) periodically receives green certificates (according to the installation power; production method, etc.). The producer may sell those certificates to an intermediary or directly to a supplier.

Indeed, all holders of an electricity supply licence have to give back each year to the regulation authority a certain number of green certificates. The quota to give back corresponds to a percentage of the total volume of electricity supplied to customers during the past year. It is of 3.25% for year 2012. It is foreseen to increase the quota for the following years.

- Integrating part of green energy production into the consumption of newly-built public buildings

The authorities in Brussels are encouraged to gradually integrate a proportion of green energy production into the consumption of newly-built public buildings. Moreover, this measure will be included as part of COBRACE. The Brussels-Capital Region's governmental statement has set a threshold of 30%.

- Pursuing and reinforcing aid for "green certificate" production

The granting of green certificates has been simplified in order to ensure the profitability of green energy production installations. On average, EUR 20 million worth of green certificates are granted every year.

### **Walloon Region**

- Green certificates for the production of electricity from renewable sources and from high-yield cogeneration, and the payment mechanism for transfer/supply to the power grid

The basis for the mechanism is an obligation placed on providers. Indeed, each quarter, these providers are required to submit to the regulator, CWaPE, a number of green certificates based on their sales of electricity, otherwise they incur a fine. This quota is set annually by the Government. Management and monitoring of the system are handled by CWaPE

- Project tenders – large solar thermal systems

## **A.1.11 Measures focusing on energy saving and energy efficiency in general**

Nothing declared.

## A.2 Bulgaria

### A.2.1 Preliminary Remarks

In the Bulgarian national plan are mainly intentions expressed to create measures and instruments, mainly at the level of national programmes and strategies.

### A.2.2 National Strategies and programmes

- analysing and revising existing national legislation, documents and measures to support the implementation of Directive 2010/31/EU
- analysing the state of the construction sector (growth of the construction process, business environment, financial and administrative obstacles, socio-economic conditions, market principles, etc)
- fine-tuning the powers and functions of the competent authorities arising from the implementation of the new requirements of Directive 2010/31/EU with regard to the building sector (public and residential buildings)
- planning measures for the period 2012/13 to assign and implement applied research tasks to determine national parameters and requirements for the energy performance of nearly zero energy buildings; supplementing the national calculation methodology with new elements from the relevant European standards for designing sustainable and smart buildings, taking into account standards for passive buildings and the level of technologies for heating, cooling and ventilation systems using conventional or renewable energy; systematic analysis of data in the information system of the Sustainable Energy Development Agency (AUER) regarding the state of energy use in existing buildings; and preparing projects, approving and publishing legislation, by-laws and administrative regulations
- planning measures in the period 2012/13; defining the national targets, implementation mechanisms, activities related to recording, documenting and reporting results
- harmonising a package of legislation and regulations in accordance with the 2010 Energy Performance of Buildings directive by supplementing national legislative requirements with regards to the thermal transmittance (U value, W/m<sup>2</sup>K) of walls and glazed apertures, and building features, taking into account developments in the manufacture of building materials and products (Regulation No 7 of 2004 on energy efficiency, thermal insulation and energy economy in buildings, as amended in 2010, and Regulation No RD-16-1058 of 2009 on energy use indicators and the energy performance of buildings; and Regulation No 15 on the technical rules and standards for the design, construction and operation of buildings and facilities for the production, transmission and distribution of heat energy)
- priority for the renovation of concrete panel and other multi-occupancy buildings, and linking this process with the necessary energy certification and energy surveying of buildings

### **A.2.3 Regulatory and economic instruments new buildings, including new public buildings**

#### **A.2.3.1 Regulatory instruments new buildings**

Nothing declared.

#### **A.2.3.2 Economic instruments new buildings**

- assisting the construction of new nearly zero-energy buildings → *not clear, if economic assistance is meant*

### **A.2.4 Regulatory and economic instruments existing buildings, including existing public buildings**

#### **A.2.4.1 Regulatory instruments existing buildings**

- adapting the national program for housing renovation in Bulgaria for 2006—20 in order to comply with the EU's harmonised energy efficiency policy and the government's new policy for large-scale renovation of concrete panel and other multi-occupancy residential buildings

#### **A.2.4.2 Economic instruments existing buildings**

- Assisting the achievement of nZEB-characteristics when existing buildings undergo major refurbishment → *not clear, if economic assistance is meant*
- Schemes to provide financial aid under the Operational Programme Regional Development (Supporting energy efficiency in multi-occupancy residential buildings)

### **A.2.5 Research, Development and other supply side measures (including certificates)**

- Linking the renovation of concrete panel and other multi-occupancy buildings with the necessary energy certification and energy surveying of buildings

### **A.2.6 Information, motivation and advice**

- Stimulating the establishment of owners' associations within the meaning of the Condominium Management Act (ZUES) and assistance with surveys of condominiums

### **A.2.7 Demonstration**

- drawing up a pilot programme for nearly zero-energy public buildings for 2011 - 2013

### **A.2.8 Capacity building (including education and training)**

Nothing declared

### **A.2.9 Monitoring**

Nothing declared

### **A.2.10 Development of renewable energies**

- Regulating the introduction of renewables in the construction of new buildings or the reconstruction, major refurbishment, major repair or conversion of existing buildings

### **A.2.11 Measures focusing on energy saving and energy efficiency in general**

## A.3 Cyprus

### A.3.1 Preliminary remarks

Cyprus sets its focus on capacity building instruments combined with technology supply side measure, information of the public and demonstration projects.

Cyprus generally defines short and medium term measures and actions in the period 2012-2015 (volunteer basis) and 2015-2018 (Gradual Application of nZEB).<sup>125</sup>

### A.3.2 National strategies and programmes

Nothing declared

### A.3.3 Regulatory and economic instruments of new buildings, including new public buildings

#### A.3.3.1 Regulatory instruments new buildings

- Gradual advancement of legal requirements (strengthening of the minimum energy performance requirements for new buildings) (stm)
- Second and third revision of the minimum energy performance requirements (mta)
- Design and announcement of a linear tightening of the minimum energy performance requirements leading to the 2020 nZEB (sta)

#### A.3.3.2 Economic instruments new buildings

Nothing declared

### A.3.4 Regulatory and economic instruments of existing buildings, including existing public buildings

#### A.3.4.1 Regulatory instruments existing buildings

- Second and third revision of the minimum energy performance requirements (mta) → *not clear if true for existing buildings*
- Design and announcement of a linear tightening of the minimum energy performance requirements leading to the 2020 nZEB (sta) → *not clear if true for existing buildings*

#### A.3.4.2 Economic instruments new buildings

Nothing declared

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<sup>125</sup> Short term measures will be marked (stm), medium term measures will be marked (mtm). Actions in the period 2012-2015 will be marked (sta) and actions in the period 2015-2018 will be marked (mta).

### **A.3.5 Research, Development and other supply side measures (including certificates)**

- Guidance for preparation of the industry and construction companies (stm)
- Certification of nZEB (mtm)
- Supporting Research Programmes for the development, improvement or advancement of construction techniques (sta)
- Developing methodology and software for the Energy Performance Certification of the nZEB (sta)
- Further upgrading of the software for the Certification of the nZEB (mta)

### **A.3.6 Information, motivation and supervision**

- Information of the public (stm) / Raising the awareness of the public (sta)
- Raising the awareness of the public (continued) (mta)

### **A.3.7 Demonstration**

- Pilot project applications and encouragement of volunteer application of the NZEB in private buildings (stm)
- Residential and non-residential Pilot Project Applications of nZEB (construction, not refurbishment) (sta)

### **A.3.8 Capacity building (including education and training)**

- Education of selected groups of the industry (stm)
- Preparation of a Technical Guide with technical and construction guidance in order to facilitate the design and construction of buildings. The application of the Technical Guide will be on a volunteer basis and will be upgraded continually (sta)
- Information of the qualified experts and the engineers of the building industry about the changes of the legal framework and the minimum energy performance requirements of nZEB (sta)
- Training the construction companies personnel and the on site technicians (sta)
- Further upgrading the nZEB web platform (mta)
- Informing the Qualified Experts and the Engineers of the building industry (continued) (mta)
- Training the construction companies personnel and the on-site technicians (continued) (mta)

### **A.3.9 Monitoring**

- Compliance monitoring (mtm)

### **A.3.10 Development of renewable energies**

Nothing declared

### **A.3.11 Measures focusing on energy saving and energy efficiency in general**

Nothing declared

## **A.4 Denmark**

### **A.4.1 National Strategies and programmes**

- Strategy for energy renovation of the existing building stock: The Energy Agreement from 2012 obliges the government to prepare an overall strategy for the energy renovation of the existing building stock. The strategy must be based on a general analysis of the existing building stock including possible potentials, and ensuring that it employs the most cost-effective solutions. The strategy is to be discussed between the signatories to the agreement before the end of 2013. The strategy considers possible solutions for all types of building and there is a special focus on incentives and new financial models for promoting energy renovations including ESCOs

### **A.4.2 Regulatory and economic instruments new buildings, including new public buildings**

#### ***A.4.2.1 Regulatory instruments new buildings***

- The Planning Act (planloven) allows local authorities to assign certain areas for buildings that comply with the requirements of Low-Energy Class 2015, which a number of local authorities have taken advantage of.

#### ***A.4.2.2 Economic instruments new buildings***

Nothing declared

### **A.4.3 Regulatory and economic instruments existing buildings, including existing public buildings**

#### ***A.4.3.1 Regulatory instruments existing buildings***

Nothing declared

#### ***A.4.3.2 Economic instruments existing buildings***

- The 2013 Finance Act earmarked finance of DKK 5 million for the development of ESCO models

### **A.4.4 Research, Development and other supply side measures (including certificates)**

Nothing declared

### **A.4.5 Information, motivation and advice**

- Information campaigns: These initiatives have targeted commercial and private buildings as well as public buildings and there has been a focus on behavior-related energy consumption, process energy, and energy improvements to buildings. In relation to new buildings

### **A.4.6 Demonstration**

Nothing declared



### **A.4.7 Capacity building (including education and training)**

- Building process guidelines have been drawn up for contractors, architects and engineers that wish to build energy efficiently

### **A.4.8 Monitoring**

Nothing declared

### **A.4.9 Development of renewable energies**

- The changeover to renewable energy for heating: In the period from 1 March 2010 to 30 June 2012, it has been possible for owners of oil-fired central heating to apply for a grant to scrap their system and replace it with either a geothermal heating system, an air to water heat pump, a solar panel heating system or connection to district heating. The grant is for 15-25 % of the cost of installing a new energy-efficient solution. The Energy Agreement of 2012 decided to phase out oil and gas central heating. From 2013, it will no longer be possible to install oil or gas central heating in new buildings, although will be possible in situations where there is no other available alternative. Furthermore, from 2016 it will no longer be possible to install oil-fired central heating in existing buildings
- The Government's RE objectives and support for solar panels: The Danish objectives for the changeover to renewable energy are stated in the Danish National Renewable Energy Action Plan of June 2012 cf. Article 4 of the Directive on the promotion of the use of energy from renewable sources.<sup>17</sup> A grant scheme for the installation of solar panels has been in existence for a number of years, either as a direct grant or as the possibility for selling extra energy to the grid. This scheme has been especially advantageous for owners of single family houses, aided in particular by a fall in the price of solar panels. This has resulted in a pronounced increase in the number of solar panels installed on or near to these buildings.

### **A.4.10 Measures focusing on energy saving and energy efficiency in general**

- Energy saving solutions of the energy companies  
In Denmark, electricity, gas district heating and oil grid and distribution companies have had energy saving obligations with annual targets since 2006. Following the Energy Agreement of March 2012, this obligation has intensified. The agreement states that the energy companies' savings obligations in 2013 and 2014 will increase by 75 % in relation to the 2010-2012 period, corresponding to 10.7 PJ annually during the 2013-2014 period. From 2015 to 2020, the obligation will increase by 100 %, corresponding to 12.2 PJ annually. This corresponds to around 2.6 and 3.0 % of the final energy consumption respectively, excluding transport.
- Energy savings in government buildings

The Circular on energy savings in government buildings<sup>19</sup> from 2009, introduced a framework management target that required each ministry to save 10 % on energy consumption in 2011 in relation to the 2006 level. The Circular also lays down that ministries have an obligation to publish their results on a central publicly accessible internet database. The final results were calculated and presented to the Danish Parliament (Folketinget) in 2012. A new circular is being prepared and will be ready for publication in the middle of 2013.

- **Energy savings in local authority buildings**  
The voluntary agreement between Local Government Denmark (Kommunernes Landsforening) and the Minister for Climate, Energy and Buildings, establishes the framework for energy savings in local authorities.<sup>20</sup> The agreement states that local authorities must demonstrate energy efficient behavior, undertake energy-efficient procurement and implement energy efficiency initiatives for local authority buildings, including beginning energy renovation with a repayment period of up to five years, carry out energy labeling of local authority buildings etc. The agreement is expected to be re-negotiated at the beginning of 2013. Furthermore, the Planning Act (planloven) allows local authorities to assign certain areas for buildings that comply with the requirements of Low-Energy Class 2015, which a number of local authorities have taken advantage of.
- **Energy saving in regional buildings**  
Regional buildings are primarily hospitals. A current reorganisation of the infrastructure of the hospital sector indicates that in coming years, a number of 'super hospitals' will be built that are intended to cover a wider geographical area than the present smaller hospitals. The economic framework for this is DKK 43 million up to 2020. Some of these 'super hospital projects have already begun and because of the large investments in the sector, an agreement has already been entered into between the regions and the Danish government allowing extended loan access for hospital buildings built in accordance with Building Class 2020. The agreement allows for a special loan pool of DKK 1bn. It is expected that a significant number of the new hospitals will comply with Building Class 2020 and thus will make a positive contribution to the government's energy policy targets. Furthermore, as with the local authorities, a voluntary agreement exists between the Danish Government and the Danish Regions for regional energy savings initiatives. The agreement is fundamentally the same as the voluntary agreement with the local authorities, although with special focus on the hospital sector. The agreement is expected to be re-negotiated in 2013.

## **A.5 Finland**

### **A.5.1 National Strategies and programmes**

- Prime Minister Jyrki Katainen's government programme (2011): The government programme is a plan of action approved by the parties participating in government, in which the most important task areas for the government are agreed. Prime Minister Jyrki Katainen's government programme contains sev-

eral entries to improve the energy performance of buildings. The elements of the programme have been assigned to the categories of instruments below

- Specify real emission reduction opportunities in the building stock, particularly in public buildings and in the stock of dwelling units; also specify to which timetable, financing and tendering models and with which technical solutions these will be attainable.

## **A.5.2 Regulatory and economic instruments new buildings, including new public buildings**

### **A.5.2.1 Regulatory instruments new buildings**

- Draw up a roadmap for statutory provisions regarding the energy performance of buildings, with the target of nearly zero-energy construction by 2020. Utilise this roadmap to bring the regulations into force as a broader package.
- In March 2011 the Ministry of the Environment issued new building regulations to improve energy performance; these entered into force on 1 July 2012. The intention is to impose a renewable energy minimum requirement for new construction from 2015 onwards.

### **A.5.2.2 Economic instruments new buildings**

- Improve the energy performance of construction by creating incentives → *not clear, if economic incentive is meant*

## **A.5.3 Regulatory and economic instruments existing buildings, including existing public buildings**

### **A.5.3.1 Regulatory instruments existing buildings**

- Enact energy efficiency requirements for repair and renovation work, whose implementation is economically cost-effective
- On 6 September 2012 the Council of State issued a Bill to Finland's Parliament for amendment of the Land Use and Building Act. The Act will enable the issue of a Decree regarding energy performance regulations for renovation buildings following its entry into force.

This Decree will impose minimum requirements for the energy performance of a building in the following situations: repairs that require a permit, change of intended use, or the repair of technical systems. Examples of such repairs include extensive major repairs, repairs to the outer shell of the building and the replacement of technical systems. Energy performance improvement measures will not need to be implemented if these are not technically, operationally or economically feasible. It is also important that actions to improve energy performance are taken with due consideration of the special features and intended use of the building. The intention is to issue minimum requirements in terms of renewable energy in connection with extensive major repair work from 2015 onwards.

### **A.5.3.2 Economic instruments existing buildings**

- Energy grants for residential buildings: Funds from the administrative sector of the Ministry of the Environment are granted for residential buildings in the form of energy grants. These are dealt with in the Act (1184/2005) and Decree (128/2006) on grants for repairing dwellings or improving their energy economy and health standard. The 2012 State Budget allocated an appropriation of EUR 10 million of the grants for repair and renovation work to the introduction of modes of heating which utilise renewable energy in residential buildings. EUR 8.8 million has been reserved for other energy grants for residential buildings; of this, EUR 2 million is targeted on means-tested energy grants for one-family houses.

In particular, energy grants are awarded for residential building energy surveys, outer shell repairs, and energy performance improvement, ventilation heat recovery construction and the connection of residential buildings to district heating. The improvement of energy performance is also given significant weight when considering the award of repair and renovation grants for residential buildings.

### **A.5.4 Research, Development and other supply side measures (including certificates)**

- Financing research and development: Each year about EUR 600 million is used for financing applied research and product development, and the target groups are both enterprises and public research organisations. Tekes, the principle public financier, operates subject to the Ministry of Employment and the Economy, and obtains the funding for its activity from the State Budget. Tekes has specified energy and raw materials efficiency and intelligent energy systems as specific areas of emphasis in its strategy.

Financing has increased considerably in recent years, since energy efficiency is seen as being a main competitive factor in the future. About half of the financing has been directed to the industrial use of energy. Other important sectors are the energy performance of buildings and transport. Part of Tekes's financing is channelled via programmes constructed in subject areas which are important for business and society.

- Clustering the energy and environment sector players: The clustering of energy and environment sector players enables the building of a joint research infrastructure and increases the possibilities of creating globally significant energy and environment innovations. The strategic theme areas selected are carbon-neutral energy production, dispersed energy systems, sustainable fuels, energy markets and intelligent electricity networks, efficient use of energy, resource-efficient production technologies and services, recycling of materials and waste management, plus measurement, monitoring and the appraisal of environmental efficiency.
- Clustering the property and construction sector players: The property and construction sector cluster aims at world-class know-how over the entire life cycle

of the built environment. The selected themes of its research strategy are the development of modes of procedure and business models which are customer-led and take into account the entire lifecycle, utilising inter alia information modelling. Other targets of development include indoor environments which promote health and improve productivity, and urban planning and construction which is sustainable and utilises digital technology.

- Energy performance certificate for the construction of buildings since 2008, reform in progress. The promotion of nZEB construction shall be taken into account in the updated energy classification.

#### **A.5.5 Information, motivation and advice**

- Improve the energy performance of construction by guidance (e.g. Energy information center and energy agencies, special online information tool focusing renovation of buildings)

#### **A.5.6 Demonstration**

Nothing declared

#### **A.5.7 Capacity building (including education and training)**

Nothing declared

#### **A.5.8 Monitoring**

Nothing declared

#### **A.5.9 Development of renewable energies**

- Increase the exploitation of renewable energy in the building stock
- Energy grants for residential buildings: Funds from the administrative sector of the Ministry of the Environment are granted for residential buildings in the form of energy grants. These are dealt with in the Act (1184/2005) and Decree (128/2006) on grants for repairing dwellings or improving their energy economy and health standard. The 2012 State Budget allocated an appropriation of EUR 10 million of the grants for repair and renovation work to the introduction of modes of heating which utilise renewable energy in residential buildings. EUR 8.8 million has been reserved for other energy grants for residential buildings; of this, EUR 2 million is targeted on means-tested energy grants for one-family houses.

#### **A.5.10 Measures focusing on energy saving and energy efficiency in general**

Nothing declared

## A.6 Germany

### A.6.1 National Strategies and programmes

- Expert analysis of the economic and technical framework for determinations in regulatory law and promotion: For the on-going development of regulatory law, e.g. by means of a revision of the EnEV, research contracts are regularly awarded on issues of potential, economically reasonable amendments of the energetic standards. Though the results do not bind the authority adopting the regulation, they are used as an aid in the decision-making process.

Even the KfW support programmes for energy-efficient construction and refurbishment issued as part of the CO<sub>2</sub> building refurbishment programme are comprehensively reviewed on an annual basis within the scope of flanking scientific research. On this basis, the programmes are regularly updated and improved to adapt them to the current state of the art and the actual conditions of the market and to enhance the promotional incentives. If fundamental modifications of the technical requirements have become necessary as the result of e.g. a revision of the EnEV, supplementary expert reports are commissioned as a rule. In addition, the findings form the research development and the pilot projects contribute to the further development of the KfW programmes, which serve to initially prepare the market for new technologies and methods.

### A.6.2 Regulatory and economic instruments new buildings, including new public buildings

#### A.6.2.1 Regulatory instruments new buildings

- Energy Conservation Act (Section 2a of the German Energy Conservation Act — EnEG) and the Energy Conservation Regulation (EnEV): German energy conservation law seeks to transpose the requirements of sentence 1 of Article 9(1) EPBD by means of the Energy Conservation Act (EnEG): Builder-owners are obliged, as of 31 December 2020, to construct new buildings in the form of nearly-zero buildings. For newly constructed buildings that are to be used by public administrations and owned by the public administrations, the obligation commences already two years earlier. In this regard, the minimum requirements of the statutory definition in Article 2(2) EPBD have been adopted. This same is also true of the requirement 'very low amount of energy required'. Even though it might be desirable to render this requirement more specific by reference to a specific, uniform energy parameter already in the pending revision, this aim is opposed by the need to consider the principle of economic reasonableness in determining the threshold in the short term.

It is envisaged that the Federal Government Energy Conservation Act will be authorised by regulation (EnEV) to lay down specific requirements for the energy performance of nearly zero-energy buildings. In view of the specific requirements for nearly zero-energy buildings, the relevant provisions will be adopted or amended in good time before 2019.



The present revision of the Energy Conservation Regulation aims to take first steps on the road to a nearly zero-energy building standard. It is envisaged to tighten the energetic minimum standards for new buildings in two phases (in 2014 and 2016) by an average of 12.5 % each.

- Exemplarity of federal buildings

As part of the turnaround in energy policy adopted in June 2011, the Federal Government decided that federal buildings should set an example in the reduction of energy consumption. The decision provides that all new buildings of the Federal Government as of 2012 are to be constructed in line with the nearly zero-energy standard. For existing federal buildings, an energy-efficiency refurbishment roadmap is to be developed. The aim is to create a nearly carbon-neutral stock of existing buildings by 2050. Already by 2020, a reduction of the final energy consumption for heating by 20 % is to be achieved. To this end, specific buildings are to be improved in regard to energy efficiency to such an extent that the nearly zero-energy standard is met.

#### **A.6.2.2 Economic instruments new buildings**

- Support programme "Energy efficient construction" (residential buildings) *by the Kreditanstalt für Wiederaufbau (KfW)*

Since the early years of the previous decade, energetic refurbishment of residential buildings and, successively, also the energetic refurbishment of municipal and social infrastructure buildings as well as the creation and construction of energy-efficient residential buildings is funded from the federal budget via the state-owned KfW bank group. For this purpose, approx. EUR 1.4 bn in programme funds were made available in the years up to 2005. Programme funds of approx. EUR 7.8 bn were made available in the period from 2006 to 2011 for the KfW support programmes for energy-efficient construction and refurbishment launched as part of the CO<sub>2</sub> building refurbishment programme. A total of EUR 4.5 bn in programme funds are available for the period from 2012 to 2014.

The current KfW programme 'Energy-efficient Construction' exists since April 2009 and was managed by the KfW bank group under the name 'Ecological Construction' until March 2009. In the programme 'Ecological Construction' served to fund buildings with a maximum energy consumption of 40 respectively 60 kWh pro m<sup>2</sup>/year of the standard energy-saving building 40 and 60. With the adaptation of the EnEV to the reference building method, the KfW Efficiency House standard with the KfW Efficiency House 55 (including passive house), 70 and 85 levels were introduced in the programme 'Energy-efficient Construction' in April 2009. The figure reflects the maximum applicable primary energy consumption in % in relation to the maximum value under the applicable EnEV 2009.

For the further support of the technical development, the promotion of buildings built according to the KfW Efficiency House 85 standard was ceased, and a

new, demanding standard (KfW Efficiency House 40, including passive house<sup>4</sup>) was introduced in the middle of 2010. KfW support is structured in general in such a way that the financial funding increases with the energetic level achieved.

The number of applications filed (AZ) as well as the number of residential units (WE) of the Energy Saving House 40 and 60 in the period from 2003 up to the end of 2008 is shown in the following Tab. 44.

**Tab. 44: Development of funding figures from 2003 to 2008**

|              | Energy Saving House 40 |        | Energy Saving House 60 |         |
|--------------|------------------------|--------|------------------------|---------|
|              | AZ                     | WE     | AZ                     | WE      |
| <b>2003</b>  | 1,384                  | 1,744  | -                      | -       |
| <b>2004</b>  | 1,927                  | 2,428  | -                      | -       |
| <b>2005</b>  | 2,830                  | 3,584  | 7,447                  | 9,582   |
| <b>2006</b>  | 7,785                  | 17,022 | 24,769                 | 40,430  |
| <b>2007</b>  | 5,532                  | 17,158 | 20,950                 | 33,843  |
| <b>2008</b>  | 10,462                 | 26,400 | 17,147                 | 28,066  |
| <b>Total</b> | 29,920                 | 68,336 | 70,313                 | 111,921 |

The funding figures for the Energy Saving Houses 40 and 60 from January up to the end of March 2009, as well as the funded KfW Efficiency Houses (EH) 85, 70, 55 and 40 for the period from April 2009 until June 2012 are shown in the following Table 2. The Energy Saving House 40 corresponds more or less to the KfW Efficiency House 70, while the Energy Saving House 60 corresponds to the KfW Efficiency House 85.

**Tab. 45: Development of the funding figures from January 2009 until June 2012**

|              | Efficiency House 85 |        | Efficiency House 70 |         | Efficiency House 55 |        | Efficiency House 40 |        |
|--------------|---------------------|--------|---------------------|---------|---------------------|--------|---------------------|--------|
|              | AZ                  | WE     | AZ                  | WE      | AZ                  | WE     | AZ                  | WE     |
| <b>2009</b>  | 10,903              | 19,159 | 23,556              | 50,585  |                     |        |                     |        |
| <b>2010</b>  | 2,999               | 5,038  | 35,648              | 66,471  | 3,401               | 11,132 | 693                 | 1,624  |
| <b>2011</b>  | -                   | -      | 34,039              | 53,938  | 8,873               | 18,803 | 2,384               | 8,418  |
| <b>2012</b>  | -                   | -      | 21,967              | 34,232  | 4,622               | 9,205  | 1,378               | 4,429  |
| <b>Total</b> | 13,902              | 24,197 | 115,210             | 205,226 | 16,896              | 39,140 | 4,455               | 14,471 |



The energy-efficient construction of approx. new 463,000 apartments has been assisted since 2003 as part of the support.

### **A.6.3 Regulatory and economic instruments existing buildings, including existing public buildings**

#### **A.6.3.1 Regulatory instruments existing buildings**

##### **Conservation Regulation (Section 9 EnEV)**

For existing buildings, the EPBD does not require energy-related changes in the stock of nearly zero-energy building standards are implemented. However, under national law, owners are already now obliged in principle to observe demanding requirements for the component that is to be replaced or modified when refurbishing an existing building. The energy-related minimum requirements will continue to be further developed also in future in an economically reasonable way as part of a balanced overall assessment, having regard to the burdens imposed on owners and tenants (see above).

However, owing to the mandatory principle of economic feasibility of the Energy Conservation Act, it is currently not possible to impose regulatory requirements for increasing the number of existing nearly zero-energy buildings. Moreover, such measures would not be cost-efficient in the sense of the EPBD. The requirements of Article 9 EPBD are rather implemented by other instruments of a nonregulatory nature. This is achieved in particular by financial incentives.

#### **A.6.3.2 Economic instruments existing buildings**

##### **KfW development programme 'Energy efficient refurbishing'**

The current KfW programmes forming part of the CO<sub>2</sub> building refurbishment programme of the Federal Government provide a staggered range of support for refurbishments that satisfied ambitious energy-saving standards. In addition to residential buildings, the refurbishment of municipal and social infrastructure buildings is funded since 2007. The funding is provided for all categories of owners by means of low-interest loans or, alternatively for owners of singlefamily or two-family homes (residential buildings) and apartments held by 'commonhold associations', by means of grants. Dual funding is not permitted.

Following up on the EnEV currently in force, building refurbishments with the aim to meet the KfW Efficiency House 55, 70, 85, 100 and 115 standards are funded. The same rules and requirements as in 5.2.2. apply in regard to primary energy and quality of the structural envelope as well as to the intensity of the funding. Since 2005, high quality individual refurbishment measures in residential buildings are funded in addition to the funding of comprehensive refurbishments by low-interest loans and grants. By 2010, a total of 230,078 applications were approved and hence measures in 586,293 apartments were supported financially. The requirements for these individual measures are streamlined since 2011 to such an extent that by implementing all measures, the elevated energy standard of KfW Efficiency House 55 is achieved. By the end of June

2012, 45,349 applications for 145,415 apartments have been approved. The number of existing buildings meeting KfW Efficiency House standard is to be increased through refurbishments carried out gradually by individual measures as well as through comprehensive refurbishments. Especially the gradual implementation of individual measures facilitates the refurbishment of buildings by private owners.

Since April 2012, there are special funding provisions for listed buildings and buildings that are particularly worthy of conservation (residential and non-residential buildings). Funding is provided for refurbishments toward the KfW Efficiency House Monument standard in listed buildings or buildings that are classified municipalities as particularly worthy of conservation.

In this way, it is possible to improve the quality of the buildings from an energy point of view, while preserving their historical nature at the same time. The trend in the numbers of applications (AZ), as well as in the number of funded residential units (WE) as part of the CO<sub>2</sub> building refurbishment programmes using federal funds of the KfW in the period from 2001 to 2008 is shown in Tab. 46. It is not possible to provide a breakdown to individual funding standards for this period. Comprehensive energy-related refurbishments of residential buildings were funded in these years by means of the CO<sub>2</sub> building refurbishment programme. Packages of measures (three combined measures) as well as more ambitious refurbishments at the level of a comparable new building in accordance with EnEV then in force or at a level that undercuts the requirements of the EnEV by 30 % were funded.

**Tab. 46: Development of funding figures in refurbishments from 2001 to 2008**

|              | AZ      | WE      |
|--------------|---------|---------|
| <b>2001</b>  | 9.862   | 31.513  |
| <b>2002</b>  | 14.146  | 43.218  |
| <b>2003</b>  | 20.631  | 69.010  |
| <b>2004</b>  | 22.599  | 90.259  |
| <b>2005</b>  | 24.079  | 70.237  |
| <b>2006</b>  | 43.610  | 154.888 |
| <b>2007</b>  | 20.582  | 83.345  |
| <b>2008</b>  | 28.376  | 122.016 |
| <b>Total</b> | 183.885 | 664.486 |

In the course of the revision of the EnEV 2009, the programme requirements (primary energy consumption and transmission heat loss) were tightened by approximately 30 % in April 2009. At the same time, the currently applicable KfW Efficiency House standard described above was introduced. The funding of energetic refurbishment was concentrated in July 2010 to even more efficient standards by ceasing the KfW Efficiency House 130 and by introducing new demanding standards by way of the KfW Efficiency Houses 70 and 55. The trend in approval figures as well as the funded residential units since 2009 implementing the various funding standards is shown in Table 4. It reflects an increasing willingness to carry out highly energyefficient refurbishments. The demand for funding for the Efficiency Houses 55 and 70 in existing buildings, also comprising buildings on a passive house standard, has increased significantly. This trend continued in the first half of 2012.

**Tab. 47: Development of the funding figures in refurbishment from 2009 to the end of June 2012**

|             |    | EH 130 | EH 115 | EH 100 | EH 85  | EH 70 | EH 55 |
|-------------|----|--------|--------|--------|--------|-------|-------|
| <b>2009</b> | AZ | 17.560 | 95     | 11.720 | 364    |       |       |
|             | WE | 78.355 | 425    | 52.297 | 1.622  |       |       |
| <b>2010</b> | AZ | 4.480  | 2.658  | 6.111  | 4.862  | 411   | 103   |
|             | WE | 35.048 | 12.261 | 41.205 | 19.031 | 2.741 | 290   |
| <b>2011</b> | AZ | -      | 3.062  | 3.398  | 2.633  | 1.737 | 431   |
|             | WE | -      | 12.001 | 20.217 | 10.279 | 5.833 | 1.584 |

|              |    |         |        |         |        |         |       |
|--------------|----|---------|--------|---------|--------|---------|-------|
| <b>2012</b>  | AZ | -       | 1.635  | 1.793   | 1.394  | 966     | 232   |
|              | WE | -       | 7.803  | 10.427  | 6.002  | 3.245   | 525   |
| <b>Total</b> | AZ | 22.040  | 7.450  | 23.022  | 9.253  | 3.114   | 766   |
|              | WE | 113.403 | 32.490 | 124.146 | 36.934 | 115.819 | 2.399 |

In other words, a total of approximately 1,090,00 apartments were refurbished from an energy point of view in the period from 2001 to the end of June 2012. The number of apartments receiving funding for energy-efficient individual measures is not included in this figure. Moreover, planning and the supervision of the construction phase of refurbishment measures by a qualified expert is funded through the KfW programme, 'Energy-efficient Refurbishment— Construction Supervision', in addition to the investment measures. In addition to the funding provided with the aim of energy conservation and climate protection, the state funding also serves to limit the burden on tenants, users and owners resulting from the refurbishment costs, for example, by reducing the recoverable costs on the rent pursuant to Section 559a of the German Civil Code (BGB). The reduction of the financing costs and/or investment costs also facilitates the economically feasible implementation of the refurbishment measures.

#### **Financial assistance for combined heat and power generation**

The most recent revision of the Combined Heat and Power Generation Act (CHP Act) seeks in particular to achieve a CHP share in power energy of 25 % by 2020. The revision includes in particular an increase of the supplements for power generated in CHP system and the funding of heating networks, facilitation for the funding for the modernisation of systems, new means to support the retrofitting of heating plants and condensation power plant into CHP systems as well as for heat and cold storage. The revision entered into force on 19 July 2012. Moreover, the support programme for highly efficient, small CHP systems (up to 20 kilowatt) adds to meeting the CHP target of the Federal Government.

#### **KfW programme 'Energetic urban renewal'**

To develop energy savings potentials even more intensively, it will become more important in future to establish the refurbishment process beyond individual buildings on a broader urban development basis. In particular, in inner-city neighbourhoods with historical buildings and buildings worthy of conservation, a careful balancing of energy-related refurbishment measures and architectural conservation interests is required. In doing so, the requirements for energy saving and structural monument conservation conditions must be harmonised in such a way that the townscape remains intact while taking energy conservation and climate protection into consideration at the same time. The 'Energy-efficient Urban Renewal' programme seeks to initiate comprehensive measures in the field of the energy-efficiency of neighbourhood buildings and infrastructure in order to offer, i.a., a broader spectrum for the use of renewable energies and to involve additional investor groups in the refurbishment process. Grants for integrated neighbourhood concepts and refurbishment managers are provided by the pro-

gramme. Said refurbishment managers are to supervise in particular the investive implementation of the concepts, coordinate the investors, organise the participation of citizens, etc. Moreover, loans reduced in price through federal funds serve to promote investments in the infrastructure (heating, heat stores, water supply and sanitation, street lighting, etc.).

#### **A.6.4 Research, Development and other supply side measures (including certificates)**

- Research initiative "Future Building": Germany supports the development of new materials and processes with the aim to improve the energy efficiency of buildings as part of the "Future Building" initiative. Since the start of the initiative in 2006, approximately 500 research projects with an overall volume of approx. EUR 51 million have been funded. Among other things, about 40 projects of the 'New materials and techniques' cluster were funded. Because new materials and processes, such as vacuum insulation panels, integrative energy generating systems in the building envelope as well as the improvement of thermal insulation properties of already existing materials, will play a key role for the energy efficiency of buildings in future. In addition, a funding policy for education infrastructure buildings in EfficiencyPlus standard is being developed as part of the initiative.

#### **Energy certifications**

As part of the revision of the EnEV (EnEV 2012), an obligation to provide energy-related key indicators in real-estate advertisements and to hand over the energy certification to buyers and new tenants has been introduced. The obligation, introduced in 2007, to display the energy certification in buildings used by public administrations with a high incidence of public access is being extended to smaller public buildings as well as to large private buildings with a high incidence of public access. The energy certifications provide transparency about the essential energy-related properties of the buildings. In addition to the extended requirements for energy certifications, stipulated by the Directive, the new EnEV seeks to enhance the informative value of the energy certifications by adapting, i.a., the colour shading of the number ray in the energy certification and the information on the use of renewable energies.

#### **A.6.5 Information, motivation and advice**

##### **Energy consulting**

Qualified, knowledgeable and quality-assured energy consulting, planning and construction services create confidence in the sustainability of their investments among investors. For this reason, the Federal Government has extended the funding for qualified and supplier-independent energy consulting services. Local energy consulting services in residential buildings with detailed proposals for measures for energy-related refurbishment are funded with 50 % of the costs that are eligible for funding, with up to

EUR 400 per individual counselling. Even in the case of gradual refurbishment, the recommended measures shall aim to achieve a state of the building which can be considered to be a state of lasting energyefficient refurbishment. The aim is to create a KfW Efficiency House eligible for funding by means of the support programmes. Information deficits are often the main obstacle to energy efficiency investments in buildings.

For example, energy consulting services for private consumers and energy checks for households are organised via the consumer protection agencies of the Federal Government and the federal states. Energy consulting services for private consumers are currently being offered in 200 consumer protection agencies and in 460 municipal consulting points by approx. 380 energy consultants. In both 2010 and 2011, approx. 100,00 private consumers benefited from individual energy counselling. This offer was recently extended by phone and email services. Accordingly, the number of consulting services is expected to increase. In addition, an energy check for households is available, which is also organised by the consumer protection agencies. The energy check comprises a basic check for electricity at home (for tenants), a building check and a check for the efficient coordination of the system technology. The contribution of consumers is negligible (EUR 10 for a basic check, EUR 20 for a building check, EUR 30 for an efficiency check). The performance of 30,000 energy checks is scheduled for 2012. In addition to the above, energy checks are also available without public funding in connection with other services or as part of customer loyalty schemes by the various market participants, e.g. by craftsmen and energy utilities.

List of energy efficiency experts for energy consulting and KfW Efficiency Houses Finding a well-qualified expert is one of the first steps in a high-quality energy-efficient refurbishment, refurbishment for the Efficiency House Monument or when constructing a new building. The national list of energy efficiency experts for the support programmes of the Federal Government in the field of energy efficiency aims to improve the quality of local energy consulting services (see Energy consulting services), of the construction supervision funded by the KfW as well as the expert energy-related planning of particularly efficient residential buildings by means of uniform qualification criteria, proof of regular advanced training and random checks of the results. In this way, the support programmes are rendered more transparent and home owners can find suitable experts more easily. Therefore, the Federal Government has developed and introduced a list for the federal support programmes of the Federal Governments (local consulting services and support programmes of the KfW for energy-efficient construction and refurbishments) on the basis of transparent specifications.

### **Communication and public relations by the Federal Government, the Federal States and other stakeholders**

The 'Energy Efficiency' initiative and energy-related information offered by dena aim to inform consumers, professional audiences and multipliers about a variety of energy efficiency potentials. For example, practical information and specific tips show users



how to use energy efficiently, to save energy and to avoid unnecessary energy consumption.

For the range of small and medium-sized enterprises, grants of up to 80 % are provided for 'energy consulting services for SMEs' and low-interest loans for energy-efficiency measures for the entire company, including its commercial real estate,

### A.6.6 Demonstration

- Pilot projects for the development of methods and ways of practical implementation in the construction process to assist the formation of local networks: New materials and technologies are tested in pilot projects on a broader practical scale. Such pilot projects aim to identify and eliminate existing barriers in order to make investments into energy-efficient building technology, including renewable energies, in future more economical.
- Pilot projects 'Existing nearly zero-energy buildings': Supported by funds from the CO2 building rehabilitation programme, the German Energy Agency (dena) carries out approx. 450 pilot projects across Germany for highly energy efficient refurbishment of residential and non-residential buildings (municipal infrastructure buildings, especially schools). The refurbished buildings remain below the requirements of the EnEV for a comparable new building on average by approx. 50 %.

In addition, dena makes its findings and experience available to planners and craftsmen engaged in the rehabilitation sector via information platforms.

- Pilot projects 'Roadmap to the EnergyEfficiencyPlus Building': The 'Roadmap to the EnergyEfficiencyPlus Building' pilot projects for future standards for carbon-neutral new buildings and refurbishments undertaken since early 2011 are additional cornerstones. On the basis of 42 innovative construction projects (new buildings and refurbishments) selected by an expert jury, the pilot project develops and tests future new building and refurbishment standards for residential buildings that are to be nearly carbonneutral (building standards for 2050). The construction projects are closely monitored in the planning and execution stages by the engineering consultants commissioned by dena.
- Pilot project 'EfficiencyBuildingPlus with electromobility': The Federal Government takes a further step in the form of the new generation of EfficiencyBuildingsPlus buildings. Currently, an inhabited pilot project of the Technical University Stuttgart in Berlin aims to show that the building generates with renewable energies more energy than it consumes for the thermal conditioning of the house and the charging of the electric vehicles with a reach of up to 30 000 km on an annual average. Moreover, the building is also subjected to a sustainability audit (rating system for sustainable building) in accordance with the German certification system, and sets an excellent example in the field of sustainable building. For example, the environmental impact of the building was also observed during the planning stage.

The predecessors of this building were the Plus-Energy houses of the Technical University Darmstadt constructed in 2007 and 2009, which became solar world champions at the solar decathlon competition by using innovative technologies and architecture. In addition to these model buildings, a Germany-wide network of additional EfficiencyBuildingPlus is being developed with the EfficiencyBuildingPlus with electromobility. Here, the focus is on the continuous exchange of information and the financial support for a broader application of this new generation of buildings. Multiple building types are examined, ranging from single-family homes to apartment buildings, both in the form of newly constructed buildings and in the form of refurbishing of existing buildings to the EfficiencyBuilding Plus. For example, currently the refurbishment of old buildings into an EfficiencyBuildingPlus building is examined in the scope of two apartment buildings in Neu-Ulm.

- Pilot projects 'Construction of new non-residential buildings as part of the municipal and social infrastructure': Compared with the extensive experience in the residential sector, there is currently still need for research into highly-efficient non-residential buildings — both in terms of the construction and the exploitation phase.

As part of the pilot project, the new construction of schools, childcare facilities and administrative buildings, hospitals and other municipal facilities with an improvement of 60 to a minimum of 45 % on the EnEV 2009 standards (KfW Efficiency House 40, respectively 55) is being funded and scientifically monitored. In doing so, the exemplary planning, their structural implementation and the exploitation phase are being examined, i.a. in regard to their economic feasibility and transferability. As part of the 'Future Building' initiative, a funding policy for educational buildings in the EfficiencyPlus standard is being developed.

- Pilot project 'Zero-energy building for the Federal Environmental Agency (Umweltbundesamt) in Berlin-Marienfelde': The 'Zero-energy building for the Federal Environmental Agency (Umweltbundesamt) in Berlin-Marienfelde' pilot project tests compliance with the future energetic requirements for a nearly zero-energy building on a public building model already today.

### **A.6.7 Capacity building (including education and training)**

Nothing declared

### **A.6.8 Monitoring**

Nothing declared

### **A.6.9 Development of renewable energies**

- Renewable Energies Heat Act

The Renewable Energies Heat Act obliges builders-owners since 2009 to meet the thermal energy requirements of new buildings in part with renewable ener-



gies. This established for the first time a regulatory instrument in the form of the mandatory use of renewable energies for the construction of new private and public buildings.

The mandatory use may be met either by the use of solar heating (a minimum share of heating energy need of 15 %), biomass (solid and liquid: at least 50 %, gaseous: at least 30 %), geothermal energy and environmental heat (at least 50 %), but failing that, also by the use of waste heat, combined heat and power generation and energy conservation measures (15 % better than the EnEV standard). Combinations of renewable energies and with substitute measures are permitted.

In addition, the recast version of the Renewable Energies Heat Act, which entered into force on 1 May 2011, also introduced a 'role model' function of existing public buildings. There is an obligation to cover part of the heating or cooling requirements of public non-residential buildings with renewable energies as soon as the buildings are refurbished.

- Renewable Energies Heat Act - escape clause for state regulations (Section 3(2) Renewable Energies Heat Act — EEWärmeG)

Section 3(2) of the Renewable Energies Heat Act (EEWärmeG) provides an escape clause for the federal states to adopt own provisions for existing buildings. With the 'Renewable Heat Act' (EWärmeG), adopted on 7 November 2007 by the Baden-Württemberg State Parliament, Baden-Württemberg is the first federal state to adopt a heat act. The act aims to establish the use of renewable energies as a standard for heating and hot water preparation in residential buildings. Since January 2010, 10 % of the heating consumption must be covered by renewable energies when replacing a heating system in an existing residential building. Alternatively, energy can be saved by improved thermal insulation of façades or roofs.

- Research grants for solar heating with high solar fractions: Under the 6th Energy research programme of the Federal Government, funding is provided for solar heating as part low-temperature solar heating for buildings with a high solar fraction ranging between 50 and 100 %, including measuring programmes, planning tools and accompanying monitoring. This relates to next generation 'solar buildings' as well as to 'selfsufficient solar buildings', which rely fully on solar heating and power supply for the building by a combination of solar heating, photovoltaic and/or photovoltaic/heating and new solutions for efficient heat storage in the building.
- Market incentive programme

The Market Incentive Programme (MAP) is another key funding instrument of the Federal Government. As far as existing buildings are concerned, it contributes towards meeting the target of a share of 14 % of renewable energies in the heating and cooling supply in the heating sector by 2020 (as of 2011: 10.4 %).

Funding is provided for solar heating systems, biomass systems and heat pumps. The programme section on investment grants provides for increased funding by means of a bonus system (in other words, basic funding plus bonus funding), for example if the renewable heating systems are installed in buildings that are particularly well insulated and with a reduced need for energy (efficiency bonus) or if various renewable energies are combined with each other in order to achieve the use of a high percentage of renewable energies and a high efficiency standard (combination bonus 'solar/biomass' or 'solar/heat pump'). Efficient within the meaning of the MAP funding guidelines are residential buildings that meet the requirements for the building envelope of a KfW Efficiency House 55 according to the currently applicable EnEV 2009. The bonus currently amounts to 50 % of the basic funding.

Since August 2012, especially innovative and not yet economically viable techniques for using renewable energies in new buildings are once again eligible for funding. This serves to increase the incentive to go beyond the minimum requirements of the Renewable Energies Heat Act and to construct buildings with high renewable energy fractions. In this way, a contribution is made to the development of new buildings with higher renewable energy fractions.

#### **A.6.10 Measures focusing on energy saving and energy efficiency in general**

Nothing declared

## A.7 Ireland

### A.7.1 National Strategies and programmes

- Preparation of Cost-Optimal Calculations for new Dwellings and new non-residential buildings
- Revising Advisory Reports which accompany BER Certificates to highlight cost optimal measures.
- Identification of potential energy savings and appropriate targets for different categories of buildings to inform a series of step changes for upgraded Building Regulations Part L requirements.
- Upgrading NEAP software to take account of developments in relation to regulatory, technological, and primary energy matters.
- Develop an inventory of public sector buildings
- Retrofit Programme of Local Authority owned stock of social housing units.

### A.7.2 Regulatory and economic instruments new buildings, including new public buildings

#### A.7.2.1 Regulatory instruments new buildings

- Building regulations (2011) set high mandatory energy performance standards for new dwellings (primary energy consumption 61 kWh/m<sup>2</sup>/yr. and define a requirement for renewables to meet the energy demand
  - 10 kWh/m<sup>2</sup>/annum contributing to energy use for domestic hot water heating, space heating or cooling; or
  - 4 kWh/m<sup>2</sup>/annum of electrical energy; or
  - a combination of these which would have equivalent effect.

It is not intended to increase the renewable requirement for dwellings in Building Regulations; however, it is envisaged as the cost of renewable technologies drop it will become more cost effective for renewables to meet increased energy requirements for the dwellings.

- Amending Building Regulations Part L to require Nearly Zero-Energy Performance Standards (see 3.1.1 above) as soon as feasible to do so
- Building Control Regulations 2012 amendment require lodgement of drawings, professional inspection and certification of compliance with building regulations for all significant non-residential building projects (including energy efficiency and renewables requirement)
- Obligation on all public bodies to develop and maintain energy management programmes.
- Public bodies developing capital projects with projected energy consumption in excess of 1 GWh per annum will be obligated to integrate energy efficient design principles during project development phase.
-

#### **A.7.2.2 Economic instruments new buildings**

### **A.7.3 Regulatory and economic instruments existing buildings, including existing public buildings**

#### **A.7.3.1 Regulatory instruments existing buildings**

- Obligation on all public bodies to develop and maintain energy management programmes.
- Consideration of minimum thermal efficiency standards in the rental sector

#### **A.7.3.2 Economic instruments existing buildings**

- Grants in the “better energy homes scheme” and the “better energy warm homes scheme” for low-income families
- Introduction of Pay As You Save (PAYS) framework to incentivise homeowner investment in energy efficiency improvements
- National Energy Performance Contracting Framework: Model contracts will be developed

### **A.7.4 Research, Development and other supply side measures (including certificates)**

- Building Energy Rating (BER) certification scheme was introduced for dwellings in 2007 and buildings other than dwellings in 2009. Under this scheme the energy certification of a dwelling is mandatory whenever a building is commissioned or offered for sale or rent; or when the owner applies for a funded grant for retrofitting of energy efficiency measures. The certificate includes an advisory report with recommendations for cost effective improvements to energy performance
- Upgrading the Building Regulations and Energy Performance of Buildings Directive DEAP software every 2 years to take account of developments in relation to regulatory, technological, and primary energy matters.

### **A.7.5 Information, motivation and advice**

- Promotion of Nearly Zero Performance Standards as a voluntary standard.
- Energy monitoring and reporting systems will be developed to facilitate public bodies in reporting energy efficiency in their own annual reports.
- Campaign “Power of One” about importance of energy efficiency
- Publication of the “Code of Practice for Retrofitting Energy Efficiency Measures in Dwellings”
- Media campaign promoting Energy Efficiency in Homes.
- Publication of Building Energy Rating in Advertising literature.
- Ensuring Small and Medium Enterprise sector has access to necessary supports to reap financial benefits of investment in energy management practices.
- Extend Accelerated Capital Allowance products list and Triple E register to encourage energy efficient investment.

### **A.7.6 Demonstration**

Nothing declared

### **A.7.7 Capacity building (including education and training)**

- Build Up Skills Initiative (BUSI)
- Working with industry to build capacity and develop quality of energy efficiency products and practitioners (Training Schemes, Installer Schemes, Product Certification, etc).

### **A.7.8 Monitoring**

Nothing declared

### **A.7.9 Development of renewable energies**

- Any new building commissioned with a floor area exceeding 1,000 m<sup>2</sup> is required by law to undertake a feasibility study to examine the potential for availing of alternative energy sources.

### **A.7.10 Measures focusing on energy saving and energy efficiency in general**

Nothing declared

## A.8 Lithuania

### A.8.1 National Strategies and programmes

- The Law on Renewable Energy Resources
- Energy efficiency action plans I and II
- Programme “Renovation of multi-apartment buildings with the primary aim of increasing their energy efficiency”
- National aim is to modernise most residential buildings built under construction permits issued prior to 1993, to reduce heating energy costs by up to 30%, compared to the heating energy costs prior to renovation (modernisation) and to reduce carbon dioxide emissions by about 400 thousand tonnes per year.

### A.8.2 Regulatory and economic instruments new buildings, including new public buildings

#### A.8.2.1 Regulatory instruments new buildings

Nothing declared

#### A.8.2.2 Economic instruments new buildings

Nothing declared

### A.8.3 Regulatory and economic instruments existing buildings, including existing public buildings

#### A.8.3.1 Regulatory instruments existing buildings

Nothing declared

#### A.8.3.2 Economic instruments existing buildings

- Programme of energy efficiency investments through modernisation of multi-apartment buildings (JESSICA [Joint European support for sustainable Investment in City Areas] holding fund): The aim of this measure is to improve the funding conditions for projects in the area of improving the energy efficiency of the housing sector, encourage renovation (modernisation) of residential buildings and dormitories by property owners, state high schools and professional training establishments, in order to improve their energy qualities and living environment and encourage integrated city development activities in municipalities.
- 'Projects for the renovation of **public** buildings in line with the benefit and quality criteria 'Ensuring stability of energy supply, accessibility and higher energy efficiency' contained in the Lithuanian Single Programming Document for 2004-2006 will help with the objective of increasing energy production and consumption efficiency and the consumption of renewable energy resources. The aim of the measure is to reduce the energy consumed in buildings

- Special Programme for Climate Change with a fund to enable renovating (modernising) of public buildings by reducing energy consumption, renovating (modernising) one or two-apartment residential houses belonging to natural persons and private legal entities, by achieving class C building energy performance and by reducing energy consumption by at least 20%; constructing a public building with passive or low energy consumption or renovating (modernising) public buildings in order to achieve low or passive energy consumption. These funds will also encourage the use of RES.

#### **A.8.4 Research, Development and other supply side measures (including certificates)**

Nothing declared

#### **A.8.5 Information, motivation and advice**

- Promotion of renovation of multi-apartment buildings → not clear if financial promotion is meant: aim is to encourage the owners to modernise their multi-apartment houses with inefficient energy consumption

#### **A.8.6 Demonstration**

Nothing declared

#### **A.8.7 Capacity building (including education and training)**

Nothing declared

#### **A.8.8 Monitoring**

Nothing declared

#### **A.8.9 Development of renewable energies**

- Special Programme for Climate Change with a fund to enable renovating (modernising) of public buildings by reducing energy consumption, renovating (modernising) one or two-apartment residential houses belonging to natural persons and private legal entities, by achieving class C building energy performance and by reducing energy consumption by at least 20%; constructing a public building with passive or low energy consumption or renovating (modernising) public buildings in order to achieve low or passive energy consumption. These funds will also encourage the use of RES.

#### **A.8.10 Measures focusing on energy saving and energy efficiency in general**

Nothing declared

## A.9 The Netherlands

### A.9.1 National Strategies and programmes

Nothing declared

### A.9.2 Regulatory and economic instruments new buildings, including new public buildings

#### A.9.2.1 Regulatory instruments new buildings

| <b>Name</b>                                       | Stricter requirements for the energy performance (EPC) of new buildings |
|---|---|
| <b>Category</b>                                   | Legislation   |
| <b>Territorial application</b>                    | Netherlands   |
| <b>Target group</b>                               | builders<br>Project developers  |
| <b>End-user activities targeted for influence</b> | Making new buildings increasingly energy-efficient                      |
| <b>Effectiveness</b>                              | significant   |
| <b>Status of implementation and planning</b>      | Ongoing to the end of 2015  |

The EPC for new homes was lowered from 0.8 to 0.6 on 1 January 2011. This stricter requirement was laid down in the Building Decree. The next step towards a stricter EPC, down to 0.4, is scheduled for 1 January 2015, moving towards the final goal of the nearly zero-energy home in 2020. Non-residential buildings will have to be 50% more energy efficient in 2015, compared to 2007. New government buildings will have to be nearly zero energy building as from the end of 2018.



| <b>Name</b>                                       | Agreement: Spring agreement on energyefficient new buildings   |
|---|--|
| <b>Category</b>                                   | <ul style="list-style-type: none"> <li>- Building requirements and enforcement</li> <li>- Voluntary agreements (Spring agreement on energy-efficient new buildings)</li> </ul> |
| <b>Territorial application</b>                    | Netherlands  |
| <b>Target group</b>                               | Builders<br>- Project developers<br><br>Banks  |
| <b>End-user activities targeted for influence</b> | Making new buildings increasingly energy-efficient   |
| <b>Effectiveness</b>                              | significant  |
| <b>Status of implementation and planning</b>      | Ongoing to the end of 2015   |

To support the stricter energy performance requirements, an agreement (Spring Agreement) was signed in 2008 between the Dutch national government and market parties (Bouwend Nederland, the NEPROM Association of Dutch Property Developers and the NVB Association of Dutch Builders and Developers). The aim of the Spring Agreement is to improve the energy performance of new buildings by 25% in 2011 and 50% in 2015 (compared to the building requirements in 2007), with the intention of creating the conditions for zero-energy new buildings in 2020. The national government regularly strengthens laws and regulations to that end. The sector organisations implement a knowledge transfer and incentive programme for their affiliated companies to raise the level of knowledge their members have regarding improvement in energy performance.

The Spring Agreement was revised in June 2012, and implementation programmes will be devised for the recast agreement.

| <b>Name</b>                                       | Green Deal in the municipality of Amsterdam                        |
|---|--|
| <b>Category</b>                                   | Voluntary agreements   |
| <b>Territorial application</b>                    | Netherlands  |
| <b>Target group</b>                               | Housing corporations and owners' associations                      |
| <b>End-user activities targeted for influence</b> | All new buildings in the city will be climate-neutral from 2015 on |
| <b>Effectiveness</b>                              |  |
| <b>Status of implementation and planning</b>      | 2011-2015  |

The municipality of Amsterdam has set the target of ensuring that all new buildings in the city will be climate-neutral from 2015 on. It affects 23,900 homes which will be built between 2015 and 2020. The national government works with the municipality of Amsterdam to eliminate obstacles in laws and regulations, freeing the city to set requirements that lead to climate-neutral new buildings. The national government supports and appreciates this ambition and will be working with Amsterdam to assess how possible obstacles in laws and regulations that might pose a problem for this ambition could be eliminated before this transition period enters into effect. The municipality and the national government will be exploring these options together and arriving at a joint decision within a year.

#### **A.9.2.2 Economic instruments new buildings**

| <b>Name</b>                                       | Innovation Agenda for the Built Environment   |
|---|---|
| <b>Category</b>                                   | Energy efficiency funds   |
| <b>Territorial application</b>                    | Netherlands   |
| <b>Target group</b>                               | <ul style="list-style-type: none"> <li>- Project developers</li> <li>- Builders</li> <li>- Installers</li> <li>- Clients</li> </ul> |
| <b>End-user activities targeted for influence</b> | More energy-efficient new buildings, moving towards zero energy   |
| <b>Effectiveness</b>                              |   |
| <b>Status of implementation and planning</b>      | 2011-2014   |

The Energy Leap innovation programme promotes innovations and aims to halve energy consumption in the built environment in 2030 (compared to 1990). The priorities in the programme are:

- Accelerated development of scalable energy conservation packages with high energy performance, as well as introduction in existing buildings.
- Accelerated market development of energy conservation concepts that take an integrated approach to design and implementation. These concepts are necessary in realising soaring ambitions in new buildings and existing buildings (integration of the supply and production chain).
- Involving user aspects and user-friendliness in the design of energy-efficient buildings. Projects that have a tangible focus on acceleration and innovation may be eligible for support in the framework of the Innovation Agenda for the Built Environment (IAGO). The majority of the budget for IAGO-I (€ 30 million) and IAGO-II (€ 20 million) has already been invested. Proposals for the remaining funding can be submitted through 2014, focusing on residential buildings, non-residential buildings and area development.

The projects include the following:

- The Energy Leap is a broad-ranged approach aimed at preparing the entire buildingchain for (the end goal of) zero-energy building. A few of the projects in the framework of the Energy Leap:
- All Local Lights Set to Green supports the realisation of very high energy ambitions among private individuals. Targets: municipality, building sector and private individuals. A structure is set up in such a way that existing obstacles are cleared away (such as zoning scheme problems, public welfare, lack of good energy-saving concepts) and will no longer arise. The cooperating parties receive a maximum of € 250,000 in kind (advice, communications, calculations, etc.). Funding was awarded to six projects. Many more submissions were received.
- Various tendering schemes, including:
  - Call for tenders for small-scale inner-city areas. Three projects were awarded funding.
  - Tender for Offices and tender for Retail. Very high ambitions, reducing standards to 80% of total energy consumption or zero energy (based on both building and consumption). Support for the extra amount invested (above the statutory minimum). Selection process is ongoing. Registrations are still being accepted.
  - Tenders for residential housing construction: supporting projects with up to 80% savings on primary energy consumption.
- In **Zero-Energy Areas (GEN)**, three business cases are being developed: a new building location, an existing location and a business location. The aim is a reproducible effect for zero-energy areas.
- **Towards zero-energy schools and offices (NESK)**: This subsidy scheme aims to promote projects that have distinctive energy efficiency, sustainability and organisational innovations in the building process. The projects should also

be able to serve as role models and sources of inspiration. The projects that were awarded funding (eight schools and seven offices) are currently being carried out.

### A.9.3 Regulatory and economic instruments existing buildings, including existing public buildings

| <b>Name</b>                                       | Agreement on Energy Conservation in the Rental Sector                      |
|---|--|
| <b>Category</b>                                   | Voluntary agreements   |
| <b>Territorial application</b>                    | Netherlands  |
| <b>Target group</b>                               | Housing corporations<br>Builders<br>Installation sector<br>Owner-occupiers |
| <b>End-user activities targeted for influence</b> | Making existing buildings more energy-efficient                            |
| <b>Effectiveness</b>                              | Direct impact on the target group  |
| <b>Status of implementation and planning</b>      | Through 31 December 2020   |

The Agreement on Energy Conservation in the Corporation Sector for existing buildings, dating from October 2008, has been recalibrated and strengthened. The 2008 agreement with housing corporations is an agreement between the national government, the Aedes association of housing corporations and the Woonbond national housing association. The aim is to safeguard the investments made by the housing corporations in achieving the energy efficiency targets. Housing corporations own approximately 2.3 million homes and have taken steps toward improving the energy efficiency of their housing portfolio. The new Agreement on Energy Conservation in the Rental Sector in June 2012 converts the original target of 20% ‘additional’ savings in the 2008-2018 period into a total savings of 33% from 2008 to 2020. This means that the rental homes owned by housing corporations will have an average energy efficiency of label B by the end of 2020. Now that Vastgoed Belang has also signed the agreement, it also applies to tenants in the private rental sector. The target for that sector is that 80% of homes must have been improved to label C or better before the end of 2020.

The Cabinet is committed to removing statutory, financial and fiscal obstacles for collective implementation of renewable energy. In addition, labels that are not considered green (D, E, F and G) have been declared unacceptable and it is planned to bring them

to an end. The developing trend in housing costs (rent, energy, rent surcharge) is assessed nationally and monitored locally.

#### **A.9.3.1 Regulatory instruments existing buildings**

| <b>Name</b>                                       | Rental housing assessment system    |
|---|-------------------------------------|
| <b>Category</b>                                   | Legislation                         |
| <b>Territorial application</b>                    | Netherlands                         |
| <b>Target group</b>                               | Landlords<br>Tenants                |
| <b>End-user activities targeted for influence</b> | Promoting energy-saving investments |
| <b>Effectiveness</b>                              |                                     |
| <b>Status of implementation and planning</b>      | Entry into force on 1 July 2011     |

The rental housing assessment system was changed on 1 July 2011. This points system assesses the energy performance of the home (based on the energy label) in order to promote energy-saving measures. The points system uses features of the home to set the maximum rental price of the home. By including the energy label in the assessment for the points system, the maximum rental price of the home is linked to the home's energy label.

The amendment to the points system will be evaluated after three years, immediately after the end of the transition period. The amended points system immediately entered into force for homes that have an energy label and for homes that are required to have an energy label based on the regulation. Homes that are not yet required to have an energy label are subject to a transition period (until 1 January 2014). After that, the energy label of these homes will also be included in the rental assessment.

| <b>Name</b>                                       | Enforcement of the Environmental Management Act in non-residential buildings  |
|---|---|
| <b>Category</b>                                   | Building requirements and enforcement   |
| <b>Territorial application</b>                    | Netherlands   |
| <b>Target group</b>                               | Building owners   |
| <b>End-user activities targeted for influence</b> | Enforcement of statutory requirement to implement energy-saving measures that can be earned back in less than 5 years |
| <b>Effectiveness</b>                              |   |
| <b>Status of implementation and planning</b>      | Current   |

Energy conservation is a topic that is covered by the Environmental Management Act and developed in more detail in the Activities Decree. On the strength of Article 2.15(1) of the Activities Decree, large or medium-sized businesses must implement all cost-effective measures that can be earned back in 5 years or less. The obligation enters into force once a business exceeds an energy consumption level of 50,000 kWh and 25,000 m<sup>3</sup> of gas.

The obligation also applies to non-residential buildings, including offices, healthcare institutions and schools. The competent authority, generally the municipality, can enforce compliance with the Activities Decree. If the business uses more than 200,000 kWh of electricity or 75,000 m<sup>3</sup> of natural gas annually, the enforcing authority may require the business to carry out an energy conservation study. The study can be required if it can plausibly be assumed that insufficient cost-effective measures are being implemented.

| <b>Name</b>                                       | More with Less: Agreement on energy conservation in existing homes and buildings   |
|---|--|
| <b>Category</b>                                   | Voluntary agreements   |
| <b>Territorial application</b>                    | Netherlands  |
| <b>Target group</b>                               | <ul style="list-style-type: none"> <li>- Housing corporations</li> <li>- Builders</li> <li>- Installation sector</li> <li>- Owner-occupiers</li> </ul> |
| <b>End-user activities targeted for influence</b> | Making existing buildings more energyefficient   |
| <b>Effectiveness</b>                              | Direct impact on the target group  |
| <b>Status of implementation and planning</b>      | Through 31 December 2020   |

The More with Less programme is a joint initiative by the national government, housing corporations, builders, the installation sector and the power companies to save energy in existing buildings. The agreement was revised on 28 June 2012. The parties aim for this new agreement to improve the energy performance of at least 300,000 existing homes every year by at least two classes on the energy label. Subsidies from the More with Less programme were available through the end of 2011.

#### **A.9.3.2 Economic instruments existing buildings**

| <b>Name</b>                                       | Lower VAT rate for insulation work and labour costs for maintenance and renovation of residential buildings |
|---|---|
| <b>Category</b>                                   | Tax advantage   |
| <b>Territorial application</b>                    | Netherlands   |
| <b>Target group</b>                               | Housing corporations<br>Homeowners  |
| <b>End-user activities targeted for influence</b> | Promoting energy-saving investments   |
| <b>Effectiveness</b>                              | Directly targets homeowners   |
| <b>Status of implementation and planning</b>      | 2009-present  |

This concerns the reduction in VAT rate for measures in and on the home that target energy conservation (insulation of the floor, roof and outer walls) and for all labour costs involved in renovation and restoration work done in and around the home. The

VAT rate has been lowered from 19% to 6%. The low VAT rate for labour costs is still in effect.

| <b>Name</b>                                       | Green Projects scheme / National Mortgage Guarantee |
|---|---|
| <b>Category</b>                                   | Loans   |
| <b>Territorial application</b>                    | Netherlands   |
| <b>Target group</b>                               | Homeowners  |
| <b>End-user activities targeted for influence</b> | Promoting investments in energy conservation        |
| <b>Effectiveness</b>                              | Directly targets homeowner                          |
| <b>Status of implementation and planning</b>      | Current   |

These measures concern loans that homeowners take out to fund investments in energy conservation.

The Green Projects scheme is a tax discount scheme for green investments. Investments in sustainable construction and energy conservation are also covered by the scheme. Because the government gives savers and investors a tax discount on investments in green projects, investors can be satisfied with less compensation and banks can loan money to fund green projects at a lower interest rate. The scheme was modified on 1. January 2011. The 2.5% tax advantage for savers and investors was decreased gradually to 0.7%, as agreed in the 2012 Spring Agreement. The tax exemption for returns on equity (1.2% advantage) remains intact. This represents a remaining tax advantage of 1.9% for savers and investors.

The National Mortgage Guarantee insures the risk that the loan holder will not be able to pay the mortgage. This guarantee applies to mortgages up to €350,000 (1 July 2012), and will be reduced gradually to €265.000 in 1 July 2014. Energy-saving measures can also be included, allowing investments in energy conservation to be excluded from the income limit up to a maximum amount of €8,000. Energy-saving measures include: high-efficiency boiler, wall cavity insulation, floor insulation, high-efficiency++ glazing, heat pump, solar boiler and/or solar panels.

| <b>Name</b>                    | Revolving fund |
|--------------------------------|----------------|
| <b>Category</b>                | Loans          |
| <b>Territorial application</b> | Netherlands    |



|   |  |
|---|--|
| <b>Target group</b>                               | Homeowners, housing corporation and private rentals                                      |
| <b>End-user activities targeted for influence</b> | Promoting investments in energy conservation in existing buildings                       |
| <b>Effectiveness</b>                              |  |
| <b>Status of implementation and planning</b>      | Fund expected to be established at the end of 2012, duration has not yet been determined |

The national government will set up a revolving fund for energy-saving measures in the built environment (existing buildings). This measure will make the living and housing expenses of Dutch households and businesses more controllable, limiting the impact of rising energy prices and the higher energy tax. The 2013 budget agreement reserves room (70 million in 2013 and 58 million in structural budget) for co-funding large-scale projects (e.g. housing corporations, healthcare institutions, schools and swimming pools) and private projects. A fully revolving fund structure ensures that the money comes back in and is available for new investments again. It will be developed in detail in the second half of 2012.

#### **A.9.4 Research, Development and other supply side measures (including certificates)**

Nothing declared

#### **A.9.5 Information, motivation and advice**

Nothing declared

### A.9.6 Demonstration

| <b>Name</b>                                       | Green Deal in the province of Overijssel                          |
|---|---|
| <b>Category</b>                                   | Demonstration projects/knowledge and learning process             |
| <b>Territorial application</b>                    | Province of Overijssel  |
| <b>Target group</b>                               | Housing Corporations  |
| <b>End-user activities targeted for influence</b> | Investing in improving energetic quality of residential buildings |
| <b>Effectiveness</b>                              |   |
| <b>Status of implementation and planning</b>      | 2012-2014   |

The Dutch province of Overijssel signed an agreement in June 2011 with 25 housing corporations with property in that province, stating that the energy efficiency of the residential properties they own would be improved by 25%. These housing corporations represent 90% of the rent-controlled rental housing in Overijssel. The province of Overijssel has set up a scheme for the housing corporations that sign this agreement; it has arranged to provide funding for energy-saving measures or generation of renewable energy in existing rent-controlled homes. This approach is intended to lead to manageable living expenses.

| <b>Name</b>                                       | Excellent Areas  |
|---|--|
| <b>Category</b>                                   | Legislation/dissemination of knowledge   |
| <b>Territorial application</b>                    | Netherlands  |
| <b>Target group</b>                               | All parties involved in construction   |
| <b>End-user activities targeted for influence</b> | New buildings  |
| <b>Effectiveness</b>                              |  |
| <b>Status of implementation and planning</b>      | Experience is currently being developed in 19 projects. The 'Excellent Areas' will be evaluated in 2014. |

The 'Excellent Areas' are nineteen innovative new building projects across the Netherlands. In these areas, the energy performance coefficient (EPC) is one stage ahead of the statutory EPC required by the Building Decree. These involve experiments with building energy-efficient structures.

The following introduction of more stringent requirements, planned for 2015, will be supported via the 'Excellent Areas'. In the 19 Excellent Areas that have been designated, construction companies are gaining experience with an EPC which is at least 25% lower. Municipalities, project developers and other parties involved in the building process gain extensive practical experience with innovative building methods and techniques in the Excellent Areas. This especially applies to looking for innovation in the building process and for new forms of cooperation and funding. 11 of the 19 'Excellent Areas' are supported by an Order in Council, which gives legal recourse for enforcing the lower EPC in those areas. The knowledge and experiences gained there will be used to gain experience in energy efficient new buildings in the run-up to plans for stricter requirements, particularly in 2015. In the end, new buildings will have to be nearly zero energy in 2020.

| <b>Name</b>                                       | Block by Block approach (large-scale approach to energy conservation in existing residential buildings)  |
|---|--|
| <b>Category</b>                                   | Demonstration projects/knowledge and learning process  |
| <b>Territorial application</b>                    | Netherlands  |
| <b>Target group</b>                               | Homeowners, housing corporations and private rentals   |
| <b>End-user activities targeted for influence</b> | Facilitating investments in improving energetic quality of residential buildings   |
| <b>Effectiveness</b>                              |  |
| <b>Status of implementation and planing</b>       | 13 local and 1 regional Block by Block projects were launched at the end of 2011. The first 10,000 homes will have been prepared by the end of 2012. Implementation of the measures will take place in 2013. |

In order to make more progress in existing buildings, the Cabinet has instituted a largescale approach to existing buildings, known as 'Block by Block'. The aim is to use standard packages managed at the local level and relying on market funding (e.g. from institutional investors). Influencing the behaviour of residents and users will also be part of the approach. A pilot was launched in 2011 consisting of 13 local projects and 1 regional project. The local projects were driven and implemented by market parties in close collaboration with the municipalities. The first 10,000 homes will have been prepared by the end of 2012. Implementation of the measures will take place in those homes in 2013.

During the three-year period of the pilot, the aim is to gain sufficient experience to develop a concept that can be rolled out all over the country. This primarily concerns experience with various funding structures, marketing models and ways of guaranteeing quality. The national government provides financial support for the projects in terms of extra process costs and ensures the dissemination of knowledge and experience.

### A.9.7 Capacity building (including education and training)

Nothing declared

### A.9.8 Monitoring

Nothing declared

### A.9.9 Development of renewable energies

| <b>Name</b>                                       | Energy Investment Deduction (EID)                       |
|---|---|
| <b>Category</b>                                   | Fiscal measures   |
| <b>Territorial application</b>                    | Netherlands   |
| <b>Target group</b>                               | Private Sector  |
| <b>End-user activities targeted for influence</b> | Promoting procurement of energy from renewable sources. |
| <b>Effectiveness</b>                              |   |
| <b>Status of implementation and planning</b>      | Ongoing from 2011 to (at least) 2017                    |

The Energy Investment Deduction (EIA) promotes investments in energy-efficient business assets as well as assets for efficiently generating renewable energy. Part of investments in assets that meet the generic saving standards set by the EIA can be deducted from fiscal profits. This includes wind energy on land, cogeneration of heat and electricity, biomass and photovoltaic energy (solar power). Only the newest types of assets are eligible for EIA, which also allows the EIA to promote the market introduction of a new generation of efficient business assets.

### A.9.10 Measures focusing on energy saving and energy efficiency in general

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|---|--|
| <b>Name</b>                                       | Roll out of smart meters   |
| <b>Category</b>                                   | Meter readings and invoicing   |
| <b>Territorial application</b>                    | Netherlands  |
| <b>Target group</b>                               | All end users that are within the scope of the ESD   |
| <b>End-user activities targeted for influence</b> | Energy conservation by improved insight into energy consumption  |
| <b>Effectiveness</b>                              | the cost-benefit analysis done by KEMA shows that it would be possible to realise savings of 3.2% on electricity and 3.7% on gas.  |
| <b>Status of implementation and planing</b>       | A smart meter is installed in new buildings, during large-scale renovations and regular meter replacement, and as requested by the end user. Also upon request if the energy label improves by at least two label classes, or if the residence receives at least a class B energy label. |

The Act on the Implementation of EC Directives on Energy Efficiency includes rules that promote energy conservation. This law stipulates that, in new buildings, during large-scale renovations and regular meter replacement, and as requested by the end user, a meter must be placed that can measure the actual energy consumption and give that information of the time in which consumption actually took place. Since a smart meter can give consumers feedback on their energy consumption, it is an important resource for bringing about behavioural change and offers options for saving energy. Consumers who have a smart meter automatically receive an estimate of their power use and costs from their energy provider every two months. In addition, if the consumer so chooses, services can be offered using the smart meter that will help save even more energy, either on a separate display (via an app) or on the end user's own computer. The government recognises the importance of direct feedback in increasing energy awareness and offering consumers perspectives on how they could act/ In this context, businesses need to take the next step by introducing convincing applications, e.g. via mobile telephones, internet or applications in the end user's own home. The smart meter therefore needs to be able to connect to local applications in ways that are supported by international open standards. The government has required the smart meter to meet that standard of connectivity. End users can opt not to allow installation of a remotely readable meter, or to turn off remote meter reading ('administrative off switch'). In that case, the P1 consumer port can still be linked to a display.

## **A.10 Slovak Republic**

All measures are listed without further description and without mentioning if they are only identified as necessary measures, if they are already planned or even existing measures. The former is probably true.

### **A.10.1 National Strategies and programmes**

Nothing declared

### **A.10.2 Regulatory and economic instruments new buildings, including new public buildings**

#### ***A.10.2.1 Regulatory instruments new buildings***

- Tightening of the requirements laid down in technical standards:
  - low-energy level of construction for new from 1.1.2013,
  - ultra-low-energy level of construction for all new buildings from 1.12.2015,
  - the energy level of nearly zero-energy buildings occupied and owned by public authorities after 1.12.2018 and all new buildings after 1.2.2020

#### ***A.10.2.2 Economic instruments new buildings***

- Create support programmes for the energy performance of buildings → not clear if financial support is meant, also not clear if new or existing buildings or both

### **A.10.3 Regulatory and economic instruments existing buildings, including existing public buildings**

#### ***A.10.3.1 Regulatory instruments existing buildings***

- Tightening of the requirements laid down in technical standards:
  - low-energy level of construction for renovated buildings from 1.1.2013,
  - ultra-low-energy level of construction for renovated buildings conditional on meeting the cost-optimal levels of the minimum requirements for the energy performance of buildings,

#### ***A.10.3.2 Economic instruments existing buildings***

- Create support programmes for the energy performance of buildings → not clear if financial support is meant, also not clear if new or existing buildings or both

### **A.10.4 Research, Development and other supply side measures (including certificates)**

Nothing declared

### **A.10.5 Information, motivation and advice**

- Analyse and prepare motivational tools for the preparation and construction of nearly zeroenergy buildings taking account of the cost-optimal levels of the minimum energy performance requirements for buildings
- Secure an information campaign focused on tasks associated with nearly zero-energy buildings, which needs to be directed at all those involved in the process of constructing low-energy and ultra-low-energy level new and renovated buildings, and at the general public
- Involve public administration in the information campaign and preparation for the implementation of construction of nearly zero-energy buildings.

### **A.10.6 Demonstration**

- Promote the introduction of a model solution to new construction or reconstruction of buildings owned by public authorities

### **A.10.7 Capacity building (including education and training)**

- Cooperate with professional chambers to increase the professionalism of designers
- Participate in the international exchange of information and know-how in the area of building energy performance

### **A.10.8 Monitoring**

- Make interim evaluations of the fulfillment of the national plan targets.

### **A.10.9 Development of renewable energies**

- Analyse the options for the effective use of energy from renewable sources in buildings.

### **A.10.10 Measures focusing on energy saving and energy efficiency in general**

## **A.11 Sweden**

### **A.11.1 Preliminary remarks**

The Swedish national plan contains a detailed description of the national discussion about the necessary measures without giving detailed information about the measures that are finally chosen. This might be the case because there are no measures implemented or planned in detail yet. There seems to be a Report by the Swedish Energy Agency called “A Strategy for Low-Energy Buildings” proposing 12 categories of promotional measures, which has not been accepted by the government. Instead the governmental national plan contains, formulated in very general terms, the need to put in place “promotional measures” to “facilitate the implementation of the requirements for nZEBs” with two main purposes: “help minimize potential additional costs for energy efficient construction by reducing learning costs and to help ensure, through improved knowledge that the final, legally binding definition of nearly zero-energy building is built on a solid basis”. It is stated, that some measures promoting nZEB are “already in place”.

The “promotional measures” should include, “amongst other things”, the three measures listed below.

### **A.11.2 National Strategies and programmes**

Nothing declared

### **A.11.3 Regulatory and economic instruments new buildings, including new public buildings**

#### ***A.11.3.1 Regulatory instruments new buildings***

Nothing declared

#### ***A.11.3.2 Economic instruments new buildings***

Nothing declared

### **A.11.4 Regulatory and economic instruments existing buildings, including existing public buildings**

#### ***A.11.4.1 Regulatory instruments existing buildings***

Nothing declared

#### ***A.11.4.2 Economic instruments existing buildings***

Nothing declared

### **A.11.5 Research, Development and other supply side measures (including certificates)**

Nothing declared



### **A.11.6 Information, motivation and advice**

Nothing declared

### **A.11.7 Demonstration**

- Demonstration projects with a larger geographical spread than has hitherto been the case for the construction of low-energy buildings in Sweden

### **A.11.8 Capacity building (including education and training)**

- Skill-enhancement schemes for key groups; project “Build up Skills (BUSS)” already in place

### **A.11.9 Monitoring**

- Continuous follow-up and assessment of both all the technical functional requirements and cost aspects associated with energy-efficient buildings

### **A.11.10 Development of renewable energies**

Nothing declared

### **A.11.11 Measures focusing on energy saving and energy efficiency in general**

Nothing declared

## **A.12 United Kingdom**

### **A.12.1 Preliminary remarks**

There are two financial support instruments for the refurbishment of existing buildings: the Green Deal and the Energy Company Obligation (ECO). To support the development of renewable energies there also are two economic instruments: the Renewable Heat Incentive (RHI, not for households) and the Renewable Heat Premium Payment (RHPP, for households).

Besides these economic instruments the focus of the policies is on the use of Smart Meters to inform customers more detailed about their energy use (mandatory in all homes by 2019), in mandatory Energy Performance Certificates (EPC) for buildings and in the research about the potentials and barriers of heat networks.

Building regulations already contain improvements of the energy standards in new-build buildings.

### **A.12.2 National Strategies and programmes**

Nothing declared

### **A.12.3 Regulatory and economic instruments new buildings, including new public buildings**

#### ***A.12.3.1 Regulatory instruments new buildings***

- Obligation to install Smart meters in every home by 2019; also in-home displays must be provided for domestic costumers
- Building regulations contain successive improvements in new-build energy standards, e.g. the new regulations in England and Wales (from October 2010, Northern Ireland October 2012) introduced a 25% improvement on 2006 carbon emissions standards for new buildings, while regulation in Scotland delivered a 30% reduction on their 2007 standards. In England, the current review of the Building Regulations is looking at opportunities for further improvements for 2013 where these can be achieved while meeting our commitments to reduce the regulatory burden on industry, and house builders in particular.
- According to the national plan there has been already set a target for all new homes in England being nZEB from 2016 (Northern Ireland from 2017) and an “ambition for all new non-domestic buildings in England to be nZEB from 2019; 2018 for new public sector buildings” (in Northern Ireland from 2020; Scottish numbers are being prepared). There is no information about Wales; and it is not clear, if these are mandatory targets.

#### ***A.12.3.2 Economic instruments new buildings***

Nothing declared

## **A.12.4 Regulatory and economic instruments existing buildings, including existing public buildings**

### **A.12.4.1 Regulatory instruments existing buildings**

- Obligation to install Smart Meters in every home by 2019; also in-home displays must be provided for domestic costumers. The aim is to enable people to understand their energy use and maximize opportunities for energy saving.

### **A.12.4.2 Economic instruments existing buildings**

- The Green Deal financial support for energy efficiency measures: A Green Deal advisor will recommend a package of cost-effective measures for the building (based on an Energy Performance Certificate (EPC)). If the measures are installed with Green Deal finance, the building occupier then pays this money back over time as part of their fuel bill. If they leave the building, the responsibility for payments passes to the new occupier. It is a key principle of the Green Deal that the repayment cost of the measures should be covered through savings on lower fuel bills, so that consumers will not see their fuel bills rise, even though they are paying back the cost of the measures.
- Energy Company Obligation (ECO) additional financial support (supplier subsidy) for energy efficiency measures for low income and vulnerable households.

## **A.12.5 Research, Development and other supply side measures (including certificates)**

- EPCs are required on the sale, rent or construction of a building. Prepared by accredited and suitably qualified energy assessors, EPCs give consumers A to G ratings for a property's energy efficiency and also provide advice on measures that can be carried out to improve its efficiency. EPCs are also required for buildings occupied by a public authority which are larger than 1,000 m<sup>2</sup> and are frequently visited by the public. These EPCs (known in the UK as Display Energy Certificates (DECs) to distinguish them from EPCs produced in connection with a property transaction) must be displayed in a prominent place so that they can be easily seen by anyone visiting the building. DECs for these buildings must be updated every year. In 2012 the domestic EPC has been re-designed and made more consumer-friendly with clear signposting to the Green Deal and information on which measures qualify for Green Deal finance. The EPC will also be used as a mechanism to disclose the existence of a Green Deal on a particular property.
- Support the exploration of the potential and barriers of heat networks (including the possibility to supplanting heat by burning natural gas by heat from nuclear power plants)

## **A.12.6 Information, motivation and advice**

- (Information about) the smarter use of heating controls: will help to save energy, by giving consumers and businesses greater control and flexibility over the way in which they heat and cool their homes. At a relatively simple level, thermostat-

ic radiator valves allow radiators to be turned down or off in rooms that are not in use. More sophisticated options, such as remote controls and sensors that respond to building occupancy, offer more possibilities. As these technologies develop, this may enable consumers to reduce the average internal temperature of their buildings. → this measure is probably only identified, and not already planned or even existing.

### **A.12.7 Demonstration**

Nothing declared

### **A.12.8 Capacity building (including education and training)**

Nothing declared

### **A.12.9 Monitoring**

Nothing declared

### **A.12.10 Development of renewable energies**

- Renewable Heat Incentive (RHI): financial support for low carbon heat consistent with the UK's 2020 renewables target. Communities, charities, and public and private sector organisations can apply to receive a payment for generating heat using eligible low carbon heat technologies. The quality of installations and the supply chain to support low carbon heat need to be first class to ensure consumer confidence. The Government is requiring all RHI installations (up to and including 45 kWh) be installed by an accredited Microgeneration Certification Scheme installer. Support for the domestic sector is expected to be introduced under the next phase of the scheme.
- Renewable Heat Premium Payment (RHPP): The RHPP provides a single payment to households that install low carbon heat and also includes competitions for social landlords and community groups. A crucial part of the RHPP is then monitoring a significant number of installations made under the scheme. This information will inform the Government's longer-term approach to support for low carbon heat. This measure is planned to be an interim measure until the RHI will be introduced for households.

### **A.12.11 Measures focusing on energy saving and energy efficiency in general**

Nothing declared