



# DELIVERABLE D.T2.1.1

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Architecture design for the Transnational  
Online Energy Platform - OnePlace

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# **D.T2.1.1-1: Architecture design for the Transnational Online Energy Platform - OnePlace - report**

## **A.T2.1 Development of the Online Energy Platform – One Place**

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## 1. Introduction

The aim of this deliverable is to define system architecture, visual and technical design and contents of the project platform. Based on the analysis of the previous and ongoing projects similar to BOOSTEE-CE with the focus on creating the online energy platform, the questionnaire was designed with the aim to define the actual needs of project partners and stakeholders. The content of the platform was delivered as a result of the questionnaire analysis. The developed questionnaire has two main sections:

- The General Stakeholder Questionnaire (intended for citizens, municipalities, different companies and other stakeholders), to get information on the stakeholder requirements on the content of the online platform.
- The User Questionnaire (pilot – stakeholders/ project partners involved at local level), to collect the input data from Pilot actions (PAs) for the OnePlace platform as well as for the WP T1.

BOOSTEE-CE will provide public authorities with simple but useful tools and methodologies (stable, long-term strategies) for proper energy management to increase EE and renewable energy usage in public buildings. For this purpose, the Online Energy Platform – OnePlace will be developed with the following four modules:

- **3D Energy Management System (EMS)** - a webGIS solution where users can interactively navigate a map of an urban environment, select a 3D building of interest and retrieve the energy audit and other cadastral/building information;
- **Living Energy Marketplace (LEM)** - a database covering the spectrum of electronic devices and electric appliances (ENERGY STAR products), offering customers interested in energy efficiency projects a list of qualified contractors (architects, engineers, auditors, craftsmen, technicians and installers, all involved in refurbishment);
- **Energy Efficient Cities (EEC)** – a module that enables an exchange of experiences and good practices within EE sector for public authorities and other public users;
- **Financing Energy Efficiency (FEE)** - an attractive visual presentation of the transnational strategy outcomes (financial road map), examples of best practices and practical steps to use the national and EU-level resources.

For a better understanding of OnePlace and its contents, a workflow between the BOOSTEE-CE activities is also reported in Annex 1.

This document gives an overview on how the system architecture, visual and technical design and contents of the project platform were defined. In the first phase finalized and ongoing projects similar to BOOSTEE-CE and existing online available platforms/tools were analysed with the purpose to create the online energy platform as an upgrade of existing platforms/tools. Based on results of these survey a questionnaire was created (Annex 2) with the purpose to gather information about the needs of partners and stakeholders involved in the BOOSTEE-CE project to develop the OnePlace platform. In the last phase the results of the Questionnaire survey were used to define the architecture and content of the OnePlace and to form the tender (Annex 3).

The document is restricted to project partners (PP), reviewers and JS.



## 2. Analysis of existing solutions and previous projects results

### 2.1 Finalized and ongoing projects

In the tables below we present an overview of existing (closed and ongoing) projects similar to BOOSTEE-CE with focus on the OnePlace covering the four modules: 3D Energy Management System (EMS), Living Energy Marketplace, Energy Efficient Cities and Financing Energy Efficiency.

CO-FUNDED BY	TITLE/WEB	DURATION	ABOUT THE PROJECT	PP INVOLVED
Fondazione Cassa di Risparmio di Trento e Rovereto - CARITRO.	SENECA (Smart and sustainABle City from Above) <a href="http://seneca.fbek.eu/">http://seneca.fbek.eu/</a>	06/2015 – 06/2017	The project aims at developing a reliable methodology for the processing of aerial imagery for the derivation of high quality 3D data and energy audit. The partners will thus deliver innovative procedures and advanced solutions for the distribution of useful services to citizens and public administrations based on spatial information. Between the possible results and services we can list: estimation of the photo-voltaic potential of building roofs, calculation of houses heat losses, production of Building Information Models, environmental and natural resources estimation and management, etc.	FBK
Alpine Space Program and Autonomous Province of Trento	3D Solar Web: A solar cadaster in the Italian alpine landscape <a href="https://3dom.fbek.eu/projects/solar-potential-building-roofs">https://3dom.fbek.eu/projects/solar-potential-building-roofs</a>	2012-2014	The project aims at providing reliable results in a cost effective way, using (low resolution) available data and new aerial imagery acquisitions as input. The environmental context is digitally represented using already existing low resolution LiDAR data (1-2 m resolution), while the urban area is modelled using high resolution aerial images (10-20 cm GSD) and photogrammetric DSM. Reliable models and algorithms for the estimation of the incoming sun radiance are then adopted and a WebGIS is set up for the interactive calculation of the photovoltaic (PV) potential in a raster-based form.	FBK
Alpine Space Program	ENERBUILD - ENERgy Efficiency and Renewable Energies in the BUILDing Sector in the Alpine Space <a href="http://www.enerbuild.eu">http://www.enerbuild.eu</a>	06/2009 – 07/2012	The project is focused on strengthening SMEs in the building sector because of their great importance as employers in alpine valleys. New developments and changes concerning building techniques of ESAP (energy saving and producing) buildings require cross-sectoral networks and collaborations of SMEs. Because of the increasing complexity in this field there is the need for customers, especially public builders, to have a better basis for decision-making. The key topics of the project are: <ul style="list-style-type: none"> <li>- Providing latest technical know-how for craftsmen and architects</li> <li>- Developing tools for public builders which act as decision guidance</li> <li>- Providing customers with innovative financing tools concerning the energy production of</li> </ul>	FBK



			<p>buildings.</p> <p>All in all the craftsmen will be supported in this period of change and the demand for ecological building will be raised. To reach these objectives the PPs form transnational expert groups and their results are implemented in pilot actions.</p>	
Central Europe	<p>ENERCITY Reducing energy consumption and CO2 emissions in cities across Central Europe</p> <p><a href="https://www.keep.eu/keep/project-ext/15823/Reducing%20energy%20consumption%20and%20CO2%20emissions%20in%20cities%20across%20Central%20Europe">https://www.keep.eu/keep/project-ext/15823/Reducing%20energy%20consumption%20and%20CO2%20emissions%20in%20cities%20across%20Central%20Europe</a></p>	02/2010-02/2013	<p>EnerCity project aims at contributing to the reduction of energy consumption and CO2 emissions of cities through measuring the heat loss of urban buildings by aerial thermography.</p> <p>The spatial decision support (SDSS) system has been developed. It is an online geographic information system where users can achieve energy and CO2-emission related information about the building stock inside the user-selected area on the digital map. The tool can be used for energy loss and CO2 emission assessment, fuel poverty analysis and policy support. In addition, the influence of modifying the heat source can be determined.</p>	-
Interreg Central Europe	<p>CitiEnGov</p> <p><a href="http://www.interreg-central.eu/Content.Node/CitiEnGov.html">http://www.interreg-central.eu/Content.Node/CitiEnGov.html</a></p>	06/2016-05/2019	<p>CitiEnGov aims to improve the capacity of public administrations to implement new energy planning strategies through a new comprehensive concept based on the: (i) acknowledgement of a political mandate for energy; (ii) Definition of a working group with roles and activities; (iii) Real horizontal service made of experts about energy issues enabling the efficient realisation of the foreseen actions and results.</p>	-
Intelligent Energy Europe	<p>UP-RES Urban Planners with Renewable Energy Skills</p> <p><a href="http://aalto.pro2.aalto.fi/projects/up-res/">http://aalto.pro2.aalto.fi/projects/up-res/</a></p>	09/2010 - 02/2013	<p>The project designed and delivered training on energy issues for urban and regional planners in five partner countries.</p> <p>A GIS-based tool has been developed, which generates a grid-based map of the annual energy demand for room heating and hot water in a city. Required inputs are a polygon layer of building outlines and an attached data table with a building type property and the number of floors. Optional inputs are year of construction and measured energy consumption. Output is a raster layer of aggregated annual heat demand on a 200-200 m2 grid. It can be used to assess the feasibility of different heating technologies, especially district heating.</p>	-



FP7	<p>EFFESUS Energy Efficiency for EU Historic Districts' Sustainability</p> <p><a href="http://www. effesus.eu/">http://www. effesus.eu/</a></p>	09/2012-08/2016	<p>According to the European Recovery Plan one of the actions that needs to be taken to tackle the current crisis, is investing in energy efficiency. Historic urban buildings consume 4% of all energy and are responsible for 3% of CO2 emissions. Therefore, improving energy efficiency in historic buildings and historic districts is essential.</p> <p>Therefore, the main goal of EFFESUS is to develop and demonstrate through case studies a methodology for assessing and selecting energy efficiency interventions, based on existing and new technologies that are compatible with heritage values. A Decision Support System will be a primary deliverable.</p> <p>The project will develop a multiscale data model for the management of energy. In addition, new non-invasive, reversible yet cost-effective technologies for significantly improving thermal properties will also be developed.</p> <p><u>Results:</u></p> <ul style="list-style-type: none"> <li>• European building and urban stock data collection</li> <li>• Assessment of European and national policies related to energy efficiency and heritage conservation</li> <li>• Database of the structured categorisation method for historic European building stock</li> <li>• Collection of Best Practices</li> <li>• Energy efficiency solutions repository built up</li> <li>• Historic district geographical information system</li> <li>• Result integration strategy</li> <li>• Transferable models</li> <li>• Interconnection between district, building and components levels</li> <li>• Decision Support System</li> <li>• Smart management and integration of renewable and energy efficiency solutions</li> <li>• Development of conservation compatible new materials for envelope retrofitting of historic buildings</li> <li>• Strategies for decision making for improving energy efficiency in historic buildings at urban district scale</li> <li>• EFFESUS Decision Support System</li> <li>• Cases studies: Demonstration of energy efficiency measures in historic buildings</li> <li>• Existing and replicable technologies for energy efficiency improvements in historic districts</li> </ul>	-
Interreg Europe	EMPOWER - More carbon reduction by dynamically monitoring energy	01/2017 – 01/2022  ongoing	Empower will implement investment, organisational and optimisation measures in the participating cities and developed at least 2 cost effective energy monitoring systems. Partners will demonstrate that good energy management is a part of good governance. Monitored savings will reassure financial institutions about the	MAE



	<p>efficiency</p> <p><a href="https://www.interregeurope.eu/empower/">https://www.interregeurope.eu/empower/</a></p>		<p>rewards of long term energy management investment. Through the planned capacity building actions, all project partners and their stakeholders will improve their knowledge and deliver a higher-than-trend rate of carbon reduction. The key decision makers for the production of the partner's Regional Action Plans in the cooperation with the Operational Programmes Managing Authorities will play a crucial role in the durability of the project results.</p>	
Interreg Central Europe	<p>CE-HEAT Waste heat – Free energy</p> <p><a href="http://www.interreg-central.eu/Content.Node/CE-HEAT.html">www.interreg-central.eu/Content.Node/CE-HEAT.html</a></p>	<p>06/2016 – 06/2019</p> <p>ongoing</p>	<p>CE-HEAT project aims to improve the governance of energy efficiency by focusing on field of waste heat utilization in Central Europe space and through increased exploitation of endogenous RES – waste heat.</p> <p>The CE-HEAT partnership will facilitate this process by:</p> <ul style="list-style-type: none"> <li>Providing an excellent analytical and monitoring platform through establishment of GIS based regional waste heat cadastres with waste heat sources classification and a monitoring tool;</li> <li>Providing a comprehensive solution for managing waste heat utilization projects and strategies based on the development of a waste heat utilization toolbox (leading stakeholders participation process, establishing feasibility etc.);</li> <li>Incorporating a new approach into local, regional and national strategies by integrating a novel cadastres and toolbox into existing spatial planning and energy management systems and spreading it throughout central Europe and beyond.</li> </ul>	EZVD
Urban Europe	<p>SURECITY Sustainable and Resource Efficient Cities – holistic simulation and optimization for smart cities</p> <p><a href="http://ipi-urbaneurope.eu/project/surcity/">http://ipi-urbaneurope.eu/project/surcity/</a></p>	<p>2016 – 2019</p> <p>ongoing</p>	<p>SURECITY's mission is to support smart city level integration of policies and measures towards a low carbon energy system including mobility services keeping in focus the sustainability goals on air quality, sustainable land-use, efficient water use, job creation and improved governance. This is done by a software platform which bridges the different scientific models to perform a holistic and optimal design of local energy and emission abatement strategies in the medium- and longterm for neighborhoods and cities. End users of this information, e.g. politicians, citizens and companies, can use the platform to assess the social, technological and economic impacts of measures in all major economic sectors.</p>	JUD
CIP	<p>SUNSHINE Smart UrbanServices for Higher eNergy</p>	<p>02/2013 – 02/2016</p>	<p>SUNSHINE – “Smart UrbanServices for Higher eNergy Efficiency” delivers innovative digital services, interoperable with existing geographic web-service infrastructures, supporting improved energy efficiency at the urban and building level. Specifically, SUNSHINE</p>	



	<p>Efficiency</p> <p><a href="http://www.sunshineproject.eu/">http://www.sunshineproject.eu/</a></p>		<p>delivers a smart service platform accessible from both a web-based client and an App for smartphones and tablets. In particular, the SUNSHINE platform allowed to:</p> <ul style="list-style-type: none"> <li>- Automatic large-scale assessment of building energy behaviour based on data available from public services (e.g. cadastre, planning data etc.). The information on energy performances will be used to automatically create urban-scale “ecomaps” to be used for planning activities and large-scale energy pre-certification purposes.</li> <li>- ensure optimisation of energy consumption of heating/cooling systems through automatic alerts that will be sent to the SUNSHINE App installed on the smartphone of the final users.</li> <li>- ensure interoperable control of public illumination systems based on Automatic Meter Reading (AMR) facilities remotely accessible, via interoperable standards, from a web-based client as well as an App for smartphones or tablets.</li> </ul> <p>The SUNSHINE technology will be the result of the customisation and integration of existing software components developed by other EC-funded projects focusing on smart-city technologies, including BRISEIDE, i-SCOPE and i-Tour.</p>	
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## 2.2 Existing platforms/tools

An overview of existing platforms/tools similar to OnePlace is afterwards reported, considering their functionalities (similar to OnePlace modules), deployment and possible partners involved.

CO-FUNDED BY	TITLE/WEB	WHAT DOES THE TOOL/PLATFORM DO/ENABLE?	WHERE IS TOOL/PLATFORM BEING USED	PP INVOLVED
Alpines Space Project	<p>ENERBUILD Tool</p> <p><a href="http://www.enerbuild.eu/wp/enerbuild-tool.html">http://www.enerbuild.eu/wp/enerbuild-tool.html</a></p>	<p>The aim of the project is to evaluate public buildings on following five topics:</p> <ul style="list-style-type: none"> <li>- Quality of location and facilities</li> <li>- Process and planning quality</li> <li>- Energy &amp; Utilities (Passive house)</li> <li>- Health and Comfort</li> <li>- Building materials and construction</li> </ul> <p>by:</p> <ul style="list-style-type: none"> <li>- Providing latest technical know-how for craftsmen and architects</li> <li>- Developing tools for public builders which act as decision guidance</li> <li>- Providing customers with innovative financing tools concerning the energy production of buildings.</li> </ul>	7 regions in the Alpine area (Vorarlberg, Bolzano, Tyrol, Styria, Gorika region, Lyon and Grenoble)	FBK



**BOOSTEE-CE**

CENTRAL EUROPE	<p>EnergyHouseA ID – Sustainable Energy Investment Decision Aid Tool</p> <p><a href="http://livinglab.ezavod.si/app/index.php?id=1&amp;tab=1&amp;lang=en">http://livinglab.ezavod.si/app/index.php?id=1&amp;tab=1&amp;lang=en</a></p> <p>Central European Living Lab for Territorial Innovation</p>	<p>The application is designed to help users to fast and easy calculate of energy savings at the implementation of certain energy efficiency measures (EE). Following measures are planned:</p> <ul style="list-style-type: none"> <li>- Insulation of the façade</li> <li>- Insulation of the unheated basement ceiling</li> <li>- Insulation in the unheated attic</li> <li>- Floor insulation towards ground</li> <li>- Roof insulation in the mansard</li> <li>- Replacement of doors and windows</li> </ul> <p>The application enables the user to calculate some additional elements:</p> <ul style="list-style-type: none"> <li>- the energy consumption for heating by using panels and / or heat pumps.</li> <li>- calculation of electricity production from photovoltaic panels</li> <li>- payback period calculation.</li> </ul>	Pilot areas of the project	EZVD
CENTRAL EUROPE	<p>CESBA Wiki</p> <p><a href="http://wiki.cesba.eu/wiki/Main_Page">http://wiki.cesba.eu/wiki/Main_Page</a></p> <p><b>CESBA Initiative</b></p>	<p>The CESBA Wiki is the central platform to promote and harmonize the sustainability of the built environment in Europe. It is a storage place for EU projects and offers tools and services. It serves as a platform for networking with other organizations and actors.</p>	Eu-wide	EAKZ



IEE Project	<p>TABULA WebTool</p> <p><a href="http://webtool.building-typology.eu/#bm">http://webtool.building-typology.eu/#bm</a></p> <p>EPISCOPE</p> <p><a href="http://episcop.eu/iee-project/tabula">http://episcop.eu/iee-project/tabula</a></p>	<p>The TABULA WebTool has been developed within the framework of the Intelligent Energy Europe projects TABULA and EPISCOPE. The objective is to disseminate the general idea of national residential building typologies to building experts from European countries and to give them an understanding of the concrete implementation according to the TABULA concept <a href="http://www.episcop.eu/building-typology/">http://www.episcop.eu/building-typology/</a>:</p> <ul style="list-style-type: none"> <li>• The division of residential building stocks in size and age classes;</li> <li>• Data of exemplary buildings: visual appearance, commonly found construction elements and corresponding U-values;</li> <li>• Data of exemplary heat supply systems: commonly found system types and their energy performance indicators;</li> <li>• Typical values for the energy consumption by energy carriers;</li> <li>• For old buildings: energy saving measures on two quality levels and their impact on the energy consumption;</li> <li>• For new buildings: examples for realisation on three energy performance levels: minimum requirements, improved and ambitious or NZEB standard (assumed or announced level of Nearly Zero-Energy Buildings).</li> <li>• Standard reference calculation procedure based on an agreed data format, user conditions and national climatic data;</li> <li>• Calibration of the standard calculation procedure to the typical level of measured consumption.</li> </ul>	<p><i>Case studies</i></p> <p><i>National</i></p> <p>Germany Denmark England Greece Netherlands Norway Slovenia</p> <p><i>Regional</i></p> <p>Austria Spain Italy</p> <p><i>Local</i></p> <p>Belgium Cyprus Czechia Denmark France Hungary Ireland</p>	-
Horizon 2020	<p>ONE-STOP-SHOP MAKES IT EASY – MAKES IT HAPPEN</p> <p><a href="http://go-refurb.eu/">http://go-refurb.eu/</a></p>	<p>REFURB will make it easy for you as homeowner to start an energy renovation. REFURB develops an on-line tool defining packages where you can obtain a nearly Zero energy standard 50-80 % energy reduction by a step by step renovation and where the benefits are clear and easy understandable.</p> <p>The tool is an easy customer roadmap to renovation. The tool has been tested in six countries and will be launched in 2017. The one stop shop packages will also provide you with information about different possibilities for financing.</p>	<p>Pilots in Belgium, Denmark, Estonia, Germany, Netherlands, Slovenia</p>	-



INTERREG-CE	CE-HEAT <a href="http://www.interreg-central.eu/Content.Node/CE-HEAT.html">http://www.interreg-central.eu/Content.Node/CE-HEAT.html</a>	CE-HEAT aims to provide an excellent analytical and monitoring platform through establishment of GIS based regional waste heat cadastres with waste heat sources classification and a monitoring tool. In particular the project develops the waste heat utilization toolbox.	Pilots in Austria, Croatia, Czechia, Germany, Italy, Poland, Slovenia	EZVD
Private / Public	ENERGIE-ATLAS BAYERN <a href="https://www.energieatlas.bayern.de/">https://www.energieatlas.bayern.de/</a>  similar Slovenian web: <a href="http://www.engis.si/portal.html">http://www.engis.si/portal.html</a>	<a href="http://geoportal.bayern.de/energieatlas-karten/?wicket-crypt=HSXbkTkJBA">http://geoportal.bayern.de/energieatlas-karten/?wicket-crypt=HSXbkTkJBA</a> The tool allows to: - Assistance in choosing your heating - Maps, data on the renewable energy consumption in municipality, city, county or government district	Bayern, Germany	-
Private / Public	Analytical Tools for Municipal Energy Efficiency Planning <a href="http://www.esmap.org/node/378">http://www.esmap.org/node/378</a>	TRACE tool has three different modules: <b>1. Energy Benchmarking</b> TRACE's is an energy benchmarking module has a database of 28 KPIs collected from 64 cities. The data are entered into the tool using a simple web-like interface and analyzed in order to benchmark city energy use against a range of peer cities. The peer cities may be selected based on city population, climate, and human development index. <b>2. Sector Prioritization</b> TRACE's sector prioritization module uses "relative energy intensity," "sector energy spending" and "city authority control" to prioritize sectors with the most significant energy efficiency potential. The "sector spending function" allows the user to enter the total amount of money that the city spends in the sector, and the "city authority control" function allows the user to indicate the amount of control that the city authority has in the sector. The "relative intensity function" shows the potential energy efficiency improvement the city may realize if it were to match the average of better-performing cities. Based on these functions, TRACE provides the prioritized list of sectors that the city can engage in order to realize potential energy savings. <b>3. Intervention Selection</b> TRACE contains a set of 59 EE interventions which combine a blend of both high level strategic level programs and specific activities that a city can pursue. These recommendations are supported by	twenty seven cities in Africa, Asia, Europe and Central Asia, and Latin America ( <a href="http://www.esmap.org/node/4368">http://www.esmap.org/node/4368</a> )	-



		<p>a database of 191 case studies that link to appropriate resources and tools. Each recommendation is "rated" on three attributes: (a) energy savings potential (b) first cost (c) speed of implementation. The initial appraisal step enables the user to match city capability to the capabilities required to implement each recommendation. City officials can then select from the set of ranked recommendations. The energy savings assessment step allows the user to quantify the potential energy savings using spreadsheets that come with TRACE, and the final review process allows the city authorities to assess the viability of recommendations in order to come up with a final list of actions for prioritized sectors.</p>		
FP7	<p>CITYOPT PLANNING TOOL FOR ENERGY EFFICIENT CITIES <a href="https://www.witpress.com/elibrary/sdp-volumes/12/3/1491">https://www.witpress.com/elibrary/sdp-volumes/12/3/1491</a></p>	<p>The objective of the CITYOPT project was to create tools to support planning, designing and operating sustainable energy solutions in cities. In particular, the CITYOPT planning tool offered the support for simulating, optimizing and analyzing various city planning alternatives. This holistic approach integrated, among others, energy dynamics of local grids, buildings and consumption behavior and patterns, energy storages, and local energy production using renewables. The tool can generate different kinds of visualization charts: time series chart, summary chart and genetic optimization chart. The time series chart can be used for visualizing output variable time series in a time series or scatter plot format.</p>	<p>Vienna – Business model for the reuse of waste heat</p> <p>Helsinki – electricity storage in Kalasatama</p> <p>Helsinki – next generation district heating network in Östersundom</p>	-
Private / Public	<p>PORABIMANJ <a href="http://www.porabimanj.si/">http://www.porabimanj.si/</a></p>	<p>The Free Consultant Porabimanj will help you to make efficient solutions for heating, air conditioning, electrical appliances and car transport. It allows you to independently calculate energy savings that can be obtained by choosing the right energy and devices, It also provides you with independent indicative investment calculations and a payback period that your savings in energy allow. In short, it provides key information that will make it easier for you to decide on the investment you are planning. The consultant gives us insights into the energy costs that we will regularly pay for heating, electricity and transportation. For each selected measure, the consultant will also calculate the CO2 emissions that we will contribute to the environment. In case you register, the consultant allows you to save calculations, which allows you to review the overall energy consumption of your household, company or institution. The consultant offers expert advice that can save you energy without investing. Access</p>	Slovenia	



		to the consultant is provided by various energy providers, equipment and equipment for which we use the consultant as a sales tool, which, among other things, enables you to deliver demand from your chair.		
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### 3. Questionnaire

#### 3.1 Questionnaire development

Starting from the analysis of existing projects similar to BOOSTEE-CE and together with desk study, skype interview, stakeholder meeting, brainstorming discussions during partner meetings, etc.), a questionnaire was elaborated to gather information about needs of partners and stakeholders involved in the BOOSTEE-CE in having and using the OnePlace platform. The results of the questionnaire were used as support for adapting the form and content of the OnePlace online platform to the actual needs of stakeholders.

The elaborated questionnaire consists of two main sections:

- The **General Stakeholder Questionnaire** (intended for citizens, municipalities, different companies and other stakeholders) to get information about stakeholder requirements concerning the content of the online platform.
- The **User Questionnaire** (pilot – stakeholders/project partners involved at local level) to collect the input data from Pilot actions (PAs) for the OnePlace platform and for WPT1 as well as to serve as Catalogue of requirements or Manual for the content management, showing which data should be provided for new users of OnePlace.

Both questionnaire sections are divided into six parts – first part focusing on some of the general characteristics of respondents, four sections corresponding to each of the four modules: 3D Energy Management System (EMS), Living Energy Marketplace, Energy Efficient Cities and Financing Energy Efficiency and the last section focusing on feedback about OnePlace.

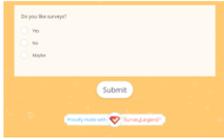
A first draft questionnaire was developed by the WPT2 leader in English language, in collaboration with PP1 and PP12, then it was distributed to all project partners. After review, discussion and adaptation the final questionnaire template was developed and translated into the project’s national languages with the aim of reaching all national stakeholders.

#### 3.2 Questionnaire online distribution

To simplify the stakeholder’s engagement and to enable the feedback analysis, the questionnaires were distributed online. With the purpose of finding a suitable, user-friendly and accessible tool to create online questionnaires, an analysis of most common available tools was realized.



### 3.2.1 Comparison of free online survey tools

NAME	Google Forms	Typeform	SurveyLegend	Survey Planet	Polldaddy
FORM					
SURVEYS	Unlimited	Unlimited	3 per account	Unlimited	Unlimited
QUESTIONS	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
NUM. of RESPONDENTS	Unlimited	100/month	Unlimited	Unlimited	Unlimited
CUSTOM DESIGN OPTIONS	Yes	Yes	Yes	No	No
DATA EXPORT OPTIONS	Yes	Yes	No	No	No
DESCRIPTION	<p>Much like the other tools Google offers, Forms lets you easily accomplish what you want – in this case, collect online survey responses. It's completely free and has no restrictions on the number of surveys you can create, the number of questions in each survey, or the number of responses you can collect. You can also automatically export your results to Google Sheets for online access and sharing. You can even add collaborators and embed surveys into emails. This is the only option on our list that doesn't offer a "premium" version – meaning that you'll have access to all of the features for free, and you don't have to worry about Google trying to upsell you on advanced versions.</p>	<p>Typeform's main advantage is that it offers a wide variety of question types, including short text responses, long text responses, dropdowns lists, dates, multiple choice, picture choice, question groups, yes/no questions, ratings, opinion scales, and more. If you're bored with the standard survey options and want to collect information from your respondents in a variety of ways, Typeform may be the way to go. However, the free version limits you to 100 responses per month. Any more than that and you'll need to consider a plan starting at \$29/month.</p>	<p>SurveyLegend is an advanced platform that allows users to create beautiful, easy-to-use surveys – even on tablets and other mobile devices. It was designed to be an enterprise-level survey tool, and it's used by major brands like Groupon, Airbnb, Samsung, and others. Surveys created with it have a more polished feel than most of the others on this list. That being said, the free version has its limitations. Although the number of questions and responses per survey are unlimited, a free account can only create 3 surveys per account. Data export options are only available in the paid versions (starting at \$15/month) and include large SurveyLegend branding on all free surveys.</p>	<p>Survey Planet is another easy-to-use platform with no restrictions on surveys, questions, or responses, making it a solid choice for anyone looking to create and send simple surveys. Their paid plans start at \$180/year and include custom survey themes, branching questions, non-branded surveys, additional question types, data exports, and results in the form of charts.</p>	<p>Polldaddy offers unlimited surveys, questions, responses, and integrates seamlessly with WordPress. So if your site is hosted on WordPress, Polldaddy could be an excellent choice. If you want to remove the company's branding, add custom CSS, export data, or access email support, you'll need to upgrade to one of their paid plans starting at \$200/year.</p>



Google Forms was selected as most suitable tool and adopted for the BOOSTEE-CE questionnaires.

#### 4. Questionnaire methodology

The questionnaire consisted of different parts according to context – first part focusing on some of the general characteristics of respondents and four sections corresponding to each of the four modules 3D Energy Management System (EMS), Living Energy Marketplace, Energy Efficient Cities and Financing Energy Efficiency.

The survey was carried out in 8 pilot regions/cities with an attempt to record general awareness about energy efficiency (EE) and stakeholders' expectations towards OnePlace.

Using Google Forms, a template for the online questionnaire was prepared and tested by beta-tester persons selected for testing. The online questionnaire is listed in Annex 2. Then project partners created their national language version to be distributed to project stakeholders (available under

<https://docs.google.com/spreadsheets/d/1QXGKuO5on9W60Mp1uOZOSnmtjs3-U4oIDUArQwf9sk/edit#gid=299669921>) including:

- Local public authority,
- Regional public authority,
- Sectoral agency,
- Infrastructure and (public) service provider,
- SME,
- Business support organization,
- General public.

The project partners then created their national language version of the Questionnaire - available here:

SLO:

<https://docs.google.com/forms/d/1sNUO2UaspxMPRgRghK7IDGEAbmvknx4NinFKSMvTiYA/edit#responses>

PL:

[https://docs.google.com/forms/d/1gg72HiKPb9PgcS8R3yh-7vnN\\_Z0TKW5pS1mAbXRORaM/edit#responses](https://docs.google.com/forms/d/1gg72HiKPb9PgcS8R3yh-7vnN_Z0TKW5pS1mAbXRORaM/edit#responses)

IT:

<https://docs.google.com/forms/d/1zW0n3f8Bu6eHYs7UE9gtl3ZRwOCSfnoeXxiAWNKDPh8/edit#responses>

HU:

[https://docs.google.com/forms/d/1TieLrMmfj4cErf3t4XPRe\\_k8vrn5vbJa0bdV6-7W-ss/edit#responses](https://docs.google.com/forms/d/1TieLrMmfj4cErf3t4XPRe_k8vrn5vbJa0bdV6-7W-ss/edit#responses)

HR:

<https://docs.google.com/forms/d/15hCxmKbtXbsMPT1cyX-qDb7FhtoeeNcaqK8grWH63K8/edit#responses>

CZ:

<https://docs.google.com/forms/d/1i7i2vVHITi3VRGRRwmhfckzjVbRpOYxmy2VxBLohViE/edit#responses>

AT:

<https://docs.google.com/forms/d/1ePJmFSFGltRoYL-fvLq2CDfQNAFNd58EeNVGfytwck/edit#responses>.

To analyse the whole sample of data and answers, the collected data were processed using the Google Forms functionalities and analysed in a descriptive manner obtaining figures, statistics and graphs.

#### 5. Questionnaire results

The first part of the survey collected some general information of the respondents. The answers were not all mandatory so, in the following statistics, it can happen to see numbers smaller than 100% in case participants didn't include all necessary information (e.g. age, country, etc.).

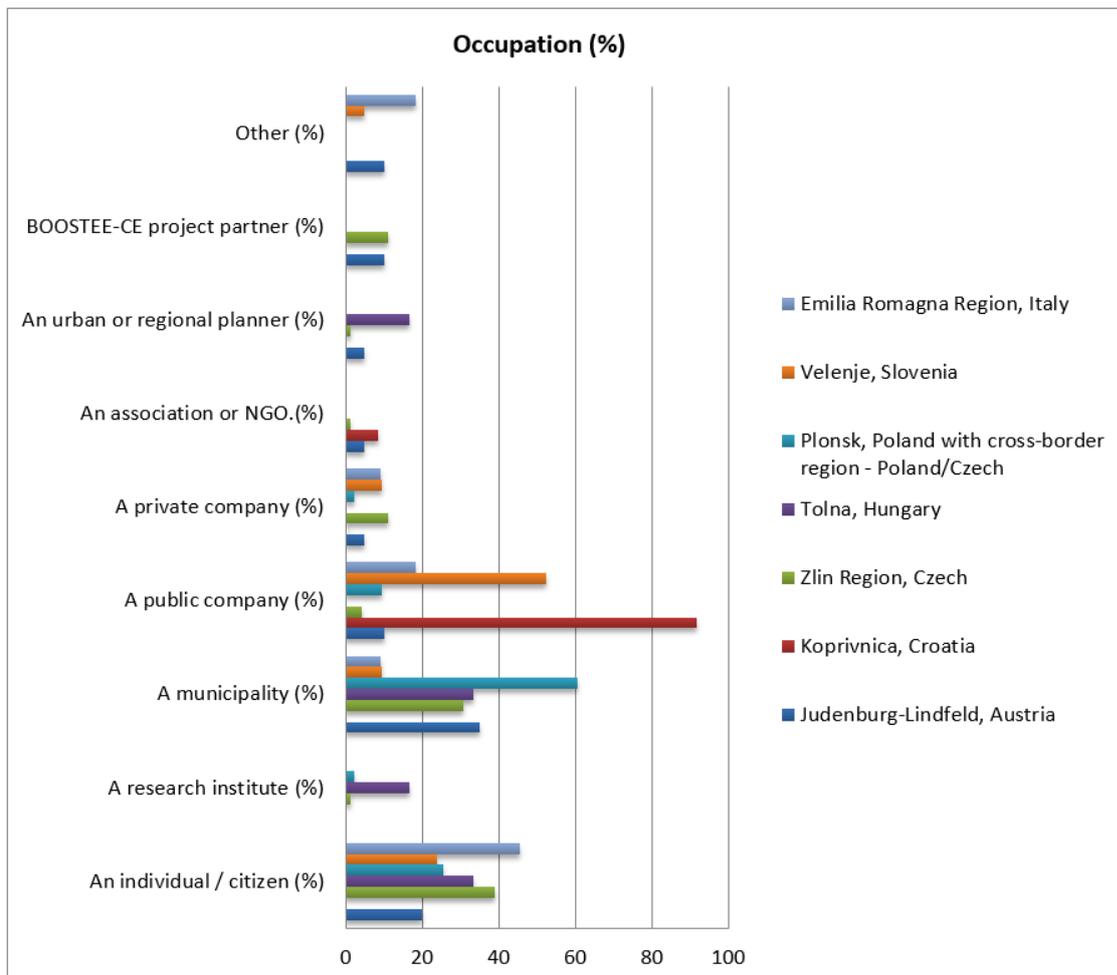
Table 1a provides the number of participating respondents by country/region. As far as occupation is concerned, the majority of respondents in Croatia and Slovenia works in public companies, in Poland and in cross-border region Poland/Czechia in municipality, in Czechia and in Hungary the majority of respondents



are distributed between citizens and municipality employees, in Italy between citizens and public company employees, while in Austria the respondents are more or less distributed over all categories (Graph 1).

Table 1a: Participants per country.

	Number of respondents
Judenburg-Lindfeld, Austria	10
Koprivnica, Croatia	12
Zlin Region, Czechia	41
Tolna, Hungary	3
Emilia Romagna Region, Italy	10
Cross-border Region, Poland/Czechia	25
Plonsk, Poland	17
Velenje, Slovenia	19
<b>Total</b>	<b>137</b>

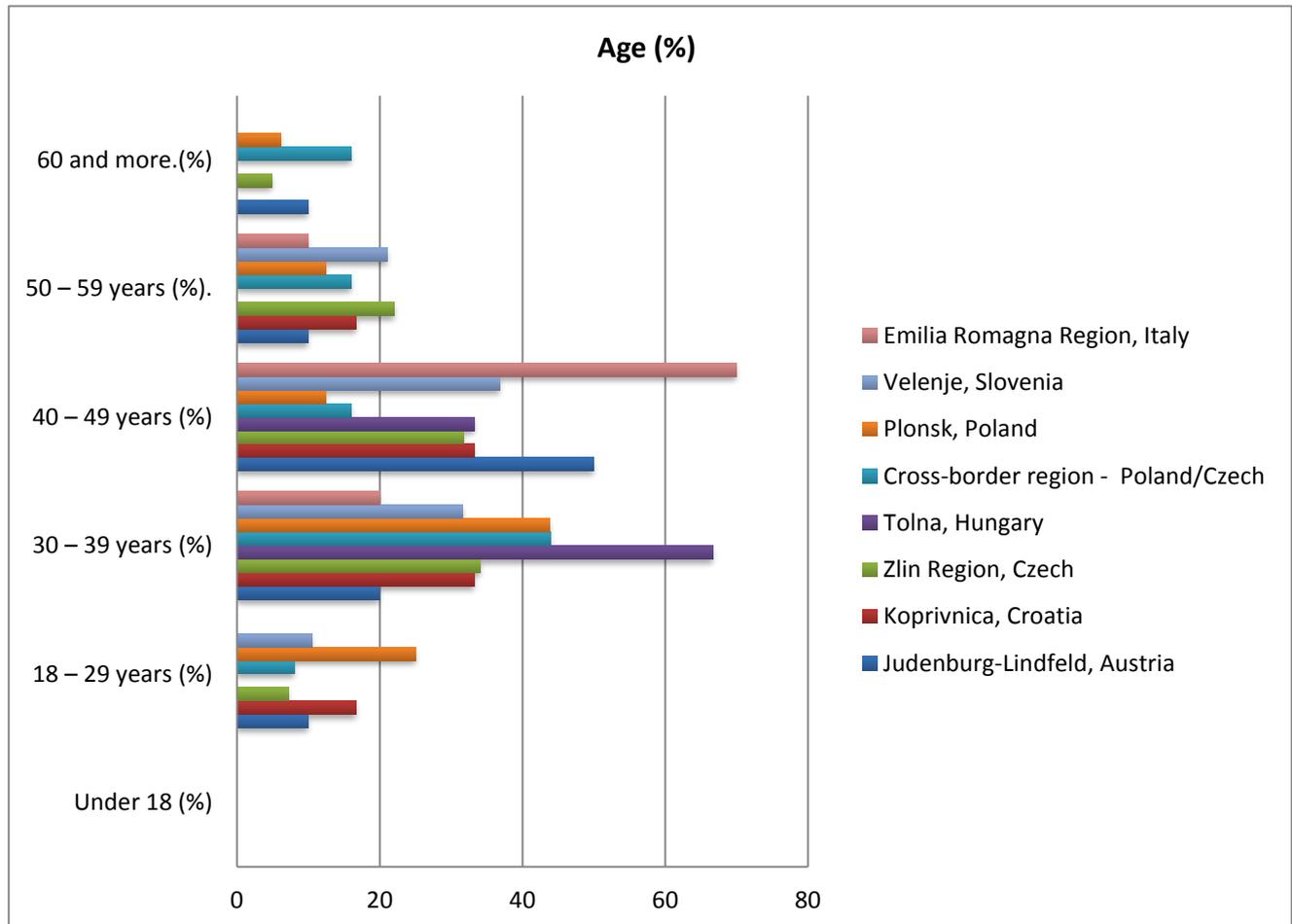


Graph 1: Statistics of the questionnaire participants



According to Graph 2, the vast majority of the respondents belong to “30 – 39” and “40 – 49” age group.

Graph 2: Age of the participants.



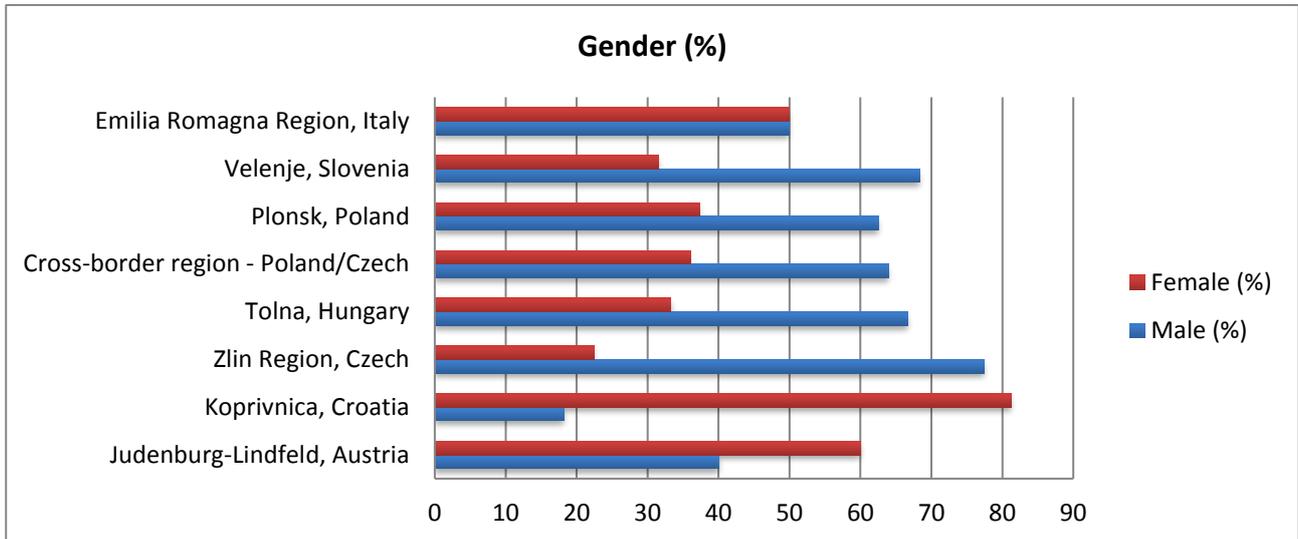
As regards the gender, males are predominant, with exception in Croatia, where females represent over 80% of the respondents, and Austria with 60% of the respondents representing females. In Italy both genders were equally represented in the survey (table 1, graph 3).

Table 1: Genders of the participants.

Gender (%)	Male (%)	Female (%)
Judenburg-Lindfeld, Austria	40.1	59.9
Koprivnica, Croatia	18,2	81,8
Zlin Region, Czechia	77,5	22,5
Tolna, Hungary	66,7	33,3
Cross-border Region, Poland/Czechia	64	36
Plonsk, Poland	62,5	37,5
Velenje, Slovenia	68,4	31,6
Emilia Romagna Region, Italy	50	50



Graph 3: Genders of the participants.

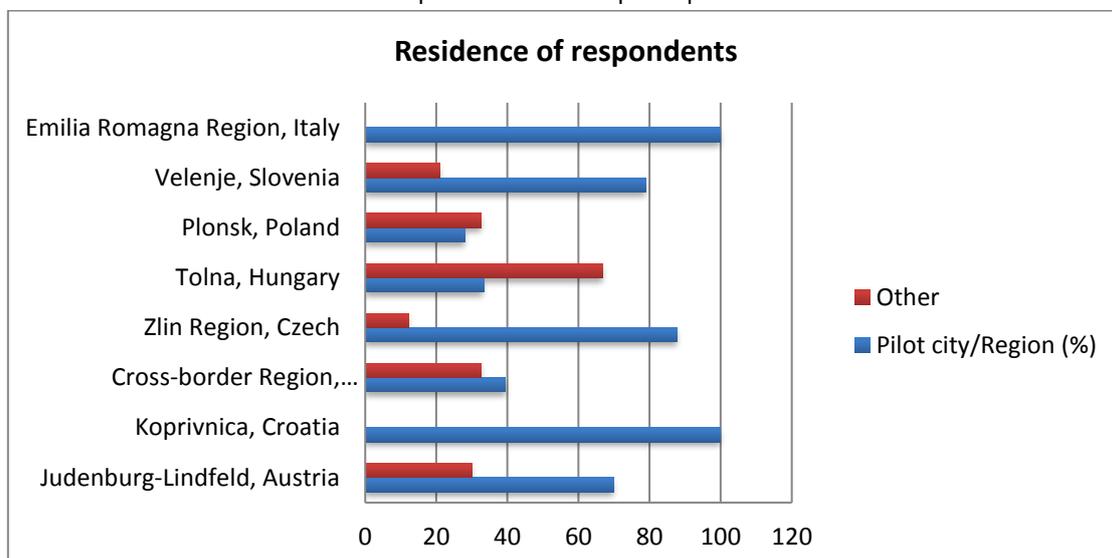


Considering the residence of respondents, the vast majority of respondents live in pilot cities - an exception was Poland, where respondents were distributed between Poland and the cross-border region Poland/Czechia, and Tolna in Hungary (Table 2, Graph 4).

Table 2: Residence of participants.

Residence of respondents	Pilot city/Region (%)	Other
Judenburg-Lindfeld, Austria	70	30
Koprivnica, Croatia	100	
Cross-border Region, Poland/Czechia	39,5	32,5
Zlin Region, Czechia	87,8	12,2
Tolna, Hungary	33,3	66,7
Plonsk, Poland	28	32,5
Velenje, Slovenia	78,9	21,1
Emilia Romagna Region, Italy	100	

Graph4: Residence of participants.





## 5.4 Awareness about energy efficiency

To improve the EE in pilot cities/regions it is important to know the current status of stakeholders' awareness and EE background to provide proper energy efficiency support. The results of this questionnaire survey will present a base for raising awareness and increasing knowledge as well as influencing attitude and behaviour of target groups through project communication activities.

Table 3: Ranking energy price.

How would you rank energy prices in your country?	Low, very accessible (%)	Medium (%)	High (%)	Prohibitively expensive (%)
Austria		90	10	
Croatia		16,7	83,3	
Czechia	2,5	78	19,5	
Hungary	33,3	33,3	33,3	
Poland		23,5	52,9	23,5
Slovenia	10,5	73,7	15,8	
Italy		30	70	

Graph 5: Ranking energy price.

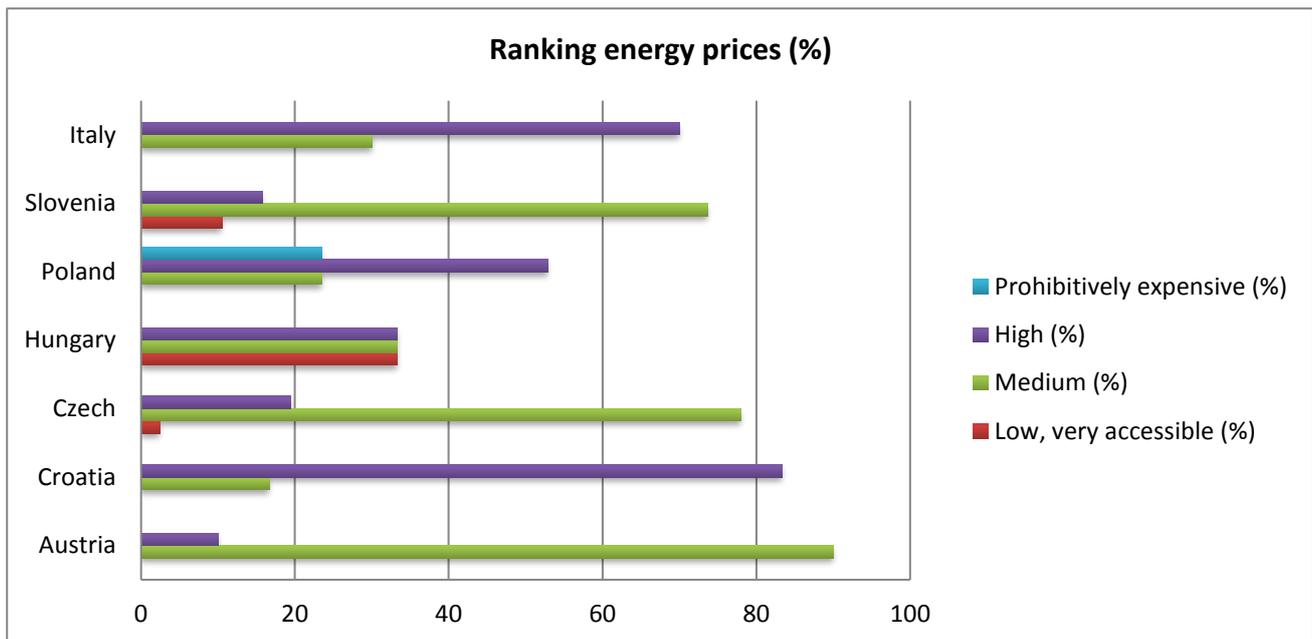


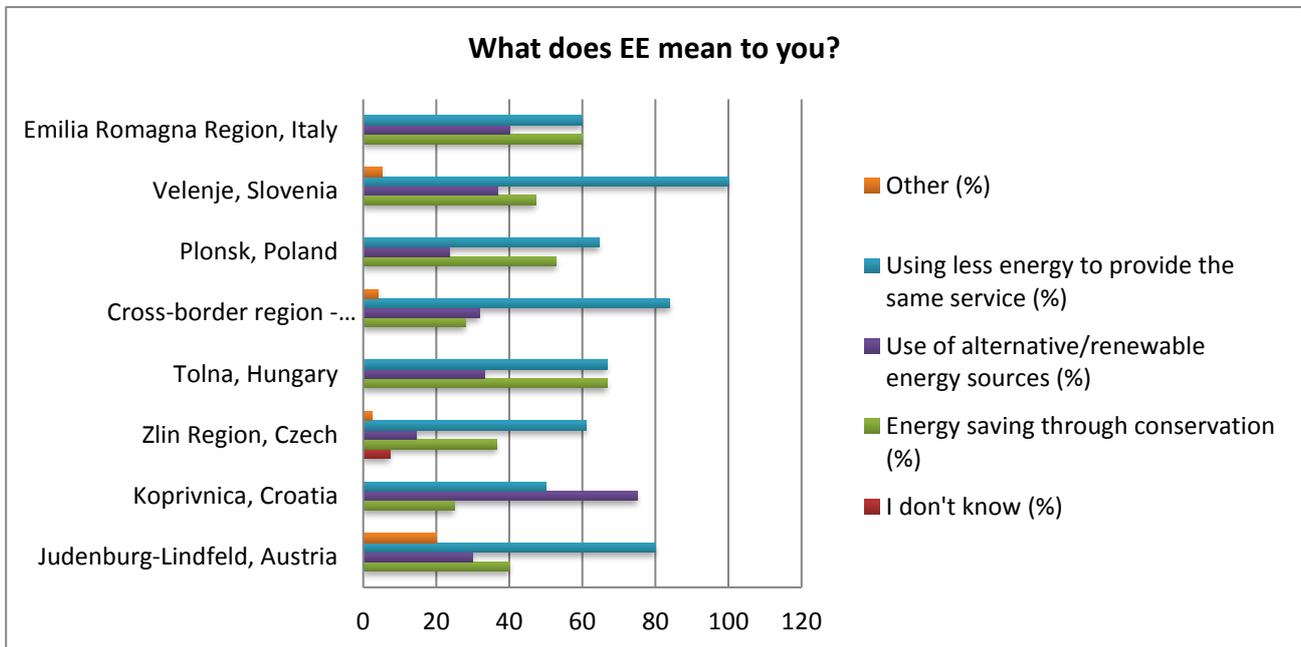
Table 3 and Graph 5 summarise respondents' perceptions towards energy prices in their country. According to results, Slovenia, Czechia and Austria rank their energy prices as medium, while in Poland, Italy and Croatia the prevailing opinion is that energy prices are high.



Table 4: Meaning of Energy Efficiency for participants.

What does energy efficiency mean for you?	I don't know (%)	Energy saving through conservation (%)	Use of alternative/renewable energy sources (%)	Using less energy to provide the same service (%)	Other (%)
Judenburg-Lindfeld, Austria		40	30	80	20
Koprivnica, Croatia		25	75	50	
Zlin Region, Czechia	7,3	36,6	14,6	61	2,4
Tolna, Hungary		66,7	33,3	66,7	
Cross-border region - Poland/Czechia		28	32	84	4
Plonsk, Poland		52,9	23,5	64,7	
Velenje, Slovenia		47,4	36,8	100	5,3
Emilia Romagna Region, Italy		60	40	60	

Graph 6: Meaning of Energy Efficiency for participants.



Energy efficiency is in majority of pilot cities/regions understood as “Using less energy to provide the same service” followed by the definition of “Energy saving through conservation”. The exception is the perception of participants in Koprivnica, Croatia, where majority understands energy efficiency as “Use of alternative/renewable energy sources” followed by the definition “Using less energy to provide the same service” (Table 4, Graph 6).



Table 5: Communication activities on EE (multiple answers were allowed).

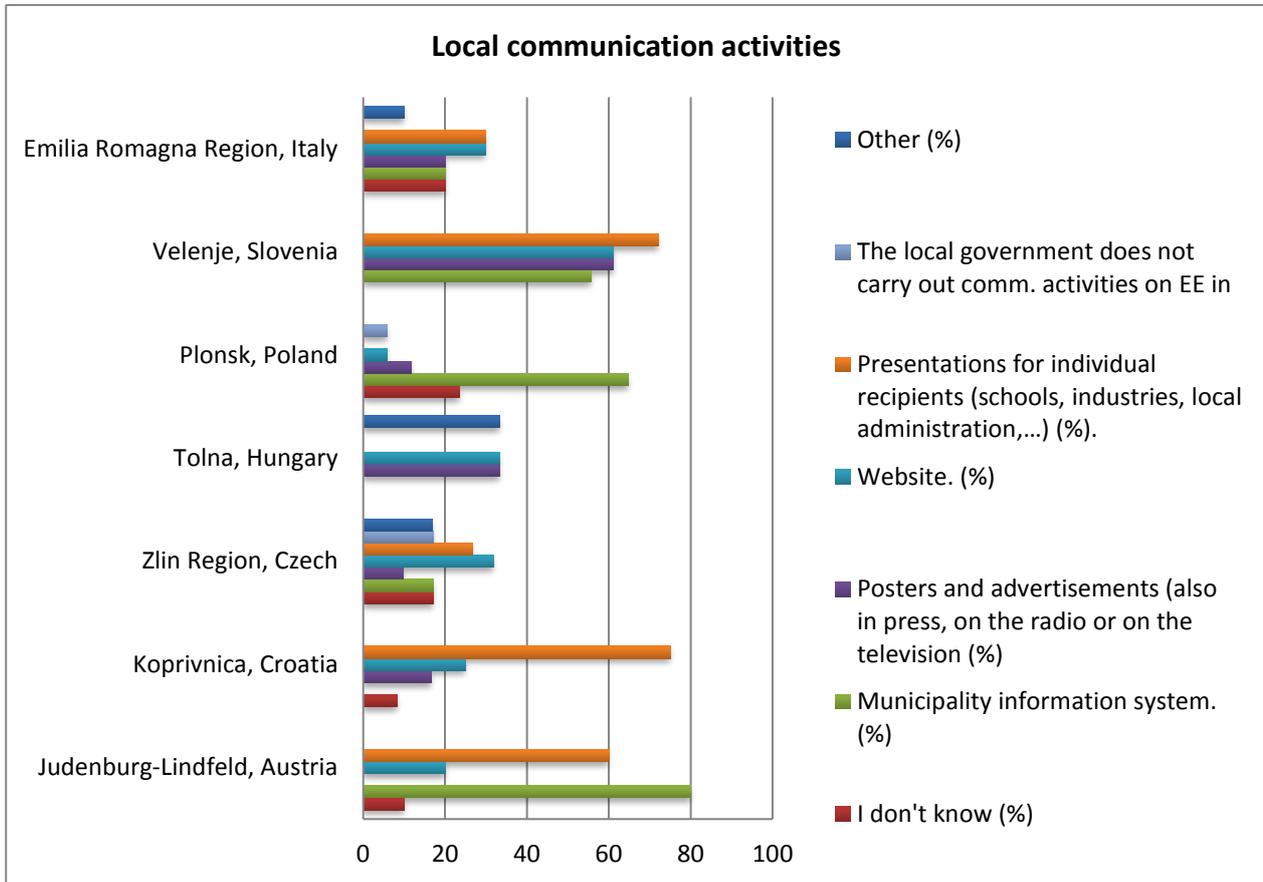
Does your local government conduct any communication activities on energy efficiency of buildings? If yes, what communication activities are these?	I don't know (%)	Municipality information system. (%)	Posters and advertisements (also in press, on the radio or on the television (%)	Website. (%)	Presentations for individual recipients (schools, industries, local administration,...) (%)	The local government does not carry out comm. activities on EE in buildings. (%)	Other (%)
Judenburg-Lindfeld, Austria	10	80		20	60		
Koprivnica, Croatia	8,3		16,7	25	75		
Zlin Region, Czechia	17,1	17,1	9,8	31,8	26,8	17,1	16,9
Tolna, Hungary			33,3	33,3			33,3
Plonsk, Poland	23,5	64,7	11,8	5,9		5,9	
Velenje, Slovenia		55,6	61,1	61,1	72,2		
Emilia Romagna Region, Italy	20	20	20	30	30		10

The local governments' communication activities on energy efficiency of buildings differ among participating countries (Table 7, Graph 7).

From the collected data it can be observed that in Velenje (Slovenia) presentations for individual recipients are prevailing, followed by the website, posters and advertisements and municipality information system. In Plonsk (Poland) the main local communication activity is represented by municipality information system. In Tolna (Hungary) website and posters and advertisements are equally represented, with emphasis on other communication activities - "Sustainable Developer Program of Tolna City" (residential information). In Zlin region, Czechia, the local communication activities are somehow distributed over all categories with additional activities performed by Energy Agency of the Zlín Region. In Emilia Romagna Region, Italy, website and presentations for individuals are equally represented, followed by the municipality information system and posters and advertisements. In Koprivnica (Croatia) presentations for individual recipients are prevailing, website and posters and advertisements present only a small share. In Judenburg-Lindfeld (Austria) main local communication activities are carried out by municipality information system and presentations for individual recipients, website is representing only 20% of communication activities.



Graph 7: Communication activities on EE.



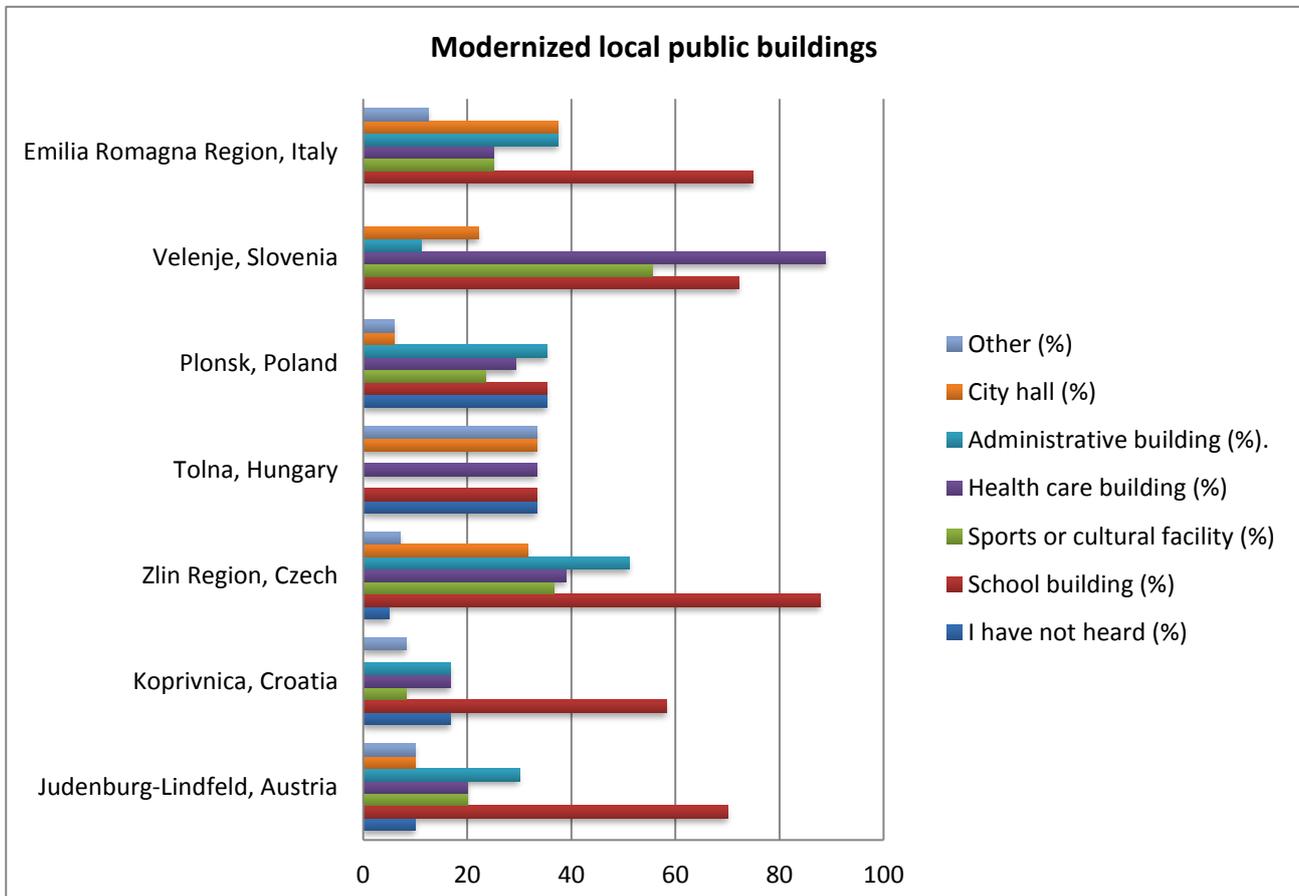
According to collected information the health care buildings are predominant among retrofitted/renovated local public buildings in Velenje (Slovenia), followed by the school buildings and sports or cultural facilities (Table 6, Graph 8). In Plonsk (Poland) all buildings' categories are about equally represented with exception of city hall. In Tolna (Hungary) city hall building, health care buildings and school buildings are listed. In Zlin region, (Czechia) school buildings prevail, followed by administrative buildings, but also other buildings' categories are represented with over 30%. In Koprivnica (Croatia) and in Judenburg-Lindfeld (Austria) school buildings are predominant among retrofitted/renovated buildings, with other buildings categories represented by 20%. Also in Italy school buildings prevail among retrofitted/renovated buildings, followed by the city hall and administrative buildings.



Table 6: Modernized buildings (multiple answers allowed).

Have you heard that the local government has modernized any public building to improve its energy efficiency over the past five years? If yes, what type of building was this:	I have not heard (%)	School building (%)	Sports or cultural facility (%)	Health care building (%)	Administrative building (%)	City hall (%)	Other (%)
Judenburg-Lindfeld, Austria	10	70	20	20	30	10	10
Koprivnica, Croatia	16,7	58,3	8,3	16,7	16,7		8,3
Zlin Region, Czechia	4,9	87,8	36,6	39	51,2	31,7	7,2
Tolna, Hungary	33,3	33,3		33,3		33,3	33,3
Plonsk, Poland	35,3	35,3	23,5	29,4	35,3	5,9	5,9
Velenje, Slovenia		72,2	55,6	88,9	11,1	22,2	
Emilia Romagna Region, Italy		75	25	25	37,5	37,5	12,5

Graph 8: Modernized buildings.





In Tables 7 a–e the data were collected on the most important obstacle in implementing energy efficiency measures in public buildings. The importance of the obstacles was rated from 1(not important) to 5 (very important).

Table 7a: Lack of information on EE.

Lack of information about State Of The Art of energy efficiency in public buildings (%).	1	2	3	4	5
Austria	10	40	30	20	
Croatia			33,3	33,3	33,3
Czechia	2,4	4,9	34,1	41,5	17,1
Hungary				66,7	33,3
Italy		10	40	40	10
Poland		5,9	29,4	35,3	29,4
Slovenia	10,5		36,8	36,8	15,8

Graph 9a: Lack of information on EE.

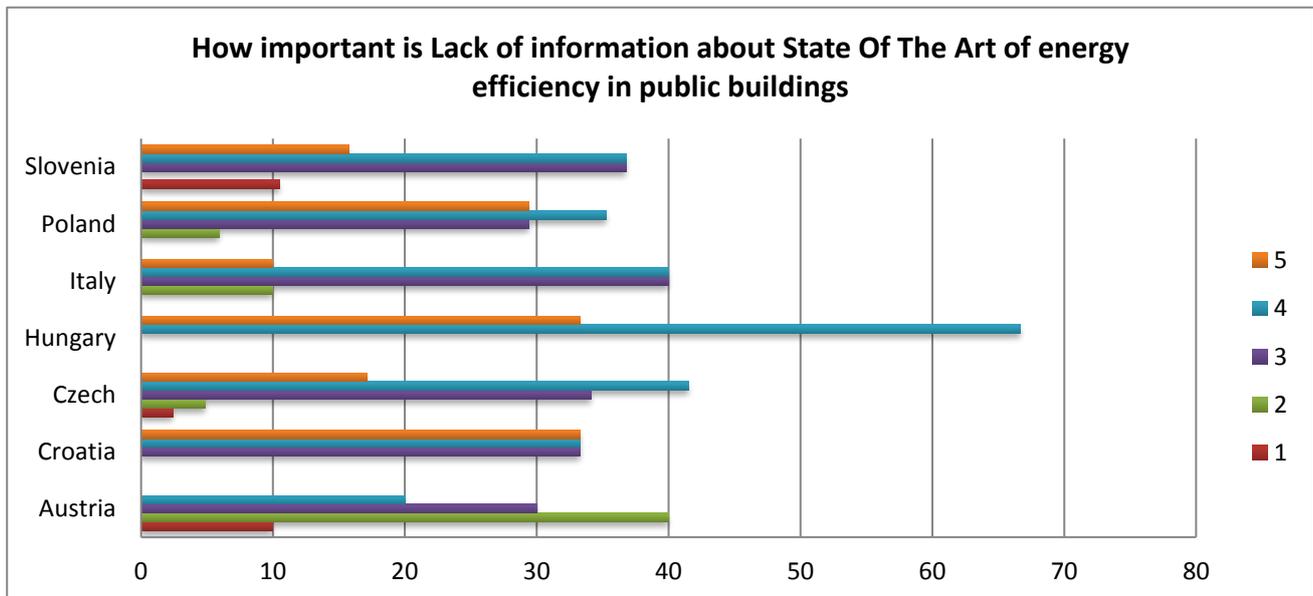


Table 7b: Lack of information on efficiency measures.

Lack of information (knowledge) on efficiency measures in public buildings (%).	1	2	3	4	5
Austria	20	30	20	30	
Croatia			33,3	33,3	33,3
Czechia	2,4	12,2	22	39	24,4
Hungary		33,3		66,7	
Italy		40	30	20	10
Poland	5,9		41,2	23,5	29,4
Slovenia	5,3	5,3	31,6	47,4	10,5



Graph 9b: Lack of information on efficiency measures.

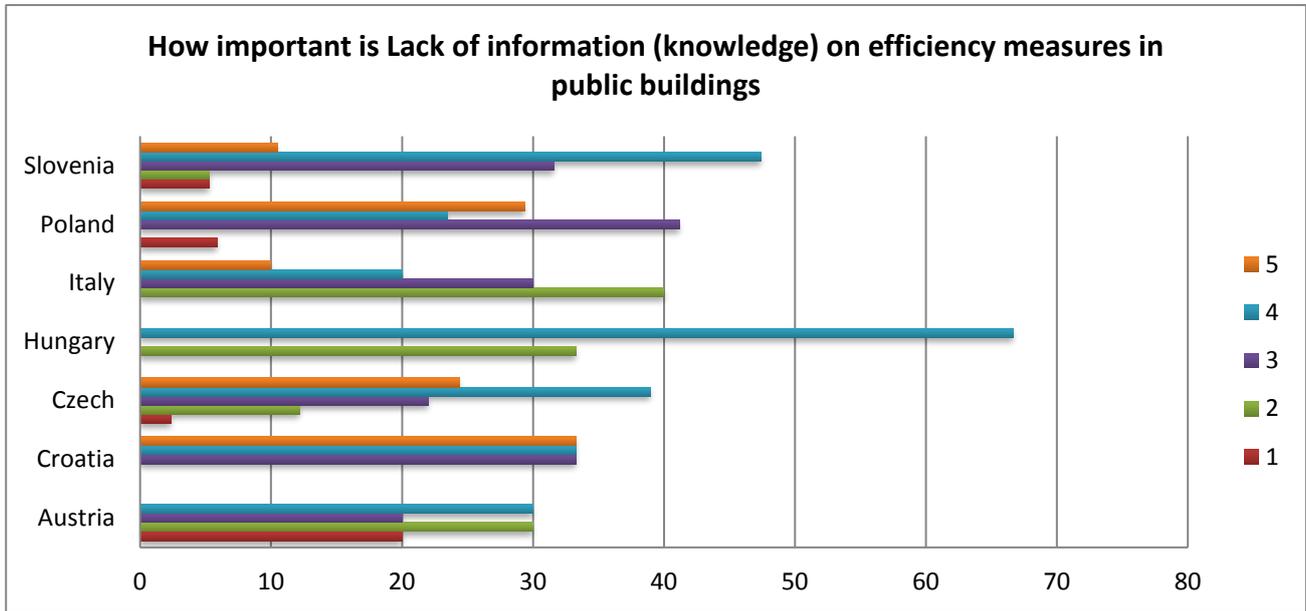


Table 7c: Other lacks.

Higher up-front costs, lack of financial aid (%).	1	2	3	4	5
Austria			10	20	70
Croatia			8,3	25	66,7
Czechia	2,4	12,2	31,7	31,7	22
Hungary		33,3	33,3	33,3	
Italy			30	50	20
Poland		11,8	5,9	35,3	47,1
Slovenia			21,1	31,6	47,4

Graph 9c: Other lacks.

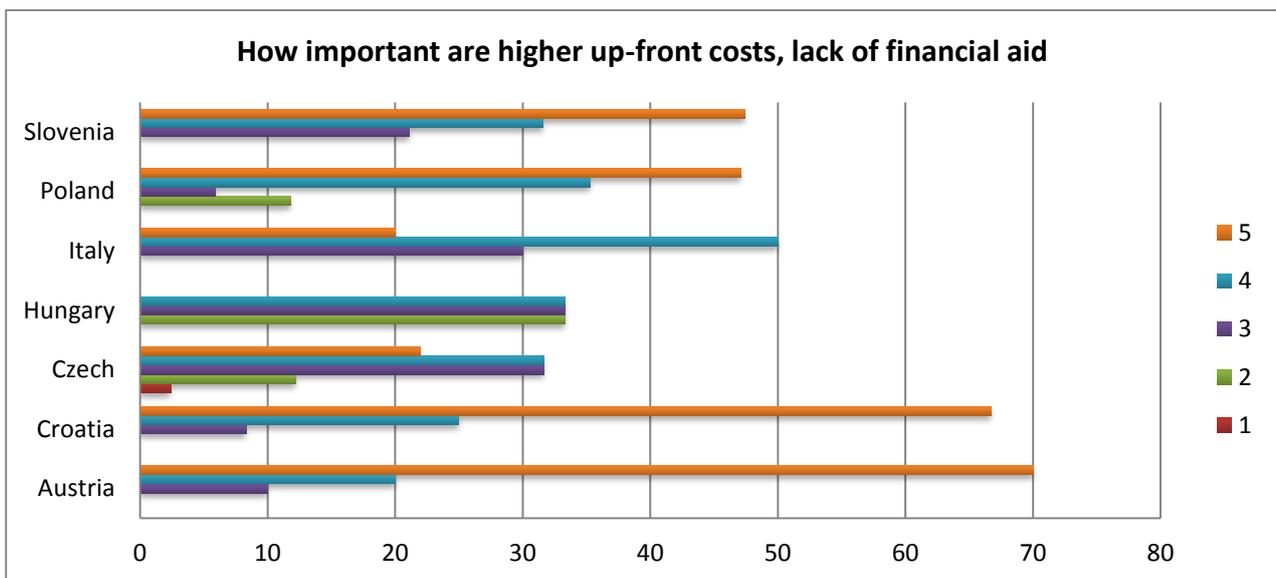




Table 7d: Barriers.

Administrative and regulatory barriers (%).	1	2	3	4	5
Austria			30	60	10
Croatia			16,7	41,7	41,7
Czechia	2,4	19,5	19,5	39	19,5
Hungary		33,3	33,3	33,3	
Italy			40	50	10
Poland	5,9	17,6	23,5	29,4	23,5
Slovenia		15,8	5,3	52,6	26,3

Graph 9d: Barriers.

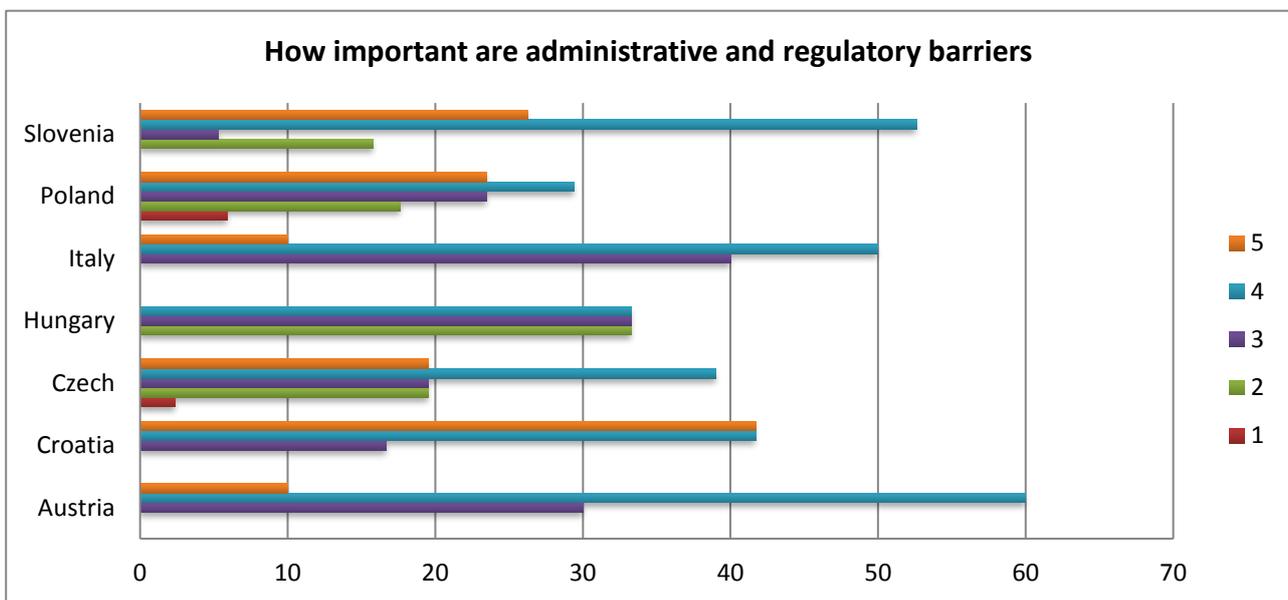
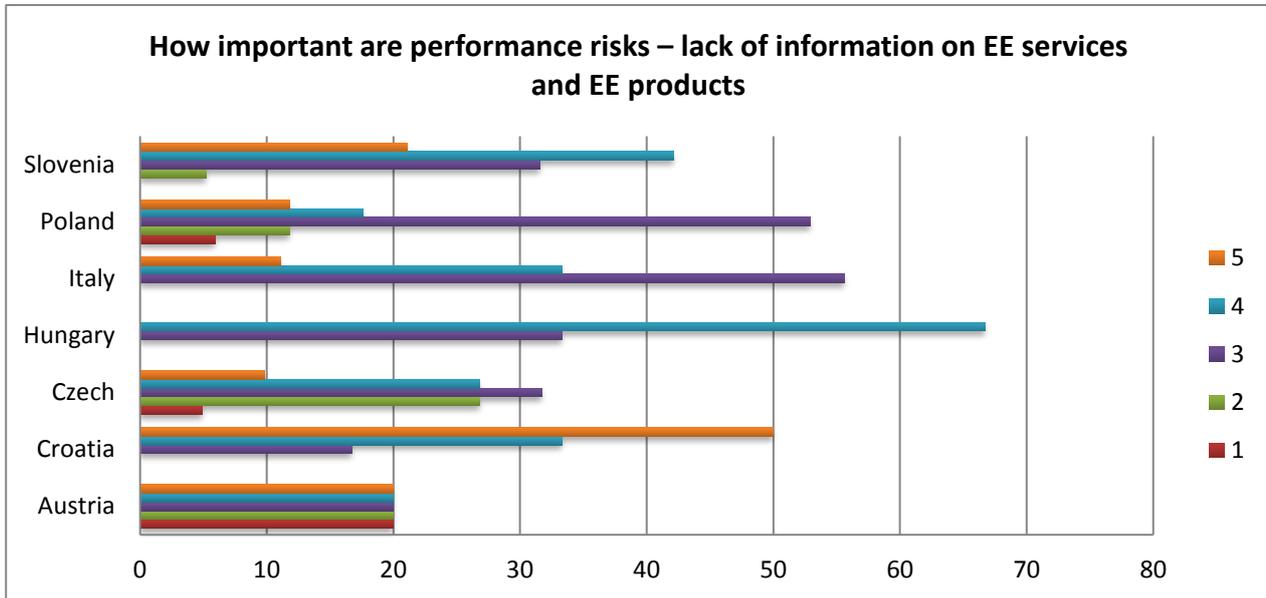


Table 7e: Performance risks.

Performance risks – lack of information on EE services and EE products (%).	1	2	3	4	5
Austria	20	20	20	20	20
Croatia			16,7	33,3	50
Czechia	4,9	26,8	31,7	26,8	9,8
Hungary			33,3	66,7	
Italy			55,6	33,3	11,1
Poland	5,9	11,8	52,9	17,6	11,8
Slovenia		5,2	31,6	42,1	21,1



Graph 9e: Performance risks.



Lack of information about State Of The Art of energy efficiency in public buildings is according to opinion of respondents in most of the countries defined as important (4) obstacle in implementing energy efficiency measures in public buildings, especially in Tolna, Hungary. The exception is Judenburg-Lindfeld (Austria), where the rate of importance for this obstacle is defined only as slightly important (2), from which we can conclude that this municipality has a good database on the existing EE situation.

Lack of information (knowledge) on efficiency measures in public buildings is according to the respondents' opinion rated as important (4) in most of participating countries, especially in Hungary (Tolna) and in Slovenia (Velenje). In Poland this obstacle is rated with 3 – moderately important and in Italy with only (2) - slightly important.

Higher up-front costs and lack of financial aid are rated as very important (5) obstacle in most of the countries. In Italy this obstacle was rated as important (4) and in Hungary and in Czechia it was rated as important (4) to moderately important (3).

Administrative and regulatory barriers are in all participating countries rated as important (4) obstacle – in Croatia even as important to very important (5), while in Hungary it was rated from slightly important (2) over moderately important (3) to important (4).

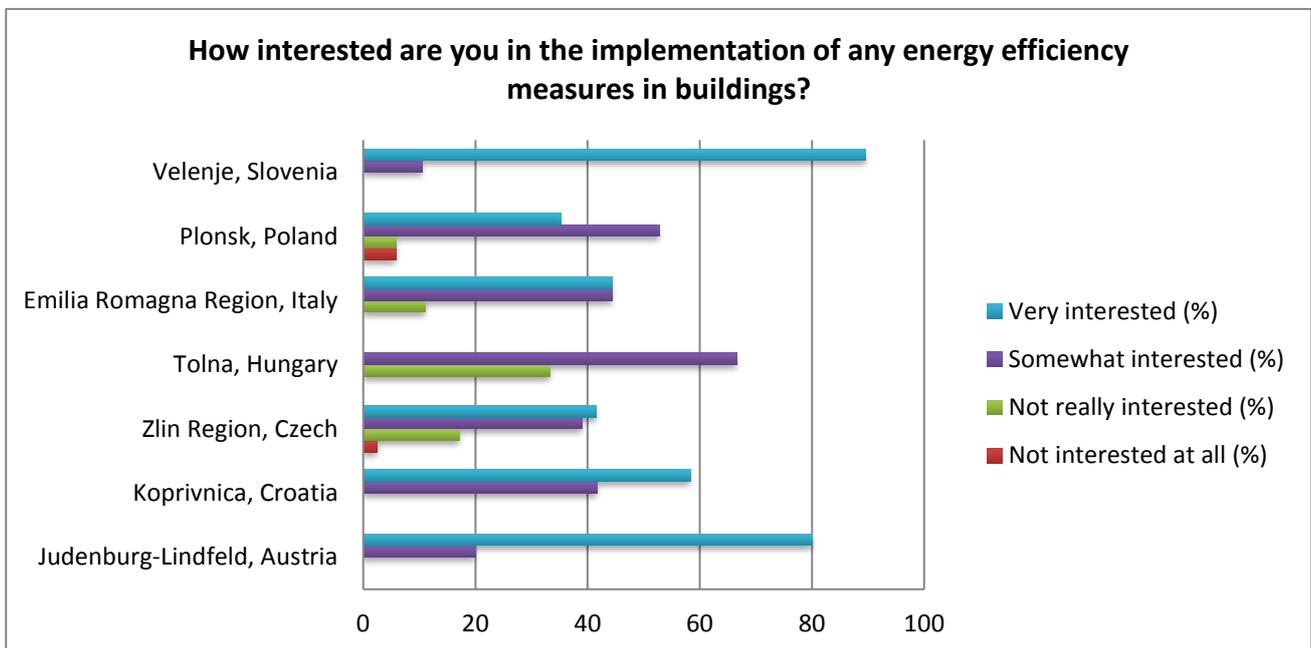
Performance risks due to lack of information on EE services and EE products were defined as very important (5) obstacle in Croatia, as important (4) obstacle in Hungary and Slovenia and as moderately important (3) in Italy, Poland and Czechia. In Austria the respondents equally distributed the rates to all categories.



Table 8: Interest in EE.

How interested are you in the implementation of any energy efficiency measures in buildings?	Not interested at all (%)	Not really interested (%)	Somewhat interested (%)	Very interested (%)
Judenburg-Lindfeld, Austria			20	80
Koprivnica, Croatia			41,7	58,3
Zlin Region, Czechia	2,4	17,1	39	41,5
Tolna, Hungary		33,3	66,7	
Emilia Romagna Region, Italy		11,1	44,4	44,4
Plonsk, Poland	5,9	5,9	52,9	35,3
Velenje, Slovenia			10,5	89,5

Graph 10: Interest in EE.



According to Table 8 and Graph 10, more than 50% of respondents are interested in the implementation of EE measures in buildings in Velenje (Slovenia), Judenburg-Lindfeld (Austria) and Koprivnica (Croatia). In Tolna (Hungary) and Plonsk (Poland) over 50% of respondents are somewhat interested in implementing EE measures in public buildings.



## 5.5 OnePlace expectations

The main purpose of the online questionnaire was to summarize the requirements of stakeholders (intended for citizens, municipalities, different companies and other stakeholders) on OnePlace and use the results as support at adopting the form and content of the OnePlace to the actual needs of stakeholders.

### 5.5.1 Which of the following information would you like to find in 3D Energy Management System?

3D Energy Management System (EMS) - a webGIS solution where users can interactively navigate a map of an urban environment, select a 3D building of interest and retrieve the energy audit and other cadastral/building information.

Table 9: Information people would like to see in the EMS module.

Nr of respondents	Address	The construction year	Building type (school, health care building, etc.)	Energy source type (gas, wood, sun, etc.)	Energy audit (type, date)	Specific primary heating energy consumption	Total primary heating energy consumption	The specific CO2 emissions	The total CO2 emissions	Renewable energy produced in the building (with use of PV, solar collectors, biofuel boilers, heat pumps, etc.)	Estimated photovoltaic potential of building roofs	Energy efficiency measures already implemented in the building	Recommended energy efficiency measures for the building	Estimation of the amount of heating losses in the building	Heating losses visualized using thermal images	Is it equipped with smart meters?
Austria	5	8	7	6	3	4	6	2	5	8	4	6	6	6	4	6
Croatia	4	6	8	7	4	2	7	1	4	7	2	7	5	4	3	4
Czechia	19	18	27	29	14	13	25	4	15	18	13	24	22	16	15	12
Hungary	3	3	3	2	2	1	2	1	2	2	2	2	2	1		2
Italy	7	9	9	8	7	6	7	5	7	10	6	10	8	7	4	5
Poland	8	5	11	9	5	6	7	7	6	6	1	3	4	4	6	3
Slovenia	13	16	14	17	15	15	15	8	11	17	11	16	13	12	12	11

Graph 11: Information people would like to see in the EMS module.

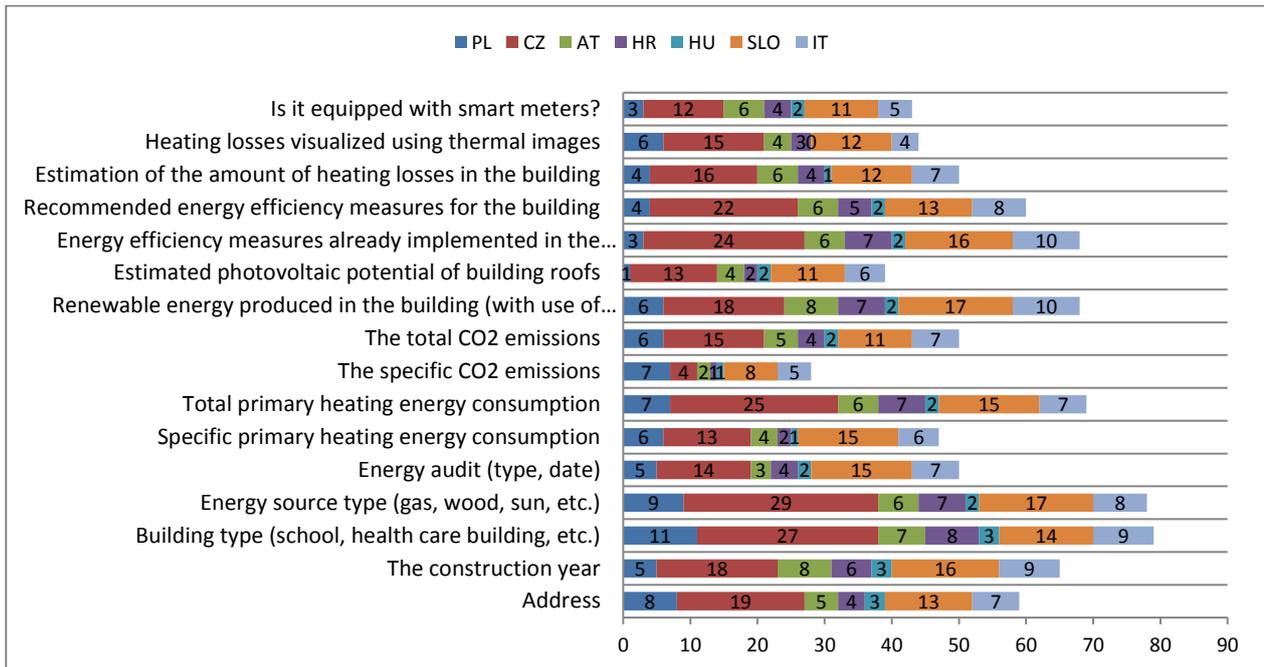


Table 9 and Graph 11 summarize the perception of respondents to data needed in 3D EMS. In the Table 10 the proposed information is ranked according to the survey results. There was a remark to the proposed list of content, that if data is dynamic or real, all listed data are desirable.

Table 10: Ranking of wished information.

Information	% of respondents interested in information
Building type (school, health care building, etc.)	74
Energy source type (gas, wood, sun, etc.)	73
Total primary heating energy consumption	64
Renewable energy produced in the building	64
Energy efficiency measures already implemented in the building	64
The construction year	61
Recommended energy efficiency measures for the building	56
Address	55
Energy audit (type, date)	47
The total CO2 emissions	47
Estimation of the amount of heating losses in the building	47
Specific primary heating energy consumption	44
Heating losses visualized using thermal images	41
Is it equipped with smart meters?	40
Estimated photovoltaic potential of building roofs	36
The specific CO2 emissions	26



**5.5.2 Which of the following information would you like to find in Energy Efficient Cities - module?**

Energy Efficient Cities (EEC) – a module that enables an exchange of experiences and good practices within EE sector for public authorities and other public users.

Table 11: Information people would like to see in the EEC module.

Nr of respondents	Energy efficiency of transport	Energy efficiency of buildings	Energy efficiency of public lighting	Energy efficiency of water & wastewater sector	Efficiency of power supply and heating (e.g. classification of buildings in classes considering the heat loss)	Energy efficiency of solid waste sector	The most important indicators for the energy efficiency of the city	Guidelines on integrating efficiency in design, planning, management and implementation of projects that improve urban services	Recommended energy efficiency measures for cities to improve energy efficiency in public buildings	List of public buildings equipped with smart meters	Best examples of energy efficiency policies/strategies for cities with the list of related documents
Austria	8	9	8	5	7	6	4	5	4	6	3
Croatia	6	9	3	5	8	3	5	5	6	2	3
Czechia	14	32	21	24	30	19	17	19	22	15	21
Hungary	1	3	3	2	2		2	3	1	2	1
Italy	10	10	9	8	6	5	7	5	4	5	5
Poland	6	12	9	4	6	3	2	6	3	4	5
Slovenia	11	19	15	12	17	7	11	7	10	11	9

The content of the Energy Efficient Cities – module is ranked according to the opinion of respondents in table 12.



Graph 12: Information people would like to see in the EEC module.

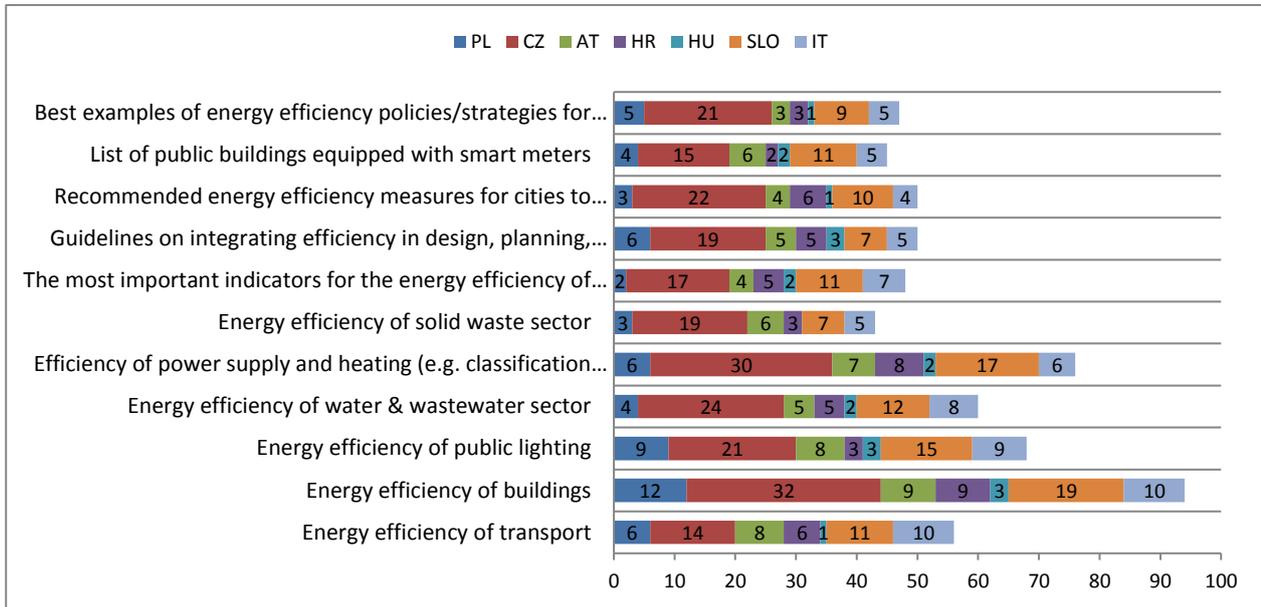


Table 12: Ranking of wished information in EEC module.

Information	% of respondents interested in information
Energy efficiency of buildings	85
Efficiency of power supply and heating (e.g. classification of buildings in classes considering the heat loss)	69
Energy efficiency of public lighting	62
Energy efficiency of water & wastewater sector	55
Energy efficiency of transport	51
Guidelines on integrating efficiency in design, planning, management and implementation of projects that improve urban services	45
Recommended energy efficiency measures for cities to improve energy efficiency in public buildings	45
The most important indicators for the energy efficiency of the city	44
Best examples of energy efficiency policies/strategies for cities with the list of related documents	43
List of public buildings equipped with smart meters	41
Energy efficiency of solid waste sector	39



**5.5.3 Which of the following information would you like to find in Living Energy Marketplace - module?**

Living Energy Marketplace (LEM) - a database covering the spectrum of electronic devices and electric appliances (ENERGY STAR products), offering customers interested in energy efficiency projects list of qualified contractors (architects, engineers, auditors, craftsmen, technicians and installers, all involved in refurbishment).

Table 13: Information people would like to see in the LEM module.

Nr of respondents	List of energy suppliers	List of energy auditors (EPC register)	List of energy experts	Most important factors to consider when buying energy-efficient appliances and devices	Most important information about using appliances and devices efficiently	List of products available on the Living Energy Marketplace	List of services provided on the Living Energy Marketplace	Information on the newest technologies for energy efficiency improvement available on market	List of smart metering & EMS expert companies	Pieces of advice for launching green procurements
Austria	7	5	6	5	4	3	3	3	2	5
Croatia	10	3	6	7	10	4	5	5	3	4
Czechia	25	13	20	27	27	24	25	19	14	8
Hungary	2	2	3	1	2	2	2	2	2	2
Italy	7	5	5	6	6	5	5	10	3	4
Poland	11	5	6	7	7	7	5	6	2	4
Slovenia	17	10	13	15	15	6	6	15	8	9

The information that respondents would like to find in the Living Energy Marketplace – module is listed in table 16. There was a remark from one respondent that many of these lists already exist on the Internet, asking if it makes sense to recreate this and to wait and keep it up to date.



Graph 13: Information people would like to see in the LEM module.

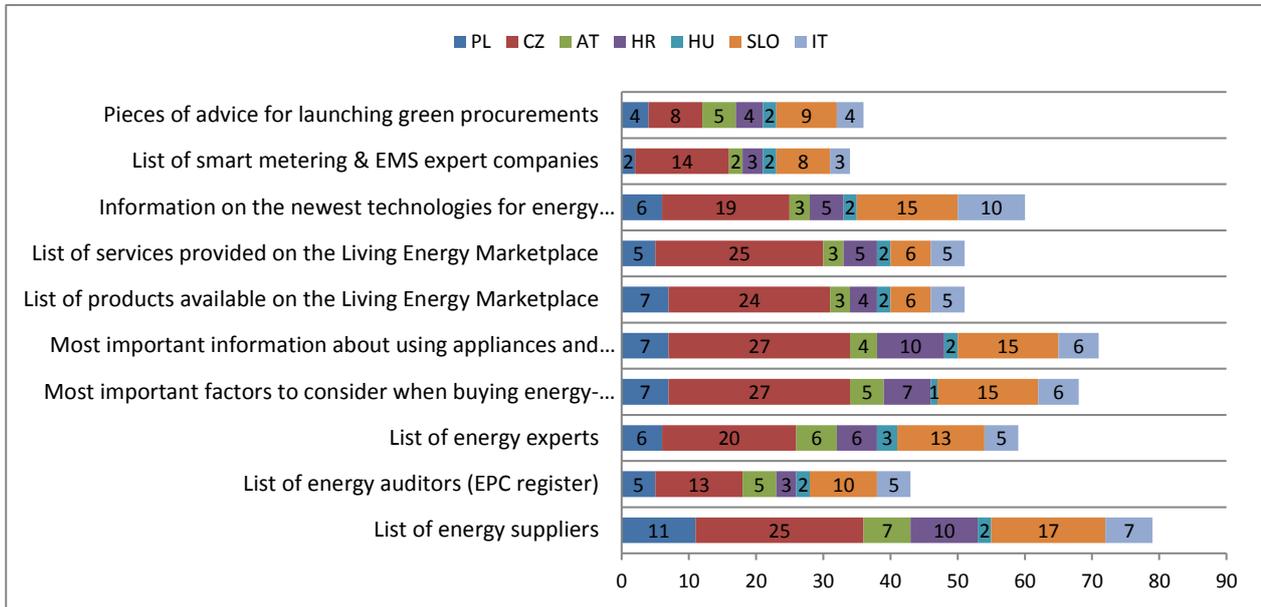


Table 14: Ranking of wished information in the LEM module.

Information	% of respondents interested in information
List of energy suppliers	72
Most important information about using appliances and devices efficiently	65
Most important factors to consider when buying energy-efficient appliances and devices	62
Information on the newest technologies for energy efficiency improvement available on market	55
List of energy experts	54
List of products available on the Living Energy Marketplace	47
List of services provided on the Living Energy Marketplace	47
List of energy auditors (EPC register)	39
Pieces of advice for launching green procurements	33
List of smart metering & EMS expert companies	31



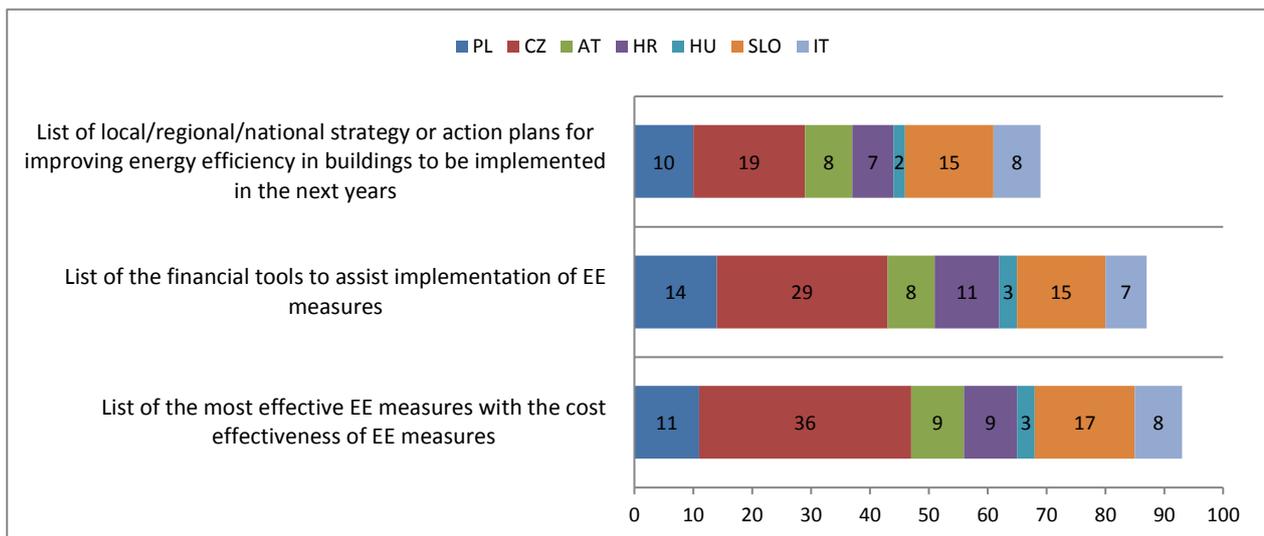
### 5.5.4 Which of the following information would you like to find in Financing Energy Efficiency - module?

The Financing Energy Efficient (FEE) – a module that enables an exchange of experiences and good practices within EE sector for public authorities and other public users.

Table 17: Information people would like to see in the FEE module.

Nr of respondents	List of the most effective EE measures with the cost effectiveness of EE measures	List of the financial tools to assist implementation of EE measures	List of local/regional/national strategy or action plans for improving energy efficiency in buildings to be implemented in the next years
Austria	9	8	8
Croatia	9	11	7
Czechia	36	29	19
Hungary	3	3	2
Italy	8	7	8
Poland	11	14	10
Slovenia	17	15	15

Graph 14: Information people would like to see in the FEM module.



According to the survey, respondents are very interested in all three proposed lists (over 60%). One of the respondents gave remark, that the Financial Module should offer a "decision support system" that would allow simulations of the reconstruction calculations to represent added value towards existing financial contents.



## 6. Conclusions

The survey showed that most of the respondents were male individuals/citizens aged between 30 and 49.

To generalize the respondents' awareness about EE it can be concluded that:

- in most of the participating countries energy prices are ranked as medium (49,3 %),
- the understanding of EE as "Using less energy to provide the same service" prevails (70,8 %),
- the local governments do conduct a variety of communication activities on EE of public buildings – prevailing are Presentations for individual recipients (52,8 %) and Municipality information system (47,5 %),
- most retrofitted/renovated public buildings are school buildings (61,7 %), followed by the health care buildings (36 %),

The following obstacles in implementing EE measures in public buildings were rated by respondents according to their importance:

- Higher up-front costs, lack of financial aid – rate 5 (45,5 %).
- Administrative and regulatory barriers – rate 4 (43,7 %).
- Lack of information about State Of The Art of energy efficiency in public buildings - rate 4 (39,1 %)
- Lack of information (knowledge) on efficiency measures in public buildings - rate 4 (37,1 %)
- Performance risks – lack of information on EE services and EE products – rate 3 (34,5 %).

Most of the respondents were very interested in the implementation of EE measures (58,2 %).

Concerning the OnePlace expectations, it can be concluded that the list of proposed content was well-placed, as most of the issues were confirmed by more than 40 % of respondents. OnePlace must focus on dynamical/real data, raising information level, including already existing updated information lists, and focus on effort to provide added value to existing data/platforms.



## 7. ONEPLACE - architecture, visual and technical design and content

### 7.1 Architecture of OnePlace

The web-based platform should include 4 functional parts / modules:

- 3D Energy Management System (EMS):
  - a 3D web viewer (for both structured and unstructured 3D data) linked to a geodatabase (geodb) where heterogeneous data are stored;
  - real-time 3D navigation of the data;
  - scalability and extension to further data (inclusion of new information at later stage by project partners);
  
- Living Energy Marketplace:
  - a database of energy-related devices used in the field of energy efficiency,
  - search functionalities based on specific parameters (e.g.: type of electronic devices, contractor name, country, etc.)
  - a possibility to upload files;
  - a discussion forum;
  
- Energy Efficient Cities:
  - a discussion forum to exchange of experiences and good practices in the EE sector for public authorities and other public users (by default in English but also in the languages of the project consortium (CZ, DE, HU, IT, PL, SI), offering the possibility to search topics and upload various files;
  - database containing a catalogue of the best practices related to EE
  - search function to look for examples of best practices based on keywords or specific parameters
  
- Financing Energy Efficiency:
  - a database of transnational financial strategies in the field of EE;
  - download / upload functions ( pdf -, xls - files, etc);
  - search function to look for examples of strategies based on keywords or specific parameters.



# **D.T2.1.1-2: Architecture design for the Transnational Online Energy Platform - OnePlace - manual**

## **A.T2.1 Development of the Online Energy Platform – One Place**

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## 1. Introduction

This deliverable represents a manual for the realization and management of the content and input of the OnePlace project platform. The manual stems as outcome of the User Questionnaire that was developed to collect the input data for the OnePlace platform (see Report document, D.T2.1.1-1).

This deliverable is focusing on creating the framework for the content and input of the online project platform, so it is addressed to project partners and also to stakeholders interested in using the platform.

The document thus represents guidelines on the data input and content management of the project platform.

The document is restricted to project partners (PP), reviewers and JS.

## 2. The OnePlace idea

BOOSTEE-CE – “Boosting energy efficiency in Central European cities through smart energy management” will provide public authorities with simple, but useful tools and methodologies (stable, long-term strategies) for proper energy management, to increase EE and renewable energy usage in public buildings. For this purpose the Online Energy Platform – OnePlace will be developed with its four modules.



### OnePlace

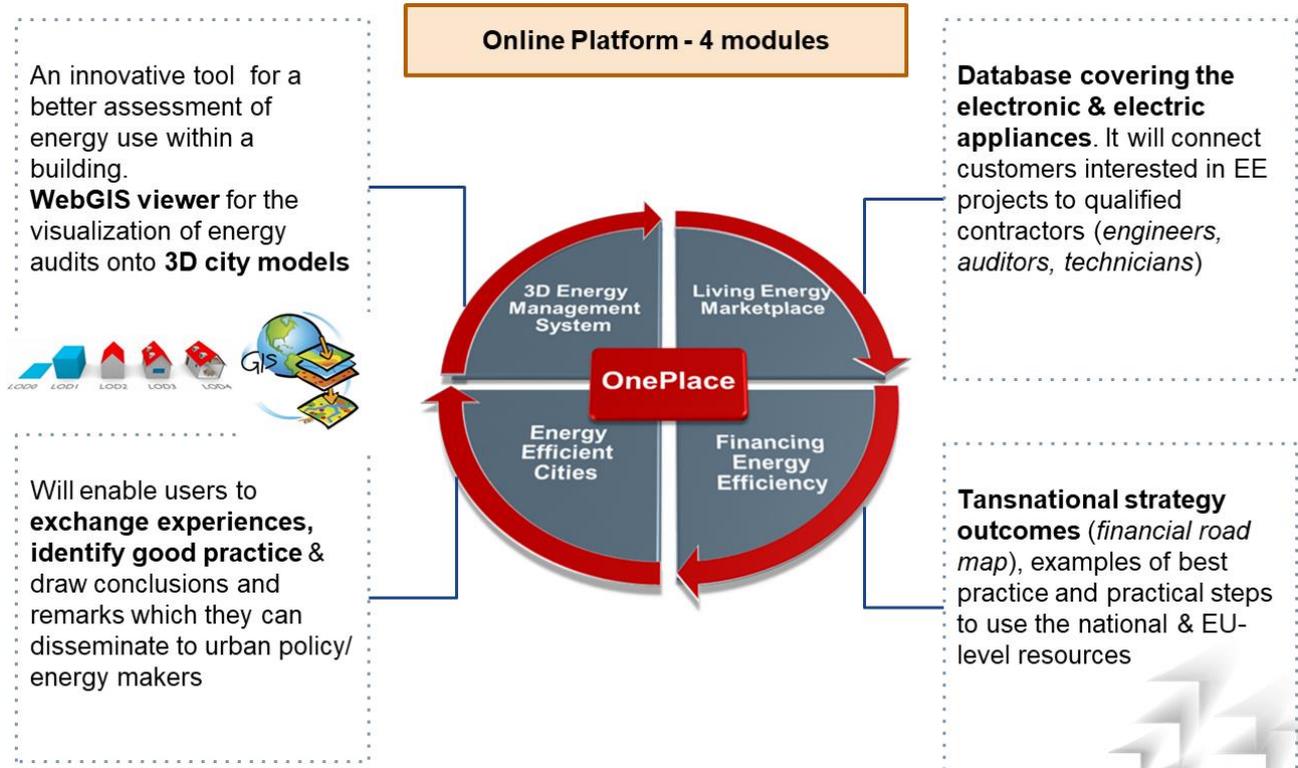
#### The Online Energy Platform - OnePlace

It is an open platform where you can find interesting guidebooks, presentations, online tools and case studies that will help you improve the energy efficiency of your building(s) and involve public authorities and users in Energy saving activities.

The OnePlace has been categories into 4 main modules:



The Online Energy Platform - OnePlace consists of the following four modules hereafter graphically shown.



### 3. Questionnaire to better shape OnePlace

The main purpose of the User Questionnaire is to collect the input data for the OnePlace platform. The User Questionnaire can also serve as Catalogue of requirements, showing which data should be provided for new users of OnePlace.

The questionnaire is divided into six parts – first part focusing on some of the general characteristics of respondents, four sections corresponding to each of the four modules 3D Energy Management System (EMS), Living Energy Marketplace, Energy Efficient Cities and Financing Energy Efficiency and the last section focusing on feedback about OnePlace.

To reach the potential users easier and to enable the feedback analysis of the online questionnaire in all languages of the project consortium (CZ, DE, EN, HU, IT, PL, SI) Google Forms was prepared (<https://docs.google.com/spreadsheets/d/1QXGKuO5on9W60Mp1uIOZOSnmtjs3-U4oIDUArQwf9sk/edit#gid=299669921>).

### 4. OnePlace - Contents

The web-based platform will include 4 functional parts / modules:

- 3D Energy Management System (EMS):

- a 3D web viewer (for both structured and unstructured 3D data) linked to a geodatabase (geoDB) where heterogeneous data are stored;
- real-time 3D navigation of the data;



- scalability and extension to further data (inclusion of new information at later stage by project partners);
- Living Energy Marketplace (LEM):
  - a database of energy-related devices used in the field of energy efficiency,
  - search functionalities based on specific parameters (e.g.: type of electronic devices, contractor name, country, etc.)
  - a possibility to upload files;
  - a discussion forum;
- Energy Efficient Cities (EEC):
  - a discussion forum to exchange of experiences and good practices in the EE sector for public authorities and other public users (by default in English but also in the languages of the project consortium (CZ, DE, HU, IT, PL, SI), offering the possibility to search topics and upload various files;
  - database containing a catalogue of the best practices related to EE
  - search function to look for examples of best practices based on keywords or specific parameters
- Financing Energy Efficiency (FEE):
  - a database of transnational financial strategies in the field of EE;
  - download / upload functions ( pdf -, xls - files, etc);
  - search function to look for examples of strategies based on keywords or specific parameters.

Each of the four modules of OnePlace has a defined content framework.

**3D Energy Management System (EMS)** is a webGIS solution where users can interactively navigate a map of an urban environment, select a 3D building of interest and retrieve the energy audit and other cadastral/building information.

The module enables access / visualization to 3D building models with the following attributes:

- Official name of the building
- Year of construction
- Building type
- Typology (number of floors)
- Energy source type
- Energy audit
- Energy consumption (heating) [GJ/year]
- Electricity consumption [kWh/year]
- The specific CO2 emissions
- The total CO2 emissions
- Renewable energy produced in the building
- Estimated photovoltaic potential of building roofs
- Energy efficiency measures already implemented in the building
- Recommended energy efficiency measures for the building
- Estimation of the amount of heating losses in the building
- Heating losses visualized using thermal images



- Equipment with smart meters

**Living Energy Marketplace (LEM) module** is a database covering the spectrum of electronic devices and electric appliances (ENERGY STAR products), offering customers interested in energy efficiency projects a list of qualified contractors (architects, engineers, auditors, craftsmen, technicians and installers, all involved in refurbishment).

A database is covering:

- Spectrum of electronic devices, electric appliances (ENERGY STAR products)
- Energy suppliers
- Energy auditors (EPC register)
- Energy experts
- Smart metering & EMS expert companies
- Information about using appliances and devices efficiently
- Factors to consider when buying energy-efficient appliances and devices
- Newest technologies for energy efficiency improvement available on market
- Advice on launching green procurements

**Energy Efficient Cities (EEC) module** is a module that enables an exchange of experiences and good practices within EE sector for public authorities and other public users.

A database of this module contains:

- Catalogue of the best practices related to EE
- Guidelines on integrating energy efficiency in design, planning, management and implementation of projects that improve urban services
- Recommended energy efficiency measures for cities to improve energy efficiency in public buildings
- The most important indicators for the energy efficiency of the city.
- List of public buildings equipped with smart meters
- Information on energy efficiency of buildings in the city
- Information on efficiency of power supply and heating (e.g. classification of buildings in classes considering the heat loss) for the city
- Information on energy efficiency of public lighting for the city
- Information on energy efficiency of transport
- Information on energy efficiency of water & wastewater sector
- Information on energy efficiency of solid waste sector

**Financing Energy Efficiency (FEE) module** is an attractive visual presentation of the transnational strategy outcomes (financial road map), examples of best practices and practical steps to use the national and EU-level resources.

A database includes:

- Catalogue of the best practices in the field of financial strategies
- Comparative analysis
- Financial road maps
- List of most effective EE measures with the cost effectiveness of EE measures
- List of financial tools to assist implementation of EE measures
- List of local/regional/national strategy or action plans for improving energy efficiency in buildings to be implemented in the next years



## 5. Oneplace – technical design

The platform will host heterogeneous data (raster and vector maps, attributes, point clouds, 3D building models, energy-related information, etc.) stored in an open source database (relational DB for structured data and preferably NoSQL for geospatial data) located on the fileserver.

The front-end (GUI) of the platform should be accessible using any web browser (without any additional plugin) and it should be responsive and self-adaptive with respect to the used device and browser.

The back-end and front-end of the platform should be realized to allow modifications and expansions in the future.

The interface used to access and modify the platform should reflect the languages of the project consortium (CZ, DE, EN, HU, IT, PL, SI).

The front-end of the platform should be available in English (by default) but also in the languages of the project consortium (CZ, DE, HU, IT, PL, SI).

The platform should be equipped with an integrated search engine.

The platform should store a history of users' activity and history of data changes.

The platform must be provided with data backup - for both database and files.

Access to the platform and each module should be granted to:

- any unregistered user whose rights include information browsing, searching and viewing
- any registered user whose rights include information browsing, searching and viewing, access to the discussion forum
- one or more super-user and manager of the platform to control accesses and activities and manage the forum.

To access to the platform a registration procedure should be implemented and it should store personal data and provide access credentials (username and password). Registered user should be able to modify and recover their credentials.

The search engine should allow multi-language researches inside the platform database and retrieve raster, vector, textual and numerical information, with the possibility to export them.

## 6. Oneplace – Users and rights

The interface of the platform will be available in the languages of the project consortium (CZ, DE, EN, HU, IT, PL, SI). Access to the platform and each module is granted to:

- any unregistered user whose rights include information browsing, searching and viewing
- any registered user whose rights include information browsing, searching and viewing, access to the discussion forum
- one or more super-user and manager of the platform to control accesses and activities and manage the forum.

To access to the platform a registration procedure should be implemented and it should store personal data and provide access credentials (username and password). Registered user should be able to modify and recover their credentials.

The search engine should allow multi-language researches inside the platform database and retrieve raster, vector, textual and numerical information, with the possibility to export them.

- To access to the platform a registration procedure should be implemented and it should store personal data and provide access credentials (username and password)
- Registered user should be able to modify and recover their credentials



- The search engine should allow multi-language researches inside the platform DB and retrieve raster, vector, textual and numerical information, with the possibility to export them
- Technical assistance from the start of the contract till one year after the platform is transferred to the project leader's server.

## 7. Oneplace – tender

For the realization of the OnePlace platform, a tender was created. Hereafter the technical contents of the tender are reported.

**The Online Energy Platform – OnePlace** platform is the core product of the Interreg BOOSTEE-CE project. It is a web-based platform, accessible via a web browser, that should be developed including the following modules:

1. **3D Energy Management System (EMS)** - a webGIS solution where users can interactively navigate a map of an urban environment, select a 3D building of interest and retrieve the energy audit and other cadastral/building information;
2. **Living Energy Marketplace** - a database covering the spectrum of electronic devices and electric appliances (ENERGY STAR products), offering customers interested in energy efficiency projects list of qualified contractors (architects, engineers, auditors, craftsmen, technicians and installers, all involved in refurbishment);
3. **Energy Efficient Cities** – a module that enables an exchange of experiences and good practices within EE sector for public authorities and other public users;
4. **Financing Energy Efficiency** - a module to access transnational strategy outcomes (financial roadmap), examples of best practices and practical steps to use the national and EU-level resources.

The platform should be operative in November 2018, with a beta-testing version in September 2018.

### General requirements of the OnePlace web platform

#### Modules, language, access and back-end/front-end:

- The web-based platform should include 4 functional parts / modules:
  - o 3D Energy Management System (EMS) – a 3D web viewer (for both structured and unstructured 3D data) linked to a geodatabase (geoDB) where heterogeneous data are stored;
  - o Living Energy Marketplace – a database (DB) of energy-related devices used in the field of energy efficiency, with search functionalities and a possibility to upload files;
  - o Energy Efficient Cities – a discussion forum (by default in English but also in the languages of the project consortium (CZ, DE, HU, IT, PL, SI), offering the possibility to search topics and upload various files;
  - o Financing Energy Efficiency - a DB of transnational financial strategies in the field of EE, with search functionalities and a possibility to upload files.
- The platform will host heterogeneous data (raster and vector maps, attributes, point clouds, 3D building models, energy-related information, etc.) stored in an open source database (relational DB for structured data and preferably NoSQL for geospatial data) located on the fileserver
- The front-end (GUI) of the platform should be accessible using any web browser (without any additional plugin) and it should be responsive and self-adaptive with respect to the used device and browser



- The back-end and front-end of the platform should be realized to allow modifications and expansions in the future
- The interface used to access and modify the platform should reflect the languages of the project consortium (CZ, DE, EN, HU, IT, PL, SI)
- The front-end of the platform should be available in English (by default) but also in the languages of the project consortium (CZ, DE, HU, IT, PL, SI)

Functions, users and rights:

- The platform should be equipped with an integrated search engine
- The platform should store a history of users' activity and history of data changes
- The platform must be provided with data backup - for both database and files
- The platform should be initially created and tested on the on the contractor's server and then transferred to the project leader's server
- Access to the platform and each module should be granted to:
  - o any unregistered user whose rights include information browsing, searching and viewing
  - o any registered user whose right include information browsing, searching and viewing, access to the discussion forum
  - o one or more super-user and manager of the platform to control accesses and activities and manage the forum
- To access to the platform a registration procedure should be implemented and it should store personal data and provide access credentials (username and password)
- Registered user should be able to modify and recover their credentials
- The search engine should allow multi-language researches inside the platform DB and retrieve raster, vector, textual and numerical information, with the possibility to export them
- Technical assistance from the start of the contract till one year after the platform is transferred to the project leader's server

The specific requirements of the 4 modules are:

**3D Energy Management System (EMS)**

The realization of this module should include:

- management and visualization of geographic data in UTM/WGS84 reference system using web 3D viewers such as Cesium, NasaWorldWind, etc.
- management and conversion of a 3D building models (LOD1 and LOD2 in obj or cityGML format) in the 8 pilot areas of the project: Emilia-Romagna (IT), Municipality of Judenburg (AT), Zlín Region (CZ), Municipality of Tolna (HU), Municipality of Płońsk (PL), City of Koprivnica (HR), Municipality of Velenje (SI), PL/CZ cross-border region (Municipality of Lubawka, PL; Municipality of Zacler, CZ)
- visualization of up to 50 raster maps grabbed (e.g. via WMS) from municipal or open DB/servers (e.g. topographic maps) or provided by the consortium (e.g. solar radiation estimation, etc.)
- storage of heterogeneous information in open source database (relational DB for structured data and preferably NoSQL for geospatial data) located on the fileserver
- functions to edit and extend the available DB information
- functions to download data from the DB
- access / visualization to some 300 3D building models (provided by PP1 - Bruno Kessler Foundation) with attributes provided by the project partners (collected by PP1 - Bruno Kessler Foundation) (e.g. Building ID address, construction year, building type, energy source type, energy audit (type, date, certificate), technical documentation of the building (drawing, etc.),



heating or electricity energy consumption, CO2 emissions, renewable energy used / produced in the building, estimated photovoltaic potential of building roofs, energy efficiency measures already implemented in the building, recommended energy efficiency measures for the building, estimation of the amount of heating losses in the building, heating losses visualized using thermal images, availability of smart meters, etc.)

- downloading data in formats compliant with accepted standards (according to the Open Geospatial Consortium)
- ability to include WMS/WFS services
- responsive web interface (without the need to install plugins for web browsers) and accessibility from PC or mobile devices
- no restrictions on the number of displayed map layers and the number of objects on individual layers
- real-time 3D navigation of the data
- scalability and extension to further data (inclusion of new information at later stage by project partners)

**Living Energy Marketplace module Includes:**

The realization of this module should include:

- a database covering the spectrum of electronic devices, electric appliances (ENERGY STAR products), energy suppliers, energy experts, qualified contractors, etc. The detailed scope will be established with the contractor
- a search function based on specific parameters (e.g.: type of electronic devices, contractor name, country, etc.)
- a discussion forum

**Energy Efficient Cities module Includes:**

The realization of this module should include:

- Discussion forum to exchange of experiences and good practices in the EE sector for public authorities and other public users;
- Database containing a catalogue of the best practices related to EE
- Search function to look for examples of best practices based on keywords or specific parameters

**Financing Energy Efficiency module includes:**

The realization of this module should include:

- Realization of a database containing:
  - a. catalogue of the best practices in the field of financial strategies
  - b. comparative analysis
  - c. financial road maps
- Download / upload functions (.pdf, .xls, etc.)
- Search function to look for examples of strategies based on keywords or specific parameters

-



**Annex 1: WP T2 - OnePlace**

**WPT2 - OnePlace**

