

REPORT ON NZEB INITIATIVES FROM THE CENTRAL EUROPE REGION

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The eCentral project summary

Addressing poor energy performances of public buildings is at the core of EU's Energy Efficiency Directive and Energy Performance Building Directive but also one of growing financial issues in Central European countries. To address that eCentral project will support key stakeholders to realize benefits of newly implemented building standard - nearly zero energy building (nZEB). eCentral project will prove that nZEB approach, although innovative, is optimal and cost-effective solution for renovation and construction of public buildings. Project aims to capitalise on results of previous and ongoing EU initiatives. Austria has a proven track record with nZEB renovation projects and will be leading other implementing partners (CRO, SLO, HUN) by example. Transnational cooperation will be used to receive maximum international visibility of selected pilot actions. Main outputs of the project are:

- energy performance certificate (EPC) Tool for public authorities
- deployment and promotion of innovative financing schemes
- training programme and project development assistance for nZEB projects
- building renovation strategies for selected regions
- state of the art pilot nZEB public buildings in selected regions
- established cooperation with scientific institutions and other nZEB initiatives

Transnational Assessment and Support Group, formed from project experts and scientific institutions will act as a support team and provide quality checks of each output. EPC Tool will be developed and used by public sector decision makers and project developers beyond eCentral project lifetime. Trained energy efficiency teams within the regional government will serve as a backbone for conducting future nZEB projects. The European Academy of Bolzano (EURAC), one of the leading centres of expertise on energy efficiency in the Central Europe region, will focus on policy analysis and dissemination of eCentral project results.

About this document

This document is part of activity A.T1.1 of workpackage T1 and named D.T1.1.1 Report on nZEB initiatives from the Central Europe Region. It gives an overview on closed or ongoing nZEB initiatives in Central Europe. It provides information on international and national initiatives and summarizes the key findings of each initiative for further processing them in the eCentral project. These key findings will be used within the project and will contribute to the success of it.

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A. Report Summary

This report will summarize results and experiences from previous European and national nZEB projects and initiatives and will serve as starting point for the eCentral project. Key findings from SUSTAINCO project, BUILD-UP initiative as well as other European projects related to nZEB will be utilised and enhanced.

The report proves, that a wide range of nZEB initiatives was already developed within the last years. Basically, every country is engaged and motivated in deploying the nZEB standard.

In total 11 pan-European initiatives and 24 national initiatives in the eCentral project countries Austria, Croatia, Hungary, Italy and Slovenia are described.

The key findings delivered several important insights for the implementation of eCentral such as:

- Legal requirements are available in all partner countries
- Funding for energy efficiency measures in buildings is widely available
- Several forerunner projects are already implemented in some regions - usable for dissemination and promotion of nZEB with best practice examples; nevertheless, several regions are lacking in demonstration buildings (there has been no wide “roll-out” of nZEBs)
- There is a need for innovative financing schemes and effective training programmes for responsible persons
- It must be ensured that the three planned nZEB renovations in eCentral are executed on a very high level to be worthy of emulation. Good experiences of PAs at the implementation of nZEBs are important for other stakeholders and the public.
- User behaviour must be included when planning, constructing and operating an nZEB, because it offers a great potential for additional energy savings. Every nZEB project is at risk that due to the user behaviour energy saving expectations are not reached (wrong handling of the building service technologies, e.g. heating system, etc.)
- There is a significant need for professional support when planning nZEBs. This is applicable to all types of public and private stakeholders, since there is often a lack of know how.
- Limited financial capacity is a big barrier for greater nZEB uptake - when promoting nZEBs, the lower operating costs throughout the building’s lifetime must be highlighted as main benefit and advantage of nZEB renovations.
- There have been several campaigns for promoting an energy efficient building standard such as NZB2021 Doors Open Days or International Passive House Open Days. The lessons learned from these initiatives deliver important input for the eCentral communication work package.
- A strong driving force behind the renovation project is crucial for the success - try to find one motivated contact person when acquiring follow-up renovations
- An extended design phase after the contracts were established allows architects, engineers and contractors to optimize design and number of changes during construction phase might be reduced



A comprehensive and more detailed summary of the findings is available in chapters 1.4 and 2.6.

Concluding it can be said that analysis of the initiatives brought important findings for the implementation of the eCentral project. The report will be shared internally with all project partners, discussed at project meetings and its main output will influence the success of eCentral.

Especially the implementation of the three pilot renovations in WP T3 will benefit from several new inputs and insights such as suggestions for building services, as well as WP C with some new promotional ideas.

B. Introduction

Addressing poor energy performance of public buildings forms a main part of the European Energy Efficiency Directive (Directive 2012/27/EU of the European Parliament and of the Council)¹, European Energy Performance of Buildings Directive² and the newly presented “Clean Energy Package for all Europeans from November 2016”³. Content of these European regulations is for example

- To achieve annual energy savings of 1.5% for companies and European countries
- the public sector in EU countries should purchase energy efficient buildings, products and services
- every year, governments in EU countries must carry out energy efficient renovations on at least 3% (by floor area) of the buildings they own and occupy Guidance to this report
- all new buildings must be nearly zero energy buildings (nZEB) by 31 December 2020 (public buildings by 31 December 2018), etc.

The goal of the project eCentral is to tackle the challenges, related to the above-mentioned Directives and to offer smart and workable solutions to public authorities for the implementation of nearly zero energy buildings (nZEB). Main outputs of the project are:

- energy performance certificate tool (EPC tool) for public authorities (PA)
- deployment and promotion of innovative financing schemes for the nZEB project implementation
- mentoring programme and project development assistance for PAs
- implementation of three pilot renovations in the target regions Croatia, Hungary and Slovenia
- Establishment of sustainable, transnational cooperation in Central Europe.

The competences and experiences of all project partners REGEA, KSENA, EAST, Energiaklub, Sveta Nedelja, Velenje, BP18 and EURAC will ensure the project’s success.

As a starting point for the eCentral project, the partners decided to develop a small inventory list for already existing nZEB initiatives across Central Europe. This deliverable D.T1.1.1 will show, that the nZEB development in Central Europe is vibrantly deployed in manifold forms. The recipe of successful initiatives such as communication strategy, etc. shall be analysed and if feasible, adapted and implemented in the eCentral project as well.

Report guideline

This report was written under the lead of EAST with contribution of all project partners. It consists of several interconnected chapters, which are designed in a clear way. Firstly, pan-European initiatives will be listed and described and afterwards, national campaigns will be targeted. An initiative can be a funded/non-funded project, a certification, international/national subsidies, campaigns, workshops, famous demo objects open for the public, public events, series of publications, legal regulations etc. It is defined as everything, which promotes the nZEB standard and makes it visible for a broad audience on an international, national, regional and local level.

¹ <https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>

² <https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>

³ <https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans>



C. International and national initiatives

Following chapter will provide information on initiatives on a Central European and national level. Each initiative will be described with respect to founding organization, geographical scope, impact, etc. Afterwards, a short conclusion and lessons learned as well as key findings on each initiative will be given.

The main difference between international and national initiatives is:

- International initiatives are considered as European projects with several international project partners e.g. projects under Build-Up, CEC5, etc. At least one partner from Central Europe Countries was involved in in the initiative.
- National initiatives are carried out on a national level by national institutions e.g klimaaktiv (Austria), EE Project (Croatia)... Regional/local initiatives can also be described in this chapter. National initiatives can be funding lines, national actions plans, national nZEB legislation, training programmes and workshops as well as outstanding buildings, which really promote the nZEB outreach.

1. Pan-European initiatives for the promotion of nearly zero energy buildings

This chapter gives a general outline of pan-European initiatives for the promotion of nearly zero energy buildings. The activities of other European projects are used as a starting point to get a general overview on the actual status. Following initiatives were included:

- The project/initiative was not closed before 2010
- At least one country from the Central Europe Region has sent a project partner

1.1. Geographical scope of Central Europe

According to the INTERREG Central Europe Funding programme, nine countries in the European Union form the Central Europe region. They are displayed in the following figure.



Figure 1: The nine countries of the Central Europe Region⁴

The overall objective of the INTERREG Central Europe programme is to force cooperation between these nine countries and function as catalyst for a better transnational collaboration. Sustainable implementation of smart solutions for regional challenges amongst innovation, low-carbon, economy, environment, culture and transport shall be the outcome of the funding line.

⁴ Source: Own illustration, based on www.interreg-central.eu

1.2. nZEB definitions across Central Europe

According to Directive 2010/31/EU (EPBD), Article 2 (2), means “a nearly zero energy building a building that has a very high energy performance....The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby”. In these terms, every European member country must define national plans for nZEB uptake.⁵

The implementation of nearly zero energy building definitions has already been executed in most European Union member states. Based on desk-research, the following table shows an overview of the definitions for residential and non-residential buildings in Central Europe. There are already quite comprehensive materials regarding the nZEB definitions and implementations in Europe available. Nevertheless, it is always useful to collect the information and extract relevant parts. The table will serve as starting point for describing nZEB initiatives on a European and national level.

It is clearly visible, that every country has its own threshold values and requirements. Basically, the definitions are divided into residential and non-residential buildings, as well as for new or existing ones. Some Central European Countries use absolute numerical indicators, the Czech Republic and Germany defined indicators, based on the maximum primary energy demand of a reference building. These below stated thresholds will be the main building quality guidelines for the three nZEB pilot renovations in eCentral in the three target countries Croatia, Hungary and Slovenia.

The thresholds were written down according to literature research with help from all partners.

Country	Main reference	Residential buildings		Non-residential buildings		Other nZEB requirements
		(kWh/m ² *a) - primary energy demand [1]				
		New	Existing	New	Existing	
Austria	OIB guidelines 6, National Plan 2014	160	200	170	250	Requirements for heating energy demand, energy efficiency factor and maximum CO ₂ emissions apply as well
Croatia	Technical regulation on rational use of energy and thermal protection in buildings OG128/15	35-80	n/a	25-250	n/a	Minimum 30% of primary energy consumption must be generated from renewables. Ranges of primary energy in this table are depending on climate zone where the building is located (continental or coastal area) and intended use of the building (eight categories- multiple dwellings, single-family homes, office building, educational building, hospitals, hotels and restaurants, sports hall, commerce buildings).

⁵ Source: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0031&from=EN>

Czech Republic	Regulation 78/2013	75-80% [2]		90% [2]		
Germany	First draft of building energy law (Gebäudeenergiegesetz) from 23.01.2017 - not yet adopted	n/a	n/a	55% [2]	n/a	Limits for primary energy demand and maximum heat transition coefficients; definition still under development or needs to be adopted - clarification for private and residential buildings expected until the end of 2018
Hungary	Amended decree 7/2006(V.24.)	100	n/a	Office buildings: 90 Educational buildings: 85	n/a	New buildings: Limits for heat transfer coefficient of structures, and specific heat loss factors. Specific requirements to prevent summer overheating of buildings and for building engineering systems.
Italy	Law 90/2013, Decree DM 26 of June 2015	Individual calculations - limits according to comparable reference building; only one fixed indicator: >50% of energy for DHW, heating and cooling provided by renewable sources				
Poland	Under development	60-75	n/a	45-75-190	n/a	
Slovakia	Decree 364/2012	Apartment buildings: 32 Family houses: 54	n/a	Offices: 60-96 Schools: 34	n/a	
Slovenia	National plan for nZEB in Slovenia approved in 2015	75-80	90-95	55	65	minimum 50% of primary energy consumption must be generated from renewables

[1] Primary energy demand according to national definitions - includes heating, domestic hot water, ventilation and cooling. **May include** additional primary energy needs for household activities (electricity, etc.)

[2] Maximum primary energy consumption compared to a defined reference building

Table 1: Overview nZEB-definitions in Central Europe

6 Own illustration, based on
http://bpie.eu/uploads/lib/document/attachment/128/BPIE_factsheet_nZEB_definitions_across_Europe.pdf,
<https://ec.europa.eu/jrc/en/publication/towards-nearly-zero-energy-buildings-europe-focus-retrofit-non-residential-buildings> and statements of eCentral project partners



1.3. International initiatives

Following chapter describes international initiatives in Central Europe. As international initiatives, the authors classified European projects with international partners and a broader outreach. At least one of the project's consortium partner shall come of the defined Central Europe countries.

Each initiative will be described according to their names, geographical scope, period, outputs and methodology. Additionally, key findings will be described according to the relevance for the project itself or as guidance for the implementation of the eCentral project.

The conclusion of this chapter will provide a comprehensive summary of all key findings, using a SWOT-analysis.

1.3.1. International Initiative - Sustainable Energy for Rural Communities

Name	<ul style="list-style-type: none"> Sustainable Energy for Rural Communities (SUSTAINCO)
Funding authority	<ul style="list-style-type: none"> Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> Austria, Croatia, Ireland, Norway, Spain, Romania, United Kingdom
Period	<ul style="list-style-type: none"> 04/2012-04/2015
Objectives	<ul style="list-style-type: none"> raise awareness and support implementation of nZEB projects, especially in rural areas increase visibility of front runners (new buildings and renovations) strengthening of capacity and confidence about nZEB in public sector
Methodology	<ul style="list-style-type: none"> web based nZEB toolkits (financial and technical) questionnaire for target group (regional stakeholders) development and promotion of case studies (role model projects) development and hosting of capacity building event and trainings (conferences, seminars, trainings and site visits) support from planning until implementation for eight selected nZEB pilot projects (feasibility studies, mentoring, monitoring) promotion of project results adapted to regional needs
Output	<ul style="list-style-type: none"> target group questionnaire and stakeholder database two toolkits (technical and financial) on how to achieve nZEB standard 20 capacity building events 13 trainings for nZEB project developers 13 pre-feasibility studies 40 nZEB case studies and comparison of overall costs of nZEB buildings with standard buildings over 30 years (building investment & operation costs) 40.000 enquiries recorded via telephone and e-mail
More information	<ul style="list-style-type: none"> www.ec.europa.eu/energy/intelligent/projects/en/projects/sustainco
Key findings	<ul style="list-style-type: none"> limited capacity (know-how and financial) of PAs is main barrier for greater nZEB uptake wrong perception of nZEBs in public education and trainings for architects, builders, building material companies, etc. needed international standardisation needed - currently wide range of national definitions nZEB buildings gain cost advantages over 30 years operation time (higher investment but lower energy costs) lack of national incentives and promotional programmes

1.3.1.1. Conclusion on Sustainable Energy for Rural Communities (SUSTAINCO)

The SUSTAINCO-project with its partners Regionalna energetska agencija sjeverozapadne Hrvatske (Croatia), Energie Agentur Steiermark GmbH (Austria), Tipperary Energy Agency Ltd. (Ireland), Severn Wye Energy Agency Limited (United Kingdom), Alba Local Energy Agency (Romania), Tipperary Rural and Business Development Institute (Ireland), Energy Farm - Centre for Bioenergy (Norway) and iMAT - Construction Technology Centre (Spain) was a successful support for the European vision of efficient buildings. It built capacity in the project countries with training programmes, collected many experiences through 40 case studies and facilitated the development of nZEB projects. Additionally, it focused on the promotion of nZEB buildings and involved many key stakeholders. The project started in 2012. At this time, the nZEB standard was not defined in most of the target countries, which means that the consortium introduced their own internal approach (max. primary energy 50 (100) kWh/m²*a) for classification of nZEB buildings.⁷

Considering the project result's, several lessons learned and key findings, usable for the eCentral project can be formulated:

- National definition of NZEB standard is very important. In Central Europe, nearly every country defined the requirements. In eCentral project, it is important to be aware of these national standards (e.g. at EPC tool development).
- The limited capacity (know-how and financial) of PAs is a main barrier for greater nZEB uptake in the regions. In these terms, the planned trainings with Regional Working Groups (RWG) in the target countries are good support for raising awareness about nZEB and intensifying (existing) knowledge. It is important, that the training curricula fit to the needs of the national Pas.
- Additionally, it was also worked out that architects, builders, and building material manufacturers need more training as well. This barrier is already addressed in other projects like build-up initiative, etc.
- There is a wrong perception of nZEBs in public. At this point, eCentral can try to bridge the gap by actively promoting the outputs of eCentral e.g. benefits of nZEBs, etc.
- A lack of incentives and promotional programmes for implementing nZEBs was detected. Possible solutions may go hand in hand with promotional campaigns of the eCentral project outputs - raise awareness at regional governments.
- In comparison with standard buildings, nZEB gain cost advantages over 30 years of operation time due to lower energy costs. Additional costs for achieving nZEB standards are "erased" by the energy costs saving. This perspective should also be considered when designing the EPC tool.

Concluding it can be said the SUSTAINCO project collected many interesting outputs, which are very usable for follow-up initiatives and projects. The key findings will be included in eCentral.

⁷ Source: <https://ec.europa.eu/energy/intelligent/projects/en/projects/sustainco>



1.3.2. International Initiative - Nearly Zero Energy Building Strategy 2020

Name	<ul style="list-style-type: none"> Nearly Zero Energy Building Strategy 2020 (ZEBRA2020)
Funding authority	<ul style="list-style-type: none"> Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> Austria, Belgium, France, Germany, Italy, Norway, Poland, Spain
Period	<ul style="list-style-type: none"> 04/2014-09/2016
Objectives	<ul style="list-style-type: none"> monitor market uptake of nZEBs across Europe provide data and recommendations for achieving nZEB standard development of strategies, tools, market tracking and scenarios until 2050
Methodology	<ul style="list-style-type: none"> Online data tools providing information on nZEB market development and status quo Desk research and surveys Scenario analysis Workshops, Conferences, Publications development of recommendations on national and European Level
Output	<ul style="list-style-type: none"> tools with comprehensive overview on nZEBs in Europe comparison of national definitions showed, that a significant share of nZEB definitions does not meet the intention of EPBD (2010/31/EU) - new EPBD requires clear definitions and thresholds Cross-country comparisons of barriers, drivers and best practices and ranking of market maturity in EU member states 618 interviews in all partner countries among real estate agents conducted (EPCs are always used in 59% of cases, bureaucratic hurdles regarding EPC shall be reduced, EPCs shall be easier to understand, lack of incentives) Recommendations: include a broad set of stakeholders, adopt long term strategies, on-going review and assessment of actions, empower local levels
More information	<ul style="list-style-type: none"> www.ec.europa.eu/energy/intelligent/projects/en/projects/zebra2020 or www.zebra2020.eu
Key findings	<ul style="list-style-type: none"> absence of key data (especially non-residential and existing building stock) big obstacle - strong need for European harmonization for reaching the committed 2 °C climate target, the European building sector must reduce its CO₂-emissions by 80-95% by 2050 phase out of new fossil heating systems required within the next 5-10 years to reach strong decarbonisation by 2050 Detailed calculations of costs of nZEB Helpful recommendations for eCentral: improve use rates of EPCs, tailored advice for building owners and investors, adopt new financing products for nZEBs, create nZEB as a brand, promote demonstration projects and implement campaigns, use adequate communication tools, train building professionals, reduce complexity of nZEB projects, empower local PAs in pilot projects

1.3.2.1. Conclusion on Nearly Zero Energy Building Strategy 2020 (ZEBRA2020)

A sustainable European society will be based on renewable energies and resource efficiencies. For this reason, the European building sector must ensure a large deployment of the nZEB standard. Main challenge on the market is to gather data for a status quo analysis. This is very important for policy-makers when evaluating the success of their frameworks and policies. Goal of ZEBRA2020 was to collect European data regarding nZEBs and to monitor the market uptake of this building standard. ZEBRA2020 covered 17 European countries and almost 90% of the EU building stock and population. Thus, it was actively contributing to meeting the ambitious target of 100%-share of nZEBs for new buildings from 2020 and a substantial increase of deep nZEB renovations. In these terms, the market maturity in Central Europe Region and eCentral project partner countries was described as following:

- Austria: 0,67 of 1,0 (market is mature)
- Czech Republic: 0,70 of 1,0 (market is mature)
- Germany: 0,66 of 1,0 (market is mature)
- Italy: 0,55 of 1,0 (market is mature)
- Poland: 0,51 of 1,0 (market is mature)
- Slovakia: 0,57 of 1,0 (market is mature)

Croatia, Hungary and Slovenia have not been part of the investigation, because these countries have not been defined as “ZEBRA floor area” in this project. This evaluation basically means, that a big potential for nZEB market uptake is still present in these countries - further measures for spreading the standard must be implemented. These experiences fit well to the eCentral project goals.

Key findings of ZEBRA2020 were that the absence of key data, especially regarding non-residential and existing building stock. This impedes the assessment of the success of nZEB policies. The EPC tool database with its building stock will bring a significant contribution to this issue.

Further recommendations, which were given through ZEBRA2020 can also be considered as very helpful for eCentral. It was stated, that the usage of EPC’s must be improved, that tailored advice for building owners and investors regarding renovation roadmaps is needed, new financing products for nZEBs shall be deployed, a strong brand called nZEB must be created, promotion of demonstration projects and implementation of campaigns and the usage of adequate communication tools is necessary and trainings regarding nZEBs for building professionals are wanted. Additionally, the complexity of nZEB projects must be reduced and local public authorities must be empowered in pilot projects. These recommendations perfectly fit to the overall goal and the methodology of eCentral. The publications of the ZEBRA2020 projects, especially the beforehand mentioned recommendations for boosting the nZEB market transitions⁸, will be considered during the eCentral project implementation. Additionally, the publication on nZEB technology solutions, cost assessment and performance⁹ will serve as literature for EPC tool, communication activities, etc.

As a conclusion it can be said that ZEBRA2020 contributed to a better understanding of the nZEB market uptake in selected European countries and gave comprehensive overview on the status quo and recommendations. It’s a well-developed base for the eCentral project.

⁸ Source: <http://zebra2020.eu/website/wp-content/uploads/2014/08/BOOSTING-THE-NZEB-MARKET-TRANSITION-full-report-Final.pdf>

⁹ Source: http://zebra2020.eu/website/wp-content/uploads/2014/08/Zebra2020_Deliverable-5.1_Report.pdf



1.3.3. International Initiative - Certified European Passive House Designer (CEPH)

Name	<ul style="list-style-type: none"> • Certified European Passive House Designer (CEPH)
Funding authority	<ul style="list-style-type: none"> • Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> • Austria, Czech Republic, Denmark, France, Germany, Italy, Netherlands, Slovakia, United Kingdom
Period	<ul style="list-style-type: none"> • 09/2008-02/2011
Objectives	<ul style="list-style-type: none"> • development of training courses for passive house designers • development of a Certification scheme and mutual recognition • deployment of passive house standard in branche
Methodology	<ul style="list-style-type: none"> • training course design • certification scheme • course materials in national languages • strategy development for long term sustainability of course
Output	<ul style="list-style-type: none"> • 70 hours course materials for Certified European Passive House Designers in several European languages • Implementation of 19 courses with altogether 380 participants (architects, engineers, building designers) • one strategy for long term sustainability
More information	<ul style="list-style-type: none"> • www.ec.europa.eu/energy/intelligent/projects/en/projects/ceph or www.passivhausplaner.eu
Key findings for eCentral	<ul style="list-style-type: none"> • use of course materials and didactic methodology for training curriculum of Regional Working Groups (RWG)



1.3.3.1. Conclusion on Certified European Passive House Designer (CEPH)

In 2011, the course on Certified European Passive House Designers was one of the first promotional and educational initiative for deploying a highly energy efficient building standard. Good planning and right execution are essential at the construction of Passive House buildings. This ensures that the high requirements for the building envelope and technology can be met. As a result, designers and specialist planners need additional expertise which can be acquired and substantiated with the Certified Passive House Designer/Consultant training course. Due to the broad project consortium, a wide geographical area was covered. Today the course is still applied and well known in Europe. ¹⁰

For the eCentral project, the course materials and didactic methodology can be considered as starting point or additional information for the education of Regional Working Groups in the target countries Croatia, Hungary and Slovenia.

¹⁰ Source: <http://passivhausplaner.eu/index.php?lang=en-GB>

1.3.4. International Initiative - Policies to enforce the transition to nearly zero energy buildings in the EU-27 (ENTRANZE)

Name	<ul style="list-style-type: none"> • Policies to enforce the transition to nearly zero energy buildings in the EU-27 (ENTRANZE)
Funding authority	<ul style="list-style-type: none"> • Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> • Austria, Belgium, Bulgaria, Finland, France, Germany, Italy, Spain
Period	<ul style="list-style-type: none"> • 04/2012-09/2014
Objectives	<ul style="list-style-type: none"> • assist policy makers in developing effective policy packages for stimulating nZEB renovations (filling information gap...) • successful communication process with policy makers including set up of policy group meetings and expert dialogs • development of different scenarios for the future development of building stock in target countries and EU28
Methodology	<ul style="list-style-type: none"> • Desk research for status quo analysis • Development of tools and models • set up of policy group meetings and expert dialogues • Definition of policy recommendations at EU and member state level for target countries (AT, BG, CZ, ES, FI, FR, DE, IT, RO)
Output	<ul style="list-style-type: none"> • Status Quo for building stock and related energy systems for several European countries • Profile of stakeholders (building owners share, type of ownership, factors influencing renovations) for target countries • Analysis on cost optimal renovations - the minimum global cost zone (costs over 30 years) is characterized by a medium level of energy efficiency • "Data Tool": contains an in-depth description of the characteristics of buildings and related energy systems in the EU-28 and Serbia. • "Cost Tool": impact analysis of renovation packages • "Scenario Tool": scenarios for development of building stock in EU 28 • Policy analysis, scenarios and recommendations for target countries and EU28 + Serbia
More information	<ul style="list-style-type: none"> • www.entranze.eu or www.ec.europa.eu/energy/intelligent/projects/en/projects/entranze
Key findings	<ul style="list-style-type: none"> • the minimum global cost zone (costs over 30 years) is characterized by a medium level of energy efficiency; moderate stimulus to increase building standard -> stricter legal requirements necessary • current EU-28 policy framework could save about 20-23% of final energy demand (2008-2030) in buildings -> higher saving potential with stricter framework • deep renovation rates must substantially be increased • creation of an effective target oriented (measurable) policy framework needed • Effective set-up, implementation and monitoring of policy packages necessary • Use economic instruments such as incentives, energy taxes, etc., regulatory instruments, advice instruments and qualification instruments

1.3.4.1. Conclusion on Policies to enforce the transition to nearly zero energy buildings in the EU-27 (ENTRANZE)

The ENTRANZE project gives a comprehensive overview on the status quo of nZEB implementation. Data about the building stock in nine target countries and EU28 and Serbia were collected and processed in a clear structure. Furthermore, main outputs have been the analysis of stakeholders, development of tools and models such as Data tool (mapping the building stock), Cost tool (defining a cost/energy balance) and Online Scenario Tool, a policy analysis on status quo and policy scenarios as well as comprehensive policy recommendations for the nine target countries and EU28.

Key findings have been the need for clear and measureable long-term targets until 2050, the need for a bundle of instruments to properly address the target groups and policy barriers (incentives, information, regulatory instruments, and qualification instruments), the existing lack of data on renovation rates and energy performance certificates and the need for building data observatory (monitoring).

In particular, it was stated in the final report of the project that *“an enhanced EPBD framework should make clear that cost optimality has to represent the absolute minimum requirements for existing regulations in the building codes. While nZEB energy performance levels should be cost-effective, they still have to be more ambitious than cost-optimal energy performance levels.”* The importance of public role-models in terms of energy efficient buildings was also highlighted. Additionally, consistency in terminology and timing between Directives and CEN standardisation procedures should be further enhanced.

According to the above-mentioned key findings, several measures can be proposed to the consortium of eCentral:

- Enforce public authorities (PA) to develop target-oriented (measurable) and long-term goals (2050) in their strategies. Although this can be considered as critical due to short political legislative period (4-5 years) are a barrier for long-term planning (develop and agree on long-term action plans and strategies necessary).
- Public authorities should really target renovations of the existing building stock. This means that the planned EPC tool of eCentral shall be user-friendly and adapted to the needs of PAs and that assisting PAs at developing building specific renovation roadmaps as helpful means for ensuring target-oriented execution of staged renovation is recommended.
- There is a huge lack of data regarding renovation activities and the energy performance of buildings. This issue is actually addressed by the eCentral project's outputs such as EPC tool, innovative financing schemes, training programmes and assistance for PAs for implementation of nZEB projects, etc.
- Make the advantages of nZEB renovation very clear and promote the implementation of it, although higher investment costs are necessary. The higher investment costs shall be set in relation to the achievable operation costs and energy savings over the lifetime. Therefore, a life-cycle-analysis shall be included in the EPC tool of the eCentral project.
- It must be ensured that the three planned nZEB renovations in eCentral are executed on a very high level to be worthy of emulation. Good experiences of PAs at the implementation of nZEBs are important for other stakeholders and the public.

Concluding it can be said that the planned content of eCentral reacts very well to actual market demands and developments. Several open issues of ENTRANZE are addressed within the work packages of eCentral. Additionally, the project consortium can benefit from the recommendations and key findings of ENTRANZE.



1.3.5. International Initiative - NZB2021 ‘Doors Open Days’ NZB2021

Name	<ul style="list-style-type: none"> NZB2021 ‘Doors Open Days’ - sharing experiences from low energy buildings to meet nearly zero building standards by 2021 (NZB2021)
Funding authority	<ul style="list-style-type: none"> Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> Austria, Belgium, France, Germany, Hungary, Ireland, Malta, Poland, Slovenia, Sweden
Period	<ul style="list-style-type: none"> 08/2012-2013-03/2015
Objectives	<ul style="list-style-type: none"> give hands-on experiences with nZEBs for public and public authorities convince target group that nZEB challenge can be met
Methodology	<ul style="list-style-type: none"> Belgian best practice campaign "Ecobouwers Opendeur" was used as role model campaign and transferred/adapted to 9 EU countries web based platform for acquisition of exhibitors interviews/surveys with important stakeholders and decision makers international visits of stakeholders with a tailored programme for the challenges and needs of the visiting team
Output	<ul style="list-style-type: none"> 25,870 people took part in two open days campaigns 2013 and 2014 in 9 EU countries 1,440 exhibited family houses (1,200) and public buildings (240) 92.5% of the visitors were satisfied with the information, 76.5% want to implement good practices for their own 32 page brochure in 8 languages on best practice nZEBs for decision makers published 899 different media reports on the open days 4,260,000 visitors on web platform for promoting the open days 10 mini-documentaries in 8 languages 50 European best practices examples translated in international languages 82 stakeholder partner platform
More information	<ul style="list-style-type: none"> www.ec.europa.eu/energy/intelligent/projects/en/projects/nzb2021 or www.nzebopendoorsday.eu
Key findings	<ul style="list-style-type: none"> exhibitors were proud and motivated to open their house personal contacts by phone and e-mail are the most efficient way to acquire exhibitors Passive House Associations were valuable partners in the countries Public and private buildings ask for a different approach



1.3.5.1. Conclusion on NZB2021 ‘Doors Open Days’ - sharing experiences from low energy buildings to meet nearly zero building standards by 2021 (NZB2021)

The “Doors Open Days” were organised in 2013 and 2014 in Belgium, Germany, Austria, Sweden, Ireland, Hungary, France, Malta, Slovenia and Poland. For promoting the event, about 26,000 people joined the campaigns and visited 1,440 private and public nearly zero energy buildings. Interested persons got the chance to visit exemplary buildings, talk to house owners and gather non-commercial hands-on-experiences. 92.5% of the visitors were pleased with the information heard. 76.5% of the visitors said they would implement good practices and build to NZEB standards themselves by 2020. In the course of the project, several publications like case studies and promotional in 8 languages were developed.

In conclusion it can be said, that the project was a success and contributed to the deployment of nZEBs in Europe. For eCentral, several valuable lessons learned can be taken for the own project’s activities. On the one hand, the successful methodology of organizing doors open days should be considered when planning the nZEB open door days in Work package C of eCentral. On the other hand, the type of promotion and attraction of local partners can be consulted for ensuring maximum outreach. Due to the similarity of the initiatives, more findings will be described in the next section 1.3.6 International initiative - International Passive House Open Days.



1.3.6. International initiative - International Passive House Open Days

Name	<ul style="list-style-type: none"> •International Passive House Open Days 2017
Initiators	<ul style="list-style-type: none"> •The International Passive House Association and its international affiliates
Geographical scope	<ul style="list-style-type: none"> •Worldwide
Period	<ul style="list-style-type: none"> •2004, once a year since then
Objectives	<ul style="list-style-type: none"> •Promote the Passive House Standard worldwide
Concept	<ul style="list-style-type: none"> •Promoting the Passive House Standard by providing visits of already inhabited objects and thereby enabling learning from the experiences of the inhabitants. •Enabling a worldwide offer of passive houses to be viewed to enlarge the circle of interested parties.
Desired output	<ul style="list-style-type: none"> •An increase in passive house buildings •Promotion of passive houses
More information	<ul style="list-style-type: none"> • www.passivehouse-international.org/index.php?page_id=262 or • www.service.passivehouse.com/en/ph_days/
Key findings for eCentral	<ul style="list-style-type: none"> •Format of promotion and knowledge transfer referring to the Passive House Building Standard



1.3.6.1. Conclusion on international Passive House Open Days

On the International Passive House Open Days, happening each year (this year from 10 - 12 November) on global-scale, passive house and passive house plus owners invite to visit their houses and show how sustainable and affordable living is possible. This year again several hundreds of new buildings as well as energy-saving renovations in passive house standard are open for visit worldwide (120 of them in Austria).

Experts are on site and show how everything works while the residents share their experiences.

Since 2004, more than 100.000 people have already taken advantage of the opportunity to experience the advantages of a passive house at first hand. The International Passive House Open Days are an initiative of the network IPHA (International Passive House Association) and further international partners.¹¹

The following key findings can be used for the eCentral project:

- Knowledge transfer at first hand is the most credible experience related to a promotion campaign.
- Enforce interpersonal exchange of experiences.
- This special kind of an “Open Days” event enables very individual, private, face-to-face information although happening within a broad range (worldwide). Therefore, it enables a wide acquisition of potential interested parties or even future clients with comparably little organisational effort (compared to usual fairs or events).
- The special organizational structure of the International Passive House Open Days enables an exceptionally self-determining, autonomous design of the Open House schedule for each of the interested parties.

These lessons learned deliver important inputs for the implementation of the “nZEB open door days” of Work package C in the eCentral project.

¹¹ <http://passivhaus-austria.org/content/einblicke-die-zukunft-des-wohnens-erleben>



1.3.7. International initiative - BUILD UP Skills

Name	•BUILD UP Skills initiative
Initiators	•Intelligent Energy Europe Programme of European Union
Geographical scope	•Europe
Period	•2011-2017
Objectives	<ul style="list-style-type: none"> •Support for achieving EU 2020 objectives in the field of energy efficient buildings •Support of EU member states in assessing training needs for the construction sector, developing strategies to meet them and fostering effective training schemes
Methodology	<ul style="list-style-type: none"> •Providing funding instruments for European projects on two pillars: <ul style="list-style-type: none"> •Pillar 1 (2011-2013): development of national status quo analysis and national roadmaps for 2020 •Pillar 2 (2013-2017): support of setup of national qualification and training schemes •Providing a europewide platform called BUILD UP Portal with latest developments and news in the efficient building sector
Output	<ul style="list-style-type: none"> •well skilled craftsmen and building inspectors contribute to increased building quality and therefore energy efficiency and energy savings in the building sector •30 pillar 1 projects and 22 pillar 2 projects completed in all 28 member states plus Former Yugoslav Republic of Macedonia and Norway •196 consortium members in pillar 1 phase <ul style="list-style-type: none"> •set up of National Qualification Platforms, identification of key stakeholders for trainings and needs •pillar 2 projects directly respond to the national outcomes of pillar1 •7 EU exchange meetings
More information	<ul style="list-style-type: none"> • Official BUILD UP Portal for Energy Efficiency in Buildings at www.buildup.eu
Key findings	<ul style="list-style-type: none"> •energy saving potential in operation and maintenance of buildings present - addressing by including the users •Recommendation to include monitoring beyond funding time for project activities in order to identify and disseminate best practice and pitfalls •already need of updating the national roadmaps due to latest developments •Exchange of Europe wide information very important for adding value on an European and national level •success of BUILD UP initiative was mainly influenced by giving the possibility to react to national dimensions - varying member state needs •Joint definition of "low energy buildings" e.g. uniform European definition of nZEB recommended



1.3.7.1. Conclusion on the BUILD UP Skills initiative

The BUILD UP Skills initiative can be considered as great success, at its design and scope was relevant to the needs of the 28 Member states plus Former Yugoslav Republic of Macedonia and Norway.¹² The initiative contributed to lifting a key barrier reaching the EU 2020 objectives by addressing the need for high quality workforce in the building sector. The most relevant key stakeholders for a high building quality and therefore a high energy efficiency of buildings were identified across Europe under pillar 1. The main target groups were:

- Technicians (non-graduate), Installers (Renewable Energy, Energy Efficiency equipment, Insulation, HVAC), Energy managers and auditors, Buildings inspectors, Plumbers, Carpenters and Electricians

Primarily, the following competencies were imparted in the national training schemes for the most relevant key stakeholders.

- Understanding the importance of nearly zero energy building standards
- Understanding of the interplay of the trades
- Avoiding the most common faults and errors and their impact

Additionally, it was pointed out that there is a Europe wide need for addressing the non-technical barriers of workforce training, skills and qualifications. These barriers are described as: the fragmentation of the buildings services and design markets; the owner dilemma (the landlord - tenant disincentive); energy market distortions; regulatory barriers (e.g. planning); lack of familiarity with and risk aversion to new technologies; information barriers; cultural and lifestyle habits; and the availability of products and the skilled workers to design, build, install, operate and maintain them. These non-technical needs are not further elaborated as they are falling outside the scope of the BUILD UP initiative.

Key findings also included the need to consider the user behaviour as a great potential for energy savings as well to monitor the project's output beyond the funding lifetime for identifying and promoting best practice examples. Additionally, it was stated that reacting to national needs and adapting the project's methodology to it is also a great success factor. For the European Commission it was recommended to force a common European definition of nZEBs for ensuring a high building standard all over Europe.

Concluding it can be said, especially from the eCentral project partner's perspective, that it is still necessary to improve the cross-trade understanding at the construction site with a focus on energy in the overall system "building". Although these skills are included in the actual apprentice and master craftsman training, it is important to improve the skills of skilled workers, who had their professional training 10 and more years ago or who had no sufficient training until now.

The key findings of the whole initiative deliver important lessons learned for the implementation of the eCentral project.

¹² https://ec.europa.eu/easme/sites/easme-site/files/bus_evaluation_final_report.pdf



1.3.8. International initiative - Concerted Action EPBD

Name	<ul style="list-style-type: none"> • Concerted Action EPBD (CA EPBD)
Funding authority	<ul style="list-style-type: none"> • Horizon 2020 research and innovation programme of the European Union
Geographical scope	<ul style="list-style-type: none"> • 28 EU Member States plus Norway
Period	<ul style="list-style-type: none"> • First CA EPBD phase: launched in 2005, closed in June 2007 • Second phase: followed immediately after the first • Third phase: from 2011 to 2015 • Current CA EPBD IV: from October 2015 to March 2018
Objectives	<ul style="list-style-type: none"> •The CA EPBD addresses the Energy Performance of Buildings Directive (EPBD). It aims to contribute to the reduction of energy use in European buildings through the exchange of knowledge and best practices in the field of energy efficiency and energy savings.
Methodology	<ul style="list-style-type: none"> •The CA EPBD IV is organised in: <ul style="list-style-type: none"> - 3 Core Teams: ‘New Buildings’, ‘Existing Buildings’ and ‘Certification & Quality of Inspection’; - 3 Cross-Cutting teams: ‘Technical Elements’, ‘Policy & Implementation’ and ‘Compliance, Capacity & Impact’; - 2 Central Functions: ‘Collaboration with other actors’ and ‘Internal & External Communication’; - some additional functions and supporting measures. •CA plenary meeting every 7-8 months with over 120 participants from 29 countries. •These meetings are accompanied by other communication enhancement measures, including a web platform and national reports.
Output	<ul style="list-style-type: none"> •Period 2015-2018: •Workshop “Vocational skills for energy efficient buildings” on 24th October 2017 in Bucharest: Presentation and discussion of challenges and opportunities in relation to empowering skills to support the quality of building construction and the rate of building renovation towards NZEB. •Workshop “Smart Buildings for a greener Europe: Emerging Policy and Practice” on 14th February 2017 in Malta: The event panel included experts from industry, academia and the European Commission to discuss “What are smart buildings?” and “How can they help improve the energy efficiency of Europe’s building stock?”, as well as to answer a variety of questions raised by participants on site or via twitter/email.
More information	<ul style="list-style-type: none"> •https://www.epbd-ca.eu/
Key findings	<ul style="list-style-type: none"> •The EPBD considered as a significant legislative component in EU energy efficiency policy and was developed to implement the saving potential in buildings, as they account for almost 40% of the consumption of energy in the EU. Full and efficient transposition of this directive is therefore central in achieving EU energy saving and carbon emission targets. •The EPBD was adopted to contribute to the Kyoto commitment, securing energy supply and competitiveness.



1.3.8.1. Conclusion on Concerted Action EPBD (CA EPBD)

The Concerted Action EPBD (CA EPBD) addresses the Energy Performance of Buildings Directive (EPBD). It aims to contribute to the reduction of energy use in European buildings, through the exchange of knowledge and best practices in the field of energy efficiency and energy savings between all 28 European Union Member States plus Norway.

The work of the CA EPBD IV is organised using Central Teams and functions, which include:

- 3 Core Teams: ‘New Buildings’, ‘Existing Buildings’ and ‘Certification & Quality of Inspection’;
- 3 Cross-Cutting teams: ‘Technical Elements’, ‘Policy & Implementation’ and ‘Compliance, Capacity & Impact’;
- 2 Central Functions: ‘Collaboration with other actors’ and ‘Internal & External Communication’;
- Some additional functions and supporting measures.

The Central Teams cover and address issues that support coordinated implementation of the EPBD to increase its impact and reduce implementation costs, focusing on issues that do not require harmonised national implementation methodologies.

The Cross-Cutting teams’ function as interface between the topics of the core teams. Additionally, there is a working group for the coordination with other Concerted Action initiatives and other EU projects.¹³

As conclusion it can be said the overall principal activity in all Core Teams and Cross-cutting Teams is organising meetings and technical discussions that assist Member States in their implementation of the EPBD, allowing them to share experience and investigate problems and opportunities. Occasionally that may be extended to working groups or study tours on specialised topics that need more detailed attention. The working approach is well structured - this could also be usable for the structure of the Steering Committee and the ASG in the eCentral project.

¹³ <https://www.epbd-ca.eu/home/structure>

1.3.9. International initiative - CONSTRUCTION21

Name	<ul style="list-style-type: none"> • CONSTRUCTION21- A EUROPEAN GREEN BUILDING EXCHANGE
Funding authority	<ul style="list-style-type: none"> •Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> •Algeria, Belgium, France, Germany, Italy, Lithuania, Morocco, Romania, Spain
Period	<ul style="list-style-type: none"> •EU funding duration 2011-2013 - still ongoing project activities
Objectives	<ul style="list-style-type: none"> •Accelerate transition to green by facilitating innovation and best practices dissemination between practitioners, public authorities, researchers and academics.
Methodology	<ul style="list-style-type: none"> •social media platform for building professionals •Award system (Green Solutions Award) for sustainable construction in 9 categories •promotion of case studies
Output	<ul style="list-style-type: none"> •Social media platform for networking and knowledge exchange •currently 561 case studies of sustainable buildings •database of sustainable and innovative products and services (currently 263 listed in database) •45 case studies of energy efficient and sustainable districts •several best practice examples of infrastructure and urban services (water management, waste management, mobility, etc.) •160 online communities are opened, mostly held by experts in their field, where practitioners can share information and best practices on relevant topics
More information	<ul style="list-style-type: none"> •www.construction21.org
Key findings	<ul style="list-style-type: none"> •Need for European platform on sustainable buildings confirmed •Social media platform is an effective tool for disseminating best practice examples



1.3.9.1. Conclusion on Construction21

Construction21 is a well-designed social media platform which offers relevant case studies and knowledge exchange to its network. The project is now self-funded and an international non-profit association manages the network. CONSTRUCTION21 will be then able to expand into other countries. Objective of the platform is

- to stimulate the sharing of knowledge
- to help pushing topics and challenges on the public debate
- to build an ecosystem of innovation and acting communities
- to exert an influence and to boost the development of new markets in sustainable buildings and cities.¹⁴

The materials and information provided on Construction21 can be helpful for the eCentral project in terms of disseminating the project's results.

¹⁴ <https://www.construction21.org/static/who-we-are.html>



1.3.10. International initiative - Nearly Zero Energy Hotels (neZEH)

Name	<ul style="list-style-type: none"> Nearly Zero Energy Hotels (neZEH)
Funding authority	<ul style="list-style-type: none"> Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> Belgium, Croatia, France, Greece, Italy, Netherlands, Romania, Spain, Sweden
Period	<ul style="list-style-type: none"> 2013-2016
Objectives	<ul style="list-style-type: none"> Accelerate the rate of large scale renovations of existing hotels into Nearly Zero Energy Buildings (NZEB)
Methodology	<ul style="list-style-type: none"> providing technical advice to committed hoteliers and demonstrating the feasibility of such investments through audits and pilot projects undertaking training and capacity building activities promoting front runners at national and EU/International level through integrated communication campaigns, increasing awareness of NZEB benefits and challenging more SMEs to invest in NZE refurbishment projects.
Output	<ul style="list-style-type: none"> 16 hotels across 7 EU countries were renovated, achieving the nZEB standard - comprehensive case studies available estimated primary energy savings of 1.123 toe/year, 300 toe/year new renewable energy production, 2.556 t of GHG emission reduction per year, over € 6 million investments A practical e-tool, for hotel owners to assess their energy consumption state and to identify appropriate solutions for improving energy efficiency Practical trainings as well as marketing guidelines and promotion tools over 56.000 hotel owners informed about the methodology and results of the project
More information	<ul style="list-style-type: none"> www.nezeh.eu/home/index.html
Key findings	<ul style="list-style-type: none"> SME hotels face big challenges - lack of funding and technical and legislative limits; public support (financial, legislative needed) Hoteliers engagement in sustainability is crucial to achieve and maintain NZE level nZEB legislation shall recognise the unusual user profile of hotel buildings Need for tailored technical assistance and financial incentives - major barrier is the complexity of the such refurbishments



1.3.10.1. Conclusion on Nearly Zero Energy Hotels (neZEH)

NeZEH directly responds to the EU 2020 and EU 2050 targets. The project targeted SME hotels, which represent over 90% of the European hospitality market. Especially for this size of hotels, support is needed. The key findings of this project showed that support in technical details is needed. Additionally, the lack of funding and financial incentives is a big barrier.

Similar to the eCentral project, hotel owners are facing nearly the same challenges as the owners of public buildings. On the one hand, there is a significant need for professional support when planning nZEB refurbishment projects, especially in terms of awareness raising and capacity building. On the other hand, the financial issues such as lack of funding is also a common feature. A need of favourable regulatory framework (harmonized policies, coordination between competent authorities) was also identified within neZEH. Another similarity is the unusual user profile of hotels and public buildings - a special focus must be laid on the user behaviour e.g. staff needs to be trained and engaged and guests have to be informed and inspired. Additionally, hotels represent a specific building type as a high share of delivered energy is used for non-hosting functions: a number of energy intensive operations associated with customers' comfort and expectations, therefore linked to their competitiveness and viability. NZEB definitions should recognize this aspect, also different targets should be set for new and existing buildings. Tailored technical assistance and financial incentives are also necessary for motivating to implement an nZEB renovation project. A major barrier is the complexity of the renovation project requiring financial, technical, organizational and legal insights. Hoteliers consider the available financing tools as too complex. Independent, documented energy audits were a proved key factor in their decision-making, which underlines the importance of personal guidance of building owners throughout the whole renovation project.¹⁵

Due to the similar characteristics of hotels and public buildings, the results of neZEH are transferable and shall be included in the current eCentral project. Guidance and support throughout the whole nZEB project through experts as well as financial incentives are major success factor. This could be an indicator that especially the financial benefits of an nZEB during its lifetime should be promoted for convincing building owners to renovate their buildings.

¹⁵ <https://ec.europa.eu/energy/intelligent/projects/en/projects/nezeh>



1.3.11. International initiative - RENEW SCHOOL

Name	<ul style="list-style-type: none"> • Sustainable school building renovation promoting timber prefabrication, indoor environment quality and active use of renewables (RENEW SCHOOL)
Funding authority	<ul style="list-style-type: none"> • Intelligent Energy Europe Programme of European Union
Geographical scope	<ul style="list-style-type: none"> • Austria, Belgium, Denmark, Germany, Italy, Norway, Poland, Sweden
Period	<ul style="list-style-type: none"> • 2014-2017
Objectives	<ul style="list-style-type: none"> • promote and increase prefabricated timber-based renovation of school buildings to nearly zero energy building (nZEB) standard in Europe
Methodology	<ul style="list-style-type: none"> • identification of frontrunner buildings and site visits • technical workshops • trainings for employees of SMEs in the building sector • establishment of online-platform and interactive web tool • promotion of nZEBs with events, folders, brochures, etc.
Output	<ul style="list-style-type: none"> • 122 events with more than 7.500 visitors in 9 countries • 19 frontrunner buildings identified and case studies produced • 27 site visits of frontrunner buildings • 20 technical workshops were carried out • 8 technology talks in schools • organization of 50 trainings on specific topics related to wood and prefabricated elements with 1,448 participants were organized • online based decision support tool (www.schoolrenovatie.be/en) providing 4 options: relocation; new construction, traditional renovation, renovation with prefab elements
More information	<ul style="list-style-type: none"> • www.renew-school.eu
Key findings	<ul style="list-style-type: none"> • Strong driving force behind the project is crucial • extended design phase after the contracts were established allows architects, engineers and contractors to optimize design and number of changes during construction phase might be reduced • integrated planning (owner, architects, structural engineer, etc.) important -personal meetings and dialogues enabled a better mutual understanding • central information sharing system for project management is helpful • precise and understandable documentation of how to operate and maintain the building must be handed over to the users • The public procurement regulation force the 'lowest price' principle, but optimal solutions often require specific experience and capabilities

1.3.11.1. Conclusion on RENEW School

School buildings are places of major public interest. Therefore, not only the educational system itself, but also the conditions of these buildings are very important signals to the public, even to the pupils themselves. Goal of the the RENEW SCHOOL project was to promote and increase prefabricated timber-based renovation of school buildings to nearly zero energy building (nZEB) standard in Europe. It will help to downsize the energy use significantly and create and secure comfortable conditions for the pupils and teachers. Following three focus points promoted by this project:

- Improvement of the building's envelope by coating it with insulated prefabricated timber modules integrating windows, solar shading and ventilation/heating pipework
- Improvement of the indoor environment quality (IEQ) by ventilating, passive cooling and daylight upgrading the classrooms
- Improvement of the energy gains on site by using renewable energy sources, beside passive measures

Mayor results is the big outreach, which was achieved by several side visits, workshops, trainings and events. A big barrier for renovations through prefabricated elements was seen in the lack of best practice examples on the markets. Building owners associate this fact with a lack of experienced companies, no standardized public procurement method and no standardized set of rules for governmental subvention. The RENEW SCHOOL project tried to overcome barriers, brought financiers and professional contractors together, served as a platform for information and promoted high-energy efficient comprehensive school renovation. 20 school building renovations of 12 different municipalities could be initiated by the project, but not all are using / used the modular way of renovation. In order to monitor the project's results and promote a "green, quick and affordable way of renovation through prefabricated wooden elements", the project's consortium will maintain the website for 5 years after the project is closed.¹⁶

Several lessons learned are also worth being considered throughout the execution of the eCentral project:

- A strong driving force behind the renovation project is crucial for the success - try to find one motivated contact person when acquiring follow-up renovations
- An extended design phase after the contracts were established allows architects, engineers and contractors to optimize design and number of changes during construction phase might be reduced
- An integrated planning process (owner, architects, structural engineer, electricians etc.) is important for reaching optimized and efficient results
- Involve future users of the building (e.g. employees in public buildings, teachers in school buildings, etc.) through participation in the whole renovation process to ensure that they fully support the project.
- The information flow between design and execution or the integration of experts in early planning phases is crucial, resulting in short construction times, trouble-free renovation process and school operation.
- A Central information sharing system for all participants is helpful for efficient project management - everybody stays informed in real time
- Personal meetings and dialogues enabled a better mutual understanding of different perspectives

¹⁶ http://www.renew-school.eu/wp-content/uploads/2017/05/RENEWSCHOOL_publishable-report.pdf



- A precise and understandable documentation of how to operate and maintain the building must be handed over to the users, in order to understand the used technologies and to make advantage of the new energy efficiency - user behaviour has significant energy saving potential
- The public procurement regulation forces the ‘lowest price’ principle, but optimal solutions often require specific experience and capabilities. The tender should thus identify the required capabilities necessary to realize the proposed solution. The disadvantage of this approach is that there is less room to think about an alternative solution that might be even easier to realize.
- For deep renovation, there is a risk of the tender being fragmented. This can result in sub-optimal situations and end products if the different partners do not exchange information and communicate sufficiently in the early stages of the planning process

These above lessons learned are a valuable input for the planned renovations of work package T3 in the eCentral project.



1.4. Overall conclusions on international initiatives

The analysis of nZEB initiatives in Central Europe shows that there are vibrantly ongoing activities. Goal of this report is to summarize and use the results and experiences from previous projects as starting point for the eCentral project. The key findings will be utilized and enhanced.

In total, the 11 most remarkable and relevant ones for the eCentral project were described. The chosen initiatives have in common, that at least one project partner comes from a Central Europe country. Since all projects normally include broad outreach and communication activities, it can be assumed that the project's results are widely spread in the project partner's countries. Additionally, some members of the eCentral consortium also were part of the described initiatives. The objectives of the described initiatives vary from awareness raising to implemented building renovations over training programmes for blue collar workers and building inspectors. The project's main results and findings are summarized in tables, using an adapted SWOT-analysis tool by categorizing them in opportunities and barriers. This approach can be seen in the tables below.

Firstly, the found opportunities and barriers are visualized and afterwards, the strengths and weaknesses of the eCentral project, as well as countermeasures are highlighted. This ensures that the objectives of the eCentral project are analysed according to actual market needs and opportunities. If necessary, the promised project outputs can be slightly adapted. This approach ensures a maximum exploitation of the approved budget. According to the below mentioned barriers and opportunities, the content of the eCentral project clearly responds to actual market demands.

The table below shows possible opportunities for eCentral, countermeasures as well as impacts and affected WPs.

Opportunities	Measure	Impact on/Action in eCentral	Affected WP*)	Impact **)
Limited financial capacity for new nZEBs and renovations	Highlighting lower operating costs for nZEB throughout the whole lifetime when promoting nZEB	Include life-cycle cost analysis in EPC tool (D.T1.4.2) for visualizing the benefits of higher investment costs in relation to energy cost savings over lifetime	WP T1	Yellow
	Provide informational materials about national funding	Produce brochures	WP C	Green
nZEB standard defined in all eCentral project partner countries		Legal certainty when conducting the nZEB renovations (A.T3.1, A.T3.2, A.T3.3), legal framework available	WP T3 and I1	Red
Lack of demonstration buildings	Implement demonstration buildings	Make sure, that the three pilot renovations (A.T3.1, A.T3.2, A.T3.3) are implemented in an outstanding way on a high-quality standard for being best practice examples	WP T3 and I1	Red
	Produce case studies and a database with nZEB buildings	Corresponds to deliverable D.T1.1.2	WP T1	Red

High public interest for energy efficient renovation of public buildings	EPC tool	Creation of user-friendly and EPC tool (D.T1.4.2) for wide uptake		
	Pilot renovations	Ensure high implementation standard for pilot buildings (A.T3.1, A.T3.2, A.T3.3) and effective communication of results (A.T3.4, A.C.1-6))	WP T3, I1 and WP C	
Communication of project results	Learn from forerunner projects such as NZB2020 Doors Open Days or International Passive House Open Days		WP C	
Include user behaviour when planning nZEBs - big potential for extending energy savings	Involve future users of the building in the planning process	Include employees of public authorities when planning the nZEB pilot actions (A.T3.1, A.T3.2, A.T3.3) - e.g. workshops, informational events, etc.	WP T3	
	Provide precise and understandable documentation on how to operate the building	Provide training for the users of the renovated buildings (A.T3.1, A.T3.2, A.T3.3), brochures, etc.	WP T3	
		Develop brochures/guide on energy efficient user behaviour	WP C	
Integrated planning process	Experiences show, that an integrated planning process (owner, architects, structural engineer, electricians etc.) is important for reaching optimized and efficient results)	Follow this recommendation for renovation actions (A.T3.1, A.T3.2, A.T3.3)	WP T3	
	Extended design phase reduces changes during construction phase			
	Stable information flow between all parties	Build up a central information system with all involved parties for the pilot renovations (A.T3.1, A.T3.2, A.T3.3)		
Strong driving force behind nZEB renovation project needed	try to find one motivated contact person when acquiring follow-up renovations		WP T3 and I1	

*) WP T1 = Work package “Support tools and schemes for deep renovation of public buildings; WP T2 = Work package “Building capacity of local and regional stakeholders”; WP T3 “Demonstration of nZEB pilot actions”; WP C “Communication”

***) red = big impact, yellow = small impact, green = no impact

Table 2: Key findings/opportunities of international nZEB initiatives (own illustration)



The table below shows possible barriers for eCentral, countermeasures as well as impacts and affected WPs.

Barriers	Countermeasures	Impact on/ action in eCentral	Affected WP*)	Impact **)
Limited financial capacity for new nZEBs and renovations	Highlighting lower operating costs for nZEB throughout the whole lifetime when promoting nZEB	Include life-cycle cost analysis in EPC tool (D.T1.4.2) for visualizing the benefits of higher investment costs in relation to energy cost savings over lifetime	WP T1	Yellow
	Provide informational materials about national funding	Produce brochures, address the needs for financial help at events and when talking to decision makers	WP C	Yellow
	Make advantages of nZEBs very clear (lower operating costs, higher living quality, etc.)	Adequate communication strategy (D.C.1.2) and promotional materials (A.C.2, A.C.4) are very important	WP C	Red
	Need of new financing schemes	Test and find practicable innovative financing schemes for nZEBs (A.T3.1, A.T3.2, A.T3.3), D.T.1.5.3	WP T1, WP T3	Red
Different nZEB standards in all partner countries	Define internal standard for eCentral, which fits to all legal requirements	Be aware of different standards when implementing pilot renovation actions (A.T3.1, A.T3.2, A.T3.3) and EPC tool (D.T.1.4.2.)	all	Green
Lack of data regarding non-residential building stock, renovation rates and energy performance of buildings	European wide data collection necessary	Database of building stock (D.T1.3.2) is included in EPC tool - development of uniform protocols for data collection (D.T1.3.1)	WP T1	Yellow
Lack of knowledge, unskilled construction workers	Development of adequate training programmes and information material	Training programmes for local authorities in target regions are developed (A.T2.2) User-friendly design of EPC tool important (D.T1.4.2) Development of step by step guide for using EPC tool (D.T1.4.4) Decision support tool for nZEB renovation (D.T1.5.3, D.T2.3.2)	WP T1, T2	Yellow
Political long term planning difficult (short political legislative period of 4-5 years)	Development of long term-goals necessary	Include long-term goals in regional and local renovation roadmap beyond 2030 (D.T2.4.2), convince participating PAs to accept long-term strategies (A.T2.4)	WP T2, WP T3	Green



Lack of support for building owners in the planning process of nZEBs	Inform building owners about their possibilities	Use findings of the pilot action renovations (A.T3.1, A.T3.2, A.T3.3) in brochures, show how to successfully implement nZEBs (D.T2.3.2), ensure that EPC tool (D.T1.4.2) is adapted to needs of users	WP T1, WP T2, WP T3	
public procurement regulation forces the 'lowest price' principle	Try to find cost-optimum and most energy efficient solution	Consider these barriers when implementing the pilot action renovations (A.T3.1, A.T3.2, A.T3.3)	WP T3, I1	
For deep renovation, there is a risk of the tender being fragmented. This can result in sub-optimal situations and end products if the different partners do not exchange information and communicate sufficiently in the early stages of the planning process.	Try to avoid tender fragmentation and ensure an adequate communication system between all involved parties	Consider these barriers when implementing the pilot action renovations (A.T3.1, A.T3.2, A.T3.3), ensure stable information flow e.g. through a central information system (Google Drive, Dropbox, etc.)		
Project activities are often completely shut down after the project ends	Develop an "exit strategy" for activities after the project's lifetime	Sustainability plan (D.T2.1.4) for endorsement and continuation of key project outputs will be developed	WP T2	

*) WP T1 = Work package "Support tools and schemes for deep renovation of public buildings; WP T2 = Work package "Building capacity of local and regional stakeholders"; WP T3 "Demonstration of nZEB pilot actions"; WP C "Communication"

***) red = big impact, yellow = small impact, green = no impact

Table 3: Key findings (barriers) of international nZEB initiatives (own illustration)



2. National initiatives for the promotion of nearly zero energy buildings

In this chapter, only national initiatives for the promotion of nearly zero energy buildings will be described. It was jointly decided that only national initiatives from the project partner's countries (Austria, Croatia, Hungary, Italy, and Slovenia) will be described to ensure appropriate quality of the deliverable. Due to the fact that each national organisation knows their national initiatives best and can report a conclusion, lessons learned and key findings, the national initiatives from Poland, Czech Republic, Germany and Slovakia are excluded due to lack of project partners from these countries. They will be addressed in the chapter on the international initiatives.

The description of the initiatives will cover the founders, geographical scope, period, main content and output as well as success factors and lessons learned. Key findings for the eCentral project shall be written down in the short conclusions.

For some countries, the national nZEB legislation was also described as nZEB initiative. An overview on the main national nZEB requirements was already given in chapter 1.2 nZEB definitions across Central Europe.

2.1. Austria

In Austria, about 8 national relevant initiatives are currently ongoing or already finished. The scope of the initiatives has a wide range, starting with unofficial highly efficient buildings standards to advocacy groups, funding lines, buildings, etc. It was tried to show the wide range of different initiatives and to extract the lessons learned and possible findings for the implementation of the eCentral project.



2.1.1. National initiative - klimaaktiv building standard

Name	<ul style="list-style-type: none"> • klimaaktiv - buildings
Initiators	<ul style="list-style-type: none"> • Ministry for Sustainability and Tourism (former Austrian Ministry of Environment)
Geographical scope	<ul style="list-style-type: none"> • Austria, all nine federal states (Styria, Carinthia, etc.)
Period	<ul style="list-style-type: none"> • Ongoing (since 2004)
Objectives	<ul style="list-style-type: none"> • klimaaktiv's primary objective is to launch and promote climate-friendly technologies and services. It focuses on high standards of quality, provides education and training of professionals, gives advice and cooperates with a large network of partners. • Promoting energy-efficient and ecological buildings and renovation measures in Austria • Declaration of buildings built or renovated according to the klimaaktiv standards (comparable to nZEB standard) • Quick and transparent building quality assessment.
Methodology	<ul style="list-style-type: none"> • Building standard - certifies buildings that combine highest energetic and ecological standards with professional implementation • Declaration - in three status quo categories: planning phase, already built or in operation • Criteria catalogue - applicable for all building categories and divided in four evaluation criteria: location & quality assurance, energy & supply, building material & construction, comfort & indoor air quality • Assessment - follows a 1000 points scoring system in three quality levels: bronze, silver and gold. • Building database - includes all buildings planned or already built according to the klimaaktiv criteria
Output	<ul style="list-style-type: none"> • 541 klimaaktiv building declarations (nZEB-buildings) in Austria • networking activities, various brochures and flyer to distribute
More information	<ul style="list-style-type: none"> • www.klimaaktiv.at and www.klimaaktiv-gebaut.at
Key findings for eCentral	<ul style="list-style-type: none"> • information on best practice nZEB buildings • format of promotion and knowledge transfer • interdisciplinary approach • building quality assessment method for eCentral EPC tool • transparency of processes (e.g. building assessment)

2.1.1.1. Conclusion on klimaaktiv building standard

Klimaaktiv is the Austrian climate protection initiative and part of the Austrian Climate Strategy. It is a very broad initiative with activities in the fields of energy efficient buildings, efficient municipalities, mobility, heating systems, etc. which forms a multidisciplinary approach and tackling Austrian challenges on several levels. The programme management is situated in the Austrian Federal Ministry for Sustainability and Tourism - this leads to a strong backing through politics.

klimaaktiv



Figure 2: Official logo of the initiative

The klimaaktiv - building and renovation program track is applicable to residential buildings and public buildings (private and non-private residential or non-residential buildings). It provides an assessment catalogue with several criteria in the fields of energy efficiency, health and user comfort, avoidance of environmentally harmful construction material and high construction quality. Declarable buildings that are conditioned in any form (heated or cooled) can be evaluated on the basis of the klimaaktiv- criteria set and subsequently declared. In the focus of eCentral are buildings which are under the control of local authorities. Currently, more than 500 declared klimaaktiv-buildings- some of them correspond to the use-profile of the renovations planned in the framework of eCentral - can be used very well as illustrative examples of the planned buildings in the target regions Croatia, Hungary and Slovenia. The represented buildings are very well documented with photos. Furthermore, there is a short description, technical data from the energy performance calculation or PHPP (passive house planning package) calculation, information about the owner, the planners, as well as a description of the qualities of the building on the basis of achieved points of declaration following the criteria-set available. The platform is for public use and open to everybody. The declaration is free of charge.

Additionally, in every federal state of Austria, at least one regional programme partner of klimaaktiv is situated. Tasks of the regional partners are offering support for building developers, architects, municipalities and private persons, promoting the programme through publications and events and declare buildings. In Styria, the Energy Agency of Styria is the regional klimaaktiv-partner.¹⁷

The following key findings can be used for the eCentral project:

- Klimaaktiv-database with best practice examples for case studies and for excursions
- Multidisciplinary approach, combining mobility, buildings, etc.
- Use the assessment criteria for development of EPC tool and national strategies
- Format and process of declaration is transparent - clear structure for scoring system and achievable points; use of an official award system as motivation
- Possible role model for the three eCentral renovations - award the buildings
- Use regional contact points for transferring the key messages - comparable to Regional Working Groups in eCentral project
- Use knowledge transfer and outreach formats of the programmes (publications, workshops, etc.)

Since more than ten years, the programme is very successful in Austria. The implementation approach can be included in the eCentral project and its main findings adapted to Central Europe region's needs.

¹⁷ Source: www.klimaaktiv.at



2.1.2. National initiative -ÖGNB - ASBC

Name	•ÖGNB - ASBC - The Austrian Sustainable Building Council
Initiators	•Austrian Institute for Building Biology and Ecology (IBO) and Austrian Institute for Ecology (ÖÖI)
Geographical scope	•Austria, all nine federal states (Styria, Carinthia, etc.)
Period	•2009 until today
Objectives	<ul style="list-style-type: none"> •Enhancing quality standards of the Austrian building industry, in compliance with sustainable building. •Knowledge, methods and tools to sustainably enhance quality standards of the Austrian and the international building industry are provided free of cost (if possible) to those who want to contribute to this cause. •As an open-source developer, the Austrian Sustainable Building Council aims to counteract the trend towards expensive brands. •Membership is open to individuals, institutions and businesses interested in providing their expertise in the field of sustainable building, and those who want to support the goals of the Austrian Sustainable Building Council.
Methodology	<ul style="list-style-type: none"> •The ASBC uses the Total Quality Building Assessment (TQB) scheme. The general procedure is carried out in five steps: •Building documentation using online declaration tools; carried out by ASBC consultants. •Handover of submitted project to the Austrian Sustainable Building Council and application for building surveying •Verification of proof by ASBC auditors. •Approval of assessment results by ASBC after consulting with submitters. •Publication of assessment results in ASBC press, above all on ASBC website. •Use of the assessment tools is free and a ASBC membership is not required. However, registration with ASBC, a qualification proof and at least one reference project for residential and service buildings must be presented. This reference project can also be one which was submitted for declaration.
Output	•99 building declarations are registered (nZEB-buildings)
More information	• https://www.oegnb.net
Key findings for eCentral	<ul style="list-style-type: none"> •Format of knowledge transfer •Interdisciplinary approach •Building quality assessment scheme •nZEB building declarations



2.1.2.1. Conclusion on ÖGNB - ASBC

The Austrian Sustainable Building Council (ÖGNB) was initiated and founded in Austria in January 2009, by a number of renowned and independent institutions in the field of sustainable building. Membership is open to all who are interested, to institutions and businesses seeking to participate actively in supporting the Austrian building industry in compliance with sustainable building.

The structure for the assessment system is designed in close consultation with klimaaktiv Construction and Renovation. In addition, a considerable number of insights gained from scientific projects of the R&D Programme, House of Tomorrow/Plus are included, which is the most extensive R&D initiative in the field of sustainable building in Europe. The ÖGNB also collaborates closely with policy-makers, specialists and building-relevant institutions from science, business and administration.

The ASBC uses the Total Quality Building (TQB) assessment scheme which was designed as "open standard" and made freely available to those interested and to businesses and institutions. This assessment tool has several modules. Using a user-friendly editing system, TQB can continually be adapted and further developed - only very little maintenance and programming efforts required. Designed in 2002, TQB has been a comprehensive building assessment scheme ever since, which is referred to as the second generation building assessment system. The TQB content is fully compatible with international norms (e.g. CEN TC350), these are currently being developed. TQB provides a comprehensive solution for building assessment in Austria, both in terms of content and technology. The TQB building declaration is fee based. ¹⁸

For testing purposes, the TQB assessment tool is open for public for residential buildings and office buildings.

The following key findings can be used for the eCentral project:

- Knowledge, methods and tools enhance quality standards of the Austrian and the international building industry sustainably are provided free of cost (if possible) to those who want to contribute to this cause.
- The close consultation with klimaaktiv Construction and Renovation, the insights gained from scientific projects of the R&D Programme and the close collaboration with policy-makers, specialists and building-relevant institutions from science, business and administration provides an interdisciplinary approach, which enables holistic solutions.
- The TQB can support quality assurance for sustainable building both nationally and internationally by significant influence of the following attributes:
 - > TQB is an online assessment tool,
 - > a comprehensive building assessment scheme and
 - > Fully compatible with international norms.

The Austrian Sustainable Building Council's goal is to support the idea of an Open Source Community in the field of sustainable building, and to differentiate itself clearly from high-cost franchise concepts.

¹⁸ Source: www.oegnb.net



2.1.3. National initiative - “OIB Richtlinie 6” definition of national nZEBs in 2015

Name	<ul style="list-style-type: none"> OIB Richtlinie 6 and National Plan for Austria (2014)
Initiators	<ul style="list-style-type: none"> Austrian Institute for construction engineering
Geographical scope	<ul style="list-style-type: none"> Austria, all nine federal states (Styria, Carinthia, etc.)
Period	<ul style="list-style-type: none"> New OIB 6 Richtlinie (guidelines) and national plan since 2015
Objectives	<ul style="list-style-type: none"> Establishment of an energy efficient and sustainable building standard in Austria
Methodology	<ul style="list-style-type: none"> OIB 6 Richtlinie (national guidelines) serves as base for the building laws of the nine federal states Definition of minimum energy efficiency standards for new buildings and bigger renovations of buildings (renovation of building envelope and building services) for 2014-2020 Definition of heating energy demand, end energy demand, primary energy demand and CO₂ emissions Stricter thresholds every two years (2014, 2016, 2018, 2020) Distinction between residential buildings and non-residential buildings Primary energy demand includes heating, domestic hot water, ventilation, cooling and needs for household activities (electricity, etc.)
Output	<ul style="list-style-type: none"> nZEB defined according to EPB Directive 2010/31/EU Primary energy demand for new residential buildings in 2020: 160 kWh/m²*a Primary energy demand for new non-residential buildings in 2020: 170 kWh/m²*a Primary energy demand for renovated residential buildings in 2020: 200 kWh/m²*a Primary energy demand for renovated non-residential buildings in 2020: 250 kWh/m²*a
More information	<ul style="list-style-type: none"> www.oib.or.at or building laws of each Federal Austrian State
Key findings for eCentral	<ul style="list-style-type: none"> Definition of the nZEB standard in Austria



2.1.3.1. Conclusion on “OIB Richtlinie 6”

The national plan and guideline “OIB Richtlinie 6”, released in March 2015, serves as base for the building laws of the nine federal states. It deals with energy savings and thermal insulation and provides a definition of minimum energy efficiency standards for new buildings and bigger renovations of buildings (renovation of building envelope and building services) for 2014-2020. Furthermore, it gives a definition of heating energy demand, end energy demand, primary energy demand and CO₂ emissions and distinguishes between residential buildings and non-residential buildings

The objective of the guideline was to establish an energy efficient and sustainable building standard in Austria. Thereby, the guideline is subject to stricter thresholds every two years (2014, 2016, 2018, 2020).¹⁹ For the eCentral project, the nZEB definition serves as base for further Austrian activities.

¹⁹ Source: <https://www.oib.or.at/de/oib-richtlinien/richtlinien/2015/oib-richtlinie-6>



2.1.4. National initiative - Austrian Green Building Star

Name	<ul style="list-style-type: none"> •Austrian Green Building Star
Initiators	<ul style="list-style-type: none"> •Austrian Ministry of Environment
Geographical scope	<ul style="list-style-type: none"> •Austria, all nine federal states (Styria, Carinthia, etc.)
Period	<ul style="list-style-type: none"> •2004 until today
Objectives	<ul style="list-style-type: none"> •Present Austrian quality in the field of sustainable building on an international scale •The certificate is granted to energy-efficient and sustainable buildings abroad which are constructed with Austrian participation. •Offer the involved, Austrian enterprises and engineering firms a high-quality and transparent umbrella brand which enables them to communicate their achievements all over the world.
Methodology	<ul style="list-style-type: none"> •Certification system •Focus on Energy efficiency, Health and user comfort, Avoidance of environmentally harmful construction material, and High construction quality. •klimaaktiv building standard as a basis •Rating provides for 4 to 6 stars •Where the basic criteria are complied with, the building is a very comfortable and environmentally optimised nearly zero-energy building and receives four stars. •Five stars can be obtained if, in addition, the building also complies with the passive house standard. •Six stars are granted if the building has a neutral or even a positive energy balance.
Output	<ul style="list-style-type: none"> •Austrian quality in the field of sustainable building is now presented on an international scale.
More information	<ul style="list-style-type: none"> •https://www.klimaaktiv.at/english/buildings/austriagreenbuilding.html
key findings for eCentral	<ul style="list-style-type: none"> •information on nZebS abroad, built with Austrian participation •format of promotion and knowledge transfer •building certification system •transparency of processes (klimaaktiv building standard as basis)

2.1.4.1. Conclusion on Austrian Green Building Star

With the new certification system Austrian Green Building Star Austrian quality in the field of sustainable building is now presented on an international scale. The certificate has been jointly developed by the BMLFUW and the BMVIT and is marketed on a global scale via the Board of Foreign Trade of the Austrian Federal Economic Chamber. The certificate is granted to energy-efficient and sustainable buildings abroad which are constructed with Austrian participation.

Based on the klimaaktiv building standard of the BMLFUW globally applicable quality criteria for energy-efficient and sustainable building have been developed. The scheme is implemented with simple and, above all, transparent means. The Austrian Building Star focuses on energy efficiency, health and user comfort, avoidance of environmentally harmful construction material and high construction quality.

The rating of the certification system "Austrian Green Building Star" provides for 4 to 6 stars:



Figure 3: Official logo of the Austrian Green Building Star

- Four stars: Where the basic criteria are complied with and the building is a very comfortable and environmentally optimised nearly zero-energy building.
- Five stars: If, in addition, the building also complies with the passive house standard.
- Six stars: If the building has a neutral or even a positive energy balance.

Austrian Green Building Stars are awarded solely to buildings abroad in which Austrian planning and architecture firms, construction materials manufacturers, construction companies or investors have made a major contribution to planning and implementation. With the Austrian Green Building Star, the Ministries involved, and the Austrian Economic Chamber want to offer the involved Austrian enterprises and engineering firms a high-quality and transparent umbrella brand which enables them to communicate their achievements all over the world.²⁰

The following key findings can be used for the eCentral project:

- Information on nZEBs abroad, built with Austrian participation → A similar "list" of nZEBs built abroad by the eCentral partner countries might be of interest, lead to further promotion, improve knowledge transfer and broaden the network.
- Again, the transparency of processes (klimaaktiv building standard as basis, Certification system) turns out to be an important aspect regarding the external image of projects.

²⁰ Source: <https://www.klimaaktiv.at/english/buildings/austriagreenbuilding.html>



2.1.5. National initiative - Haus der Zukunft - Building of tomorrow

Name	<ul style="list-style-type: none"> Haus der Zukunft - Building of tomorrow
Initiators	<ul style="list-style-type: none"> Federal Ministry of Transport, Innovation and Technology
Geographical scope	<ul style="list-style-type: none"> Austria, all nine federal states (Styria, Carinthia, etc.)
Period	<ul style="list-style-type: none"> The programme „building of tomorrow“ started in 1999. In the course of “building of tomorrow plus” (2. phase started in 2008) it was further developed to “city of tomorrow” which now runs since 2013.
Objectives	<ul style="list-style-type: none"> Achieve the technological preconditions for constructing buildings that do not consume energy, but generate it. The long-term vision for "Building of Tomorrow" is to increase the energy efficiency of building construction and use to a point where the emissions of greenhouse gases over the entire life cycle of buildings are reduced to zero overall.
Methodology	<ul style="list-style-type: none"> Research and technology program Provide a basis for innovative, sustainable concepts for new buildings and for renovating existing ones, especially the plus-energy houses. Adapting innovative technologies and products for large-scale industrial manufacture. Supporting the interlinking of the key Austrian providers of know-how internationally, boosting the transfer of know-how across borders, accumulating human resources and integrating existing knowledge into suitable training schemes.
Output	<ul style="list-style-type: none"> "Building of Tomorrow" has pointed the way for eco-efficient construction and the sustainable use of resources in Austria. A great deal of scientific competence in this field has been accumulated in Austria. Austria now has the highest density of passive buildings world-wide. Austrian firms have taken the lead in the technology of sustainable construction world-wide.
More information	<ul style="list-style-type: none"> https://nachhaltigwirtschaften.at/en/hdz/
key findings for eCentral	<ul style="list-style-type: none"> Transfer of know-how across borders and integrating existing knowledge into suitable training schemes Interdisciplinary approach

2.1.5.1. Conclusion on Haus der Zukunft - Building of tomorrow

"Building of Tomorrow" is one of the Federal Ministry of Transport, Innovation and Technology's research and technology programs. Starting from the low-energy solar building approach and the concept of the passive building and incorporating ways of using environmentally friendly and renewable materials in construction, new designs with great promise for the future have been developed and implemented.

Research and development work has provided a firm basis for innovative, sustainable concepts both for new buildings and for renovating existing ones.

In Phase 2 of the program - Building of Tomorrow Plus - the following aims are currently prioritized:

- Creating the technological basis for the building of tomorrow, especially the plus-energy house.
- The program is also focused on office and factory buildings and on modernizing existing buildings.
- Adapting innovative technologies and products for large-scale industrial manufacture.
- Initiating demonstration projects (buildings, settlements, networks ...) to put new technologies and approaches on the map.
- Supporting the interlinking of the key Austrian providers of know-how internationally, boosting the transfer of know-how across borders, accumulating human resources and integrating existing knowledge into suitable training schemes. ²¹

The following key findings can be used for the eCentral project:

- With the planning and implementation of innovative residential and office buildings, "Building of Tomorrow" has pointed the way for eco-efficient construction and the sustainable use of resources in Austria and might provide a similar approach for other countries.
- Accumulating a great deal of scientific competence in this field has proved to be of significant importance.
- Support has been provided for the process of adapting the Austrian system of subsidizing the construction of accommodation to take account of the latest developments in construction. → This support might also be of interest for our partner countries.

²¹ Source: <https://nachhaltigwirtschaften.at/en/hdz/>



2.1.6. National initiative - BUILD UP Skills CrossCraft

Name	<ul style="list-style-type: none"> • BUILD UP Skills CrossCraft
Funding authority	<ul style="list-style-type: none"> • Co-funded by the Intelligent Energy Europe Programme of the European Union
Geographical scope	<ul style="list-style-type: none"> • Austria
Period	<ul style="list-style-type: none"> • 2013 to 2016
Objectives	<ul style="list-style-type: none"> • create a solid basis for the implementation of CrossCraft Training course modules. (Focus on practical topics (e.g. air tightness, appropriate handling of insulation component connections and installation of vapour barriers, CrossCraft understanding). Especially the “beyond the own craft thinking” should be learned and enhanced by these modules. • Development of new financing concepts for training courses.
Methodology	<ul style="list-style-type: none"> • Trainings nationwide will help to design a clear understanding of a qualification for the builders of highly energyefficient buildings. This applies to employees as well as employers. The following trainings were developed and offered: <ul style="list-style-type: none"> • Onsite CrossCraft Training • Basic CrossCraft Training • Quality Coach Training • Special Module Techniques for renovation of old buildings • Special Module Installation of renewable energy systems
Output	<ul style="list-style-type: none"> • Training programmes, policy recommendations
More information	<ul style="list-style-type: none"> • www.buildupskills-crosscraft.at
Key findings	<ul style="list-style-type: none"> • The qualification needs in the building sector in Austria derived from the analysis of the “BUILD UP Skills Status quo report” and the stakeholder discussion process within the platform were defined. • One of the overall results can be summarized as follows: It is necessary to improve the cross-trade understanding at the construction site with a focus on energy in the overall system “building”. Although these skills are included in the actual “Lehrlings- und Meisterausbildung” in Austria, it is important to improve the skills of skilled workers, who had their professional training 10 and more years ago or who had no sufficient training until now. Build Up Skills Cross Craft is therefore providing now the courses, offered by the vocational training institution of Austria’s building sector, the Bauakademie.

2.1.6.1. Conclusion on BUILD UP Skills CrossCraft

The project as part of phase 2 of the superordinate European initiative BUILD UP Skills aimed to develop a modular qualification scheme for professionals in the construction industry with an emphasis on across-the-crafts training of, e.g., general foreman, foremen, skilled workers, craftsmen and unskilled workpeople. Primarily, the following competencies are to be imparted by the developed courses:

- Understanding the importance of nearly zero energy building standards
- Understanding of the interplay of the trades
- Avoiding the most common faults and errors and their impact

Aiming to ensure implementation of 2020 targets and progression to nearly zero energy building standards, it is also crucial to warrant the large scale and lasting approach. Therefore, the qualification scheme were be developed and tested in pilot courses, which were monitored and evaluated, all that in collaboration with key actors in the building sector as well as in the advanced training sector. Financial concepts for the scheme were developed, as well as a strategy for establishing the scheme within the continuing education and training sector. Promotional activities were also provided.

The main output of the project is the development of a curriculum for a three steps national training scheme. The training concept is based on the recommendation of the Austrian BUILD UP Skills Roadmap (phase 1 of the European BUILD UP Skills initiative) to implement cross-craft training of craftsmen in the construction industry (i.e. foremen, skilled workers and a new service provider which were called “on site quality coach”). The following training modules (based on BUILD UP Skills Roadmap) were developed (WP 3), implemented by pilot courses (WP 4) and evaluated (WP 5) during the project’s lifetime:

- On-Site CrossCraft training module
- Basic cross-craft training module
- Quality Coach training module
- Special modules
 - Special Module Techniques for renovation of old buildings
 - Special Module Installation of renewable energy systems

By this process the large scale and lasting approach can be warrant to ensure the implementation of 2020 targets and progression to nearly zero energy building standards.

As conclusion it can be said that it was not easy to implement the training modules on the market because of various market barriers such as mismatch between needed and available skills, lack of collaboration between different disciplines, lack of financial volume, deficient educational system etc. The findings of the project such as market analysis, stakeholder contact lists and developed training materials will be included in eCentral.



2.1.7. National initiative - The Science Tower

Name	<ul style="list-style-type: none"> The Science Tower in Graz, Styria
Initiators	<ul style="list-style-type: none"> Company "SFL technologies GmbH"
Location	<ul style="list-style-type: none"> City of Graz in Styria: Waagner-Biro-Strasse 100, North of event center "Helmut List-Halle"
Construction period	<ul style="list-style-type: none"> 5. May 2015 - 21. September 2017
Objectives & Usage	<ul style="list-style-type: none"> The Science Tower of the SFL technologies GmbH is the lighthouse of Smart City Graz. "Smart City Graz" received funding from the Austrian Climate and Energy Fund. Research Building for Urban and Green Technologies, office building
Building	<ul style="list-style-type: none"> Approx. 2.500 m² of building surface Approx. 215 m² seminar and meeting rooms 60 m total height / 45 m office building Approx. € 16 Million of construction costs (€ 4.2 public funding) Seminar room and smart urban gardening at the 13th floor The Science tower has a double-skinned facade that is cast on the outside as a cloak around the basic shape of a truncated cone standing on its tip and consists completely of orange and green coloured translucent photovoltaic panels in Grätzel technology. The inner facade is made of metal until the third floor and from there on out of larch wood. The wooden windows can be shut with perforated wooden doors to provide sun and heat protection. In the open state the inside of these wooden doors reflects the sunlight through the Grätzel cells and thereby (according to the position of the sun) illuminate the tower from the inside.
More information	<ul style="list-style-type: none"> www.info.science-tower.at/en/
Key findings for eCentral	<ul style="list-style-type: none"> Use of the building technology and building concept



2.1.7.1. Conclusion on the Science Tower in Graz

The Science Tower, constructed by the Styrian façade and plant manufacturer SFL technologies, is the lighthouse of Smart City Graz, which was funded as pilot project as “Smart City” Austria. The Science Tower, as an urban landmark, has a double-skinned façade that is cast on the outside as a cloak around the basic shape of a truncated cone standing on its tip, and partly consists of transparent energy glasses that convert light into electrical energy. Its operating mode is also called “artificial photosynthesis”.

In the clear-glass area of the tower a special thin glass with a thickness of less than three millimetres was used. This glass, developed by SFL, allows an ultra-light and still highly stressable performance of extensive façade elements.

The Science Tower is not only a building but a message for a liveable, urban future and synergy spring for science, technique and economy. ²²

For eCentral, it is recommended to consider the used building services and technologies for the three nZEB pilot renovations.

²² Source: <http://info.science-tower.at/en/>



2.1.8. National initiative - Governmental funding line "Thermische Gebäudesanierung für Gemeinden - Umfassende Sanierungen"

Name	<ul style="list-style-type: none"> • Funding line "Thermische Gebäudesanierung für Gemeinden - Umfassende Sanierungen" (engl. Thermal building renovations for municipalities"
Initiators	<ul style="list-style-type: none"> • Federal Republic of Austria, execution by KPC - Kommunal Kredit Public Consulting
Period	<ul style="list-style-type: none"> • Ongoing
Who can apply for funding?	<ul style="list-style-type: none"> • All Austrian municipalities
More details	<ul style="list-style-type: none"> • Funding items: <ul style="list-style-type: none"> • Thermal insulation improvement measures of public buildings that are older than 20 years • change of doors and windows • Heat recovery systems • shading systems for lowering the cooling demands • legal regulations regarding the heating energy demand must be reached (nZEB standard) and a significant reduction of the heating energy demand achieved • The funding amounts up to 18% of the eligible costs, but there must be additional funding granted by the federal states (at least 12% of the applied costs) • surcharge for use of sustainable insulation material and heating demand reduction of more than 50%
More information	<ul style="list-style-type: none"> • www.umweltfoerderung.at/gemeinden/sanierungsoffensive-umfassende-sanierung.html

2.1.8.1. Conclusion on Governmental funding line "Thermische Gebäudesanierung für Gemeinden - Umfassende Sanierungen"

This funding line provides subsidies for thermal insulation improvement measures of public buildings that are older than 20 years. The funding amounts up to 18% of the eligible costs. All Austrian municipalities are allowed to submit a funding request. The funding amount depends on the restoration quality. Requirements for the funding are:

- Staying below the requirements of the heating demand according to OIB guideline 6 (state 2015) or
- Significant reduction of the heating demand compared to the existing one

The funding amount is calculated by using funding rates that are related to the eligible costs of the environmental investment. Building extensions and parts for private use are deducted. The funding is awarded after the implementation of the project in form of a one-off, not repayable investment subsidy. The funding is restricted by € 0.88 per year and kWh heat demand or rather the required investment subsidy according to the online application.

Examples for eligible project parts:

Insulation of the exterior wall, insulation of the top-floor ceiling, insulation of the undermost ceiling, insulation, supporting construction of rear-ventilated facades, restructuring or rather exchange of windows and outer doors, installation of heat recovery systems in ventilation systems in the course of thermal restorations of the building, exterior shading systems for the reduction of the cooling demand of the building.

The application must be made before the first legally binding order of services (excl. planning services), before delivery, before start of construction or another obligation that makes the investment irreversible. A submission is possible until exhaustion of the budget.

All energy-efficiency measures that comply with §5(1) 8 EEffG and relate to the project being funded, need to be credited entirely towards the national environmental funding as strategic measurement according to §27(4) 2 EEffG. Crediting through third parties is (also proportionally) excluded. A participation of at least 12% of the applicable costs of the respective federal state must be guaranteed.²³

²³ Source: <https://www.umweltfoerderung.at/gemeinden/sanierungsoffensive-umfassende-sanierung/navigator/gebaeude-4/sanierungsoffensive-umfassende-sanierung.html>



2.1.9. National initiative - Governmental funding line “Mustersanierung”

Name	<ul style="list-style-type: none"> • Funding line "Mustersanierung" (engl. "exemplary renovations")
Initiators	<ul style="list-style-type: none"> • Federal Republic of Austria, execution by KPC - Kommunal Kredit Public Consulting
Period	<ul style="list-style-type: none"> • Annual limited funding campaign. Submission for funding in 2017 ended on 19th October 2017
Who can apply for funding?	<ul style="list-style-type: none"> • All natural and legal persons (for engaging in commercial activities) • Public institutions, regional authorities, tourist accommodations with more than ten beds, contractors, associations and confessional institutions
More details	<ul style="list-style-type: none"> • Comprehensive rehabilitation projects of operationally used and public buildings - annual funding volume € 800,000 • Funding of thermal insulation improvement measures (max. 40% of investment costs) • Application measures for renewable energy sources (max. 25% of investment costs) • Energy-efficiency improvement measures • surcharge for renovations to passive house or plus energy standard • Obligation to install an energy demand monitoring system - data are possibly analysed and published • in the first year of operation, the building service technologies must be tested and optimized by external experts
More information	<ul style="list-style-type: none"> • www.umweltfoerderung.at/betriebe/mustersanierung.html
Key findings	<ul style="list-style-type: none"> • Successful Austrian funding line for companies and the public with useful criteria



2.1.9.1. Conclusion on initiative Governmental funding line “Mustersanierung”

This Austrian governmental funding line “Mustersanierung” (engl.: exemplary renovations) provides subsidies for comprehensive rehabilitation projects (e.g. thermal insulation improvement measures, application measures for renewable energy sources or energy-efficiency improvement measures) of operationally used and public buildings.

Authorised for application are all natural and legal persons (for engaging in commercial activities) as well as public institutions, regional authorities, tourist accommodations with more than ten beds, contractors, associations and confessional institutions.

Before the application, applicants need to register on the website of the “Klima- und Energiefonds”, before the submission is made online. The application must be made before the first legally binding order of services (excl. planning services), before delivery, before start of construction or another obligation that makes the investment irreversible. Here, the earliest of these dates is decisive. All important information and funding criteria can be found in the guideline and on the website of the Klima and Energiefonds.²⁴

As a conclusion it can be said that the funding line is quite successful in Austria. On the hand it is necessary to offer funding to owners of public buildings, since the lack of financial means is often considered as great barrier for implementing innovative (and more expensive) refurbishments of public buildings. The obligation of installing a building monitoring system and providing measurement data for the public mainly contributes to promoting successful and innovative refurbishments of public buildings. Additionally, the need of testing the building services technologies after the first year of operation by experts ensures an efficient use of the new installed building techniques. This also contributes to achieve high energy savings after the high-quality renovations. In these terms, it is recommended to apply these two measures for the three renovations which will take place in the eCentral project.

2.2. Croatia

In Croatia, official nZEB standard was introduced in 2014 as part of Technical regulation on rational use of energy and thermal protection in buildings. Even before the 2014, there has been many educational and promotional activities- from European projects where Croatia had a representative (i.e. IEE project SUSTAINCO, 2011) to local and regional events (nZEB Regional Conference in Dubrovnik, 2014). The following national initiatives are described below: National legislation on nZEB standard; National plan for increasing the number of nZEB buildings; Implementation of EE&RES measures in public buildings; nZEB workshop for professionals.

In Croatia, official nZEB standard was introduced in 2014th as part of *Technical regulation on rational use of energy and thermal protection in buildings*. Even before the 2014, there has been many educational and promotional activities- from European projects where Croatia had a representative (i.e. IEE project SUSTAINCO, 2011) to local and regional events (nZEB Regional Conference in Dubrovnik, 2014). The following national initiatives are described below: National legislation on nZEB standard; National plan for increasing the number of nZEB buildings; Implementation of EE&RES measures in public buildings; nZEB workshop for professionals.

²⁴ <https://www.umweltfoerderung.at/betriebe/mustersanierung/navigator/gebaeude-4/mustersanierung-1.html>



2.2.1. National initiative - National legislation on nZEB standard

Name	<ul style="list-style-type: none"> National legislation on nZEB standard
Initiators	<ul style="list-style-type: none"> Republic of Croatia- Ministry of Construction and Physical Planning
Geographical scope	<ul style="list-style-type: none"> Republic of Croatia
Period	<ul style="list-style-type: none"> 2014 until today
Objectives	<ul style="list-style-type: none"> Definition of nZEB according to eight types of reference buildings
Methodology	<ul style="list-style-type: none"> There are eight building categories for which nZEB needs to be applied- single family buildings, multiple dwellings, office buildings, educational buildings, sport halls, hotel&restaurant buildings, hospitals, shopping centres. The standard is directly defined by the use of primary energy and percentage of renewables (minimum of 30%)
Output	<ul style="list-style-type: none"> nZEB building standard is, for now, defined only for new-builds From 31.12.2018 all new public buildings are nZEBs From 31.12.2020 all new buildings are nZEBs
More information	<ul style="list-style-type: none"> https://narodne-novine.nn.hr/clanci/sluzbeni/2015_11_128_2428.html



2.2.1.1. Conclusion on Croatian nZEB legislation

Croatia is one of the 11 member states of the European Union that has fulfilled its obligation to define a nZEB building standard. The Energy Efficiency Directive 2010/31/EU defines requirements that each member state must meet in terms of energy performance of buildings. One part of the Directive refers to approximately zero energy buildings that are defined by the Directive as buildings with very high energy efficiency. This, approximately zero, or very low amount of energy should be covered to a considerable extent by energy from renewable sources, including renewable energy produced in or near the building. All of these requirements were met in Croatia's *Technical regulation on rational use of energy and thermal protection in buildings* in 2014th and the deadlines were defined.

Project eCentral will use defined standard for pilot project (reconstruction) in Sv.Nedelja and therefore follow all technical and legal requirements defined in Technical regulation.



2.2.2. National initiative - National plan for increasing the number of nZEB buildings

Name	<ul style="list-style-type: none"> National plan for increasing the number of nZEB buildings by 2020
Initiators	<ul style="list-style-type: none"> Republic of Croatia- Ministry of Construction and Physical Planning
Geographical scope	<ul style="list-style-type: none"> Republic of Croatia
Period	<ul style="list-style-type: none"> 2014-2020
Objectives	<ul style="list-style-type: none"> Long-term strategy/plan for increasing the number of nZEB buildings in Croatia
Methodology	<ul style="list-style-type: none"> Overview of current building practice and types of buildings-creation of cause Overview of available financial mechanisms and instruments for promotion of nZEBs- aftermath
Output	<ul style="list-style-type: none"> Reference buildings for nZEB List of available financial mechanisms Plan for increasing the number of nZEB buildings by 2020
More information	<ul style="list-style-type: none"> http://www.mgipu.hr/doc/Propisi/PLAN_PBZ_0_energije_do_2020.pdf



2.2.2.1. Conclusion on the national plan for increasing nZEBs

Croatia's standards for the design and construction of residential and non-residential buildings to nZEB level and belonging deadlines were defined in *Technical regulation on rational use of energy and thermal protection in buildings (Official Gazette 130/14)*. As all other member states with nZEB definition in place Croatia is obliged to ensure that by 31 December 2020 all new buildings are nZEBs, and all new buildings in which they are resident and owned by public authorities have these properties after 31 December 2018. Plan for increasing the number of nZEBs by 2020 gives a brief overview of current state in building stock-year of construction, energy consumption, etc. In that way it leads us to a somehow 'natural' conclusion of need for change. Here comes the nZEB standard and outlook for future buildings. Especially useful chapters are those with available financial mechanisms for this type of construction, as well as detailed display of reference buildings- from optimal building orientation to envelope composition and U values.

Project eCentral could/will use the material condensed within this document for educational purposes and for planning of Croatia's pilot project.



2.2.3. National initiative - Implementation of EE&RES

Name	<ul style="list-style-type: none"> Implementation of EE&RES measures in public buildings- public call
Initiators	<ul style="list-style-type: none"> Republic of Croatia- Ministry of Construction and Physical Planning; The Environmental Protection and Energy Efficiency Fund; European Fund for Regional Development
Geographical scope	<ul style="list-style-type: none"> Republic of Croatia
Period	<ul style="list-style-type: none"> 2015 until today
Objectives	<ul style="list-style-type: none"> Encouraging and co-financing deep renovation of public buildings Required energy savings after the implementation of EE&RES measures- >50%
Methodology	<ul style="list-style-type: none"> Desirable buildings- under the ownership and/or occupied by public bodies >50% required energy savings (heating/cooling) in comparison to the current energy consumption Acceptable costs: Project design documentation, Renovation works, Supervision, Promotional activities, Project management and administration, Energy audit & energy certificate
Output	<ul style="list-style-type: none"> From 2015 more than 200 renovated public buildings (schools, kindergartens, etc.) with the same number of newly signed contracts for renovation
More information	<ul style="list-style-type: none"> https://strukturnifondovi.hr/natjecaji/energetska-obnova-koristenje-obnovljivih-izvora-energije-zgradama-javnog-sektora/



2.2.3.1. Conclusion on Implementation of EE&RES

The purpose of the call is to support the implementation of energy efficiency and renewable energy measures in public sector buildings which will result in a reduction of annual energy consumption (kWh/year) by at least 50% compared to the current annual heating/cooling energy consumption. Project eCentral could use renovated buildings as an example of good/bad practice. Especially those whose renovation is in line with the current nZEB standard definition.



2.2.4. National initiatives - nZEB workshops for professionals

Name	<ul style="list-style-type: none"> nZEB workshop for professionals
Initiators	<ul style="list-style-type: none"> Association of Croatian Architects; The Environmental Protection and Energy Efficiency Fund
Geographical scope	<ul style="list-style-type: none"> Republic of Croatia
Period	<ul style="list-style-type: none"> 2015
Objectives	<ul style="list-style-type: none"> Education of building professionals on following topics: modern energy concept of buildings, legislative framework, energy renovation of buildings protected as cultural heritage, nZEB project design phase
Output	<ul style="list-style-type: none"> more than 50 professionals attended the workshop one of the first nZEB based workshop organized Energy Institute "Hrvoje Pozar" included the participation to this workshop as part of their 'internal' education programme
More information	<ul style="list-style-type: none"> https://www.arhitekti-hka.hr/hr/novosti/dogadanja/projektiranje-zgrada-gotovo-nulte-energije,1910.html
key findings for eCentral	<ul style="list-style-type: none"> first hand information on best practice in project design scope of work interdisciplinary approach (engineers and architects)



2.2.4.1. Conclusion on nZEB workshops for professionals

This education, with its professional program, directly contributed to the education of architects and other participants in the construction and to the understanding of the new legislative frameworks. The basic content of education was the consideration of modern solutions to the energy concept of buildings both in the reconstruction of existing ones and in the construction of new buildings. Education has covered the legislative framework, new materials, design of nZEB, modern energy concepts in buildings, energy reconstruction of buildings and the possibility of using EU and HR funds for projects to increase energy efficiency and use of renewable energy sources.

Project eCentral could use the external expertise of members of Association of Croatian Architects when it comes to nZEB workshops which will be organized within the project.



2.3. Hungary

The most remarkable Hungarian initiatives are described below.

2.3.1. National initiative - Hungarian network of Energy Advisers

Name	<ul style="list-style-type: none"> National Network of Energy Advisors
Initiators	<ul style="list-style-type: none"> Hungarian Ministry of Development
Geographical scope	<ul style="list-style-type: none"> Hungary
Period	<ul style="list-style-type: none"> since 01.2017
Objectives	<ul style="list-style-type: none"> Free support for local authorities with expertise and technical assistance in energy efficiency investments and in energy-service procuring In consequence to foster achievement of the EU objectives on energy efficiency To revise and monitor the energy consumption and efficiency of public buildings Data for strategic planning
Methodology	<ul style="list-style-type: none"> Trainig for the members of the network by the Hungarian Energy and Public Utility Regulatory Authority (HEPRA), the expertise and qualification of the Advisors are also specified Template for the public buildings' operators to fill in in every 5 years on planned 'Energy Saving Actions' Executed energy saving actions should be monitored and reported to the Network On-line platform where monthly energy consumption datas should be uploaded for each public building Awareness raising activites
Output	<ul style="list-style-type: none"> 76 local offices of the National Network of Energy Advisors on-line database for energy consumption of public buildings
More information	<ul style="list-style-type: none"> www.enhat.mekh.hu/index.php/kozintezmenyek/
key findings for eCentral	<ul style="list-style-type: none"> channel to the local authorities important stakeholders



2.3.1.1. Conclusion on national initiative ‘National Network of Energy Advisors’

To foster achievement of the EU objectives on energy efficiency and in accordance with the national regulation on energy efficiency, the Hungarian Ministry of Development has launched the National Network of Energy Advisors in January 2017. The Network cover all the country, could be reached in each county easy at governance offices. The Network helps local public authorities and public building maintainers to plan and implement energy saving activities. Meanwhile public building maintainers have been obligated to gather monthly energy data of the buildings for better local and national planning, to elaborate local energy efficiency action plans following a given template and to revise them year to year. In addition, awareness raising activities should be implemented as well, supported and guided by Hungarian Energy and Public Utility Regulatory Authority.²⁵

However, the efficiency and success of the Network is still a question and depends of the facility and agility of its members, hopefully it will work and support local stakeholders.

The Network could be a channel to local authorities and important stakeholder of e-Central project, but it must be considered that firstly a list of concerned civil servants should be mapped. The reach of the on-line database on energy data of public buildings is also doubtful in this phase.

²⁵ www.enhat.mekh.hu/index.php/kozintezmenyek/



2.3.2. National initiative - Knowledge transfer by conferences

Name	<ul style="list-style-type: none"> • Knowledge transfer by conferences on nZEB regulation and related possibilities
Initiators	<ul style="list-style-type: none"> • Hungarian Energy Efficiency Institut
Geographical scope	<ul style="list-style-type: none"> • the biggest cities of Hungary
Period	<ul style="list-style-type: none"> • 05.2016-11.2017
Objectives	<ul style="list-style-type: none"> • To raise awareness and provide information to stakeholders on energy efficiency and EU/national EE objectives, especially on nzeb regulation • To show that new regulations on nzeb is rather a possibility • To introduce new technologies and innovative possibilities in financing • To find out the position of the sector in nzeb regard, and what shell the stakeholders do to be more prepared for the changes
Methodology	<ul style="list-style-type: none"> • Partnership with Climate Alliance, with companies interested in EE technologies and with experts • General conferece and regional trainig days with recognised experts and moderators, round-table sessions • Organising local events (not only in the capital) to reach more stakeholders • Conference has been organised in the frame of project "CITYnvest" (Horizon2020)
Output	<ul style="list-style-type: none"> • 1 conference for local authorities and 4 traning days • pool of interested stakeholders • good relation with the presenters
More information	<ul style="list-style-type: none"> • http://mehi.hu/sites/default/files/invitation_letter_12_may.pdf • http://mehi.hu/rendezveny/korszakvaltas-az-energiatekonysagban-teher-vagy-lehetoseg • http://mehi.hu/rendezveny/az-onkormanyzatok-lehetosegei-az-energiatekony-telepulesek-megvalositasara • http://www.citynvest.eu/
key findings for eCentral	<ul style="list-style-type: none"> • pool of interested stakeholders • pool of experted presenters in the field of EE and nzeb



2.3.2.1. Conclusion on knowledge transfer by conferences

Hungarian Energy Efficiency Institut (HEEI) has been funded to gather relevant information and to present position papers on EE policies to national authorities, to fill the gap in the national authorities' activities regarding knowledge transfer on energy efficiency. However, Hungary has a great potential in energy efficiency, in particular in the building sector, the public stakeholders lack information and funds to finance these types of investments. That is why the trainings and other events on energy efficiency investments are so elementary needed.

The events have been organised in Budapest and in 4 regional centres of Hungary with success and planned to be continued in 2018 as well.

As HEEI is the member of the ASG of e-Central project, experiences could be transferred to WP T2, the lecturers of the events could be invited to present at the nZEB trainings of the project if their expertise would fit the curriculum.

2.3.3. National initiative - Best practices from Pioneer BP13

Name	<ul style="list-style-type: none"> nZEB public buildings in Budapest XIII. District
Initiators	<ul style="list-style-type: none"> Municipality of Budapest XIII. District
Geographical scope	<ul style="list-style-type: none"> Budapest XIII. District
Period	<ul style="list-style-type: none"> since 2013
Objectives	<ul style="list-style-type: none"> To achieve the objectives of the local climate strategy To get cost- and energy effective public buildings
Best practices	<ul style="list-style-type: none"> Certified passive apartment house to rent with 100 flats, built in 2013-2014, monitored - pioneer in Central-Europe as well, honoured by FIABCI (http://www.fiabci.org/) Mesés kert Kindergarten: certified passive public building, built in 2015-2016 - app. 4.200.000 EUR Passive apartment house to rent (Kartács street), 5 floors, 23 flats, with heat pumps - app. 3.200.000 EUR - under implementation
Output	<ul style="list-style-type: none"> 1st certified public buildings in Hungary, one of them pioneer in CE as well
More information	<ul style="list-style-type: none"> www.epiteszforum.hu/meses-lett-a-meseskert-ovoda www.epiteszforum.hu/szazlakasos-passzivhaz www.kozszolgaltato.bp13.hu/beruhazas/hirek/20170914-bokretaunnepseg-a-kartacs-utca-14-cimen-epulo-23-lakasos-onkormanyzati-berhaz-epitkezésen/
key findings for eCentral	<ul style="list-style-type: none"> best practice examples

2.3.3.1. Conclusion on BP13 Budapest as pioneer

Upon our experiences attractive best practices are very useful in conviction and awareness raising activities. To show that all is possible what we are talking about, e-Central project needs a couple of flagship municipalities with successfully implemented nZEB projects.

BP13 bears the capacity and motivation to be one of them, its climate strategy is one of the 1sts in Hungary. Fortunately, this Municipality has enough resources to develop, but this should be slim without strategic, professional and innovative approach. Step by step, one investment after the other and the District become the most prestigious one on the energy and climate side - however with a strong industrial foreground, it isn't the most popular one for the tourists.

The most important ZEB investments in the district are:

- Certified passive apartment house to rent with 100 flats, built in 2013-2014, monitored - pioneer in Central-Europe as well, honoured by [FIABCI](#)
- Meséskert Kindergarten: certified passive house public building, built in 2015-2016 - app. 4.200.000 EUR
- Passive house apartment house to rent (Kartács street), 5 floors, 23 apartments, with heat pumps - app. 3.200.000 EUR - under implementation

It should be underlined that with these cases that municipalities are role models for the residents and have an important position in awareness raising.

2.4. Italy

In Italy, there are several actions organized to disseminate the nZEBs target. The selected initiatives are five, two located in the North of Italy, and other three presented all over the country. Three of these initiatives organize events and seminars on nZEBs and other topics.

Another initiative is the CasaClima Agency of Bozen, Italian region "Alto Adige - South Tyrol". The CasaClima Agency is manager of the energy certification process and verification of the energy performance level achieved. The latest initiative, organized by CasaClima Agency, is the CasaClima Awards. A price that aims to define the nZEBs built or renovated ones.

All these initiatives have positive aspects to be used in the eCentral project:

- Best practice examples and case studies
- Use the assessment criteria for development of EPC tool and national strategies
- Use regional contact points for transferring the key messages
- Use knowledge transfer (publications, workshops, etc.)
- Promotion and knowledge transfer through organization of events, courses and fairs.
- Organization of nZEBs awards

2.4.1. National initiative - Energy Agency CasaClima

Name	<ul style="list-style-type: none"> • Agenzia per l'Energia Alto Adige - CasaClima
Initiators	<ul style="list-style-type: none"> • Autonomous province of Bolzano/Bozen
Geographical scope	<ul style="list-style-type: none"> • Compulsory in the province of Bolzano. • Optional in other territories.
Period	<ul style="list-style-type: none"> • since 2002
Objectives	<ul style="list-style-type: none"> • objective is to launch and promote high energy efficiency buildings, and reduce the energy consumption reducing the heating, cooling and electric demands. • CasaClima provides education and training of professionals, construction and gives advice and cooperates with a large network of partners. • Promoting energy-efficient and ecological buildings and renovation measures in South Tyrol • Declaration of buildings built or renovated according to the CasaClima standards. The Standard CasacaClima A, Gold, Nature comparable to nZEB standard • Quick and transparent building quality assessment.
Methodology	<ul style="list-style-type: none"> • Building standard - certifies buildings that combine highest energetic and ecological standards with professional implementation • Declaration - in three categories: (1) planning, (2) built and (3) operation phase. • Criteria catalogue - applicable for all building categories and divided in four valuation criteria: (1) location & quality assurance, (2) energy & supply, (3) building material & construction, (4) comfort & indoor air quality.
Output	<ul style="list-style-type: none"> • 8,780 new buildings are certificated CasaClima, about 800 buildings/year • Organization of events, conference and fairs. The most important one is CasaClima Fair, organized at the end of January in Bolzano (IT), with 37.500 visitors and 460 exhibitors in the 2017 • Organization of training courses on high energy efficient buildings, sustainability, ecological approaches, and editing of books, brochures and flyer • Organization of the CasaClimaAward: the best CasaClima realized each year. • Support in the organization of the visit tours at nZEBs
More information	<ul style="list-style-type: none"> • www.agenziacasaclima.it/it/home-1.html
Key findings for eCentral	<ul style="list-style-type: none"> • Information on high energy efficient buildings (nZEB buildings), indoor comfort, sustainability concepts and design processes • Promotion and knowledge transfer through organization of events, courses and fairs. • Interdisciplinary approach • Building quality assessment method for EPC tool • Transparency of processes (e.g. building assessment) • Calculation of the CO2 impact

2.4.1.1. Conclusion on Energy Agency CasaClima

CasaClima is the Energy Agency of Italian region “Alto Adige - South Tyrol”. It takes place in Bolzano, a town in the north of Italy and Middle Europe.

The CasaClima Agency is manager of the energy certification process and verification of the energy performance level achieved. The CasaClima certification is a mandatory authorization for new and renovated buildings. Since more than ten years, the programme is very successful in Alto Adige-South Tyrol region. Currently, 8780 new buildings are certificated CasaClima, about 800 buildings/year.

Within the CasaClima certification, there are several standards, in relation to the final energy performance achieved and use of the building typologies (residential, school, office, etc...). Buildings with the standard CasaClima A or higher (Gold and Nature) can be considered as nZEBs.

The procedure to receive the CasaClima standard is composed by two important steps. The first check comes during the design process, and the second one during the construction process. Furthermore, an external expert of the working team (design team, owner or investors) is involved in the verification process.

CasaClima provides education and training of professionals, construction and gives advice and cooperates with a large network of partners.

In order to disseminate the knowledge learnt, on the CasaClima Agency’s website there are several available documentations (books, brochures and flyers) on high-energy efficient buildings, sustainability, ecological approaches and tools on calculation of the energy performance or CO₂ impacts, to download.

Each year, the CasaClima Agency organizes one of the most important national fairs on high energy efficiency buildings and quality of the building construction, called “CasaClima”. This year (2017) 37.500 visitors and 460 exhibitors were involved in it.²⁶

The following bullet points can be used within the eCentral project:

- CasaClima standard, verification process and energy performance tool
- Information on energy performance renovation measures
- Regional contact point to disseminate the eCentral results and the knowledge transfer
- Active involvement on organization of workshops, editing of documentation, etc.

The implementation approach can be included in the eCentral project and its main findings adapted to Central Europe region’s needs.

²⁶ Source: www.agenziacasaclima.it/it/home-1.html



2.4.2. National initiative 2 - CasaClima Awards

Name	<ul style="list-style-type: none"> • Agenzia per l'Energia Alto Adige - CasaClima
Initiators	<ul style="list-style-type: none"> • Autonomous province of Bolzano/Bozen
Geographical scope	<ul style="list-style-type: none"> • Promote the CasaClima buildings of the year
Period	<ul style="list-style-type: none"> • From 2015 until today
Objectives	<ul style="list-style-type: none"> • CasaClima Award aims to define the beautiful buildings built or renovated each year. • Minimum requirement to participate is the standards CasaClima A. • There are several prizes, in relation to the building use
Methodology	<ul style="list-style-type: none"> • CasaClima Award Criteria: (a) minimum CasaClima standard A, (b) innovation aspects, (c) building construction characteristics, (d) sustainability, (e) comfort & indoor air quality...
Output	<ul style="list-style-type: none"> • 8780 new buildings are certificated CasaClima, about 800 buildings/year • Organization of the CasaClimaAward: the best CasaClima realized each year.
More information	<ul style="list-style-type: none"> • www.casaclima-awards.it/it/wilkoemmen-bei-uns-1.html
key findings for eCentral	<ul style="list-style-type: none"> • Building quality assessment • High energy performance buildings



2.4.2.1. Conclusion on initiative 2

CasaClima is the Energy Agency of Italian region “Alto Adige - South Tyrol”. It takes place in Bolzano, a town in the north of Italy and Middle Europe.

The CasaClima Agency is manager of the energy certification process and verification of the energy performance level achieved. The CasaClima certification is a mandatory authorization for new and renovated buildings. Since more than ten years, the programme is very successful in Alto Adige-South Tyrol region. Currently, 8780 new buildings are certificated CasaClima, about 800 buildings/year.

Within the CasaClima certification there are several standards, in relation to the final energy performance achieved and use of the building typologies (residential, school, office, ...).

Buildings with the standard CasaClima A or higher (Gold and Nature) are considered nZEBs. This kind of buildings can participate at the CasaClima Award. The CasaClima Awards have several prizes in relation to the building use. In 2017, the CasaClima Award was the third edition of the prize. ²⁷

²⁷ Source: www.casaclima-awards.it/it/wilkoemmen-bei-uns-1.html



2.4.3. National Initiative - Enertour

Name	<ul style="list-style-type: none"> Alto Adige - energia da esplorare - Enertour
Initiators	<ul style="list-style-type: none"> IDM Innovation, Development e Marketing (ex TIS innovation park) in conjunction with the South Tyrol Savings Bank Foundation.
Geographical scope	<ul style="list-style-type: none"> Province of Bolzano
Period	<ul style="list-style-type: none"> 2007 until today
Objectives	<ul style="list-style-type: none"> The purpose of enertour is to disseminate the knowledge and know-how learnt from built case studies. new practical technological solutions to benefit a more sustainable energy. Building standard - certifies buildings that combine highest energetic and ecological standards with professional implementation
Methodology	<ul style="list-style-type: none"> Enertour is an initiative that consists of technical visits to CasaClima buildings, installations of renewable energy systems and municipal systems. During an enertour, the planner and managers of the systems and buildings give directly on the location explanations on the technical and economic aspects. During the enertour is presented the design approach used, the experts involves, the problems found, the method used to choose the technologic solutions, the integration with owners and tenants and architectonic, economic and energy requiremnts.
Output	<ul style="list-style-type: none"> More than 10.000 visitors have so far taken part in an enertour.
More information	<ul style="list-style-type: none"> www.enertour.bz.it/en
key findings for eCentral	<ul style="list-style-type: none"> Practical technological solutions for energy-saving renovation Sharing of real experiences and explanations on the technical and economic aspects Information on best practice CasaClima buildings



2.4.3.1. Conclusion on Enertour

Enertour is an initiative of IDM Südtirol-Alto Adige (Innovation, Development e Marketing, ex TIS innovation park) in conjunction with the South Tyrol Savings Bank Foundation. IDM provides services for companies in the areas of innovation, export and investment promotion, and is responsible for the economic development of the location as well as for marketing South Tyrol and its products.

The aim of Enertour is to present and disseminate the most up-to-date knowledge and experience in the sustainable energy sector. Participants will be able to check out the functionality of the latest technologies and at the same time will receive detailed information from the site planners and operators, who will personally lead the tour.

More than 8.700 new buildings have been certificated within CasaClima, the South Tyrol certification for sustainable buildings, and more than 4,000 buildings are located in the region. This has permitted to offer a wide variety of themes and projects to present during the Enertours, from the energy generation plants from renewable sources (biomass districts, wood gasification, biogas, hydroelectric stations, solar systems, etc.), low energy buildings (residential, offices, schools, hotels, museums, buildings), new and renovated ones, private and publics, nZEBs, and smart and city mobility projects and actions.

Some achievements in numbers:

- 150 different sites can be visited in South Tyrol
- more than 10,000 persons from all the over the world have participated in the Enertour
- more than 100 partners joint in the expert networks.

Enertour is an initiative that permits to share the experiences and technical knowledge, favouring the over cross the same technical problems. ²⁸

The initiative can be repeated in other countries and case studies involved within eCentral project. These visit tours can support the dissemination of results and improve the knowledge on high energy efficient buildings.

²⁸ Source: www.enertour.bz.it/en

2.4.4. National Initiative - EDIFICI2020

Name	<ul style="list-style-type: none"> • EDIFICI 2020
Initiators	<ul style="list-style-type: none"> •ANDIL (Associazione Nazionale degli Industriali dei Laterizi) •C21 ITALIA (Construction21,Italia) •ACER (Azienda Casa Emilia-Romagna, Reggio Emilia) •Maggioli Editore
Geographical scope	<ul style="list-style-type: none"> • Treviso, Bergamo, Asti, L'Aquila, Bari
Period	<ul style="list-style-type: none"> • 2014-2015
Objectives	<ul style="list-style-type: none"> •EDIFICI2020 aims to disseminate the energy efficiency in buildings, presenting the energy performance requirements, introducing the innovative energy laws and simulation tools, and presenting the positive case studies.
Methodology	<ul style="list-style-type: none"> •EDIFICI2020 organized events, conferences and workshops on energy efficiency in buildings. •During an events several experts are invited to present them experiences, the innovative procedures, or the energy requirements defined by laws
Output	<ul style="list-style-type: none"> •Several topics are presented and discussed in particular on: nearly Zero Energy Buildings, Net zero energy buildings, Road show buildings2020, Energy Performance Certification, and energy performance renovations measures... •Several articles are available from the website. •more than 14 companies involved, more than 4000 registered, about 600 participants at each events.
More information	<ul style="list-style-type: none"> •www.edifici2020.it
key findings for eCentral	<ul style="list-style-type: none"> •Presentation of energy performance laws, tools and procedures •Introduction to energy performance solutions and technological systems for energy-saving renovation •Sharing of real experiences, technical and economic aspects



2.4.4.1. Conclusion on EDIFICI2020

EDIFICI2020 is an initiative of ANDIL (Associazione Nazionale degli Industriali dei Laterizi), C21 ITALIA (Construction21, Italia), ACER (Azienda Casa Emilia-Romagna, Reggio Emilia) and Maggioli Editore, supported by 14th companies who works in the building sector.

EIDIFICI2020 organized in 2014 and 2015, some events, conferences and workshops on energy efficiency in buildings in several city, such as Treviso, Bergamo, Asti, L'Aquila, Bari.

The aim of EDIFICI2020 is to present and disseminate the nZEBs and the energy performance topic. Several experts are invited to present and discuss:

- nearly Zero Energy Buildings
- Net zero energy buildings
- energy performance requirements as defined by laws
- Road show buildings2020
- Energy Performance Certification
- energy performance renovations measures

Some achievements in numbers:

- more than 4,000 registered at the newsletters
- about 600 participants at each event
- Several articles are available from the website.²⁹

EIDIFICI2020 is an initiative that permitted to share the technical knowledge on nZEBs, energy performance requirements, and experiences. The initiative can be repeat in other countries and case studies involved within eCentral project. These visit tours can support the dissemination of results and improve the knowledge on high-energy efficient buildings.

²⁹ Source: www.edifici2020.it



2.4.5. National Initiative - Future Build Meeting Tour 2017

Name	<ul style="list-style-type: none"> • Future Build Meeting Tour 2017
Initiators	<ul style="list-style-type: none"> • Maggioli Editore
Geographical scope	<ul style="list-style-type: none"> • Italy
Period	<ul style="list-style-type: none"> • 2017
Objectives	<ul style="list-style-type: none"> • Organization of seminars and workshops
Methodology	<ul style="list-style-type: none"> • It is an initiative that consists of technical visits to CasaClima buildings, installations of renewable energy systems and municipal systems. • During a tour, the planner and managers of the systems and buildings give directly on the location explanations on the technical and economic aspects. • During the tour the used design approach is presented, the experts involved, the problems found, the method used to choose the technologic solutions, the integration with owners and tenants and architectonic, economic and energy requirements.
Output	<ul style="list-style-type: none"> • More than 1400.000 experts involved • 40 seminars organized each year
More information	<ul style="list-style-type: none"> • www.maggioliadv.it/convegni-tecnici/
key findings for eCentral	<ul style="list-style-type: none"> • High energy efficient buildings • energy performance requirements • energy performance renovation measures

2.4.5.1. Conclusion on Future Build Meeting Tour 2017

Future Build Meeting Tour 2017 is an initiative of Maggioli editore.

The aim of Future Build Meeting Tour 2017 is to present and disseminate the law requirements on several topics:

- High energy performance buildings
- School buildings
- Safety in buildings
- Fire prevention
- Internal comfort and sustainability
- Urban recovery

The events are organized in collaboration with the University, chambers of architects and the private companies. More than 140.000 building professionals are involved in these events, and in the 2017, about 40 events were organized in Italy. Future Build Meeting Tour 2017 is an initiative that permits to present the updates on several topics and support the building professionals to pursue the building targets as defined by laws.³⁰

2.5. Slovenia

In Slovenia, several initiatives regarding nZEBs are currently ongoing or already finished. The foundation for classification of an nZEB is the underlying legal regulation.

In June 2010, pursuant to the Recast EPBD, Slovenia adopted the Rules on Efficient Use of Energy in Buildings (PURES 2010), which introduces the methodology for calculating the indicators of energy efficiency in buildings in accordance with the CEN EPBD standards or the SIST EN ISO 13790 standard, and lays down the minimum energy-efficiency requirements for new buildings and the major renovation of existing buildings; it also prescribes the minimum requirements relating to maintenance and technical improvements (prior to the end of the lifecycle of an individual element, system or sub-system of a building). PURES 2010 laid down requirements for all public buildings that were 10% more stringent. One important new feature of PURES 2010 is the requirement for a share of renewables in overall end-use energy for the operation of (all) systems in buildings of at least 25 %, which is deemed to have been met in the following cases as well:

If the share of end-use energy for heating and cooling of a building and the preparation of hot water is obtained in one of the following ways:

- at least 25% from solar radiation,
- at least 30% from gaseous biomass,
- at least 50% from solid biomass,
- at least 70% from geothermal energy,
- at least 50% from ambient heat,

³⁰ Source: www.maggioliadv.it/convegni-tecnici/



- at least 50% from high-efficiency CHP installations in compliance with the regulation governing support for electricity generated in the high-efficiency co-generation of heat and power,
- the building is supplied to at least 50% from a system of energy-efficient district heating or cooling,
- or if the heat required for heating is at least 30% lower than the limit value referred to in Article 7 of PURES 2010,
- or for single-family houses: if solar collectors with a light surface of at least 6 m² and an annual yield of at least 500 kWh/(m²a) have been installed.

PURES 2010 sets strict minimum requirements for thermal insulation of the envelope (opaque elements, windows and doors) and the maximum permitted annual heat requirement for heating. Together with the prescribed 25 % of renewable sources in overall end-use energy for operation of the systems in the building and the technical requirements for the systems (gas-fired condensing boilers, the required COP for heat pumps, the required efficiency of ventilation recovery systems, the compulsory use of renewable sources in DHW systems), it constitutes a key part of the minimum requirements for energy-efficient buildings.

While primary energy for heating and cooling is defined somewhat loosely, with stricter provisions envisaged as part of the updating of the Rules.

The following figure shows the minimum requirements of PURES 2010 for the construction of new buildings and for major renovations of buildings from beginning 2015 on:

Minimum requirements for the construction of new buildings and the major renovation of buildings under PURES 2010, entry into force of which is envisaged from the beginning of 2015:

The maximum permissible annual heat for heating Q_{NH} of the building (from 31 December 2014), converted into a unit of conditioned surface area A_u or volume V_e of the building, may not exceed:

- for residential buildings: $Q_{NH}/A_u \leq 45 + 60 f_0 - 4.4 T_L$ (kWh/(m²a))
- for non-residential buildings: $Q_{NH}/V_e \leq 0.32 (45 + 60 f_0 - 4.4 T_L)$ (kWh/(m³a))
- for public buildings -10%: $Q_{NH}/V_e \leq 0.29 (45 + 60 f_0 - 4.4 T_L)$ (kWh/m³a)

The maximum permitted annual requirement for cooling Q_{NC} of a residential building, converted into a unit of cooled building surface area A_u , may not exceed:

- for residential buildings: $Q_{NC}/A_u \leq 50$ kWh/(m²a)

The maximum permitted annual primary energy for the operation of systems in a building Q_p , converted into a unit of heated building surface area A_u , may not exceed:

- for residential buildings: $Q_p/A_u = 200 + 1.1 (60 f_0 - 4.4 T_L)$ kWh/(m²a)

The maximum permitted values U_{max} for individual building elements of the thermal envelope of the building are given in Table 1.

The coefficient of the maximum permitted specific transmission heat losses through the surface of the thermal envelope of the building A , determined by the formula H'_T (W/m²K) = H_T/A , may not exceed

$$H'_T \leq 0,28 + \frac{T_l}{300} + \frac{0,04}{f_0} + \frac{z}{4};$$

where T_l is the average annual air temperature (°C) and with the proportion of glazed surfaces in the envelope (-).

Public buildings:

- The minimum requirements are 10% stricter for public buildings, i.e. 90% of the level of the general minimum requirements.

Figure 4: Requirements according to PURES 2010³¹

³¹http://www.izs.si/fileadmin/dokumenti/aktualno/aktualno-letno-2014/AN_sNES_Slovenija.pdf

A national study of cost-optimal level of minimum requirements for 18 reference buildings in 2014 showed³² that the existing minimum requirements for new residential buildings for primary energy prescribed by PURES 2010 are not strict enough (deviation of -14% for new buildings between the calculated cost-optimal level and minimum requirements). The figure below shows the reference buildings for the cost-optimal study in Slovenia.



Figure 5: Slovenian reference buildings for cost-optimal study³³

Based on this analysis, the national nZEB definition in Slovenia was developed. It is written down in a national action plan and defines the primary energy demand as main performance indicator for nZEBs.

³² <http://www.buildup.eu/sites/default/files/content/ca3-2016-national-slovenia-web.pdf>

³³ <http://www.buildup.eu/sites/default/files/content/ca3-2016-national-slovenia-web.pdf>

2.5.1. National initiative - Official national plan for increasing the number of nZEB buildings in Slovenia

Name	<ul style="list-style-type: none"> National plan for increasing the number of nZEB buildings by 2020
Initiators	<ul style="list-style-type: none"> Republic of Slovenia, Ministry of Infrastructure
Geographical scope	<ul style="list-style-type: none"> Republic of Slovenia
Period	<ul style="list-style-type: none"> 2014-2020
Objectives	<ul style="list-style-type: none"> Long-term strategy/plan for increasing the number of nZEB buildings in Slovenia Definition of nZEB requirements
Methodology	<ul style="list-style-type: none"> Overview of current building stock and topologies, status quo and potentials development of national nZEB requirements based on reference buildings and current law Intermediate targets for nZEB share in new buildings and renovations according to m²
Output	<ul style="list-style-type: none"> Requirements for nZEBs (max. primary energy demand per conditioned floor area per year in kWh/m²a): <ul style="list-style-type: none"> minimum share of RES: 50% of end energy use Single family houses 75kWh/m²a (new) or 95kWh/m²a (renovation) Apartment buildings 80kWh/m²a (new) or 90kWh/m²a (renovation) non-residential 55kWh/m²a (new) or 65kWh/m²a (renovation)
More information	<ul style="list-style-type: none"> www.izs.si/fileadmin/dokumenti/aktualno/aktualno-letno-2014/AN_sNES_Slovenija.pdf www.buildup.eu/sites/default/files/content/ca3-2016-national-slovenia-web.pdf www.buildup.eu/en/practices/publications/national-plan-increasing-number-nearly-zero-energy-buildings-required-2



2.5.1.1. Conclusion on the national plan for increasing nZEBs

The following description of the Slovenian National Plan on increasing the number of nZEB buildings was already summarized by: Zavrl, M. Š., Stegnar, G. and Gjerkeš, H. (2015) Demonstration of the Nearly Zero Energy Building Concept³⁴ in 2013 and will be used on conclusion on the national plan:

“National definition of nZEB is based on cost optimal study for reference buildings where the primary energy as a core nZEB performance indicator is complemented with the criterion of achievable target of 50% share of renewables in final energy use, selected with consideration to the nZEB acceptable technologies and available renewable energy sources. In future the use of RES will be increased due to growing share of RES in district heating systems that are subject to comply with 2020 energy efficiency targets set in the Energy Act. In addition to that, the nearly zero or very low amount of energy required is achieved by further limitation of energy need for heating to a maximum value between 25 kWh/(m²K) and 15 kWh/(m²K), with respect to the shape factor and climate on the location. Although not directly prescribed the very high energy performance of nZEB will be demonstrated with nZEB building ranked in class A1, A2 or B2 based on the building heating needs. nZEB definition provided minimum requirements for primary energy (for all energy use according to Directive EPBD Annex I, including lighting in residential building and excluding appliances and other energy use but EPBD related.) for new building as well as for major renovation, for single family houses, apartment buildings and for non-residential/office buildings. nZEB action plan with the national definition of nZEB was accepted by the government in April 2015.”

Project eCentral could/will use the material condensed within this document for educational purposes and for planning of Slovenia’s pilot project.

³⁴ http://file.scirp.org/Html/59005_59005.htm



2.5.2. National initiative - The Passive House Consortium

Name	<ul style="list-style-type: none"> The Passive House Consortium initiative
Initiators	<ul style="list-style-type: none"> Faculty of architecture (UL FA), University of Ljubljana
Geographical scope	<ul style="list-style-type: none"> Slovenia
Objectives	<ul style="list-style-type: none"> The aim of the initiative is to bring the passive house concept closer to end users and investors - by presenting the model and living comfort as well as informing about the current state and offers in Slovenia.
Main activities	<ul style="list-style-type: none"> Dissemination of information and knowledge about the passive house standard and increasing the trust of the profession and the public Professional monitoring of the design, construction and implementation (new construction and renovation) of passive houses Verification of the suitability of build facilities and components necessary for the construction and renovation of passive houses Presentation of architects, contractors and providers of various components to the public and connection of all interested parties on construction projects Presenting the achievements of members in the field of realized new constructions and rehabilitation to the professional and lay public Education of members of the Passive House Consortium
Output	<ul style="list-style-type: none"> Organization of various educational activities for architects and designers as well as the Passive House Open Day intended for the broader public Issuing The Passive House Consortium Certificate (according to PHI directions) and supporting members of the Consortium in gaining PHI Certificate (already few members got this certification as the Xella Group, LUMAR IG d.o.o, JUB d.o.o) Professional counseling for potential investors and support in submitting projects for subventions at Eko Sklad (national fund) and gaining favourable credit lines from commercial banks Publication of professional literature (Journal, Magazine, Monographies, Info newsletter etc) and spreading information through the Passive House Consortium website
More information	<ul style="list-style-type: none"> www.fa.uni-lj.si/default.asp?id=2492
Key findings for eCentral	<ul style="list-style-type: none"> information on best practice nZEB buildings format of promotion and knowledge transfer directions for building quality assessment method for EPC tool transparency of processes (e.g. building assessment)

2.5.2.1. Conclusion on The Passive House Consortium

The Passive House Consortium operates under the auspices of the Faculty of Architecture at the University of Ljubljana, Slovenia.

It is an informal association of institutions, companies and professionals who, through their activities, promote and facilitate the construction of passive houses (heating energy consumption up to 15 kWh/m²a) and better low-energy houses (heating energy consumption of 15 kWh/m²a) to 30 kWh/m²a). The main task is to connect scientific, professional institutions and companies that are offering the possibility of constructing or remodelling passive houses through their activities with potential investors.



Figure 6: Official logo of the initiative

The Consortium organizes various educational events for architects and other professionals involved in the field of passive building and publishes professional literature as Magazine Ar architecture (research), monographies, Infa (monthly newsletter), Arhipub (Review system of the Faculty of Architecture) and Journal Creativity Game - theory and practice of spatial planning. Additionally, they support their members in obtaining PHI Certificate (already few members got this certification as the Xella Group, LUMAR IG d.o.o, JUB d.o.o) and are issuing the Passive House Consortium Certificate (according to PHI directions) for those that are in the process of preparation.

The potential investors of passive house buildings can get professional counselling by the Consortia and additional support in applying for finances from the Eko Sklad (public financial fund offering soft loans, guarantees and grants (non-repayable subsidies). This supports environmental investments as well as investments in energy efficiency of the final consumers of energy or other commercial banks that have special credit lines for environmental investments. Moreover, they have a directory of already build representative passive houses and public buildings with information about the planners, short description of the construction work, technical data from the energy performance calculation and photos that can be used by architects and public when planning the construction or renovation according to the criteria for passive building.

Once in a year, they organize the Passive House Open Day as an opportunity for the broader public to visit the referential buildings and houses and get acquainted with energy-efficient building process.³⁵

The following key findings can be used for the eCentral project:

- Database with best practice examples for case studies and for excursions
- Use their experience and knowledge for development of EPC tool and national strategies
- Potential promotion of eCentral pilot project during the Passive House Open Day and in their publications

³⁵ Source: www.fa.uni-lj.si/default.asp?id=2492



2.5.3. National initiative - Governmental funding line “Non-refundable financial incentives to individuals for new investments of renewable energy sources and improved energy efficiency of residential buildings”

Name	<ul style="list-style-type: none"> • Funding line "Non-refundable financial incentives to individuals for new investments of renewable energy sources and improved energy efficiency of residential buildings"
Initiators	<ul style="list-style-type: none"> • Republic of Slovenia - Eco Fund Slovenian Environmental Public Found
Period	<ul style="list-style-type: none"> • Ongoing
Who can apply for funding?	<ul style="list-style-type: none"> • All Slovenian Citizens - owner of residential buildings (natural persons)
More details	<ul style="list-style-type: none"> • Funding purpose: increase the use of renewable energy sources and greater energy efficiency in residential buildings, reduction of air pollution • Total funding volume: € 15.8 Million • Funded measures: <ul style="list-style-type: none"> • A- installation of a solar heating system in a residential building, • B- installation of a combustion plant biomass for central heating of residential buildings, • C- installation of heat pumps, central heating residential buildings, • D- connection older single-dwelling buildings in the district heating renewable source energy, • E installation energy efficient wooden building fittings in older apartment buildings • F- thermal insulation of the facade older single-dwelling buildings, • G thermal insulation of the roof or ceiling unheated space in the older single-dwelling buildings, • H- installation of ventilation the heat recovery air in the residential building, • I- construction or purchase of nearly zero-energy new one- or two-dwelling building, • J- comprehensive renovation of older one- or two-dwelling building • K - purchase of residential units in three and apartment building, refurbished into nearly zero-energy class
More information	<ul style="list-style-type: none"> • https://www.ekosklad.si/fizicne-osebe/nameni/prikazi/actionID=149

2.5.3.1. Conclusion on Governmental funding line “Non-refundable financial incentives to individuals for new investments of renewable energy sources and improved energy efficiency of residential buildings”

Eco Fund is an independent legal entity, with the Ministry of the Environment and Spatial Planning, being represented as majority in the Supervisory Board.

The subject of the public call for non-refundable financial incentives for citizens is to use renewable energy sources and greater energy efficiency in residential buildings in the entire territory of the Republic of Slovenia (hereinafter: non-refundable financial incentives) for new investments and for some new investments in older residential buildings in the Municipality of Celje, the municipality of Hrastnik, municipality of Kranj, Ljubljana municipality, the municipality of Maribor, municipality of Murska Sobota, Novo Mesto Urban municipality, the municipality of Trbovlje and Zagorje ob Savi. This is in accordance with the Regulation on ambient air quality (Official Gazette of RS, no. 9/11 and 8/15), the Ordinance establishing the zone and the classification of areas, agglomerations and sub regions with regard to ambient air pollution (Official Gazette of RS, no.50/11) and the Decision on establishing sub-regions for the management of ambient air quality (Official Gazette of RS, no. 58/11) because of excessive ambient air pollution with PM10 particles.

The purpose of a public call to increase the use of renewable energy sources and greater energy efficiency in residential buildings and the reduction of excessive air pollution with PM10 and thereby improve the quality of ambient air. New investment is an investment for the execution of one or more of the above mentioned measures, which will be implemented after submission of an application for non-refundable financial incentives for the public call.

Requirements for the application for funding are:

- > candidates can only be a natural person;
- > the role of the public call must be made before the start of works for the realization of the investment;
- > investments must be made in accordance with all applicable regulations;
- > building and all its components must be constructed in accordance with the applicable building laws;
- > grant financial incentives for measures D, E, F, G, J and K may be granted only for residential buildings, for which the building permit was issued before 1.1.2003, respectively. for residential buildings built before 1.1.2003 and legalized before submitting an application to the public call;
- > higher grant financial incentives for measures that will be implemented in municipalities that have adopted the Ordinance on air quality plan may be granted only for older residential buildings, which have been building permit was issued before 1.1.2003, respectively. for residential buildings built before 1.1.2003 and legalized before submitting an application to the public call;
- > installation and commissioning of individual devices or equipment may be carried out by a trained contractor with the registered activity;
- > the applicant can apply for a number of measures in the same residential building;
- > incentives might not be allocated for the installation of the prototype and used equipment / devices;
- > Embedded construction products, equipment, devices or residential buildings (in the case of action I, J and K) cannot be removed for at least three years following payment of non-refundable financial incentives.³⁶

³⁶ Source: <https://www.ekosklad.si/fizicne-osebe/nameni/prikazi/actionID=149>



Information on governmental funding lines can be included in informational material to stimulate follow-up projects.

2.5.4. National initiative - Lavrica Kindergarten

Name	<ul style="list-style-type: none"> Lavrica Kindergarten in Škofljica, Slovenia
Initiators	<ul style="list-style-type: none"> Skofljica Municipality
Construction period	<ul style="list-style-type: none"> May 2011 - May 2012
Objectives & Usage	<ul style="list-style-type: none"> New built kindergarten on nZEB level
Building	<ul style="list-style-type: none"> Approx. 1,738 m² of gross floor area (GFA) Number of storeys: 2 heating energy demand: 22 kWh/m²a (average heating demand in Slovenian Kindertgartens over 200 kWh/m²a) Air heat pump (provides 60% of demand) and natural gas <ul style="list-style-type: none"> component activation (walls) - used for heating and cooling purposes Net cost: € 2.3 Million Main contractor: Marles Hiše d.o.o. Architect: Arhitektura Branko Hojnik shading with outside blind (electrically driven) three layer wooden window U_{max} 0,9 W/m²K, glazing U_g 0,7 W/m²K Building received funding of the Slovenian Ministry of Infrastructure and Spatial Planning, Operational Programme for the energetic renovation of public buildings co-financed from the EU Cohesion Fund
More information	<ul style="list-style-type: none"> www.renew-school.eu/wp-content/uploads/2015/01/13_Lavrica_folder.pdf
Key findings for eCentral	<ul style="list-style-type: none"> Use of the building technology and building concept Use of prefabricated building parts



2.5.4.1. Conclusion on Lavrica Kindergarten

The kindergarten was built in 2012, using prefabricated spare parts (Company Marles Hiše d.o.o.). The main energy related targets were to achieve low energy standard, to use renewable energy sources and to focus on indoor air quality. The heating demand of the kindergarten is 22 kWh/m²aGFA. In Slovenia the average heating demand of old kindergartens is over 200 kWh/m²aGFA. The heat pump for Lavrica kindergarten operates until the outside temperature is 0°C. Below this temperature the kindergarten is heated by a gas condensing boiler using natural gas. The share of the heat produced by the heat pump is 60%. The rest is provided by the gas boiler. The heating is a combination of floor heating and wall heating. The wall heating is used in summertime for cooling. The shading is constructed with outside blind and is driven electrically.

The quick installation of the prefabricated building parts was seen as a main advantage by the public investor (Municipality of Skofljica, Slovenia).³⁷

2.6. Overall conclusions on national initiatives

The analysis of national initiatives regarding nZEB initiatives has shown several results. In total 24 initiatives from five Central European countries were described, which can be considered as the main activities in these areas.

There are several national building labelling projects and award systems e.g. in Austria and in Italy, which established a very high building standard and a certification system with much stricter requirements than written down in the current building laws. This basically means, that the public is motivated to build and renovate with high quality and it is ready to go far beyond the legal regulations in a more courageous way. This can be considered as an ideal starting point for the activities in the eCentral project, since an increased interest simplifies the effect of outreach and promotional activities. Additionally, it is conceivable that the three pilot renovations of public buildings in Croatia, Slovenia and Hungary with its innovative financing schemes are able to attract a big amount of supporters from the local residents.

The following table shows the main findings of the national initiatives and its impact on the eCentral project:

Opportunities	Impact on eCentral ^{*)}	Extent of impact on eCentral ^{**)}
Legal nZEB definitions in all countries available		Use of nZEB definitions for three pilot renovations (WP T3)
Big amount of private initiatives - motivated and courageous public		Higher acceptance of public for the project activities in eCentral (all WP)
Funding for energy efficiency measures in buildings (thermal insulation, window change, etc.) widely available		Exploit further funding possibilities for pilot renovations (WP T3), input for national training curriculum (WP T2)
Several forerunner projects in every country available (lighthouse projects as well as national database)		Availability of good practice examples, usable for case studies (WP T1 and WP T2) and as role models for the three renovations of public buildings which will be conducted in eCentral (WP T3), usable for communication activities e.g. newsletters etc. (WP C)

³⁷ Source: www.renew-school.eu/wp-content/uploads/2015/01/13_Lavrica_folder.pdf



Broad availability of already developed outreach formats		Use knowledge transfer and outreach formats of the programmes (publications, workshops, etc.) in WP C
Well established regional contact points and platforms e.g. (CasaClima, klimaaktiv, Passive House Consortium...) available		Possibility to promote and disseminate the eCentral project's results; use of these regional contact points for transportation of key messages available (WP C)
Several building assessment methodologies available due to different award systems (CasaClima Award, klimaaktiv building standard, etc.)		Make use of this criteria when designing the EPC tool (WP T1) or when assessing renovation measures for the pilot renovations (WP T3)
Transferable and good-practice initiatives such as "Enertour" in Italy or "nZEB workshop for professionals" in Croatia for promoting nZEB standard		Use their methodologies in WP C
Several training programmes for building professionals were already developed.		These materials can be used for the curriculum development in eCentral (WP T2)
Good suggestions from national initiatives regarding building measures implementations		Usable for the three nZEB pilot renovations (WP T3) e.g. installation of a building monitoring system, testing of function of building services after one year of operation for ensuring an efficient and energy saving operation mode

Possible barriers	Impact on eCentral*)	Extent of impact on eCentral**)
Lax legal requirements regarding nZEB - additional motivation from building owners needed to go beyond these requirements		Only indirect relevant - impact on follow-up projects since the owners of the three public buildings where renovations will be realized (WP T3) are already convinced of nZEB standard
Still a lack of knowledge of the nZEB standard in the building industry (building professionals and different crafts)- lack of know-how is always a risk for failures and insufficient results		Can have an impact on the results of the three pilot renovations - risk of commissioning unsuitable companies for the renovations
Financing issues regarding additional costs for upgrading to nZEB standard		Only indirect relevant - impact on follow-up projects since the owners of the three public building where renovations will be conducted (WP T3) are already convinced of nZEB standard
Funding lines for energy efficiency measures in buildings such as thermal insulation, window change, renewable energy supply (solar thermal collectors, etc.) only cover a small percentage of the investment costs		Only indirect relevant - not clear if funding is possible for the three pilot renovations (WP T3); renovation costs are covered within the eCentral project



<p>**) WP T1 = Work package “Support tools and schemes for deep renovation of public buildings; WP T2 = Work package “Building capacity of local and regional stakeholders”; WP T3 “Demonstration of nZEB pilot actions”; WP C “Communication”</p>
<p>*) red = big impact, yellow = small impact, green = no impact</p>

Table 4: Barriers and opportunities (own illustration)

As conclusion it can be said that the analysis of the national initiatives brought important findings for the implementation of the eCentral project. The report and its findings will be shared with all project partners and its main output will influence the success of eCentral. Especially the implementation of the three pilot renovations in WP T3 will benefit from several new inputs and insights such as suggestions for building services, as well as WP C with some new promotional ideas.



D. General conclusions on the report

The report has shown that there are vital ongoing activities in Central Europe for promoting and implementing the nZEB standard.

Firstly, a report summary and an introduction on the overall topic was written by the authors of this deliverable. Furthermore, the already existing nZEB definitions across Central Europe were summarized for showing the different starting points in each nation. It is clearly visible, that every country has its own threshold values and requirements. The definitions are divided into residential and non-residential buildings, as well as for new or existing ones. Some Central European Countries use absolute numerical indicators, the Czech Republic and Germany defined indicators, based on the maximum primary energy demand of a reference building. These stated thresholds will be the main building quality guidelines for the three nZEB pilot renovations in eCentral in the three target countries Croatia, Hungary and Slovenia.

Afterwards, 11 selected and relevant Pan-European initiatives were described. As international initiative, the authors classified European projects with international partners and a broader outreach. At least one partner of the project consortium shall come from one of the nine Interreg Central Europe countries (Austria, Croatia, Czech Republic, Germany, Hungary, Italy, Poland, Slovakia, Slovenia). Each initiative will be described according to their names, geographical scope, period, outputs and methodology. Additionally, key finding will be described according to the relevance for the project itself or as guidance for the implementation of the eCentral project.

Then, an overview on national nZEB initiatives in the eCentral project partner's countries were given. It was decided to concentrate on these five Central Europe countries since the national initiatives are mostly described in the national languages. Additionally, an inner inside and practical experiences with national initiatives are also important for drawing the right conclusions and key findings. In total 24 national initiatives, at least the most important ones per country, were written down and analysed.

Concluding it can be said that analysis of the initiatives brought important findings for the implementation of the eCentral project. The most important considerations were already written down in chapter 1.4 Overall conclusions on international initiatives and chapter 2.6 Overall conclusions on national initiatives. Overall, this deliverable functions as well researched base for further activities in the eCentral project.



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