EXECUTIVE SUMMARY:

EPBD IMPLEMENTATION – REVIEW OF REGULATIONS, NATIONAL PLANS, BARRIERS AND DRIVERS

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Project consortium

BME       WP3 Leader
BRE       WP6 Leader
BSERC     WP2 Leader
CRES      Partner
CTI       WP1-WP7 Leader
EIHP      Coordination
URBAN-INCERC Partner
IREC      Partner
LNEG      WP5 Leader
MACEF     Partner
POLITO    WP 4 Leader
ZRMK      Partner
Project overview

The RePublic_ZEB project is focused on the energy and CO₂ emissions associated with existing public buildings and their refurbishment towards nZEB.

The core objective of the project is to:

- Define costs-benefit optimized “packages of measures” based on efficient and quality-guaranteed technologies for the refurbishment of the public building stock towards nZEB that are standardized and adopted by builders and building owners.

From this stems three basic objectives:

(i) State-of-the-art assessment of the public building stock through a country-specific evaluation of the energy consumption and CO₂ emissions;

(ii) Define reference buildings; and;

(iii) Develop a common framework and a harmonized methodology for the definition of a nZEB concept for public buildings.

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Executive Summary

This document is one of a series of executive summary of the core deliverables of the RePublic_ZEB project. This is a summary of the first deliverable in Work Package (WP) 3. The flow chart below shows its context in the overall project.

1. Objective
The objective of this report is to summarise the project partners’ national regulatory frameworks for nZEB (nearly Zero Energy Buildings) legislation with respect to:

- current nZEB definitions and numerical requirements
- policies and measures to promote nZEBs
- drivers and barriers to refurbishment of existing public buildings towards the nZEB level.

2. Legislative status of nZEB definition
The national legislation process to define nZEB and its application in practice show considerable variety between the target countries of the RePublic_ZEB project. Some countries have not yet transposed the nZEB definition into their national legislation, and others have introduced only a general nZEB definition without any numerical requirement. A number of countries have already
officially transposed the nZEB definition with numerical values whereas others are in the process of confirming their proposed requirements.

Specifically, two of the target countries – Macedonia and Spain – have not transposed the nZEB definition into national legislation. Macedonia has currently no plans for the future implementation of the EPBD and transposition of nZEB into the legislation, while Spain has made steps towards nZEB implementation by improving the energy requirements, i.e. limiting non-renewable primary energy consumption both in residential and non-residential buildings.

The nZEB definition has been introduced into national legislation in Greece and Portugal but only in general terms, so the detailed requirements and the application in practice have not been specified yet. Italy has established the legal definition of nZEB, and the draft copy of the proposed regulations implementing the requirement incorporates various indices which will need to be met to demonstrate that a given building is nZEB. The numerical values of these requirements will be set later. These indices may serve as good examples for RePublic_ZEB when setting the common framework and suitable parameters to describe an nZEB.

In Romania the general nZEB definition is included in the law, and the detailed definition has been integrated within the National Plan to increase the number of buildings with nearly zero energy consumption. The numerical targets, which are subject to an approval process, are maximum allowable levels of primary energy use and CO₂ emission by building type, climatic zone and mandatory share of RES. In Slovenia, the situation is similar: the nZEB definition is being integrated into the National Plan for nZEB. In Slovenia the requirements have been set for primary energy consumption and share of RES, and the confirmation of the values is in progress.

In Bulgaria the national definition of nZEB has been formulated, but to implement this an update of three legislative documents is needed. The national nZEB definition has been transposed into the legislation with numerical requirements for several building types in Croatia and Hungary, and is ready for the implementation in practice.

Across the UK the energy performance (EP) requirements are framed in terms of CO₂ compliance for all building types. The set of requirements and the legislation of zero carbon buildings was in progress with proposals for zero carbon homes in terms of fabric efficiency and final energy and CO₂ emission requirement for heating and cooling of dwellings, which may serve as indicators for the project. However, these proposals have been shelved pending a further period of time for the current EP requirements to ‘bed in’.

### 3. Primary energy use and share of RES in nZEB

As mentioned above, only Croatia and Hungary have introduced a numerical primary energy requirement for nZEB into their national legislation. Slovenia and Romania have also implemented a definition for nZEB, but the values are not yet confirmed officially.

A review of these four countries' national nZEB definitions for residential buildings shows high variation in primary energy requirements from 30 (in Croatia) to 217 kWh/m².yr (in Romania). As for office buildings, the requirements also show considerable variety among target countries with a range of 25 - 160 kWh/m².yr. Specifically:

- in Croatia the requirement for nearly zero energy office buildings is only 25-30 kWh/m².yr (due to its very low primary energy conversion factor for electricity),
- in Romania it is 45-89 kWh/m².yr,
- for Slovenia: 55-80 kWh/m²a, and,
- in Hungary: 132-160 kWh/m².yr.

In Bulgaria the current requirements of Class “A” is defined as nZEB, so the primary energy consumption for office buildings is 70-140 kWh/m².yr.
There is also considerable variation in the nZEB requirements for education buildings. The Croatian requirement is 50-55 kWh/m².yr, while in Hungary (90-150 kWh/m².yr) and Romania (92-185 kWh/m².yr) the values are much higher. The Bulgarian Class “A” requirement is 25-50 kWh/m².yr for school buildings and 33-65 kWh/m².yr for kindergartens.

Croatia and Romania have also introduced nZEB primary energy requirements for health facilities. In Croatia the requirement is 190-200 kWh/m².yr, while in Romania it is set to lower values (76-167 kWh/m².yr). The Bulgarian Class “A” requirement is 70-140 kWh/m²a for hospitals.

In conclusion in most cases the available nZEB requirements for different types of buildings (both residential and non-residential) show large variation among the target countries. It is partly due to different climatic conditions, but it is worth noting the variation still occurred even where there were similar climates. A review of these values and common criteria for setting the requirements is to be undertaken in subsequent reports.

There is also great variety in the figures for the mandatory share of RES for nZEB. In some countries the basis is primary energy, while elsewhere it is final energy (delivered energy to the building), or only some part of final energy. The requirement for mandatory share of RES varies between 10% and 55% in the target countries: Romania 10%, Hungary 25%, Croatia 30%, Italy 35-50%, Slovenia 50% and Bulgaria 55%. The remaining target countries (Macedonia, Greece, Portugal, Spain and UK) have not yet specified a numerical requirement for the mandatory share of RES.

4. Drivers and barriers to transform existing buildings to nZEB

Analysis has shown that both the barriers (see Table 1) and drivers (Table 2) to transform existing buildings towards nZEB are comparable in the RePublic_ZEB target countries. There are special issues within some countries, but generally the situation is similar.

Table 1. Barriers to refurbishment of existing public buildings towards nZEB

<table>
<thead>
<tr>
<th>Numerical indicator for energy demand of nZEB has not been specified</th>
<th>Bulgaria</th>
<th>Croatia</th>
<th>Macedonia</th>
<th>Greece</th>
<th>Hungary</th>
<th>Italy</th>
<th>Portugal</th>
<th>Romania</th>
<th>Slovenia</th>
<th>Spain</th>
<th>UK</th>
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<tbody>
<tr>
<td>No requirement for mandatory share of RES in the current status</td>
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<td>No requirement for mandatory share of RES concerning nZEBs</td>
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<tr>
<td>Definitions, algorithms, requirements greatly vary locally within the country, due to several local administrations (regions)</td>
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<td>Low state/local budget for energy efficiency projects of public buildings</td>
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<td>Lack of financial instruments for major renovation of existing buildings with nZEB targets</td>
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<td>High initial costs of investments</td>
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<td>Long payback time of investments</td>
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<td>Low level of energy prices</td>
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<td>Limited technical skill in the decision making process at public institutions, which may lead to choosing conventional, less energy-efficient options</td>
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<td>There is no (or very low) number of demo projects of renovation existing buildings onto nZEB level</td>
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</table>
Lack of awareness concerning the economic benefits from refurbishment measures
Uncertainties concerning the measurement and verification of the energy-saving

The (highlighted) major barriers are:

1. The **high initial costs of investments** (or the long payback period) is a barrier to refurbish existing buildings towards nZEB in almost all target countries.

2. Related to the first point, the **low budget for energy efficiency projects of public buildings** is a common issue, and it is a barrier mainly in Croatia, Macedonia, Greece, Italy, Portugal, Spain and UK; moreover, there is a lack of financial instruments for major renovation of existing buildings in almost all target countries.

3. **Low energy prices** hinder the implementing of energy efficiency projects, since they increase the payback time of an investment which focuses on reducing energy consumption and cost. This is a particularly an issue in Macedonia, Hungary, Romania, Portugal and the UK.

4. The nZEB requirement will be mandatory for new public buildings after 31st December 2018 therefore there is **very low number of demonstration projects**, which have adopted the concepts of nZEB.

5. A common barrier in almost all target countries is the limited **technical skill in the decision making process at public institutions**, which may lead to choosing conventional, less energy-efficient options.

6. If **definitions, algorithms and requirements vary greatly** within a country (due to several local regions) it may cause difficulties. This barrier was identified in Italy, Portugal and Macedonia.

### Table 2. Drivers of refurbishment of existing public buildings towards nZEB

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<tr>
<th>Factor</th>
<th>Bulgaria</th>
<th>Croatia</th>
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<tr>
<td>nZEB definition is described in the legislation</td>
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<td>Energy cost saving</td>
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<td>Lower dependence on energy suppliers</td>
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<td>Improved comfort, better working or living conditions</td>
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<td>Tax reductions</td>
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<td>Low interest loans</td>
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<td>Availability of innovative building retrofitting solutions</td>
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<td>Best practices are available related to renovation existing buildings onto high energy efficiency level</td>
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<td>Demonstrational projects, which enable the builders to get to know the benefits fulfilling the nZEB requirements</td>
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<td>Energy Performance Certification database, which may ease to choose the potential buildings for major renovations</td>
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The major drivers for renovation in several countries are energy cost savings, lower dependence on energy suppliers and improved comfort in the buildings. Integrating energy aspects into planned renovations seems to depend greatly on government support programmes such as grants, reduced tax levels and low-interest rate loans. Support programmes seem to influence the type and scope of energy improvements included in the renovations, so an increase in these financial instruments is necessary in the target countries.

Other indicators have also been identified that are closely connected to drivers and barriers. These are climatic conditions (Figures 1 and 2), energy prices, GDP per capita, main heating sources of public buildings and primary energy factors. Countries were grouped in terms of these indicators to better assess the common nZEB framework. Three groups were identified concerning the summer and winter conditions, which has very significant effect on the energy required for heating and cooling.

![Figure 1. The average monthly temperature in the coldest month](image)
Global horizontal radiation was also analysed. Taking into account these climatic conditions **Greece, Italy, Spain, Portugal and Croatia** can be assigned to one category (1<sup>st</sup> group), and the remaining countries to another category (2<sup>nd</sup> group). However, the boundary between the two groups is not sharp. Energy prices are generally higher in the 1<sup>st</sup> group, which may ease the implementation of major refurbishment projects which aim towards nZEB.