

# DELIVERABLE D.T2.3.1

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D.T2.3.1 Developing Training Materials

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Version 1  
10/2019





## **D.T2.3.1: Developing Training Materials**

A.T2.3 Trainings for municipality/city staff, urban and energy planners

Transnational report

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<b>Authors</b>		
	<b>Name (organization)</b>	<b>e-mail</b>
<b>WP leader</b>	Valerija Petrinec (EZVD)	<a href="mailto:valerija@ezavod.si">valerija@ezavod.si</a>
Contributing participants	Jurica Perko (REAN) Fabio Remondino (FBK) Anna Nowacka (EUWT NOVUM) Silvia Rossi - Clust-ER BUILD Manager	<a href="mailto:jurica.perko@rea-sjever.hr">jurica.perko@rea-sjever.hr</a> <a href="mailto:remondino@fbk.eu">remondino@fbk.eu</a> <a href="mailto:anna.nowacka@euwt-novum.eu">anna.nowacka@euwt-novum.eu</a> <a href="mailto:silvia.rossi@build.clust-er.it">silvia.rossi@build.clust-er.it</a>



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## 1. Introduction

The training material, which is included in this document, has been developed within the BOOSTEE-CE project, co-funded by the Interreg CENTRAL EUROPE programme, which encourages cooperation on shared challenges in Central Europe. The project supports implementation of the concept of integrated energy management in public buildings through implementation of selected technical and ICT tools in 8 pilot areas from different EU countries. The tools implemented will lead to reduction of energy consumption and change of behaviour of building users. The training material focuses on issues related to the overall topic of energy efficiency in public buildings, that could be used to increase knowledge, capacities and skills of building owners, managers and decisions makers, enabling them to successfully implement sustainable energy measures in their buildings.

The training material elaborated by the consortium discusses variety of topics, which fall under three main categories: ICT issues, financial aspects and energy management.

The training material has been divided into 3 training modules presented below:

1. Module I: Introducing Energy and Climate Planning.
2. Module II: The Online Energy Platform OnePlace.
3. Module III: Energy management for public administrations: from retrofit measure to financial scheme.

For each module there is a theoretical introduction accompanied by at least one exercise allowing the trainees to test new knowledge gained. What is very important about the BOOSTEE-CE training material, is that it not only provides knowledge but also shows practical aspects related with the implementation of ICT tools and energy efficiency measures in public buildings. Each training module is available in English version as well as was translated into 7 consortium languages (Polish, Italian, Slovenian, German, Croatian, Czech, Hungarian). The training materials are available on BOOSTEE-CE project website:

<https://www.interreg-central.eu/Content.Node/BOOSTEE-CE.html>





## 2. Training courses curricula

The BOOSTEE training is structured in three parts:

### **THEMATIC PANEL 1: Energy and climate planning for boosting public building EE**

Partner in charge for the content	Regional Energy Agency North - PP 4
Summary	The first panel gives an overview about the tools and actions in EE as well as insights to the decision-making process regards EE actions, RES investments. A guided exercise during the first panel helped to put theory into practice!
Duration	2 h 45 min

The purpose of the thematic panel "Introducing Energy and Climate Planning" is to enable participants of BOOSTEE-CE International Training to apply gained EE knowledge to a real world problems within their area of action. Energy and climate planning is a framework of each country/county/municipality within each of them have to plan, in an integrated manner, their climate and energy objectives, targets, policies and measures that are, in many cases, basis for decision-making.

Training participants will acquire the following learning outcomes:

- basic knowledge on energy and climate planning, procedures and methodology, relevant directives and legislations and key stakeholders to be involved in implementations
- identify and use tools for actions identification and decision making facilitation
- develop measures and actions on energy efficiency and use of renewable energy sources in public sector
- develop measures and actions on adaptation to climate change
- define presentation strategy
- present measures developed as a part of energy planning in public buildings.

Training will be divided into three parts. The first one will provide brief theoretical introduction into energy and climate planning methodology and key issues planners facing with. The second and third parts are guided practical works that will give participants ability to prepare three different measures or actions as a part of energy and climate plans through three different roles: Managing Director, Energy Expert and Financial Expert.



Agenda:

- Introducing Energy and Climate Planning
- Tools for facilitating decision making
- Guided exercise on energy planning in public buildings
- Closing discussion

**THEMATIC PANEL 2: Online Energy Platform - OnePlace**

Partner in charge for the content	FBK - PP1, EUWT NOVUM - PP12
Summary	BOOSTEE-CE OnePlace platform was introduced as well as tutorial on how to use and how to navigate between the different sections which help the visualization and query of energy audits within a 3D city model to improve assessment, understanding and planning of energy uses and flows. At the same time, the platform offers also guidebooks, tools and best practices to improve energy efficiency of building(s).
Duration	1 h 45 min

The thematic panel will introduce, describe and showcase the BOOSTEE-CE web platform named OnePlace. OnePlace allows to use 3D city models for the visualization and query of energy related information to better assess, understand and plan energy uses and flows. At the same time, the platform offers also guidebooks, tools and best practices to improve energy efficiency of public buildings.

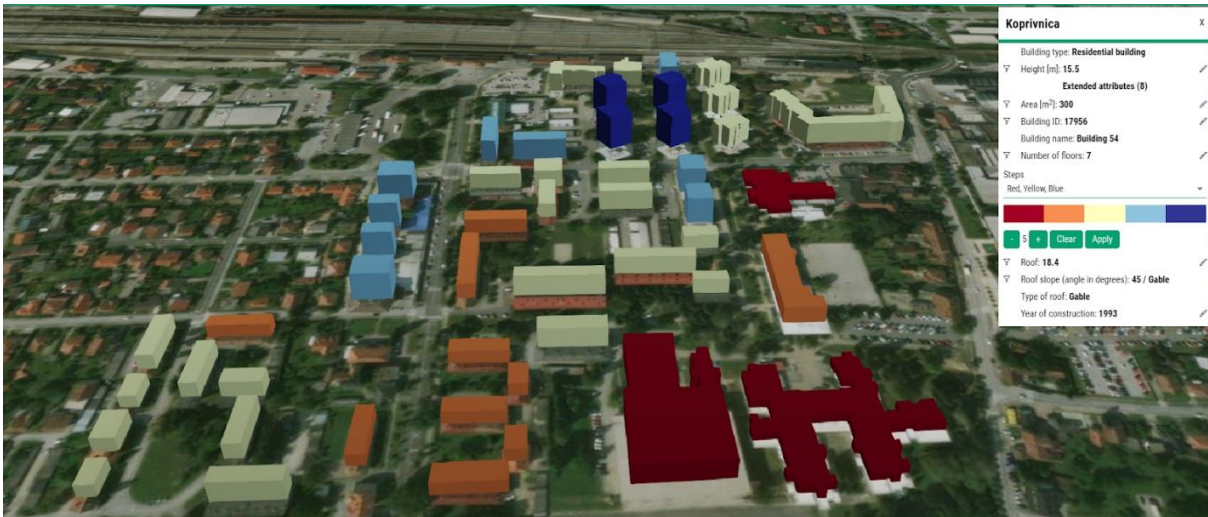
The training will introduce the online platform with its tools, examples and methodologies for public authorities and energy planners in order to assist them at proper energy management and energy savings in public buildings. The participants will learn

- how to visualize and query energy data (consumption, audits, PV potential) within 3D city models to enhance assessment, understanding and planning of energy uses and flows
- how to use the national & EU-level resources (practical steps) through introduced transnational strategy outcomes, financial road maps and examples of the best practices



**BOOSTEE-CE**

- how to make an energy-wise decision when buying electronic or electric appliances and where to find qualified contractors for energy efficiency projects (architects, engineers, auditors, craftsmen, technicians and installers, energy agencies etc.)
- some good practices within energy efficiency sector, that demonstrate the range of approaches and measures various cities have used to undertake efficiency improvements and thus help to guide cities in designing effective urban energy efficiency policies and programs.



**Agenda:**

- Introduction to OnePlace Platform
- I module: Living Energy Marketplace
- II module: Energy Efficient Cities
- III module: Financing Energy Efficiency
- IV module: 3D Energy Management System (3DEMS)
- DEMO - practical use of 3DEMS

**THEMATIC PANEL 3: Introduction to EU funding sources and financial models for applying energy efficiency in public buildings.**

Partner in charge for the content	RER - PP 7
Summary	Participant became familiar with the European Structural and Investment Funds - what is their role in the European Union, who



	can be a beneficiary, their aims, how do they work and what are their expected results.
Duration	2 h

The purpose of the thematic panel "Energy management for PA" is to review available funding sources to implement energy efficiency action in public administrations. Regarding sustainable energy and energy efficiency, the main directly managed instruments (i.e. direct funds) are the following:

- the Horizon 2020 program;
- the Life 2014 - 2020 program;
- financial instruments (Elena, EEEF).

On the other hand, more than half of the EU funds are disbursed through 5 European Structural and Investment Funds (ESIF), jointly managed by the EC and EU countries. All these funds are used to make investments to create jobs and a healthy and sustainable economy and environment in Europe. ESIF focus on 5 sectors: research and innovation, digital technologies, supporting the low-carbon economy, sustainable management of natural resources, small businesses. ESIF include:

- the European Regional Development Fund (ERDF) - which promotes balanced development in the different regions of the EU.
- the European Social Fund (ESF) - which supports projects on employment throughout Europe and invests in Europe's human capital: in workers, young people and all those seeking a job.
- the Cohesion Fund (CF) - which finances transport and environmental projects in countries where the gross national income (GNI) per capita is less than 90% of the EU average. In the 2014-2020 period, these are Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia.
- the European Agricultural Fund for Rural Development (EAFRD) - dedicated to rural areas of the EU.
- the European Fund for Maritime Affairs and Fisheries (EMFF) - which helps fishermen to use sustainable fishing methods and coastal communities to diversify their economies, improving the quality of life in European coastal regions.

All these funds are managed by the countries themselves, through partnership agreements. Each country prepares an agreement, in collaboration with the European Commission, which illustrates how the funds will be used during the funding period.

Participating in a community program is certainly not an easy task, even if the EC's programming tends to call planning that allows you to prepare a proposal well in advance. Starting from the announcement, in fact, one must deal with documents of considerable complexity that require the application of specific skills. The activity of study of the reference documentation is therefore absolutely preliminary to obtaining community subsidies. However, this activity should not be limited to the study of the call, because any proposal must necessarily comply with the general objectives of the European Commission and the specific



objectives of the individual program. The project proposal must therefore organically integrate a hierarchy of equally relevant objectives. Participating in a community program and obtaining grants for a project is an important growth opportunity for the local authority and its territory, but at the same time a challenging challenge because it represents a long-term commitment that requires the acquisition of skills specific and high motivation. As with any competition, to win you need to prepare yourself with determination, build a competitive team and participate with ambitious goals.

Agenda:

- European direct funds
- European structural and investment funds

Abstracts of the three topics provided in Annex 1 will be distributed to participants before the training. The presentations for each panel are attached as annex 2.



### 3. Transnational implementation of training courses

The training course curricula presented in the previous chapter is developed for the two planned transnational trainings. Joint transnational training seminar are organized for municipalities and agencies in the partnership which will act as ambassadors for the implementation of OnePlace platform in their administrations and premises.

Also other regions will be invited to participate at the international training - municipality staff, public building operators, urban and energy planners, citizens and researchers from the whole EU to take part and to increase their knowledge about energy efficiency in public buildings. Two-day events are planned in Warsaw, Poland and Bled, Slovenia.

The knowledge and experience transfer will facilitate the uptake, diffusion & possible improvement of OnePlace and the transnational work of the project.

### 4. National implementation of training courses

Trainings (D.T2.3.3) for municipality staff, urban & energy planners will be organized in each region in order to showcase/explain the project's platform useful for energy audit and EE tasks. Trainings will be organized in each participating region, also inviting other regions.

The national versions of the training material will be developed, modified and aggregated to suit the characteristics of the local context and the needs of local users of BOOSTEE-CE tools and knowledge.

The BOOSTEE-CE developed training materials can be tailored by each Partner during the realisation of national versions of the training material for different target groups. So, it is important to point out that the duration of the courses and training presentations as shown above are “indicative” and during the implementation of the national courses they can be modified.

The steps expected before implementing the national courses in the involved countries are the following:

- development of a common training materials in English language;
- preparation of the national version of the training material;
- translation of the training material into local language;
- development and implementation of the training courses in each country.



## 5. Training courses evaluation

After the training the participants will be invited to fill in the questionnaire to give feedback on training.

The questionnaire covers:

- General information on participants
- Feedback on organisation of the training
- Feedback on training content and training material
- Feedback on usefulness of the training
- Additional comments and suggestions.

The questionnaire is attached as annex 3.

The data collected from the evaluation of the training will be used to improve the training material, to compare the national training courses implemented in the eight different regions (7 countries) and analyse strengths and weaknesses of the national training experiences.



## Annex 1 - Abstracts of the three training modules



# Introducing Energy and Climate Planning

- introduction and agenda -

The purpose of the thematic panel "Introducing Energy and Climate Planning" is to enable participants of BOOSTEE-CE International Training to apply gained EE knowledge to a real world problems within their area of action. Energy and climate planning is a framework of each country/county/municipality within each of them have to plan, in an integrated manner, their climate and energy objectives, targets, policies and measures that are, in many cases, basis for decision-making.

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## **Agenda:**

- Introducing Energy and Climate Planning
- Tools for facilitating decision making
- Guided exercise on energy planning in public buildings
- Closing discussion

## **Tutors:**

Petra Orehovacki, Jurica Perko – Regional Energy Agency North (REAN), Koprivnica, Croatia

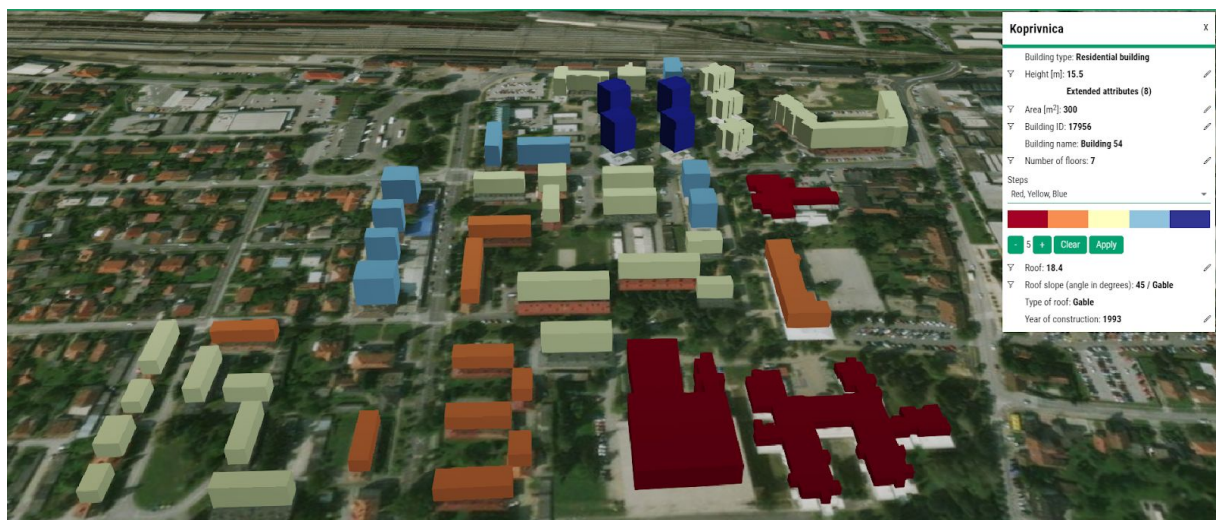
# The Online Energy Platform OnePlace

- introduction and agenda -

The thematic panel will introduce, describe and showcase the BOOSTEE-CE web platform named OnePlace. OnePlace allows to use 3D city models for the visualization and query of energy related information to better assess, understand and plan energy uses and flows. At the same time, the platform offers also guidebooks, tools and best practices to improve energy efficiency of public buildings.

The training will introduce the online platform with its tools, examples and methodologies for public authorities and energy planners in order to assist them at proper energy management and energy savings in public buildings. The participants will learn

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- how to make an energy-wise decision when buying electronic or electric appliances and where to find qualified contractors for energy efficiency projects (architects, engineers, auditors, craftsmen, technicians and installers, energy agencies etc.)
- some good practices within energy efficiency sector, that demonstrate the range of approaches and measures various cities have used to undertake efficiency improvements and thus help to guide cities in designing effective urban energy efficiency policies and programs.



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- IV module: 3D Energy Management System (3DEMS)
- DEMO – practical use of 3DEMS

## Tutors:

Fabio Remondino – FBK, Trento, Italy & Anna Nowacka – EUWT NOVUM, Jelenia Góra, Poland

# Energy management for PA: from retrofit measure to financial scheme

- introduction and agenda -

The purpose of the thematic panel "Energy management for PA" is to review available funding sources to implement energy efficiency action in public administrations. Regarding sustainable energy and energy efficiency, the main directly managed instruments (i.e. **direct funds**) are the following:

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- the European Agricultural Fund for Rural Development (**EAFRD**) - dedicated to rural areas of the EU.
- the European Fund for Maritime Affairs and Fisheries (**EMFF**) - which helps fishermen to use sustainable fishing methods and coastal communities to diversify their economies, improving the quality of life in European coastal regions.

All these funds are managed by the countries themselves, through partnership agreements. Each country prepares an agreement, in collaboration with the European Commission, which illustrates how the funds will be used during the funding period.

Participating in a community program is certainly not an easy task, even if the EC's programming tends to call planning that allows you to prepare a proposal well in advance. Starting from the announcement, in fact, one must deal with documents of considerable complexity that require the application of specific skills. The activity of study of the reference documentation is therefore absolutely preliminary to obtaining community subsidies. However, this activity should not be limited to the study of the call, because any proposal must necessarily comply with the general objectives of the European Commission and the specific objectives of the individual program. The project proposal must therefore organically integrate a hierarchy of equally relevant objectives. Participating in a community program and obtaining grants for a project is an important growth opportunity for the local authority and its territory, but at the same time a challenging challenge because it represents a long-term commitment that requires the acquisition of skills specific and high motivation. As with any competition, to win you need to prepare yourself with determination, build a competitive team and participate with ambitious goals.

## Agenda:

- European direct funds
- European structural and investment funds

## Tutor:

Silvia Rossi - Clust-ER BUILD Manager, Bologna, Italy



## Annex 2 - Presentations

THEMATIC PANEL 1: Energy and climate planning for boosting public building EE

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# Transnational training Introducing Energy and Climate Planning

Petra Orehovacki, REA North, Croatia



Regional  
Energy  
Agency **North**

September, 2019

## Energy planning

- Process of developing long-range policies to help guide the future of a local, national, regional or even the global energy system.
- Energy planning is particularly appropriate for **communities** who want to develop their own energy security, while employing best available practice in their planning processes.





## Energy planning

- MITIGATION – actions or measures that helps to reduce energy consumption and human-generated greenhouse gas emissions
- Cities must be leaders in reducing greenhouse gases!!!



## Climate planning

- There is no „**one-size fits all**” approach
- **ADAPTATION** – process through which communities prepare to cope with an uncertain future climate
- It does not mean that negative impacts of climate change will be completely avoided, only that they will be less severe than if no planning had occurred





Energy and climate planning is a cross sectoral task and involves a variety of different professional capabilities:

- **Energy sector**
- **Environmental issues**
- **City building and urban planners**
- **Architecture**
- **Logistics**

Energy and climate planning comprises many elements:

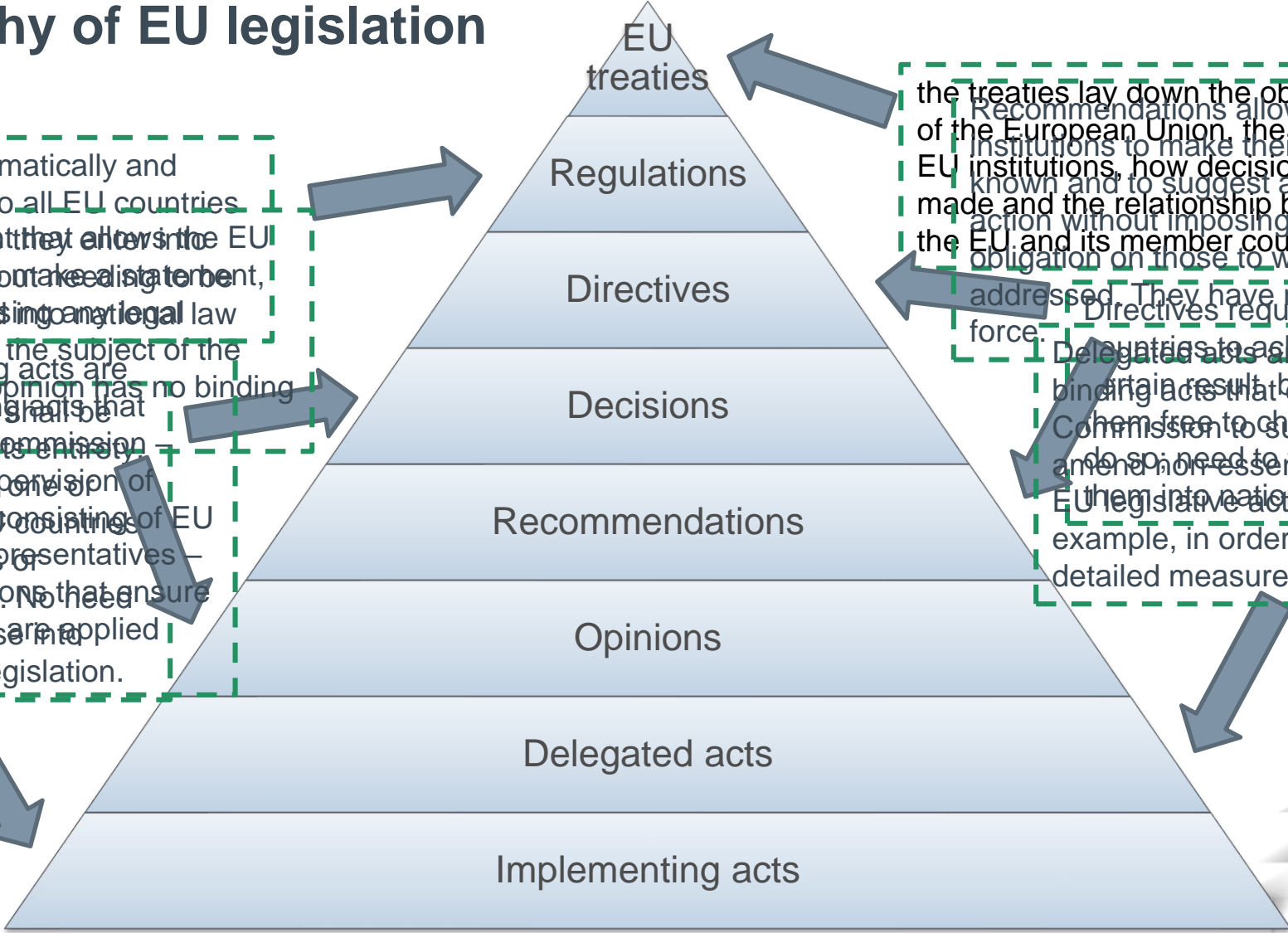
- **Planning**
- **Coordination**
- **Analyzing**
- **Process management**
- **Consulting**
- **Law issues**
- **Education**
- **Engineering**



# Energy and climate planning

## Hierarchy of EU legislation

apply automatically and uniformly to all EU countries. An institution that allows the EU in strict, without a need to be, without imposing any legal obligation on the subject of the implementing acts are legally binding acts that enable the Commission under the supervision of several EU countries' representatives to set conditions that ensure that EU laws are applied uniformly.

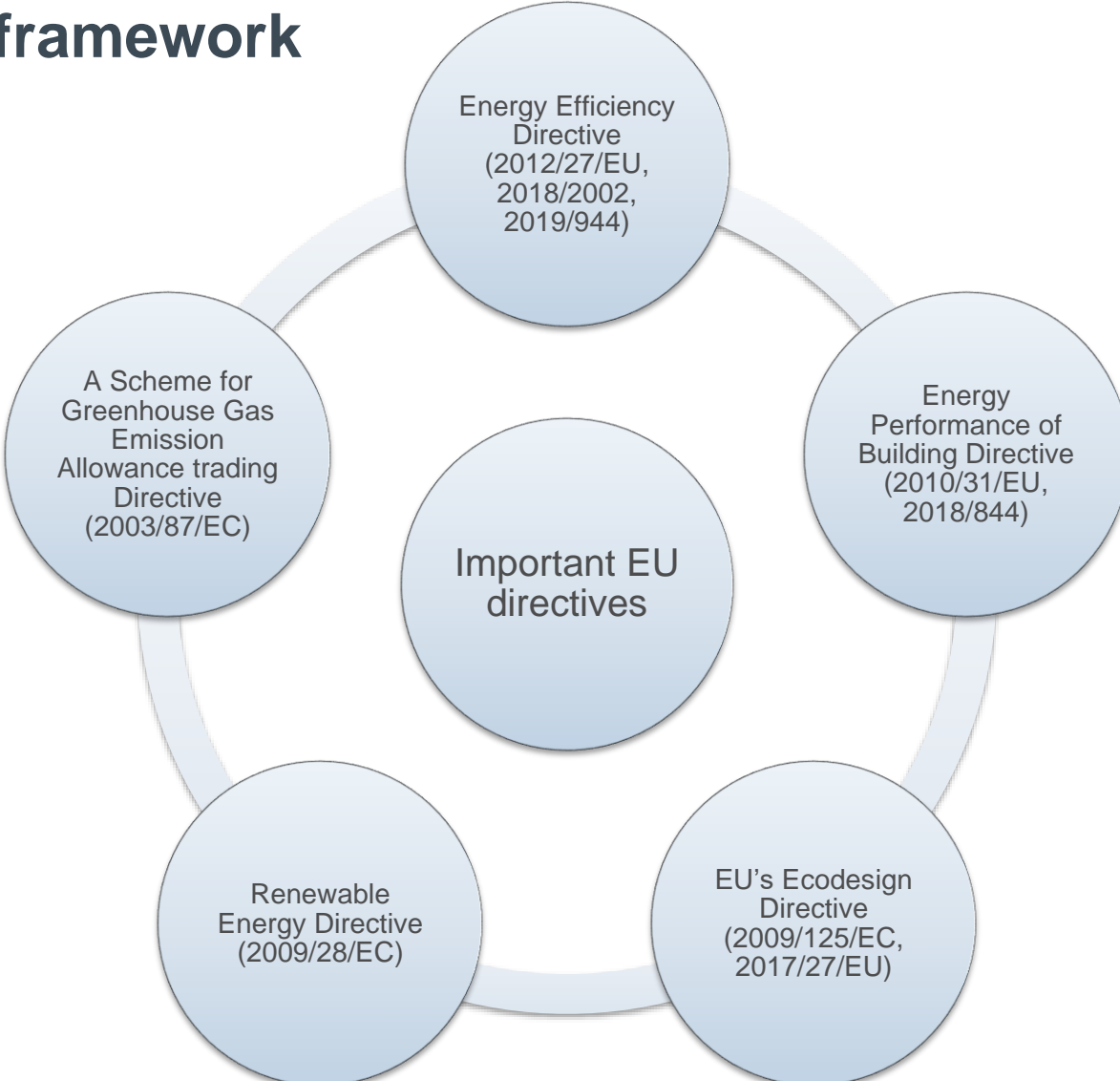


the treaties lay down the objectives of the European Union, the rules for EU institutions, how decisions are made and the relationship between the EU and its member countries. Recommendations allow the EU institutions to make their views known and to suggest a line of action without imposing any legal obligation on those to whom it is addressed. They have no binding force. Delegated acts are legally binding acts that leave the Commission to support them or amend non-essential parts of EU legislative acts, for example, in order to define detailed measures.



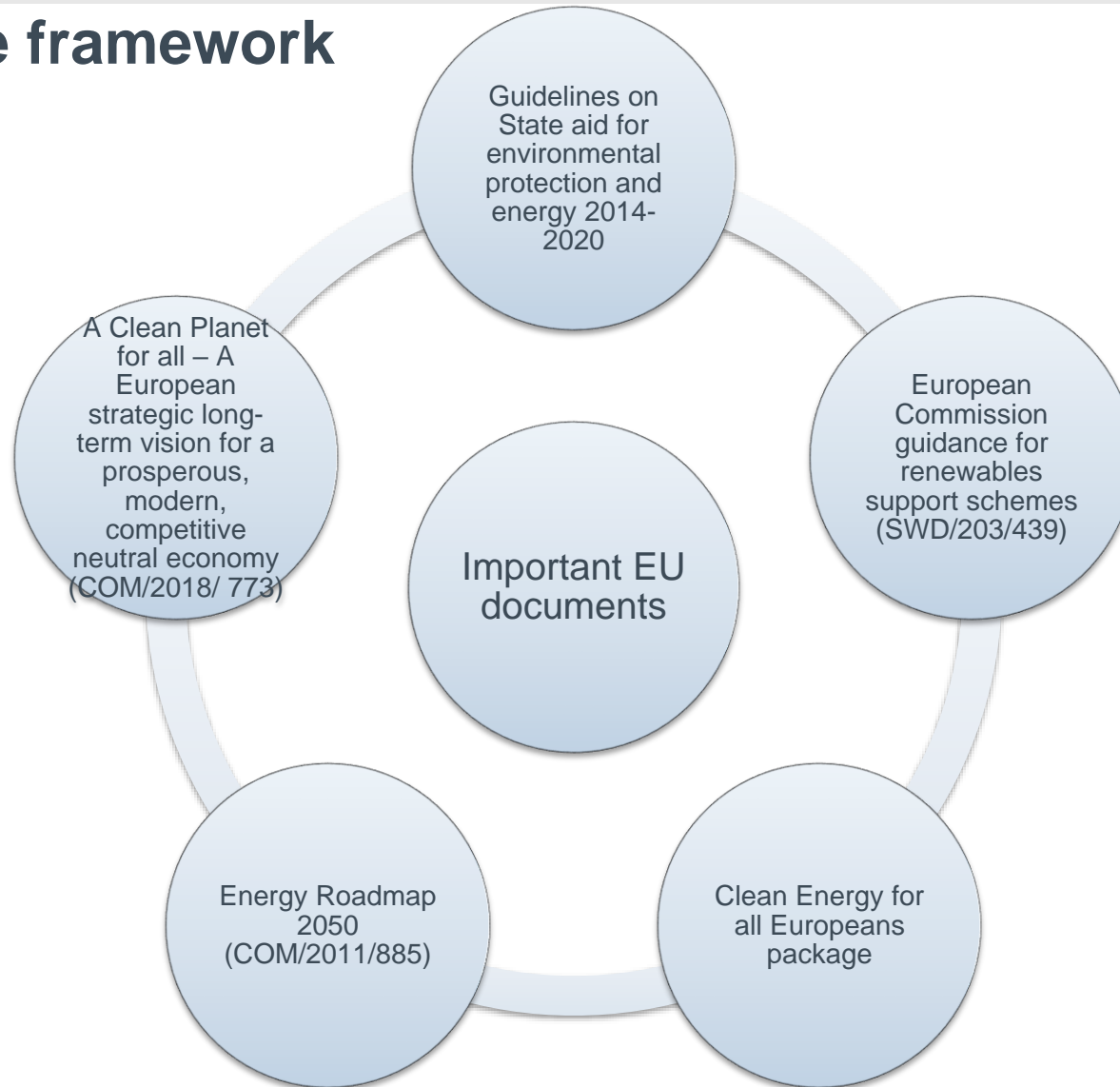
# Energy and climate planning

## EU legislative framework



# Energy and climate planning

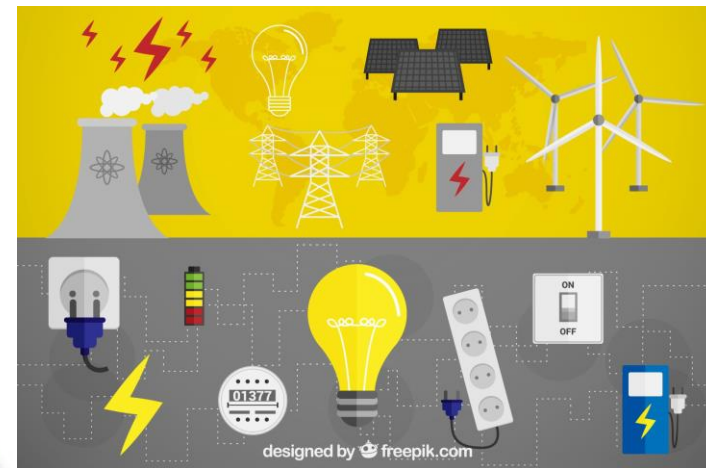
## EU legislative framework



# Energy Efficiency Directive (2012/274/EU)

## PRACTICE SO FAR

- EU countries obligated to draw up **National energy efficiency action plans (NEEAPs)**
- NEEAPs – estimated energy consumption, planned energy efficiency measures, long-term renovation strategies and the improvements that individual EU countries expect to achieve to reach EU 2020 target of 20%



→ those plans draw up every **three years** with report of the **progress** achieved towards their national energy efficiency targets on an **annual basis**

Member States shall encourage public bodies, including at regional and local level (...) to:

- a) adopt an energy efficiency plan, freestanding or as part of a broader climate or environmental plan, containing specific energy saving and efficiency objectives and actions
- b) put in place an energy management system, including energy audits, as part of the implementation of their plan
- c) use, where appropriate, energy service companies, and energy performance contracting to finance renovations and implement plans to maintain or improve energy efficiency in the long term



EU countries are required to:

→ develop integrated **National Energy and Climate Plans** (NECPs) for the period **2021 to 2030**

→ submit a draft NECP by 31 December 2018 and be ready to submit the final plans by 31 December 2019 to the European Commission

→ report on the progress they make in implementing their NECPs, mostly on a biennial basis



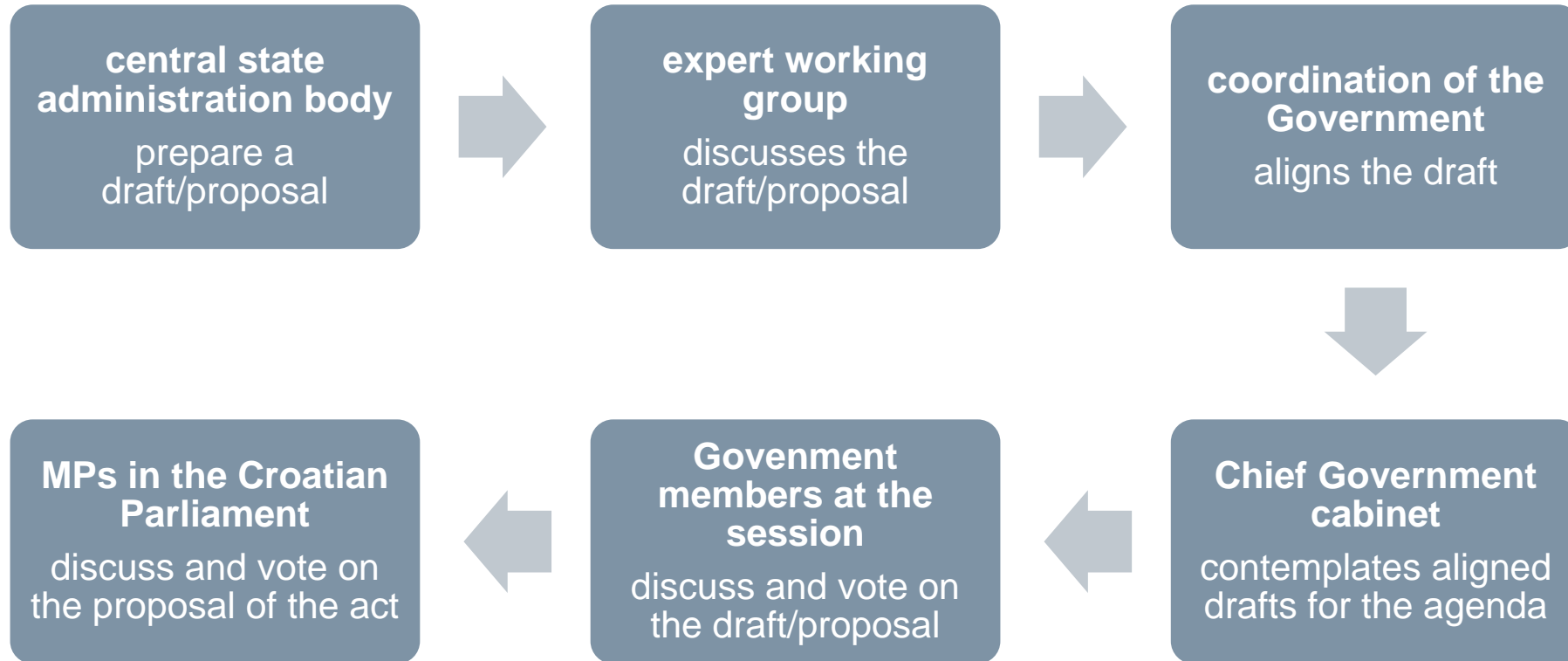


# Five dimensions of the energy union





# Proposition of the new law/regulation/strategy/decision etc.



# National planning process actors

## The main institutions responsible for energy policy in Croatia:

- Ministry of Physical Planning and Construction
- Ministry of Environmental Protection and Energy
- Ministry of the Sea, Transport and Infrastructure
- Center for Monitoring Business Activities in the Energy Sector and Investments
- Environmental Protection and Energy Efficiency Fund
- Agency for Transactions and Mediation in Immovable Properties
- Energy Institute Hrvoje Požar
- Croatian Energy Regulatory Agency

## Institutions and organizations within various energy efficiency areas:

- HEP JSC
- HEP Heat Distribution
- HEP Distribution System Operator (HEP ODS)
- Croatian Transmission System Operator Ltd.
- INA JSC
- Croatian pipeline (JANAF)
- Faculty of Mechanical Engineering and Naval Architecture
- Society for Sustainable Development Design (DOOR)

- Croatia Green Building Council
- HEP ESCO Ltd.
- State Office for the Central Public Procurement
- Energy and Environmental Protection Institute (EKONERG)
- Faculty of Electrical Engineering and Computing (FER)
- UNDP
- The International Centre for Sustainable Development of Energy, Water and Environment Systems (SDEWES)
- Croatian Business Council for Sustainable Development
- Croatian Professional Association for Solar Energy
- Croatian Association of Energy Certificators

## Regional energy agencies:

- Istrian Regional Energy Agency Ltd. (IRENA)
- North-west Croatia Regional Energy Agency (REGEA)
- Medjmurje Energy Agency Ltd. (MENEJA)
- Regional Energy Agency North (REA North)
- Regional Energy Agency Kvarner (REA Kvarner)

## Energy cooperatives:

- BAN – UNION

- Green energy cooperative (ZE)
- Energy cooperative Otok Krk
- Energy cooperative Kaštela
- Energy cooperative Lug
- Energy cooperative Sunčani H
- Veteran cooperative Ka-Solar
- Energy cooperative SPES

## ESCO companies:

- HEP ESCO Ltd.
- Rudan Ltd.
- REFLEX Ltd.
- Cras Ltd.
- Jedinstvo Krapina Ltd.
- Kamenmont Ltd.
- DUBOŠ GRADNJA Ltd.
- Sense ESCO
- WORK-ING Ltd. Varaždin
- SPACE Company
- ...

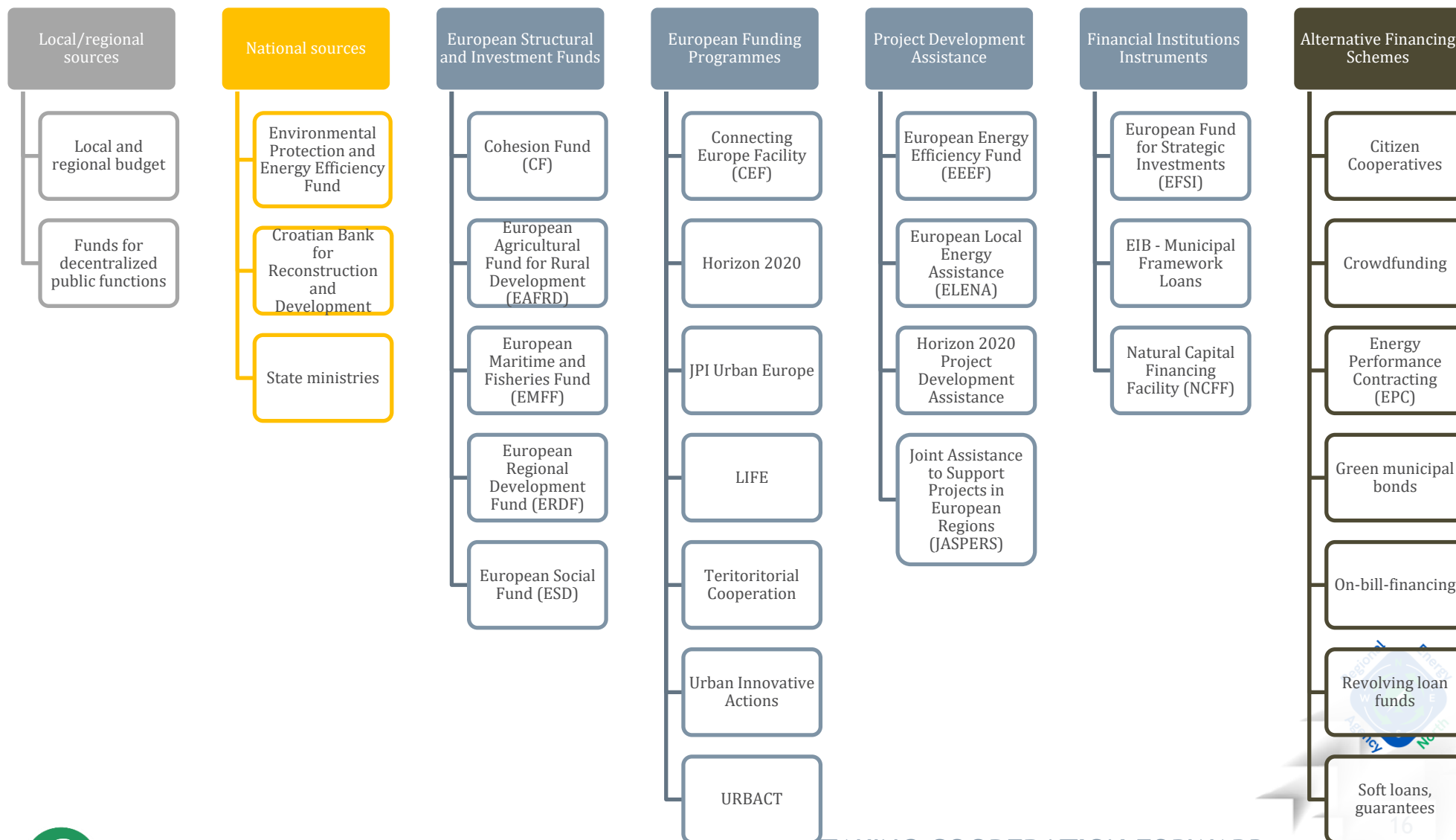


# Problems occurred in energy and climate planning

- impossibility to collect energy consumption data (no historical data, „big data” etc.)
- lack of fundings (small local/regional budgets)
- lack of knowledge
- lack of interest
- lack of multi-level governance (communication between national, regional and local level)
- GDPR



# Financial opportunities in Croatia



# Discussion points

- Which are the main barriers in setting more ambitious targets in site of 2050 at the national level and adapting to climate change? (financial, regulatory, political, technical, social, lack of infrastructure and interconnections, other).
- Buildings, transport and production from RES are key towards decarbonisation. Which have proven the most efficient incentives to further promote actions in these sectors?
- Which structures could the local/ regional administration adopt to facilitate climate and energy policy planning (regional technical groups, steering committees, assignment of energy and climate policy officers etc.)?
- What is the role of regional energy agencies and how can they more efficiently support the adaptation to climate change?



# Discussion points

- How satisfactory is the national framework for managing and monitoring energy and climate policy planning? How are data gathered at the local /regional level utilized at the national one?
- How can the national governments work more efficiently on all aspects of climate change adaptation? Ideas and exchange of best practices.
- Regulatory obligation for regional/local authorities to prepare a plan on energy and climate. Lessons learnt and issues to consider.
- Which are the potential obstacles and barriers on assigning specific GHG reduction targets at the regional level? Exchange of best practices.
- Innovative ways for national/regional actors to engage local authorities and pursue collaboration with them.



# THANK YOU!

**Petra Orehovacki**

Energy advisor

Regional Energy Agency North

Email: [petra.orehovacki@rea-sjever.hr](mailto:petra.orehovacki@rea-sjever.hr)



The BOOSTEE-CE project is EU-funded project implemented through the INTERREG CENTRAL EUROPE Programme and co-financed by the European Regional Development Fund (ERDF)



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# Transnational training Tools for facilitating decision making

Jurica Perko, REA North, Croatia



Regional  
Energy  
Agency **North**

September, 2019



## Good practice examples

HEP DSO metering - <http://mjerjenje.hep.hr/>

SCADA Smartway - <http://smartwayscada.com/>

Other PV systems - <https://www.sunnyportal.com/>

ISGE - <https://www.isge.hr/>

SMIV - [https://smiv.mzoe.hr/GIZ\\_MVP/Pages/Login/Login.aspx](https://smiv.mzoe.hr/GIZ_MVP/Pages/Login/Login.aspx)



# THANK YOU!

**Jurica Perko**

**Business Development Manager**

Regional Energy Agency North

Email: [jurica.perko@rea-sjever.hr](mailto:jurica.perko@rea-sjever.hr)



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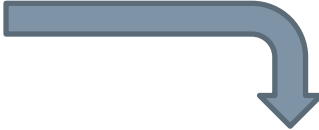
# Transnational training Guided exercise on energy planning in public buildings

Petra Orehovacki and Jurica Perko  
REA North, Croatia



Regional  
Energy  
Agency **North**

September, 2019

1. **Build an action or measure for Energy and Climate Plan**
    - a) **development of fundamental financial analysis**
    - b) **funding plan**
    - c) **preliminary pitch which will be delivered to the city mayor**
    - d) **present built action/measure**
- 
- Energy Expert (focused on energy savings, CO2 savings, technology implementation)
  - Financial Expert (more focused on costs, financial savings, payback period)



Form 3 groups of 7-9 people

1. Shavnik, Montenegro – 10 public company's official vehicles to be replaced with electric ones
2. Zhytomyr, Ukraine –8 public buildings upgradeable with PV systems
3. Gdynia, Poland – 14,600 public lighting lamps based on high pressure sodium technology without regulation modernisation with manageable LED lighting



- 1. Identify the key drivers for your mayor.**
- 2. Prepare SWOT analysis of your action (address all pros and cons as a part of the SWOT analysis)**
  - a) Identify the quantitative and qualitative benefits from the perspective of your mayor.**
  - b) Identify all negative impacts of implementation of this action.**
  - c) Identify the main reasons and external threats why your mayor may not support the initiative.**
  - d) Identify opportunities that beneficiary may exploit within implementation of the action. What positive effects can cause?**
- 3. Build a business case to present it to the stakeholder. You will have 3 minutes for your “pitch”.**



**THANK YOU!**

**Petra Orehovacki**

Energy advisor

Regional Energy Agency North

Email: [petra.orehovacki@rea-sjever.hr](mailto:petra.orehovacki@rea-sjever.hr)

**Jurica Perko**

Business Development Manager

Regional Energy Agency North

Email: [jurica.perko@rea-sjever.hr](mailto:jurica.perko@rea-sjever.hr)



The BOOSTEE-CE project is EU-funded project implemented through the INTERREG CENTRAL EUROPE Programme and co-financed by the European Regional Development Fund (ERDF)

# Guided exercise on energy planning in public buildings

## Main Task:

Build an action or measure for Energy and Climate Plan including the development of fundamental financial analysis, funding plan and prepare a preliminary pitch which will be delivered to the city mayor. Present built action/measure as one of the following:

- Managing Director (generally focused on benefits of Energy and Climate Plan, needed for project application to EU funds, environmental protection – CO2 footprint)
- Energy Expert (focused on energy savings, CO2 savings, technology implementation)
- Financial Expert (more focused on costs, financial savings, payback period)

## Problem Description

As part of Energy and Climate Plans the potential for direct action on public buildings, public lighting and transport have been prioritised.

There are two types of actions relevant in the following cities:

- Klagenfurt, Austria
  - 20 public buildings where initial feasibility indicates energy renovation and PV upgrades are viable
- Gdynia, Poland
  - 14,600 public lighting lamps based on high pressure sodium technology without regulation modernisation with manageable LED lighting are viable

You are part of energy and climate planning project team developing key actions to be included in Energy and Climate Plan. You are required to develop an action targeted at city mayor:

- Identify the key drivers for your mayor.
- Prepare SWOT analysis of your action (address all pros and cons as a part of the SWOT analysis)
  - Identify the quantitative and qualitative benefits from the perspective of your mayor.
  - Identify all negative impacts of implementation of this action.
  - Identify the main reasons and external threats why your mayor may not support the initiative.
  - Identify opportunities that beneficiary may exploit within implementation of the action. What positive effects can cause?
- Build a business case to present it to the stakeholder. You will have 3 minutes for your “pitch”. You may use up to 2 flip chart sheets to aid your presentation.



For the **building group** your team is working on consider the following relevant characteristics:

<b>Action Type</b>	<b>Public Buildings Renovation<sup>1</sup></b>
<b>Description</b>	<p>Initial assessments of the large public buildings your region have been completed by a junior engineer in your Agency. As a result, 20 large public buildings have been identified where the assessments have indicated that PV installations and integrated renovation upgrades are viable. The 20 public buildings are all occupied by different Departments and City organisations.</p> <p>In addition, no buildings currently have PV system and all buildings have traditional construction elements and traditional heating system (gas boiler) which were installed from 1964 to 1969 consisting of bricks and concrete. The buildings are near end of life and they often overheat in the summer and can't be warmed in the winter. An assessment has been completed on new, efficient gas boiler configuration. Overall integral renovation results with gas consumption reduction.</p>
<b>Number of Buildings</b>	20
<b>Electricity Cost (€/kWh)</b>	0.19 incl. VAT
<b>Gas Cost (€/kWh)</b>	0.05 incl. VAT
<b>PV Installation Scale</b>	10kW per building with no export, 1,200 kWh annual production per kW
<b>PV Installation Cost</b>	€1,300/kW
<b>Specific Energy Renovation Cost</b>	€500 per m <sup>2</sup> of usable surface area
<b>Average usable surface area</b>	1,200 m <sup>2</sup> per building
<b>Emission factor for electricity</b>	0.234 kgCO <sub>2</sub> /kWh
<b>Emission factor for gas</b>	0.202kgCO <sub>2</sub> /kWh

---

<sup>1</sup> Use „Calculation on Public Building Renovation“ excel file for savings calculation

For the **lighting group** your team is working on consider the following relevant characteristics:

<b>Action Type</b>	<b>Public Lighting Modernization</b>
<b>Description</b>	<p>There are 14,600 public lighting lamps based on high pressure sodium (HPS) technology without regulation in the City area. There are 1,460 HPS lamps of 250 W, 4,380 of 150 W, 5,840 of 100 W, 2,190 of 70 W and 730 of 50 W. Referent working hours of public lighting system is 4,100 hours per year.</p> <p>A lighting assessment has been completed and a sensible modernization from the following old HPS lamps to LED technology is clearly viable:</p> <ul style="list-style-type: none"> <li>• 250 W HPS = 94 W LED</li> <li>• 150 W HPS = 90 W LED</li> <li>• 100 W HPS = 70 W LED</li> <li>• 70 W HPS = 40 W LED</li> <li>• 50 W HPS = 35 W LED</li> </ul> <p>New lighting system will be manageable and will have 3,250 working hours per year in total.</p>
<b>Electricity Cost (€/kWh)</b>	0.19 incl. VAT
<b>Average Cost of Single Lamp</b>	€380 including installation costs
<b>Total loss on old HPS lamps<sup>2</sup></b>	25 %
<b>Total loss on new LED lamps<sup>3</sup></b>	4 %
<b>Emission factor for electricity</b>	0.234 kgCO <sub>2</sub> /kWh

<sup>2</sup> Multiply total power of old system by 25 % due to the network loss for HPS technology

<sup>3</sup> Multiply total power of new system by 4 % due to the network loss for LED technology

# Guided exercise on energy planning in public buildings

## Main Task:

Build an action or measure for Energy and Climate Plan including the development of fundamental financial analysis, funding plan and prepare a preliminary pitch which will be delivered to the city mayor. Present built action/measure as one of the following:

- Energy Expert (focused on energy savings, CO2 savings, technology implementation)
- Financial Expert (more focused on costs, financial savings, payback period)

## Problem Description

As part of Energy and Climate Plans the potential for direct action on public buildings and public company's official vehicles have been prioritised.

There are two types of actions relevant in the following cities/municipalities:

- Wind-park Krnovo, Municipality of Shavnik, Montenegro
  - 10 public company's official vehicles to be replaced with electric ones
- Zhytomyr, Ukraine
  - 8 public buildings upgradeable with PV systems

You are part of energy and climate planning project team developing key actions to be included in Energy and Climate Plan. You are required to develop an action targeted at city mayor:

- Identify the key drivers for your mayor.
- Prepare SWOT analysis of your action (address all pros and cons as a part of the SWOT analysis)
  - Identify the quantitative and qualitative benefits from the perspective of your mayor.
  - Identify all negative impacts of implementation of this action.
  - Identify the main reasons and external threats why your mayor may not support the initiative.
  - Identify opportunities that beneficiary may exploit within implementation of the action. What positive effects can cause?
- Build a business case to present it to the stakeholder. You will have 3 minutes for your "pitch". You may use up to 2 flip chart sheets to aid your presentation.

For the **transport group** your team is working on consider the following relevant characteristics:

Action Type	Cost-effectiveness of switching from conventional to electric vehicles
<b>Description</b>	<p>Public company Wind-park Krnovo from Municipality of Shavnik, Montenegro has a plan to replace all of their conventional official vehicles with electric ones. They have 10 vehicles in total with average yearly mileage of 15,000 km and with average fuel consumption of 1,200 litres per year.</p> <p>The calculation of financial viability is based on the analysis and comparison of the total cost of ownership of an existing conventional (TCOb) and new electric vehicles (TCOe). The total cost of ownership depends on the five basic parameters: technical examination costs (T), car insurance cost (I), fuel cost (F), vehicle maintenance cost (M) and the cost of buying a new vehicle (Cn). The cost-effectiveness period, as well as any of the parameters mentioned, depends on the type and manner of use of vehicle or the needs of an owner.</p> <p><b>TCOb = N*(Tb+Ib+Fb+Mb)</b>  <b>TCOe = N*(Te+Ie+Fe+Me)</b>  <b>S = TCOb – TCOe</b>  <b>JPP = N*(Cn – Co)/S</b></p>
<b>Number of vehicles</b>	10
<b>Technical examination cost per vehicle (conventional vehicle) (Tb)</b>	160 €/a
<b>Car insurance cost per vehicle (conventional vehicle) (Ib)</b>	192 €/a
<b>Fuel cost (gasoline) per vehicle (Fb)</b>	1,680 €/a
<b>Maintenance cost per vehicle (Mb) (conventional vehicle)</b>	350 €/a
<b>Technical examination cost per vehicle (electric vehicle) (Te)</b>	113 €/a
<b>Car insurance cost per vehicle (electric vehicle) (Ie)</b>	175 €/a
<b>Fuel cost (electricity) per vehicle (Fe)</b>	147 €/a
<b>Maintenance cost per vehicle (electric vehicle) (Me)</b>	80 €/a
<b>Emission factor for gasoline</b>	2.16 kgCO <sub>2</sub> /l
<b>Emission factor for electricity</b>	0.234 kgCO <sub>2</sub> /kWh
<b>Fuel consumption per vehicle (conventional vehicle)</b>	1,200 l/a
<b>Fuel consumption per vehicle (electric vehicle)</b>	2,100 kWh/a
<b>Retail price of old conventional vehicle (Co)</b>	6,200 €
<b>Price of new electric vehicle (subsidy included) (Cn)</b>	24,000 €

For the **PV group** your team is working on consider the following relevant characteristics:

Action Type	Public Buildings Renovation
Description	<p>Initial assessments of the public buildings in the City of Zhytomyr have been completed by a junior engineer in your Agency. As a result, complex of 8 large public buildings have been identified where the assessments have indicated that PV installations are viable. Complex of 8 public buildings are all occupied by Zhytomyr Ivan Franko State University.</p> <p>Due to the conservator rules and impossibility of installation on the roof of the University building, PV installation must be implemented on the ground. Point the PV panels south-west and arrange them in rows with a distance of 4 meters between the rows. Ground panels with construction occupy 2 meters in width. The bird's eye view of the University environment is shown below.</p>
Number of Buildings	5
Output power of one PV panel	230 W
Width of the panel	1.00 m
Electricity Cost (€/kWh)	0.23 incl. VAT
Annual production per kW	1,200 kWh
PV Installation Cost	€1,300/kW
Emission factor for electricity	0.234 kgCO2/kWh





## **THEMATIC PANEL 2: Online Energy Platform - OnePlace**

TAKING  
**COOPERATION**  
FORWARD

## **BOOSTEE-CE - Train the Trainers**

**Fabio Remondino** - FBK, Trento, Italy

**Anna Nowacka** - EUWT NOVUM, Jelenia Góra, Poland

**Tomáš Perutka** - EAZK, Zlin, Czech Republic



# THEMATIC PANEL

## The Online Energy Platform

# OnePlace

### Fabio REMONDINO

3D Optical Metrology (**3DOM**)  
Bruno Kessler Foundation (**FBK**)  
Trento, Italy  
Email: [remondino@fbk.eu](mailto:remondino@fbk.eu)  
<http://3dom.fbk.eu>

### Anna NOWACKA

Europejskie Ugrupowanie Współpracy  
Terytorialnej NOVUM (**EUWT NOVUM**)  
Jelenia Góra, Poland  
Email: [anna.nowacka@euwt-novum.eu](mailto:anna.nowacka@euwt-novum.eu)  
<http://www.euwt-novum.eu>

### Tomáš PERUTKA

Energy Agency of the Zlín Region (**EAZK**)  
Zlín, Czech Republic  
Email: [tomas.perutka@eazk.cz](mailto:tomas.perutka@eazk.cz)  
<http://http://www.eazk.cz/>

## The Online Energy Platform

### Schedule of the module (9:00 - 10:45)

1. Introduction to OnePlace Platform
2. I module: Living Energy Marketplace
3. II module: Energy Efficient Cities
4. III module: Financing Energy Efficiency
5. IV module: 3D Energy Management System (3DEMS)
6. DEMO – practical use of 3DEMS



# The Online Energy Platform - OnePlace

## The Online Energy Platform

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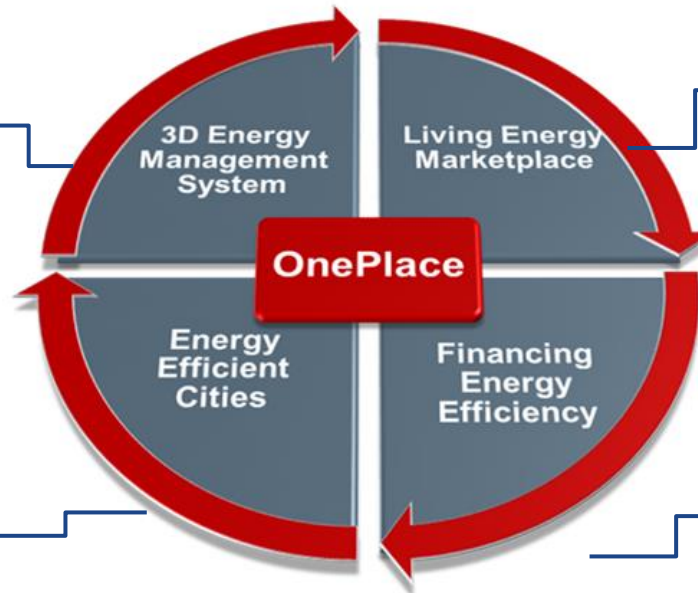
# The Online Energy Platform - OnePlace

**Web platform includes 4 interlinked modules** enriched with energy related contents (best practices, database of devices, energy certificates, PV maps, etc.) **freely accessible** to policy makers, energy planners and citizens in order to improve the governance and understanding of energy efficiency.

A **webGIS viewer** for the visualization of energy-related information (consumptions, audits, PV potential, etc.) within **3D city models**



A collection of country-based **experiences, best practices and guidelines** in the energy efficiency sector for public authorities and citizens.



**Database reporting information about electronic & electric appliances** as well as a country-based list of qualified contractors (*engineers, auditors, technicians*) for EE projects.

**Transnational strategy outcomes** (*financial road map*), examples of best practice and practical steps to use the national & EU-level resources






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# OnePlace - Living Energy Marketplace

## Living Energy Marketplace

Living Energy Marketplace aims to connect customers interested in energy efficiency projects to qualified contractors (architects, engineers, auditors, craftsmen, technicians and installers, energy agencies etc.) in order to scale up investments in energy efficiency and to reduce information barriers. It also contains links and information covering the electronic & electric appliances to empower potential investors to make energy-wise decisions.



### Device database

Here you can find links to databases or are considering buying this kind of product.

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### Experts Database

Contains database of links to experts in the field of architecture and engineering, serving as a connection point between customers interested in energy efficiency projects and qualified professionals.

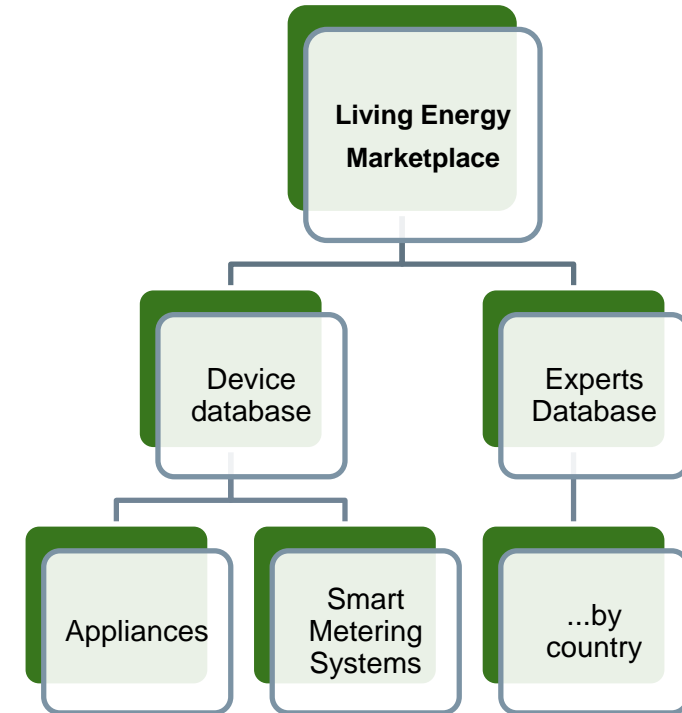
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**Living Energy Marketplace** aims to **connect customers** interested in energy efficiency projects **to qualified contractors** (architects, engineers, auditors, craftsmen, technicians and installers, energy agencies etc.) in order **to scale up investments in energy efficiency** and to reduce information barriers.

# OnePlace - Living Energy Marketplace

## It contains:

- ❑ links and information covering the **electronic & electric appliances** to empower potential investors to make energy-wise decisions.
- ❑ and **database of links to experts** in the field of architecture, engineering, energy efficiency, renewable energy sources etc. This database is meant to serve as a **connection point between customers** interested in energy efficiency projects and qualified contractors.



It is basically a **database of devices and experts** to empower potential investors to make energy wise decisions.





## Austria

### Energieberatungsstellen

Sie planen eine Biomasseheizung, eine Wärmepumpe, eine Solaranlage und interessieren sich für eine Förderung Ihres Vorhabens? Zur Beratung und Einreichung Ihres Förderungsantrages stehen Ihnen zahlreiche „Ich tu's“-Beratungsstellen in der Steiermark zur Verfügung.

→ [Visit the page](#)

### Fördereinreichstellen

EINREICHSTELLEN – UND BERATUNGSSTELLEN in der Steiermark für folgende Ökoförderungen:

- Heizungsoptimierung - Biomasse
- Biomasse-Heizungen
- Heizungsoptimierung - Wärmepumpe
- Solarthermische Anlagen

→ [Visit the page](#)

### Energieberater



### Heizkostenvergleich



Der Heizkostenvergleich der Österreichischen Energieagentur ist ein Vollkostenvergleich, der Konsumentinnen und Konsumenten als Orientierung dienen soll. Die Auswahl der zu vergleichenden Heizsysteme erfolgt mit dem Fokus, den Stand der Technik der derzeit am häufigsten neu installierten Heizsysteme in Einfamilienhäusern in Österreich abzubilden. Der Heizkostenvergleich der Österreichischen Energieagentur vergleicht folgende Heizsysteme:

- Fernwärme
- Erdgas-Brennwert
- Öl-Brennwert
- Scheitholz
- Pellets
- Luft/Wasser-Wärmepumpe
- Sole/Wasser-Wärmepumpe mit Erdsonde

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### Effiziente Heizwerke

### OeMAG - Abwicklungsstelle für Ökostrom

Die OeMAG Abwicklungsstelle für Ökostrom AG (auch Ökostromabwicklungsstelle) wurde 2006 eingerichtet, um die von anerkannten Ökostromanlagen in das öffentliche Netz eingespeisten Ökostrommengen gem. Ökostromgesetz 2012 (ÖSG 2012) und den geltenden Marktregeln abzunehmen und zu vergüten. Die gelieferten Strommengen werden an die auf österreichischem Bundesgebiet tätigen Stromhändler weitergeliefert. Die Weiterlieferung und Verrechnung erfolgt nach Maßgabe der an Endkunden abgegebenen Mengen an elektrischer Energie (Quotenregelung).

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### Monitoringstelle für Energieeffizienz



Die Monitoringstelle Energieeffizienz ist eine Einrichtung in der Österreichischen Energieagentur im Auftrag des Bundesministeriums für Nachhaltigkeit und Tourismus (BMNT) und Anlauf- und Informationsstelle für die laut Energieeffizienzgesetz verpflichteten Unternehmen, öffentlichen Stellen und



# OnePlace - Living Energy Marketplace

## Croatia

### Arhitekti



Hrvatska  
komora  
arhitekata

Hrvatska komora arhitekata ustanovljuje se kao baštinik tradicije i nasljeđa udruga i organizacija arhitekata, te nastavlja slijed organiziranih strukovnih udruga arhitekata u Hrvatskoj. Komora promiče arhitekturu kao izraz identiteta naroda i kulturu građenja, unapređuje arhitektonsku djelatnost u cilju zaštite javnog interesa i zaštite interesa trećih osoba. Ovdje možete pronaći imenik ovlaštenih arhitekata.

→ [Visit the page](#)

### Voditelji projekata (elektrotehničke struke)

Voditelj projekta je osoba koja je odgovorna za ostvarivanje definiranih ciljeva projekta. Ključne odgovornosti voditelja projekta podrazumijevaju kreiranje jasnih i ostvarivih ciljeva projekta, definiranje zahtjeva projekta te upravljanje trima važnim elementima projekta, troškovima, opsegom te kvalitetom. Ovdje možete pronaći imenik ovlaštenih voditelja projekata.

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### Izvođači



Izvođač je osoba koja gradi ili izvodi pojedine radove na građevini. Ako u građenju sudjeluju dva ili više izvođača, investitor ugovorom o građenju određuje glavnog izvođača koji je odgovoran za međusobno usklađivanje radova i koji imenuje glavnog inženjera gradilišta. Ovdje možete pronaći popis nekih izvođača u RH.

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### Energetski certifikatori



Energetsko certificiranje je skup radnji i postupaka koji se provode u svrhu izdavanja energetskog certifikata a uključuje energetski pregled zgrade, potrebne proračune za referentne klimatske podatke za iskazivanje specifične godišnje potrebne toplinske energije za grijanje, specifične godišnje potrebne toplinske energije za hlađenje, specifične godišnje isporučene energije, specifične

### Građevinski inženjeri



### Esco tvrtke




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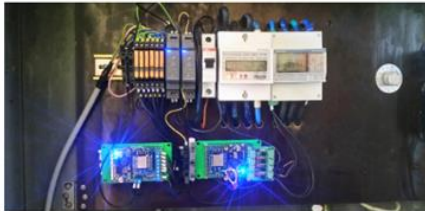
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## Smart metering system in kindergarten Loptica

Koprivnica, Koprivnicko - krizevacka County, Croatia

The whole process of SM system implementation in kindergarten Loptica started with the first month of 2018 when the needs have been defined. Current state of the building was analysed. After that, market research was conducted in March 2018 to explore possibilities of available SM systems. In April, tech guys... [Read More](#)



## Low energy reconstruction and repurpose of existing building in former military complex

Koprivnica, Koprivnicko, Croatia

The subject of this project was the reconstruction and repurpose of existing building in the former "ban Krsto Frankopan" military complex in Koprivnica for the purpose of forming a study space for the Media University - journalism studies, media design studies and business and management studies in media. Former military... [Read More](#)

The **Energy Efficient Cities** module is an **exchange platform of experiences** and identification of **good practices** within energy efficiency sector for public authorities and other public users.

It demonstrates the range of **approaches and measures** various cities have used **to undertake efficiency improvements** and thus helps to guide cities in designing effective urban energy efficiency policies and programs.



# OnePlace - Energy Efficient Cities

It contains:

- ❑ **24 Best Practices from 7 CE countries** (constantly updated) covering energy efficiency of buildings and smart metering.
- ❑ Each best practice **contains basic information**, system characteristics, financial sources and financing details and project implementation benefits.



# OnePlace - Energy Efficient Cities



## Energy renovation of 7 buildings of Kindergarten Ptuj with the co-financing share of 85% from the European cohesion fund

Ptuj, Podravska, Slovenia

Total heating surface of 4,408 m<sup>2</sup>. High consumption of energy for heating and a bad condition of the buildings envelope (windows, ceilings, and facades) were the reasons for the renovation. Implementation of measures on the buildings envelope:

- Windows (935 m<sup>2</sup>)
- Façade (2323 m<sup>2</sup>)
- Attic (4408 m<sup>2</sup>)

### Benefits

It's a remarkable case of a good practice (on a municipal level) in terms of improving and ensuring environmentally friendly and energy-efficient spatial conditions for children in the context of educational process and improving working conditions for employees. These renovations can be easily transferred into other regions.

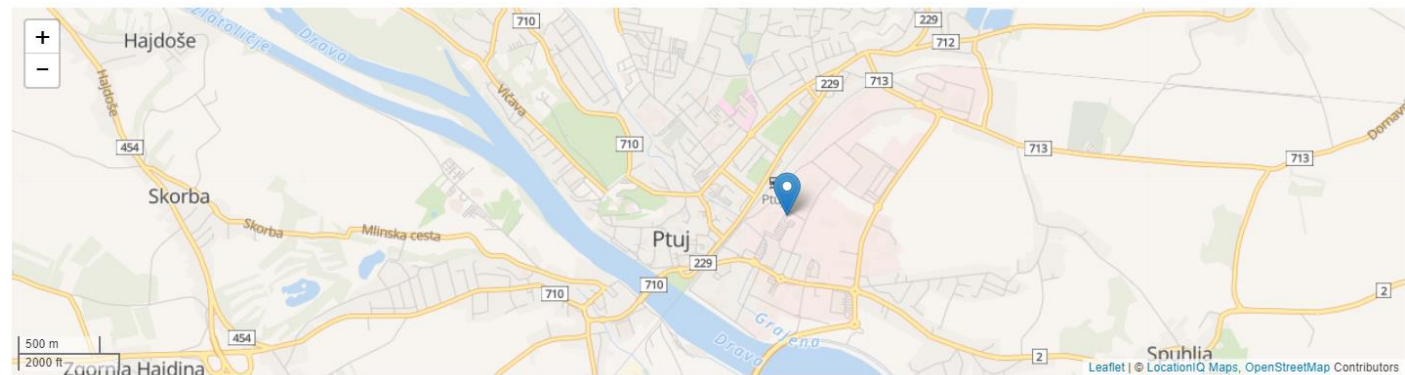
#### Documents:

[D.T2.1.2 Energy renovation of 7 kindregartens SLOVENIA \(160 KB\) Download](#)



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# OnePlace - Financing Energy Efficiency

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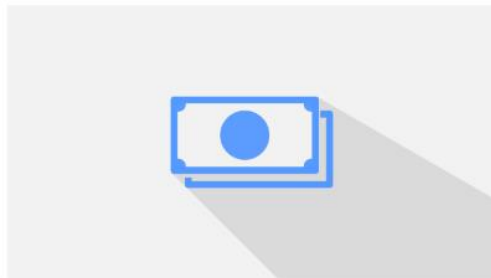
## Financing Energy Efficiency

The Financing Energy Efficiency module is the visual presentation of the transnational strategy outcomes, financial road maps, examples of the best practices and practical steps how to use the national & EU-level resources.



### Comparative analysis

[View more](#)



### Transnational EE financing strategy

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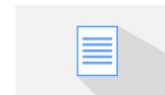
### Comparative analysis

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### Transnational EE financing strategy

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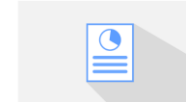
### Transnational EE financing strategy

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### EE financing roadmaps

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### Best practices and investments return models

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### Energy efficiency financing project calculator

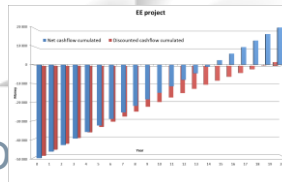
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The **Financing Energy Efficiency** module is the visual presentation of the transnational **strategy** outcomes, **financial road maps**, examples of the **best practices** and practical steps how to use the national & EU-level resources.

# OnePlace - Financing Energy Efficiency

## It contains:

- ❑ Comparative analysis of financial schema in CE countries
- ❑ Transnational Energy Efficiency Financing Strategy
- ❑ Transnational methodological framework for a EE roadmap development
- ❑ Energy efficiency financing roadmaps for public infrastructures in CE municipalities
- ❑ Best practices and investments return models in energy efficiency financing
- ❑ Energy Efficiency Financing Project Calculator



# OnePlace - Financing Energy Efficiency



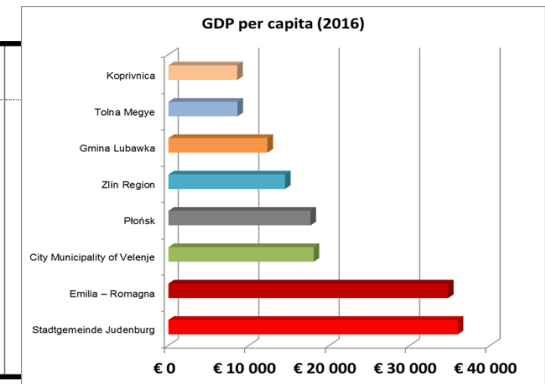
## Comparative analysis of financial schema in CE countries

Analysis & elaboration of **differences among financial schema** in partner countries, considering EU grants/funds, possible normative obstacles, investment return, models, etc.

### Basic comparison of analysed areas

- against - population
- area size
- GDP
- GDP per capita

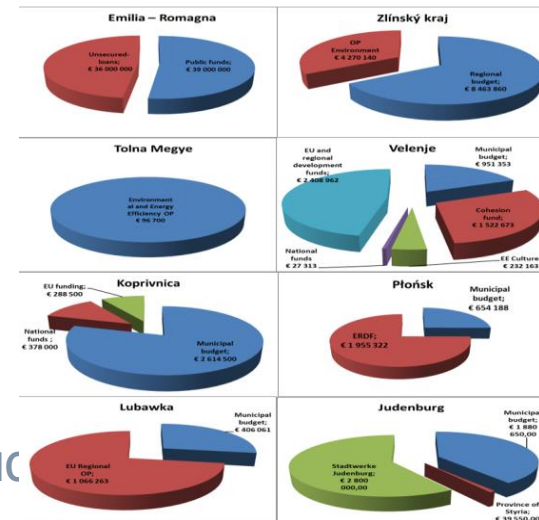
Name of the region / area
Judenburg
Emilia – Romagna
Velenje
Płońsk
Zlínský kraj
Lubawka
Tolna Megye
Koprivnica



### Current EE financing situation in partners' areas

**EE services** - core activities which must be continuously provided to fulfil partner's EE strategic objectives

**EE projects** - short-term, self-contained activities that augment the EE services, boost the energy efficiency by reducing the amount of energy required to provide services and products





## Transnational Energy Efficiency Financing Strategy

**A review of the existing energy financing solutions and models** that are or will be in the future the important enablers for EE and energy savings in public infrastructures. The strategy evaluates the potential of different financial models and give recommendations.

### ❑ **Key stakeholders, their needs and investment barriers**

**Identification the key public and private actors** responsible for Energy Efficiency Financing Strategy. Examination of barriers to investment of these actors, ways to deal with barriers and assessment of their knowledge and experience regarding financing models for energy efficiency upgrades

### ❑ **Existing funds and assistance in CE countries**

(Italy, Austria, Slovenia, Croatia, Hungary, the Czech Republic and Poland):

**Funding leveraged by ESIF**

**National Funding**

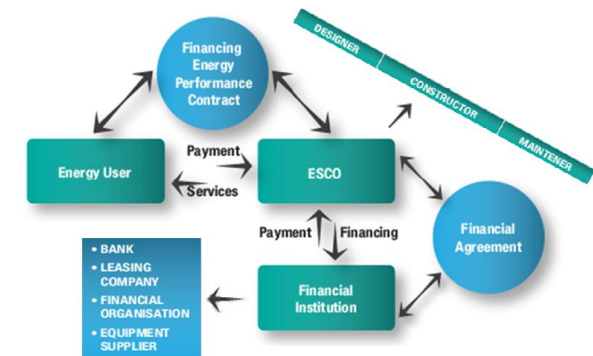
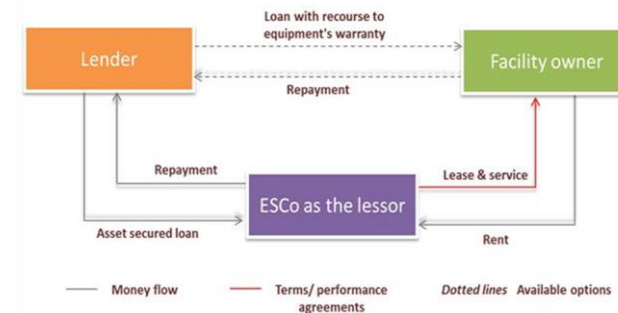




## Transnational Energy Efficiency Financing Strategy

### □ Assessment of the existing models of financing

- Proven financing instruments in partner countries - assessment with description of main factors that contributed to success of each financial instrument, along with recommendations for further improvement.
- Transferring of established financing instruments (FI) in partner countries - measures that could enable transferring of experiences critical for deployment of established FIs to partner countries that were not able to deploy pertinent FI.
- Deployment of new financing instruments – selection of instrument that could be developed in partner countries with measures required for deployment of each financial instrument.



### □ Principles for creating own EE financing strategy

- Balanced level of core financing and programme funding, exploration financing options for activities within key services, organisational background, sustainability etc...



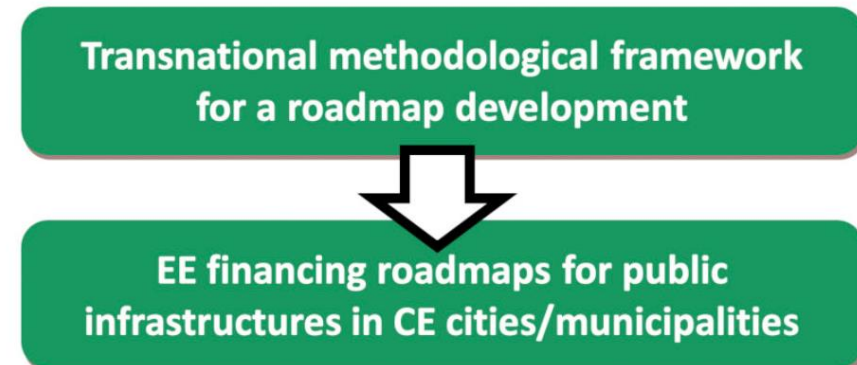
## Transnational methodological framework for a EE roadmap

**The aim of the financial roadmap is to help public authorities to deal with many different financing grants** in the EE domain. The methodological framework builds **upon the practical knowledge of public institutions** and provides an overview of financing models used to finance EE upgrades in the public sector with the specific focus on:

- financial models** to minimize the load on public budgets;
- recommendations** for decision-makers on identifying & implementing a suitable financing model;
- risks and measures** in case of financial investr
- case studies.**

### Funding sources for energy efficiency

- European level, national level, self-financing and alternative schemes, intermediaries.

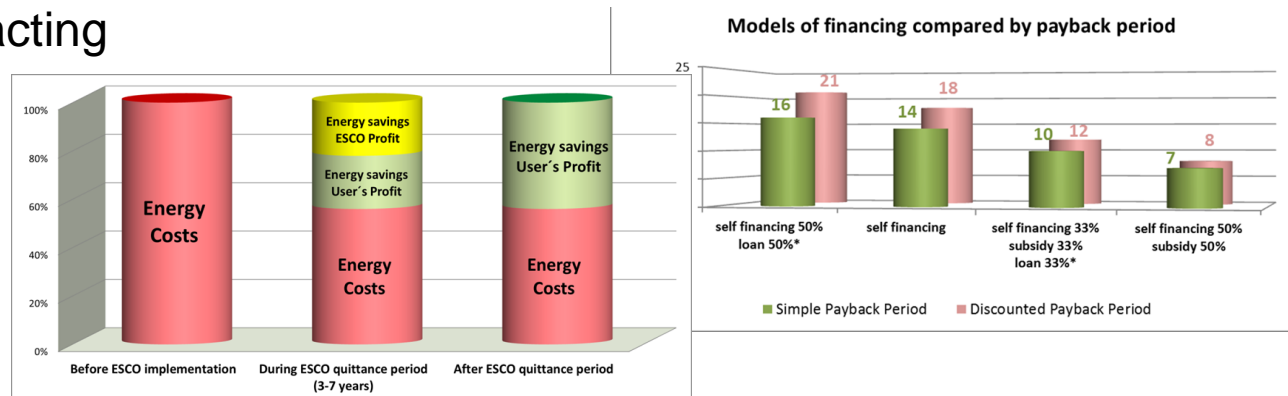


# OnePlace - Financing Energy Efficiency

## Transnational methodological framework for a EE roadmap

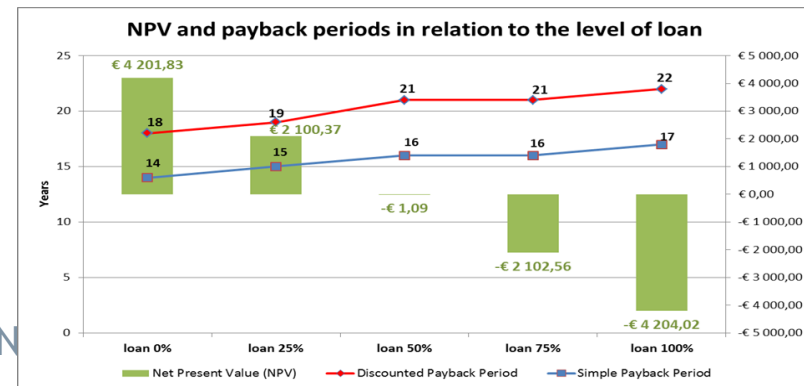
### Financing models for energy efficiency

- Conventional models of EE project financing (Self-financing through energy savings, Debt financing, EU funds and operational programmes)
- Energy Performance Contracting
- Citizen Cooperatives
- Crowdfunding
- Green municipal bonds
- On-bill financing
- Revolving loan funds



### Indicative structure for EE financing roadmap

- Introduction & Internal and External Conditions
- Strategic Targets & Priority Areas
- Action plan & Financing
- Monitoring & Evaluation





## Energy efficiency financing roadmaps for public infrastructures in CE municipalities

**Financing roadmaps** designed to achieve a desired goal of energy efficiency in public infrastructures in specific towns/municipalities in CE cities.

### Energy Efficiency Financing Roadmaps for:

- Zlín Region, Czech Republic
- Regione Emilia – Romagna, Italy
- Mestna občina Velenje, Slovenia
- Tolna Megye, Hungary
- Grad Koprivnica, Croatia
- Stadtgemeinde Judenburg, Austria
- Lubawka, Poland
- Płock, Poland







## Best practices and investments return models in energy efficiency financing

Collection of the best practice examples from CE countries on various financial investments return models through which market-enabling actions for large investments are highlighted. The best practices are presented and analysed on attractive factsheets

BP #1 - Zlín Region, Czech Republic

BP #2 - Emilia-Romagna, Italy

BP #3 Tolna County, Hungary

BP #4 – Loški Potok, Slovenia

BP #5 - Koprivnica, Croatia

BP #6 - Płock , Poland

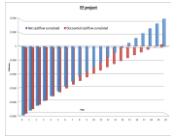
BP #7 - Płońsk, Poland

BP #8 - Jelenia Góra, Poland

BP #9 - Judenburg, Austria

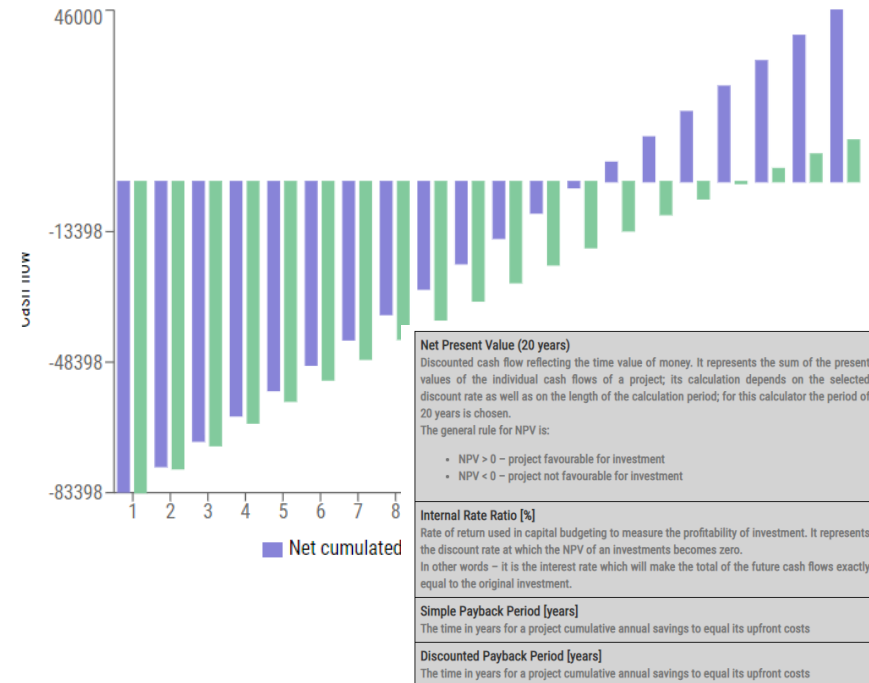
BP #10 - Judenburg, Austria





## Energy Efficiency Financing Project Calculator

- ❑ The simple EE project calculator which gives to the user a basic indicative idea of the profitability and advisability of the investment into an energy efficiency or RES project.
- ❑ It counts **just with own sources**, **not considering subsidies or loans** which both can change foreseen values significantly (*If subsidies are involved, the NPV and IRR are increasing and payback periods are shortening, while loans affect the investment in the opposite way*)



- ❑ Terms and definition of **basic financial indicators** included (NPV, IRR, Discount rate, payback period)
- ❑ Involves **graphical illustration of cash flow** and discounted cash flow.

**Important note** – *the calculator is just an indicative tool, for concrete investment calculations it is highly advisable to carry out a proper financial analysis by a financial expert!*

# OnePlace - 3D Energy Management System

BOOSTEE-CE

Home Living Energy Marketplace Energy Efficient Cities Financing Energy Efficiency 3D EMS

## The Online Energy Platform

<https://oneplace.fbk.eu>

# OnePlace



MARKETPLACE

LIVING ENERGY MARKETPLACE

MORE



CITIES

ENERGY EFFICIENT CITIES

MORE



FINANCING

FINANCING ENERGY EFFICIENCY

MORE



3D EMS

3D EMS

MORE



# OnePlace - 3D Energy Management System

- ❑ **Cities occupy** some **2% of the earth's surface** but their inhabitants consume approximately **75% of the world's energy resources**.
- ❑ Various European Directives, including the Energy Efficiency (EE) Directive 2012/27/EU (2012), is **aiming for a 27% cut in Europe's annual primary energy consumption** by 2030.



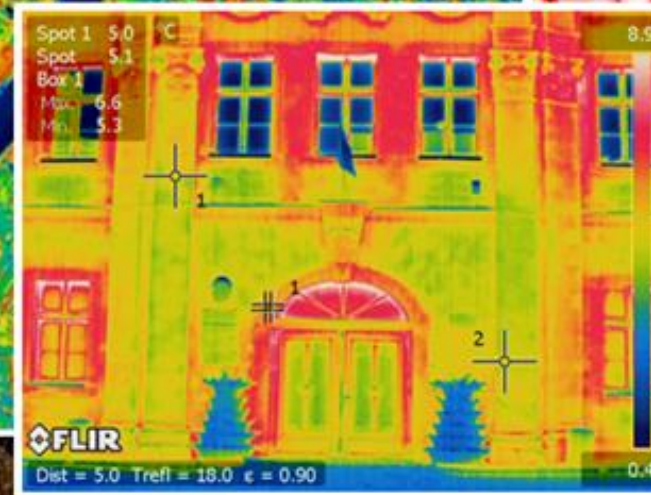
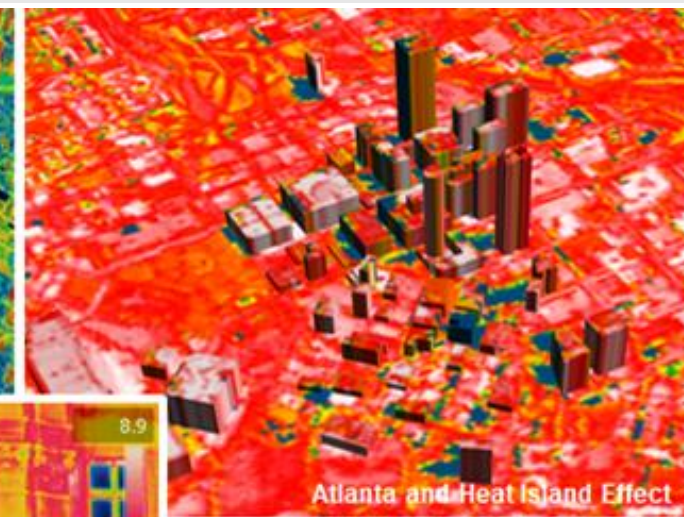
- ❑ Measures to reduce the energy consumption **focus** particularly **on the building sector** as buildings alone consume some 40% of the total energy.
- ❑ For existing constructions (buildings, streets, etc.), large attention is being paid to **improve energy efficiency** as they are accountable for large electric power consumption as well as night light pollution.

A more extensive and powerful use of **GEOSPATIAL DATA** and ICT tools **FOR ENERGY EFFICIENCY** can support the creation of **SMART** and **LOW-CARBON CITIES**





# OnePlace - 3D Energy Management System



Examples of  
**VALUE ADDED  
GEOSPATIAL  
DATA...**

...as useful tools to estimate, analyze and visualize heating flows, urban heat islands, night light pollution, etc.



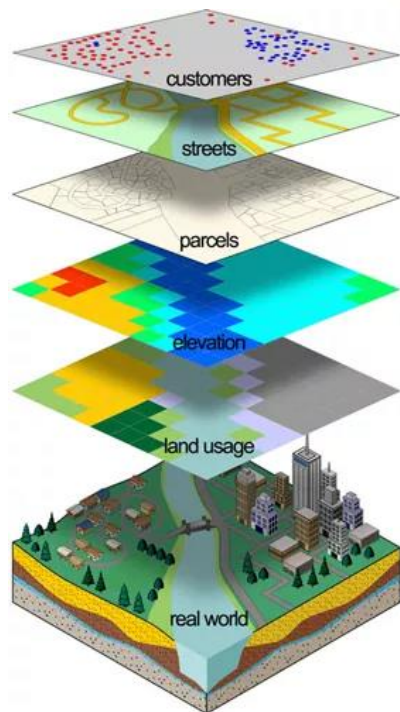


# OnePlace - 3D Energy Management System

DATA +  
GIS +  
3D CITY  
MODELS

While (2D) **GIS** are almost common in public administrations, the use of **3D city models** is still **confined** and mainly applied **to visualization purposes**.

**Spatial and non-spatial energy-related data** integrated with **3D city models into GIS environments** have been already adopted in some cities, but we are very **far away from** their **widespread** utilization and daily use.



Although **on-going initiatives** have demonstrated the potential of geospatial data, 3D city models and webGIS for better planning and management of energy efficient buildings, there is still a **gap between a “nice to have” attitude and a “need to have” one**.

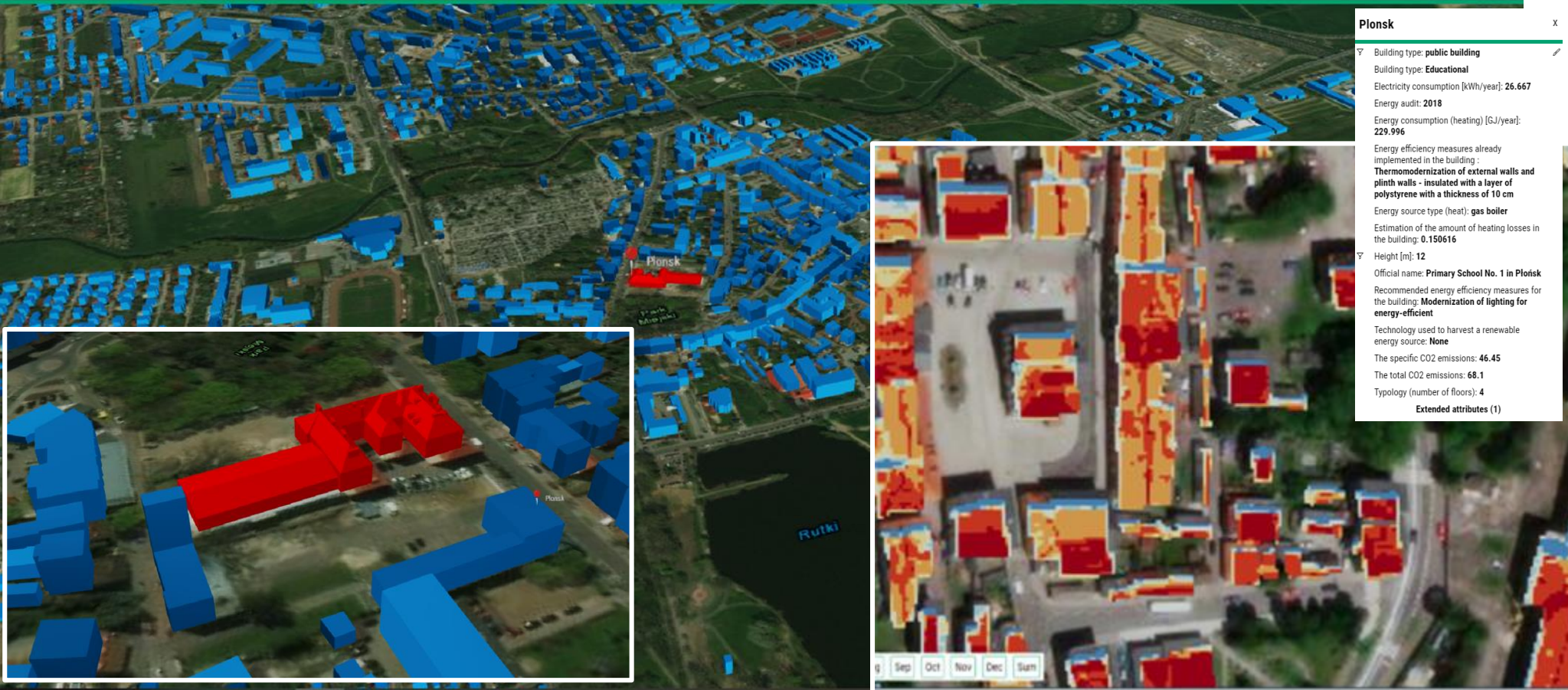


# OnePlace - 3D Energy Management System

**3D Energy Management System** is a module (**WebGIS tool**) to visualize, query and manage energy information / uses / loses / PV potential / audit certificates of ( public) buildings using 3D building models.

**OnePlace**  
The Online Energy Platform

Pilots and cities ▾ PA5 - Plonsk, Poland





# OnePlace - 3D Energy Management System

In the **pilot areas**, for selected public buildings, **geospatial databases** with urban and energy data are created in order to **combine** them with **3D building geometries** within the **3DEMS** tool.

The 3DEMS web tool is tested and deployed in 8 project's pilot areas, with different urban characteristics and EE needs.





To create the **3DEMS tool**, heterogeneous data were collected, harmonized and stored in the **2 categories (spatial and non-spatial data)**:

## a) spatial data

(i) land **cadastre maps** (2D vector or raster) / **building footprints** with attribute info



(ii) **2.5D and 3D point clouds**  
(derived from LiDAR or  
photogrammetric flights)



# OnePlace - 3D Energy Management System

To create the **3DEMS tool**, heterogeneous data were collected, harmonized and stored in the **2 categories (spatial and non-spatial data)**:

## a) spatial data

(iii) **solar energy potential maps** (available or produced from DEM data with GIS)



(iv) **3D building model**  
**LOD1 / LOD2**  
(produced from  
footprints + DEM data)



TAKING CC





To create the **3DEMS tool**, heterogeneous data were collected, harmonized and stored in the **2 categories (spatial and non-spatial data)**:

## a) non-spatial data

### (i) Energy Performance Certificates incl.

- energy consumptions
- carbon dioxide emissions
- energy efficiency indexes
- etc.



### (ii) Data from the register of buildings

- official name
- typology
- building type
- etc.



### (iii) Statistical and survey data

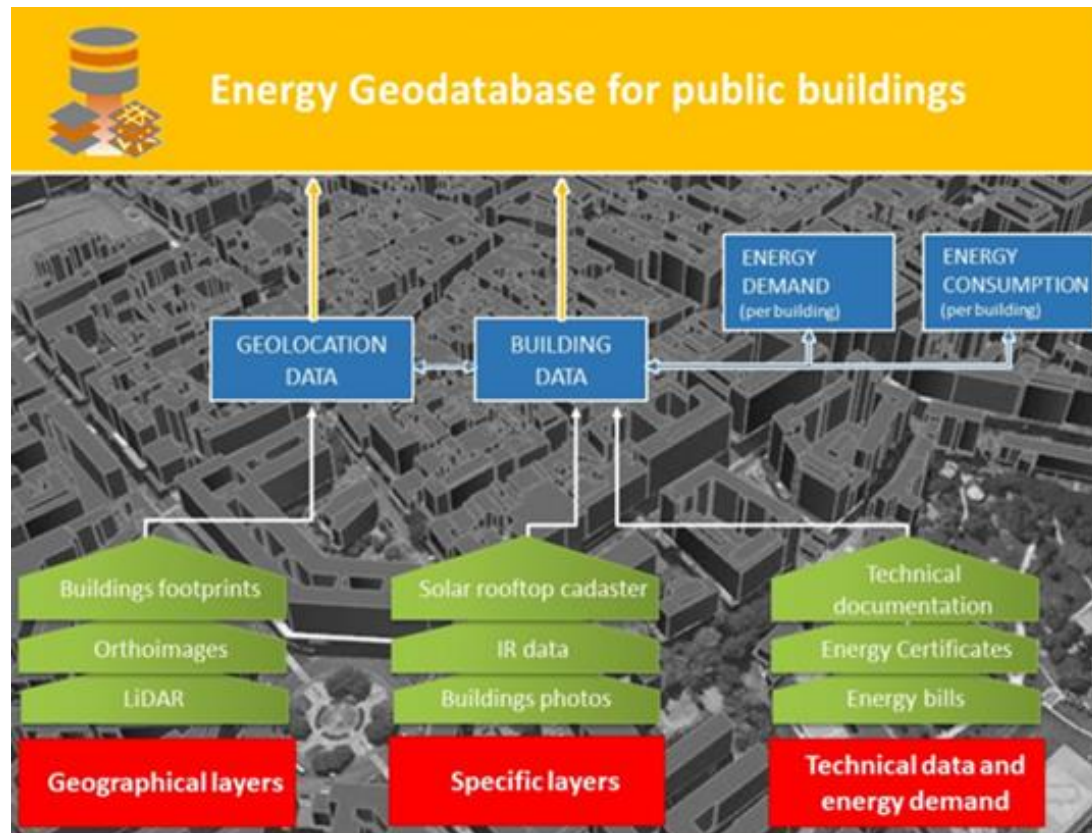
- construction plans
- energy bills
- etc.



# OnePlace - 3D Energy Management System

Starting from these (collected, generated and harmonized) data, the **3DEMS webGIS** tool allows the user to:

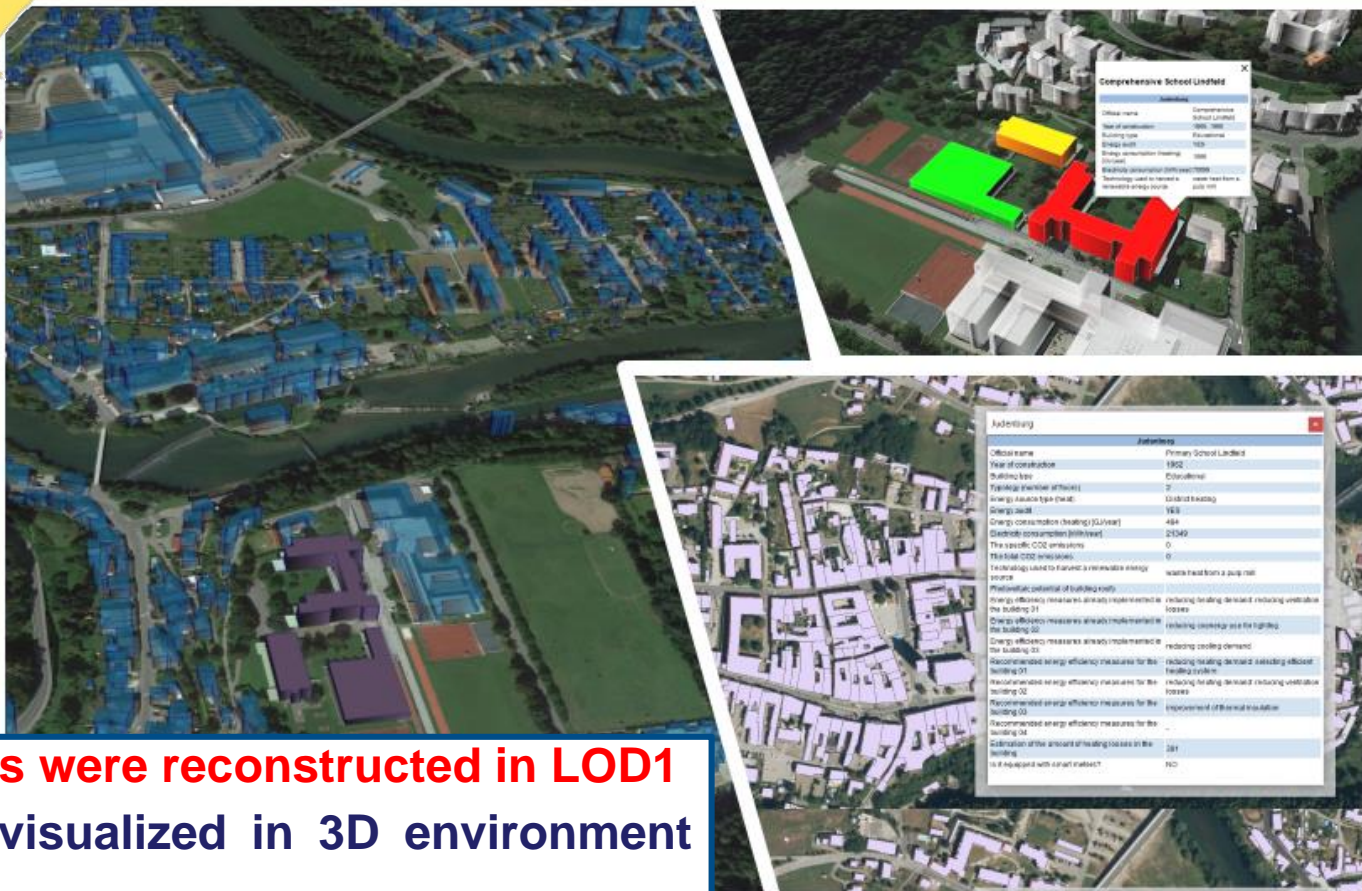
- (i) **navigate** through the urban environment at different altitudes and camera angles (based on **Cesium**);
- (ii) **visualize and interact** with LOD1 building models at urban scale, LOD2 building models at single building scale (selected pilots);
- (iii) **select** a building of interest and **retrieve** energy and other cadastral/building info, incl non spatial data;
- (iv) **analyze** the solar maps and energy maps (heating loss), visualized as additional building texture.





# OnePlace - 3D Energy Management System

Example of web based visualization of **building geometry** (LOD1 and LOD2) with associated **energy database**

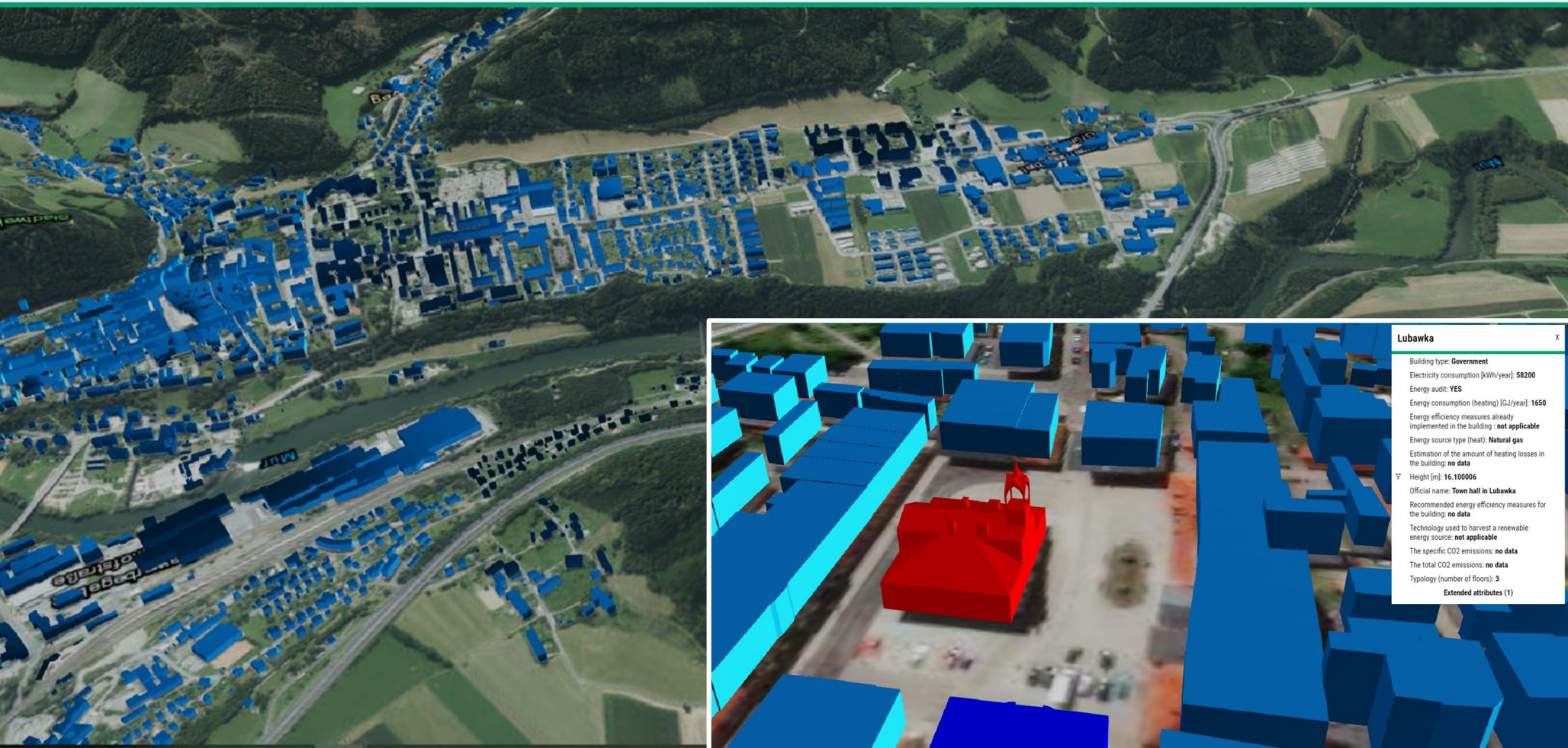


More than **10,000 buildings** were reconstructed in **LOD1** (some 25 in **LOD2**) and visualized in **3D environment**



# OnePlace - 3D Energy Management System

Example of visualization LOD1 building models at urban scale & LOD2 building models at single building scale





# OnePlace - 3D Energy Management System

Example of **aggregation** functions within 3DEMS:  
**energy sources used for buildings' heating**



**Zlin** X

- ▾ Building type: **Building for living** /
- ▾ Height [m]: **10.38** /
- Extended attributes (11)**
- ▾ Area [m<sup>2</sup>]: **200.8329** /
- ▾ Building ID: **20526** /
- ▾ House number: **194** /
- ▾ House number class: **Building with a house number** /
- ▾ Number of flats: **2** /
- ▾ Number of floors: **2** /
- ▾ Perimeter [m]: **78.14841** /
- ▾ Type of construction: **Combination of materials** /
- ▾ Type of heating: **Local heating for flats** /

Set of 5 Elements  
Orange, Red

Clear Apply



# OnePlace - 3D Energy Management System

Example of **aggregation** functions within 3DEMS:  
**number of floors**



**Koprivnica** X

Building type: **Residential building**

▾ Height [m]: **15.5** ✎

**Extended attributes (8)**

▾ Area [m<sup>2</sup>]: **300** ✎

▾ Building ID: **17956** ✎

Building name: **Building 54**

▾ Number of floors: **7** ✎

Steps  
Red, Yellow, Blue ▾

- 5 + Clear Apply

▾ Roof: **18.4** ✎

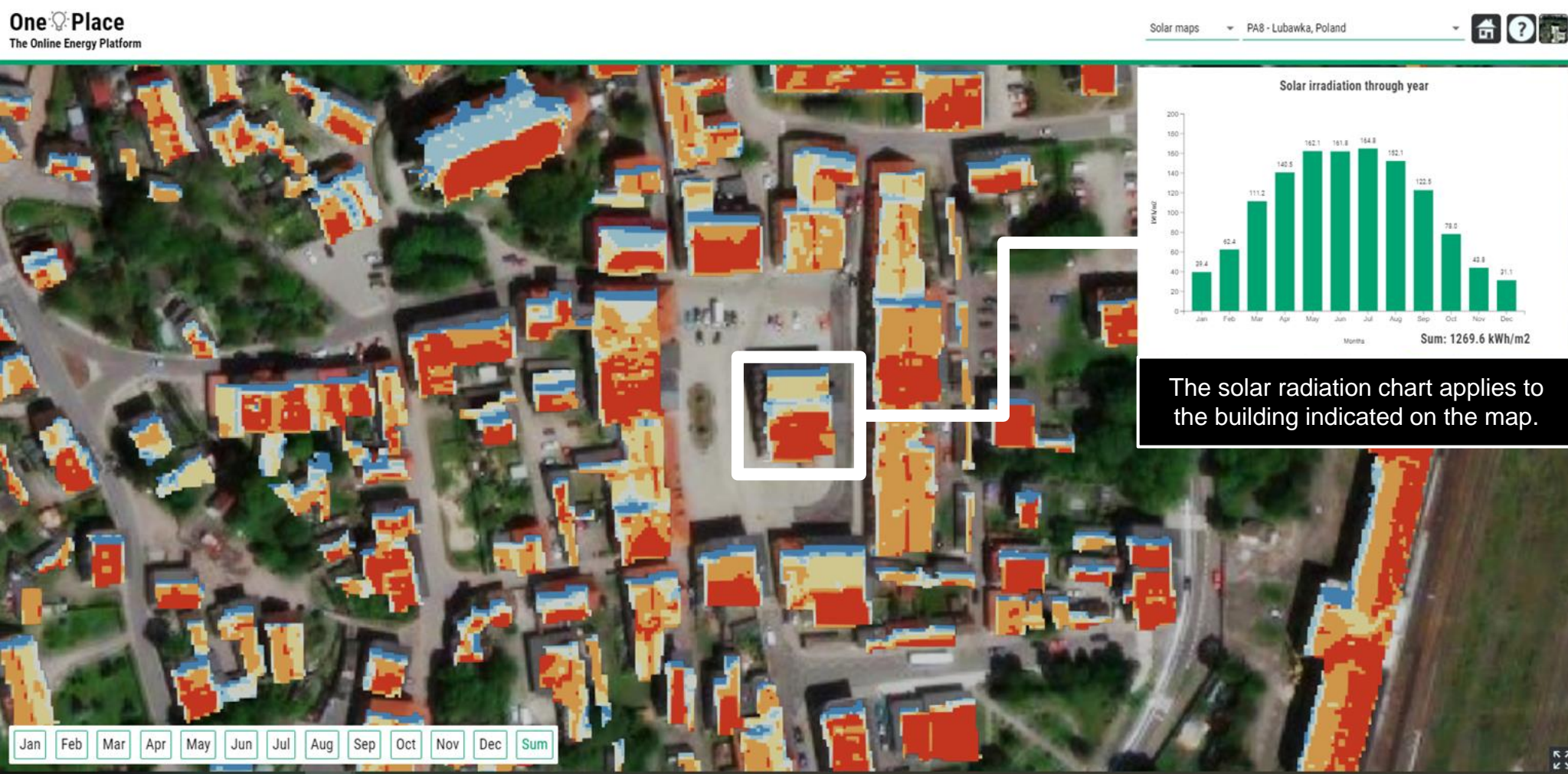
▾ Roof slope (angle in degrees): **45 / Gable**

Type of roof: **Gable**

Year of construction: **1993** ✎

# OnePlace - 3D Energy Management System

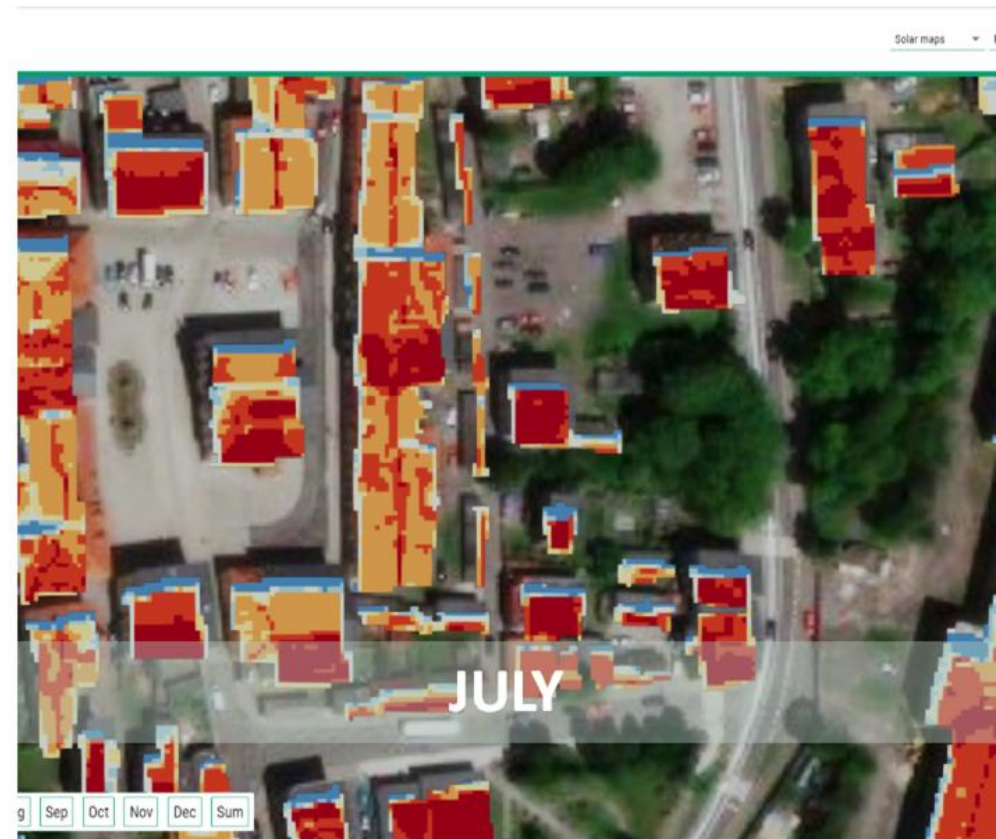
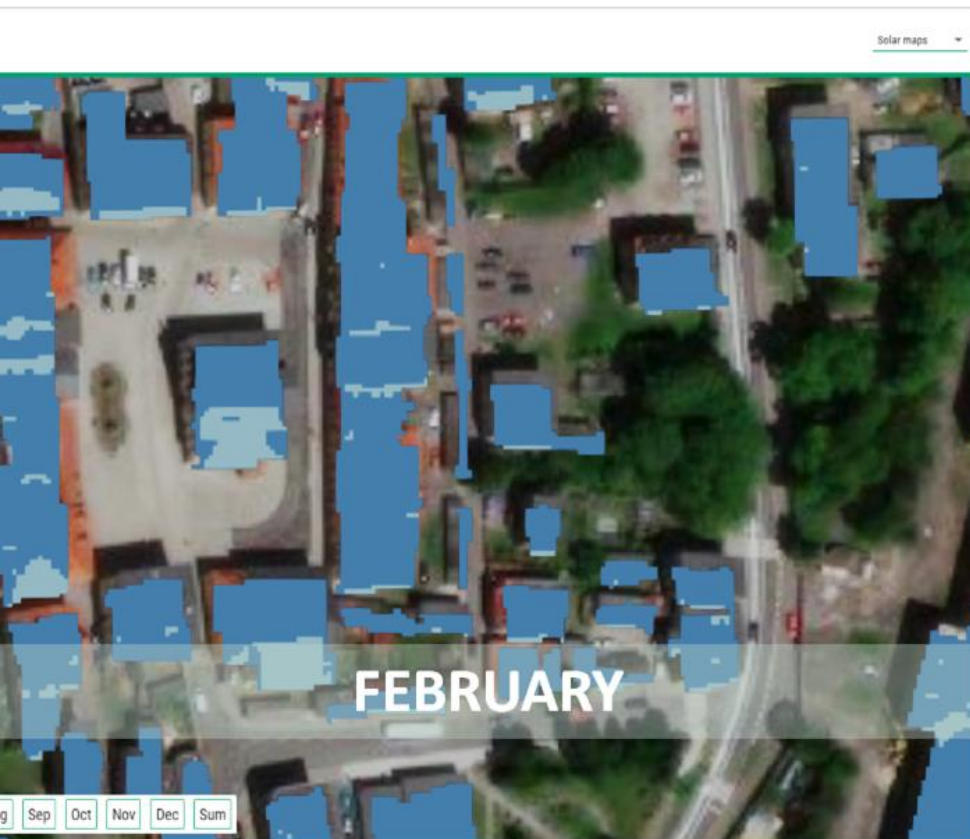
Example of web based visualization of **photovoltaic PV maps**:  
hourly global incoming solar radiation, aggregated on a monthly and yearly basis





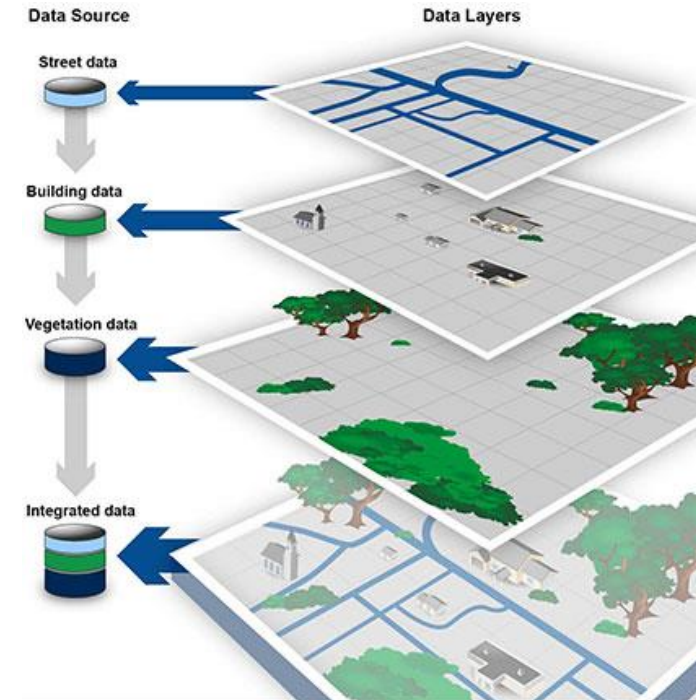
# OnePlace - 3D Energy Management System

Example of web based visualization of **photovoltaic PV maps** in **February** (on the left) and **July** (on the right)



## Why create your own 3D EMS? Different reasons:

1. Data you need is on a paper map (documents) and needs to be converted to a digital format.
  2. To organize geospatial data and 3D building models for energy-related needs
  3. To plan retrofits to save energy and improve energy efficiency.
  4. Data need to be accessed /used by multiple people at the same time.
- ...and many other reasons.





## HOW TO START?

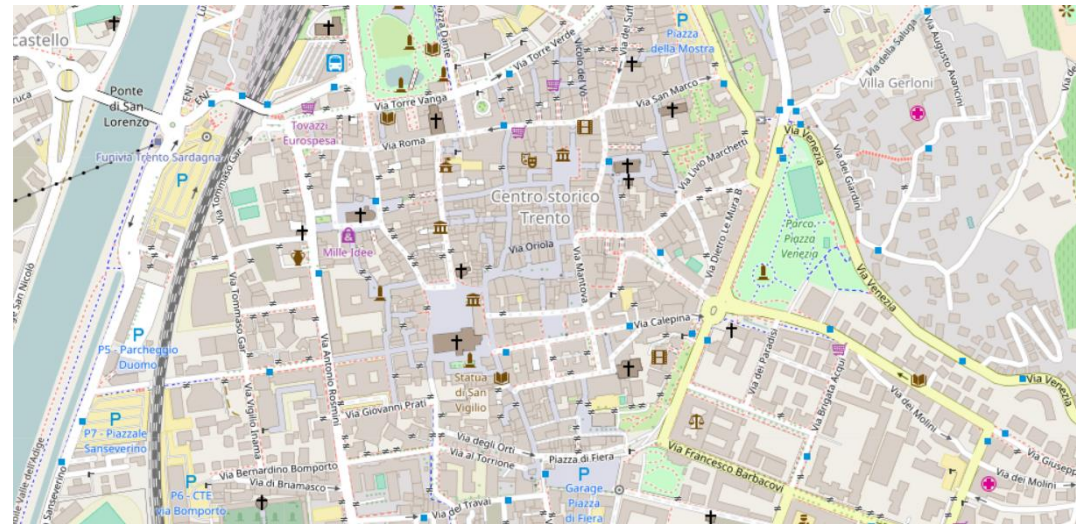


### 1. (spatial) data collection:

- geospatial data to create 3D building models  
(*building footprints, maps, LiDAR point clouds, terrain models, orthoimages, etc.*)



Building footprints



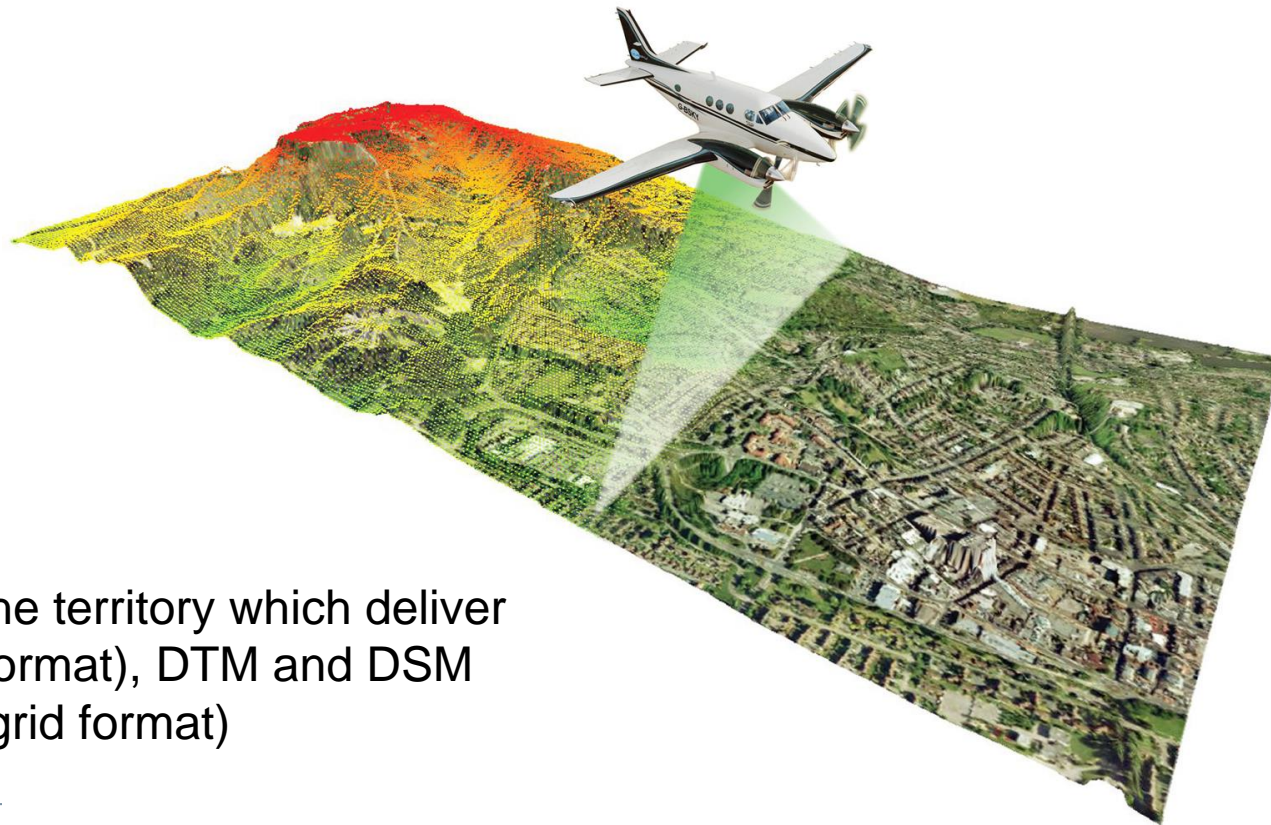
Building footprint but much more (semantics)

## HOW TO START?



### 1. (spatial) data collection:

- geospatial data to create 3D building models  
(building footprints, maps, *LiDAR point clouds*, *terrain models*, orthoimages, etc.)



Aerial 3D survey of the territory which deliver point clouds (LAS format), DTM and DSM (ASCII grid format)



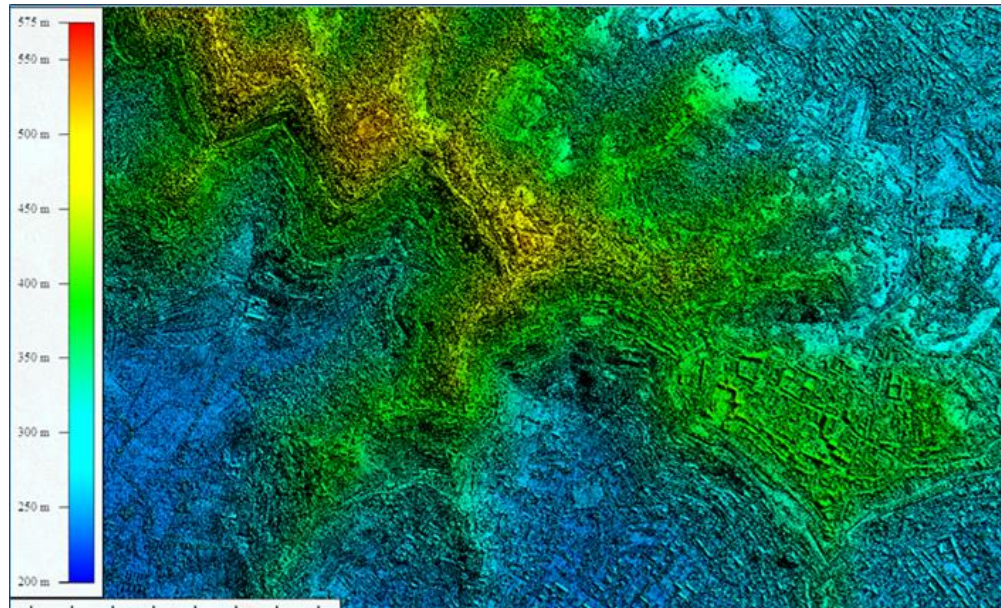


## HOW TO START?



### 1. (spatial) data collection:

- geospatial data to create 3D building models  
(building footprints, maps, *LiDAR point clouds*, *terrain models*, orthoimages, etc.)



DSM (Digital Surface Model) - raster format



DSM (Digital Surface Model) - point cloud format





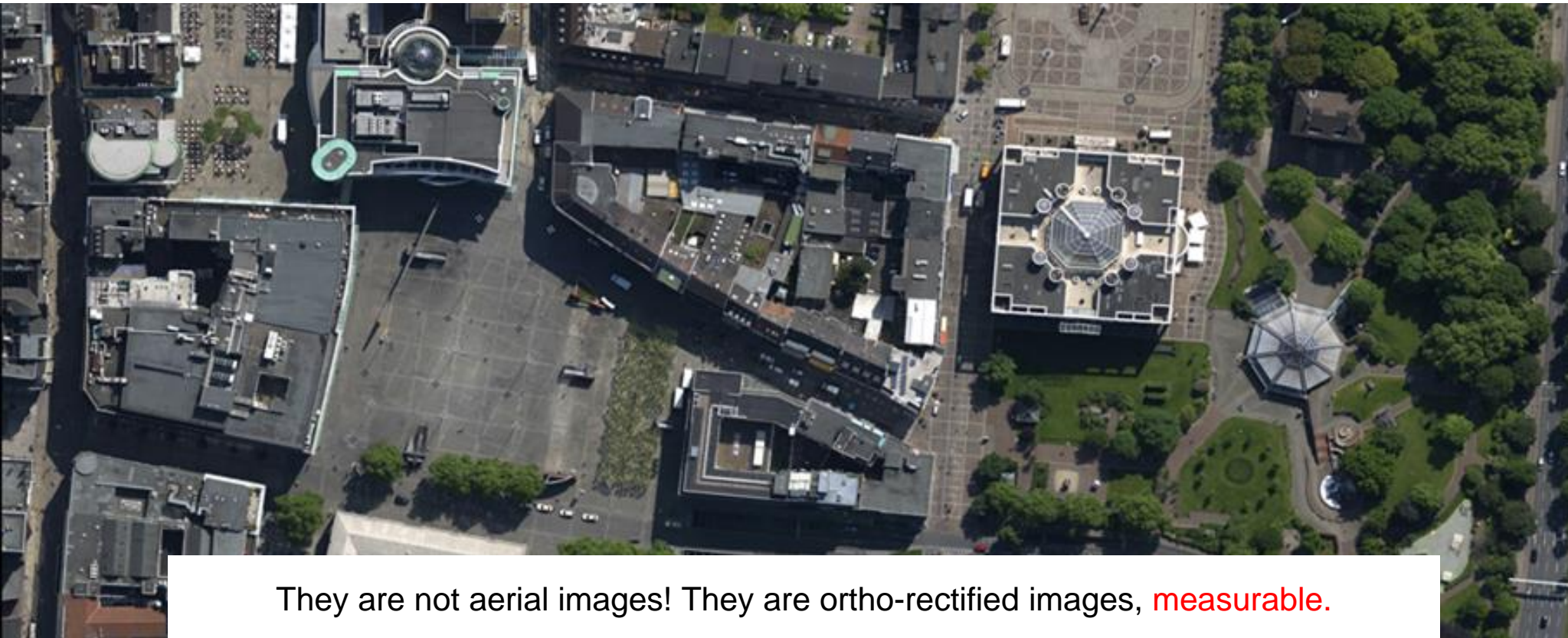
# OnePlace - 3D Energy Management System

## HOW TO START?



### 1. (spatial) data collection:

- **geospatial data to create 3D building models**  
(*building footprints, maps, LiDAR point clouds, terrain models, **orthoimages**, etc.*)



They are not aerial images! They are ortho-rectified images, **measurable**.

## HOW TO START?



### 1. (non-spatial) data collection:

#### - energy-related data

(e.g. energy consumption, CO2 emissions, heating consumption, etc.)

Field	Units	Description
Official name	-	-
Year of construction	-	-
Building type	-	<b>Type of building:</b> residential, agricultural, civil, medical, educational, government, industrial, military, religious, transport.
Typology (number of floors)	-	-
Energy source type (heat)	-	<b>Type of the heat source:</b> geothermal energy, district heating, cogeneration unit, heat pump, biofuel boilers, solid fuel, electricity, natural gas, oil.
Energy audit	-	-
Energy consumption (heating)	GJ/year	-
Electricity consumption	kWh/year	-
The specific CO2 emissions	tons/year	-
The total CO2 emissions	tons/year	-
Technology used to harvest a renewable energy source	-	<b>Type of the technology:</b> photovoltaics (PV), solar collectors, biofuel boilers, heat pumps
Estimated photovoltaic potential of roof	kW	Calculated from the solar potential maps
EE measures already implemented in the building	-	<b>Type of the measures:</b> (i) reducing heating demand: improving the insulation, limiting the exposed surface area, reducing ventilation losses, selecting efficient heating system, new roof; (ii) reducing cooling demand, (iii) reducing energy use for lighting, (iv) reducing energy used for heating water, etc.
Recommended EE measures for the building	-	
Estimation of the amount of heating losses	MWh/year	-



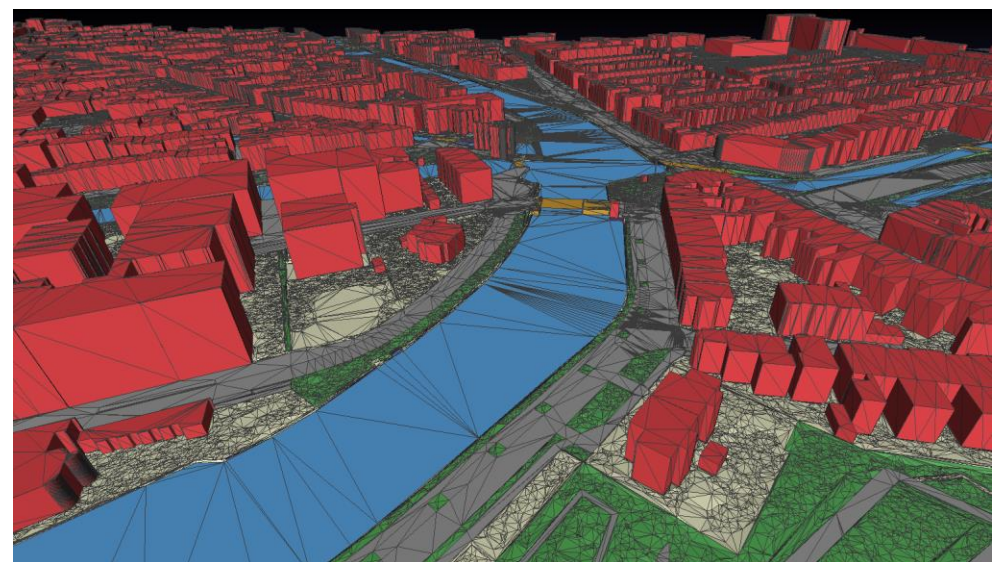
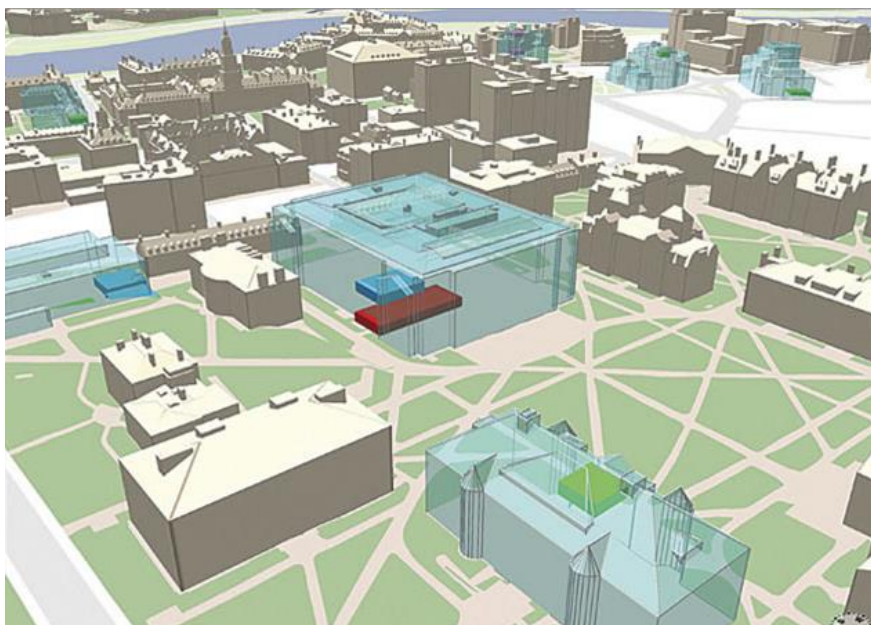


## HOW TO START?



### 2. 3D model generation:

depending on the available geodata, different procedures can be applied to produce 3D geometries, *i.e.* 3D envelopes, at different geometric resolution and with different levels of detail

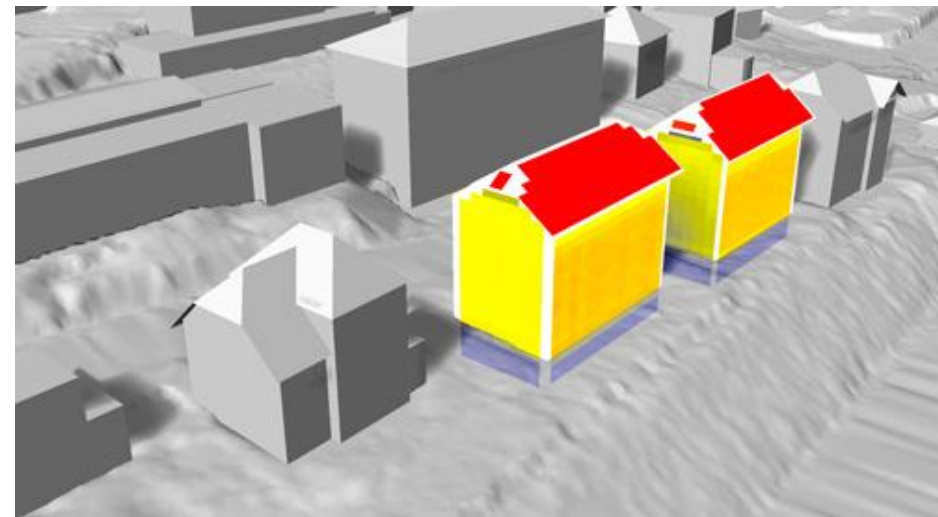
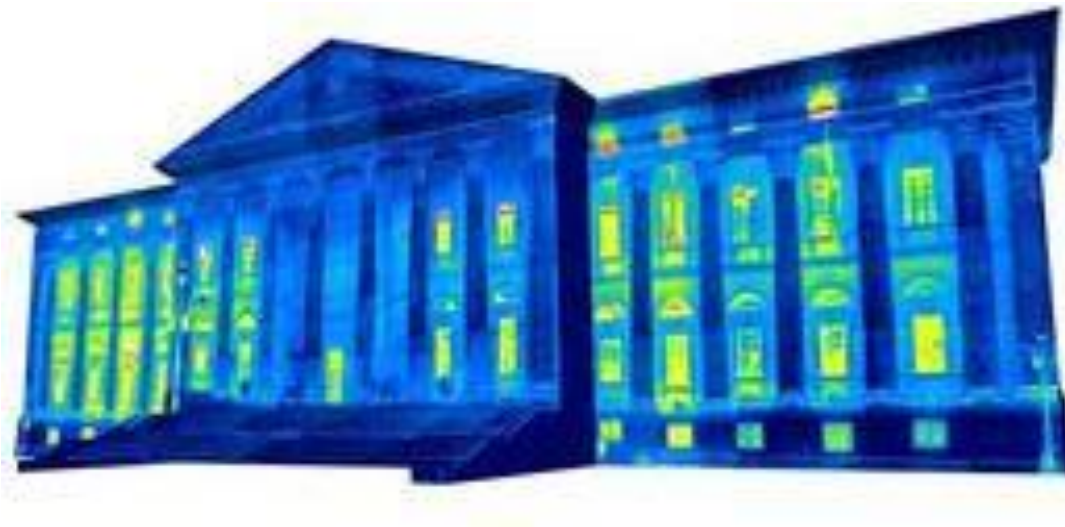


## HOW TO START?



### 3. Further data generation and collection:

3D building geometries, coupled with terrain information, occlusions and geolocations, can be used to estimate the **photovoltaic (PV)** potential of building roofs and produce 3D solar maps

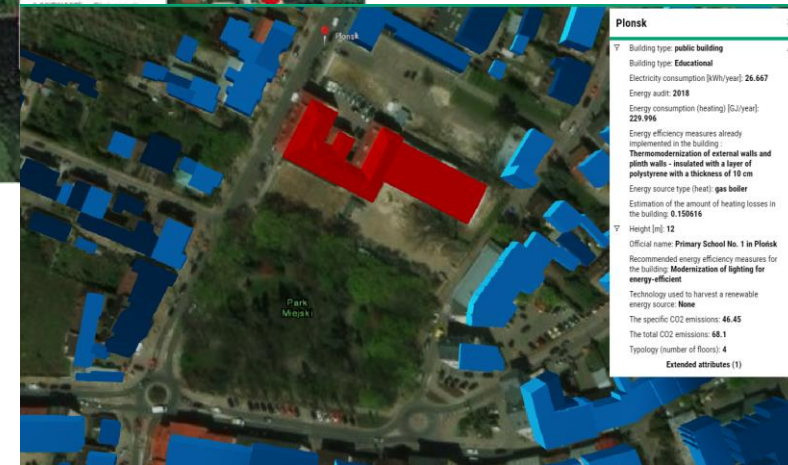
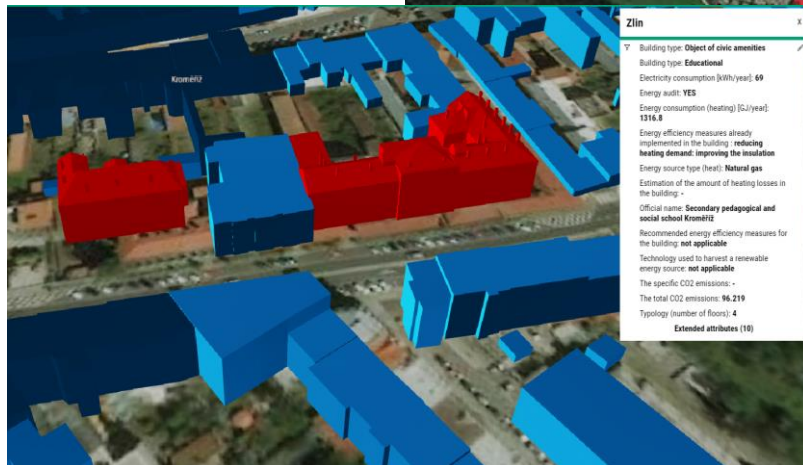




## HOW TO START?



4. **Data and geometry linking:**  
the created **geospatial databases** allow to connect heterogeneous information (*also non-spatial attributes available in the geoDB*) **with geometric/3D information**, retrieving such info on demand and with specific tools








# OnePlace - DEMO - practical use of 3DEMS -


## The Online Energy Platform

<https://oneplace.fbk.eu>


# OnePlace




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# OnePlace - DEMO

## - Living Energy Marketplace: 5 min -

### Living Energy Marketplace

Living Energy Marketplace aims to connect customers interested in energy efficiency projects to qualified contractors (architects, engineers, auditors, craftsmen, technicians and installers, energy agencies etc.) in order to scale up investments in energy efficiency and to reduce information barriers. It also contains links and information covering the electronic & electric appliances to empower potential investors to make energy-wise decisions.



#### Device database

Here you can find links to databases covering the electronic & electric appliances. This databases can help you to make energy-wise decisions if you are considering buying this kind of products.

[View more](#)



#### Experts Database

Contains database of links to experts in the field of architecture, engineering, energy efficiency, renewable energy sources etc. This database is meant to serve as a connection point between customers interested in energy efficiency projects and qualified contractors.

[View more](#)



# OnePlace - DEMO

## - Energy Efficiency Cities: 5 min -

### Energy Efficient Cities

The Energy Efficient Cities module is an exchange platform of experiences and identification of good practices within energy efficiency sector for public authorities and other public users. It demonstrates the range of approaches and measures various cities have used to undertake efficiency improvements and thus helps to guide cities in designing effective urban energy efficiency policies and programs.



Search Database





# OnePlace - DEMO

## - Financing Energy Efficiency: 10 min -

## Financing Energy Efficiency

The Financing Energy Efficiency module is the visual presentation of the transnational strategy outcomes, financial road maps, examples of the best practices and practical steps how to use the national & EU-level resources.



### Comparative analysis

[View more](#)



### Transnational EE financing strategy

[View more](#)



### Transnational methodological framework

[View more](#)



# OnePlace - DEMO

## - Financing Energy Efficiency: 10 min -

### Energy efficiency financing project calculator

This is the simple web based energy efficiency project calculator which gives to the user a basic indicative idea of profitability and advisability of the investment into an energy efficiency or RES project. It counts just with own sources, not considering for instance grants and subsidies on one side or loans on the other side which both can significantly change foreseen values.

If grants and subsidies are involved, the NPV and IRR are increasing and payback periods are shortening, on the other hand, loans affect the investment the opposite way, i.e. when you are co-financing the investment project with a loan, the NPV and IRR are decreasing and payback periods are extending.

You can check also graphical illustration of cash flow and discounted cash flow on a separate sheet.

For concrete investment calculations it is highly advisable to carry out a proper financial analysis by a financial specialist!

You can find instruction on how to use the calculator [here](#).

#### Capital costs

Capital costs are fixed, one-time expenses incurred on the purchase of land, buildings, construction, and equipment. The sum of the different type of costs related to the considered investment, for example the capital costs of building refurbishment, new EE and RES installations, infrastructure reconstruction etc.

#### Annual Energy Savings

Annual sum of money savings generated by the investment, for instance costs saved for heating, hot water preparation, electricity etc.

#### Annual Revenues

Annual sum of money generated by the investment, for instance electricity sales received on a basis of feed in tariffs, overall heat and electricity sales to customers etc.

#### Operational Costs

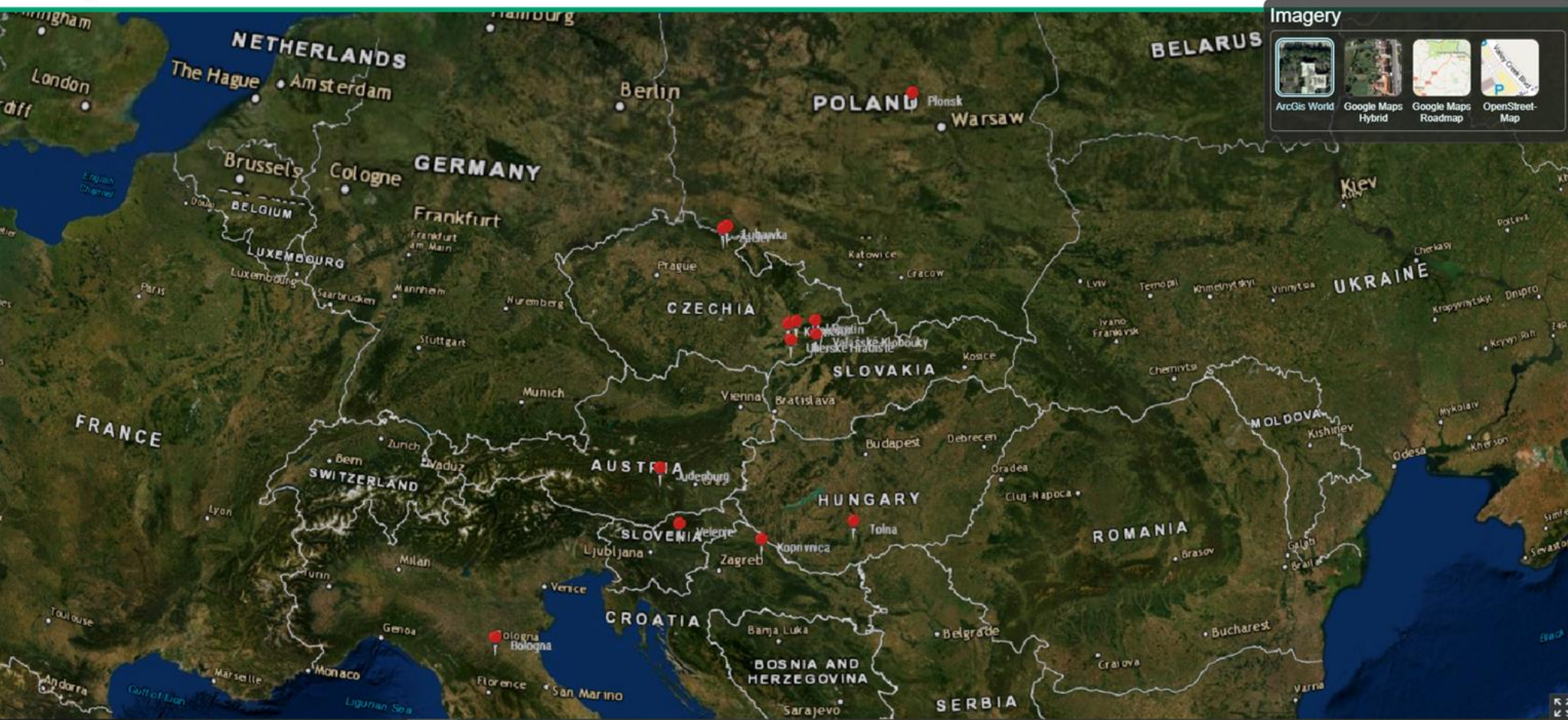


# OnePlace - DEMO

## - 3D Energy Management System: 15 min -

BOOSTEE-CE

BOOSTEE-CE





# OnePlace - DEMO

## - 3D Energy Management System: 15 min -

BOOSTEE-CE



**Zlin** X

- Building type: **Other building**
- Height [m]: **8.74**
- Extended attributes (11)
- Area [m<sup>2</sup>]: **5043.16575**
- Building ID: **20336**
- House number: **1**
- House number class: **Building with a house number**
- Number of flats: **2**
- Number of floors: **4**
- Perimeter [m]: **573.48082**
- Type of construction: **Combination of materials**

Set of 11 Elements  
Orange, Red **5 - Unburnt brick**

Clear Apply

- Type of heating: **Other (or without heating)**



# OnePlace - DEMO

## - 3D Energy Management System: 15 min -

BOOSTEE-CE

BOOSTEE-CE



### Velenje

X

Height [m]: 17.8



Extended attributes (18)

Building ID: 25586560



Building ridge altitude [m asl]: 414.5

Lowest point altitude [m asl]: 394

Name: Dom za varstvo odraslih

Status: Public



Set of 2 Elements

Spectral

Clear

Apply

Terrain altitude [m asl]: 396.7

Year of construction: NI PODATKOV



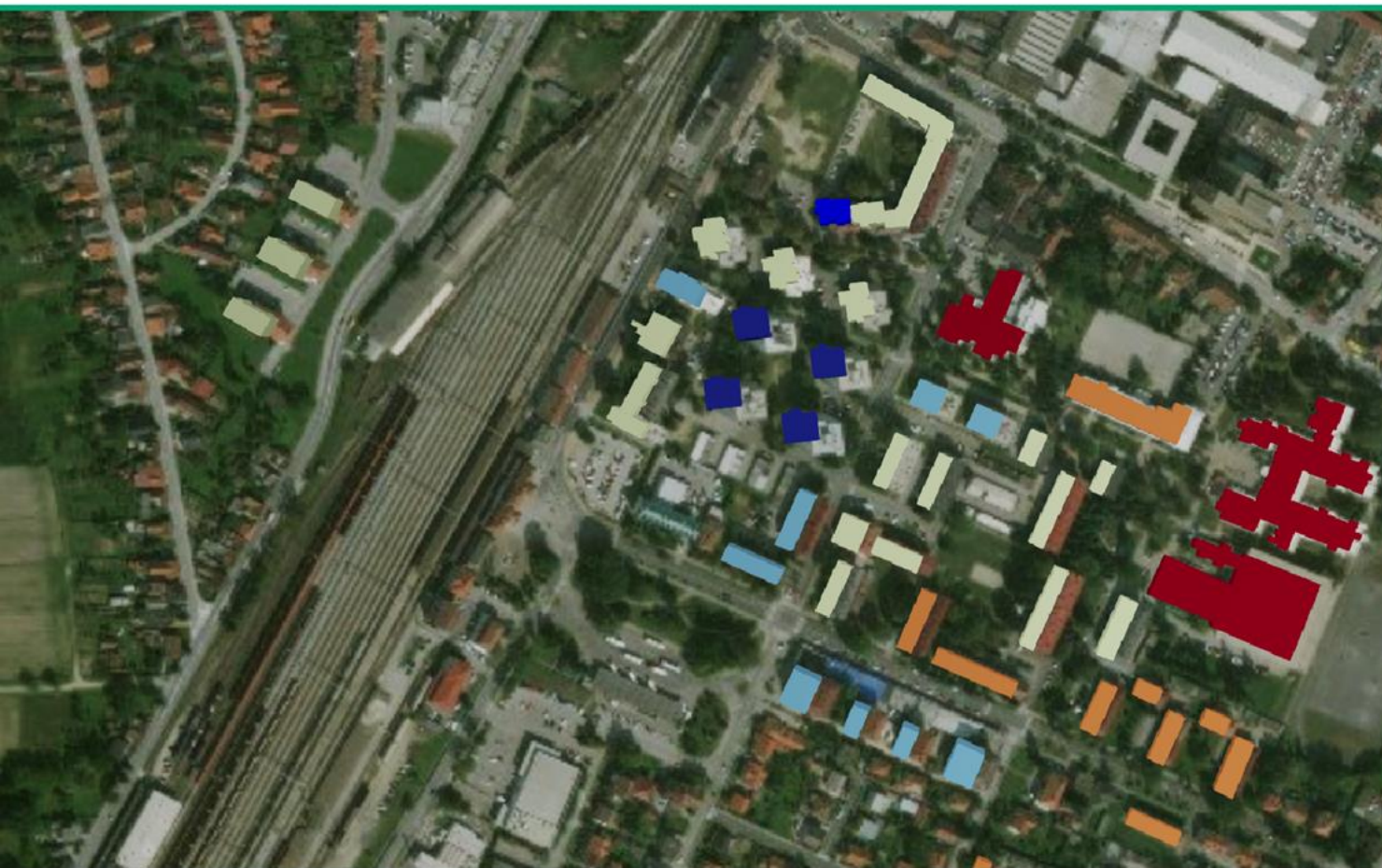


# OnePlace - DEMO

## - 3D Energy Management System: 15 min -

BOOSTEE-CE

BOOSTEE-CE



**Koprivnica** X

Building type: **High school gym**

Height [m]: **12.5**

**Extended attributes (8)**

Area [m<sup>2</sup>]: **5100**

Building ID: **547**

Building name: **High school gym**

Number of floors: **1**

Steps  
Red, Yellow, Blue

**- 5 + Clear Apply**

Roof: **12.5**

Roof slope (angle in degrees): **0/Mansard roof**

Type of roof: **Flat**

Year of construction: **1959**



# OnePlace - DEMO

## - 3D Energy Management System: 15 min -

BOOSTEE-CE

BOOSTEE-CE



**Plonsk** X

Building type: **public building**

Building type: **Educational**

Electricity consumption [kWh/year]: **26.667**

Energy audit: **2018**

Energy consumption (heating) [GJ/year]: **229.996**

Energy efficiency measures already implemented in the building :  
**Thermomodernization of external walls and plinth walls - insulated with a layer of polystyrene with a thickness of 10 cm**

Energy source type (heat): **gas boiler**

Estimation of the amount of heating losses in the building: **0.150616**

Height [m]: **12**

Official name: **Primary School No. 1 in Plonsk**

Recommended energy efficiency measures for the building: **Modernization of lighting for energy-efficient**

Technology used to harvest a renewable energy source: **None**

The specific CO2 emissions: **46.45**

The total CO2 emissions: **68.1**

Typology (number of floors): **4**

**Extended attributes (1)**



# OnePlace - DEMO

## - 3D Energy Management System: 15 min -

BOOSTEE-CE

BOOSTEE-CE



### Lubawka

X

Building type: **Government**

Electricity consumption [kWh/year]: **58200**

Energy audit: **YES**

Energy consumption (heating) [GJ/year]: **1650**

Energy efficiency measures already implemented in the building : **not applicable**

Energy source type (heat): **Natural gas**

Estimation of the amount of heating losses in the building: **no data**

Height [m]: **16.100006**

Official name: **Town hall in Lubawka**

Recommended energy efficiency measures for the building: **no data**

Technology used to harvest a renewable energy source: **not applicable**

The specific CO2 emissions: **no data**

The total CO2 emissions: **no data**

Typology (number of floors): **3**

**Extended attributes (1)**

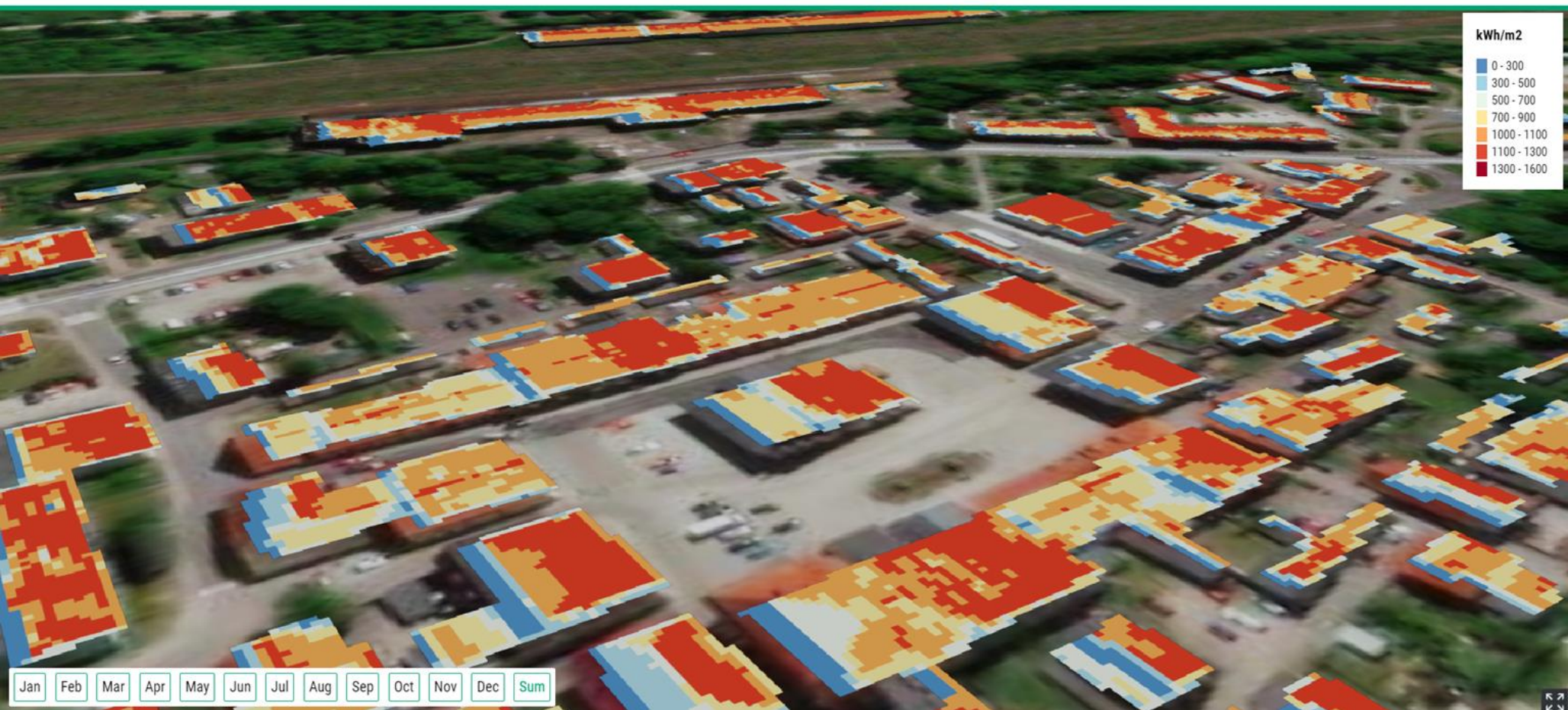


# OnePlace - DEMO

## - 3D Energy Management System: 15 min -

BOOSTEE-CE

BOOSTEE-CE



# THANK YOU!

## BOOSTEE-CE Train the Trainers Warsaw, 1.10.2019

### Fabio REMONDINO

3D Optical Metrology (**3DOM**)  
Bruno Kessler Foundation (**FBK**)  
Trento, Italy  
Email: [remondino@fbk.eu](mailto:remondino@fbk.eu)  
<http://3dom.fbk.eu>



### Anna NOWACKA

Europejskie Ugrupowanie Współpracy  
Terytorialnej NOVUM (**EUWT NOVUM**)  
Jelenia Góra, Poland  
Email: [anna.nowacka@euwt-novum.eu](mailto:anna.nowacka@euwt-novum.eu)  
<http://www.euwt-novum.eu>



### Tomáš PERUTKA

Energy Agency of the Zlín Region (**EAZK**)  
Zlín, Czech Republic  
Email: [tomas.perutka@eazk.cz](mailto:tomas.perutka@eazk.cz)  
<http://http://www.eazk.cz/>



The BOOSTEE-CE project is EU-funded project implemented through the INTERREG CENTRAL EUROPE programme and co-financed by the European Regional Development Fund (ERDF)



## **THEMATIC PANEL 3: Introduction to EU funding sources and financial models for applying energy efficiency in public buildings.**



# ENERGY MANAGEMENT FOR PA: FROM RETROFIT MEASURE TO FINANCIAL SCHEME



## Energy management for PA: from retrofit measure to financial scheme

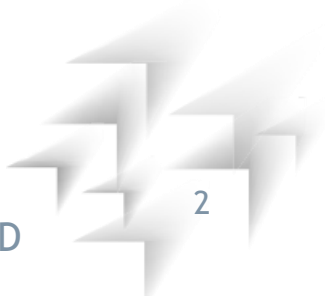
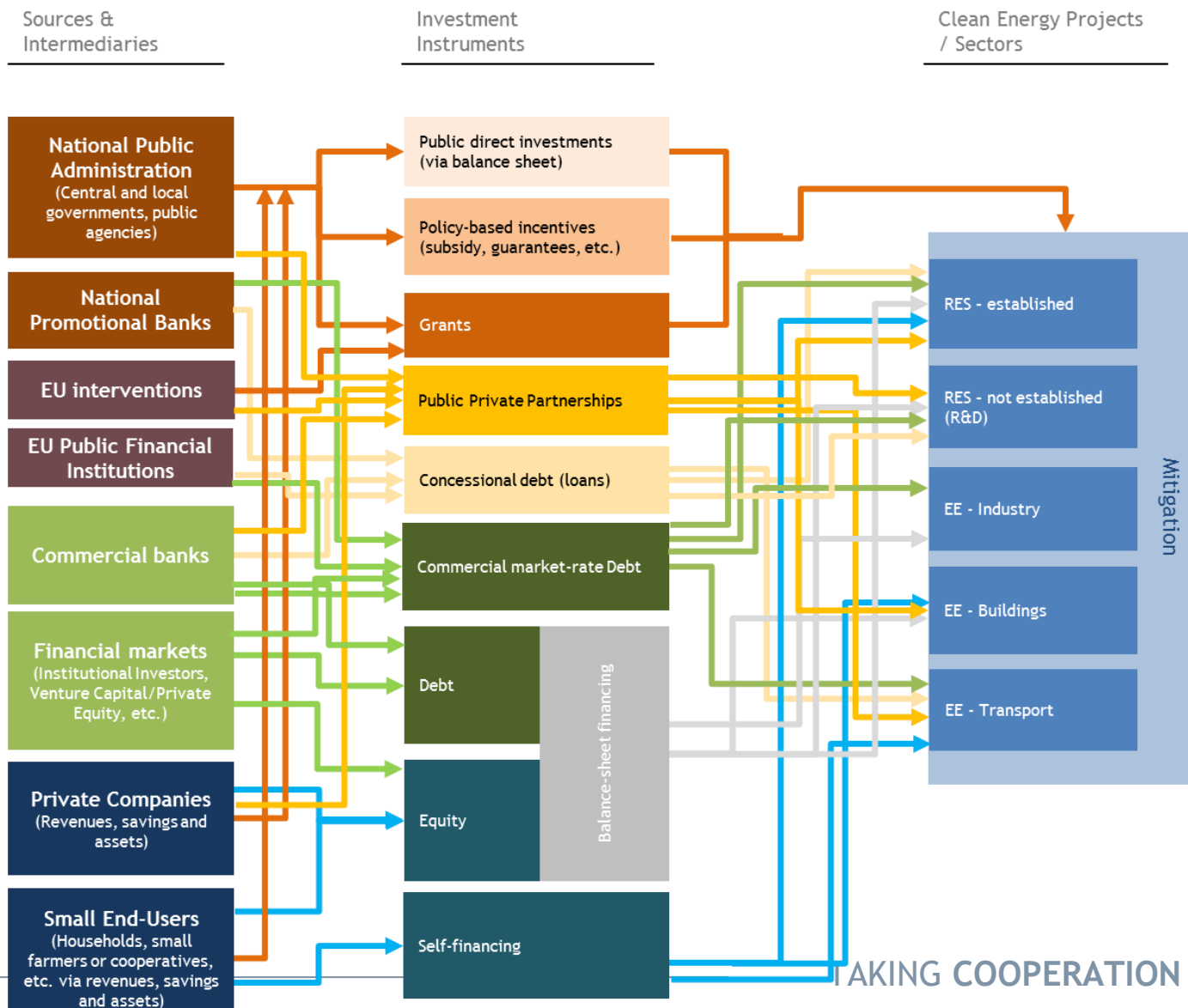
Silvia Rossi - Clust-ER BUILD – Energy Management Expert

17/18-10-2010 - Hotel Park, Cesta Svobode 15, Bled (Slovenia)

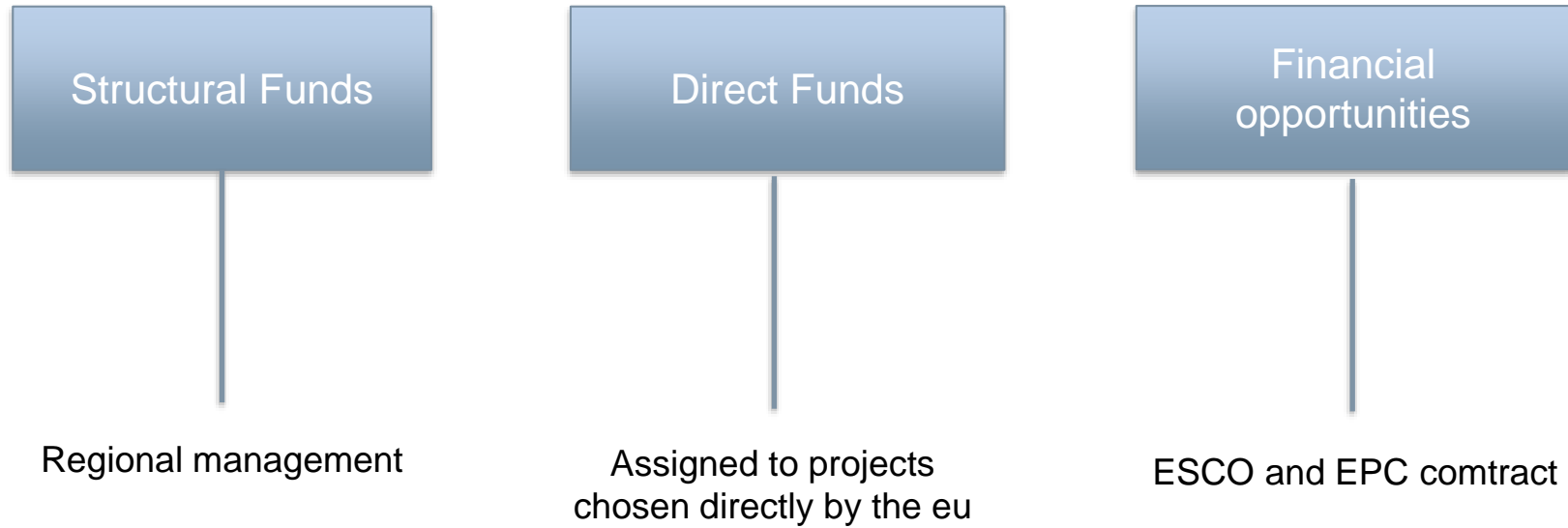




# Financial Landscape for clean energy in EU



# OVERVIEW EU GRANT SOURCES AND FINANCIAL OPPORTUNITIES



# STRUCTURAL FUNDS

- The **European Regional Development Fund (ERDF)** - which promotes balanced development in the different regions of the EU.
- The **European Social Fund (ESF)** - which supports projects on employment throughout Europe and invests in Europe's human capital: in workers, young people and all those seeking a job.
- The **Cohesion Fund (CF)** - which finances transport and environmental projects in countries where the gross national income (GNI) per capita is less than 90% of the EU average. In the 2014-2020 period, these are Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia.
- The **European Agricultural Fund for Rural Development (EAFRD)** - which focuses on solving specific challenges facing rural areas of the EU.
- The **European Fund for Maritime Affairs and Fisheries (EMFF)** - which helps fishermen to use sustainable fishing methods and coastal communities to diversify their economies, improving the quality of life in European coastal regions.



# DIRECT FUNDS

**Horizon 2020** is the recent Framework Program for Innovation and Research launched by the EU for the period 2014 - 2020. It groups European funding for research and innovation into a single framework, allowing for greater simplification than the previous programming. The general objective of the new Program is to contribute to building a society and an economy based on knowledge and innovation, thus promoting the implementation of the Europe 2020 strategy, the European Research Area (ERA) and the other European policies.



The **Life Program 2014 - 2020** is aimed at supporting the protection of the environment, the best use of resources and the evolution of European legislation on the subject. The available budget is around 3.4 billion euros for the entire period.

The Life program particularly encourages the development of innovative technologies and good practices capable of producing a positive environmental impact in certain priority areas: water and the marine environment, waste, efficient use of resources, soil, environment and health, air and urban environment, forests.





# DIRECT FUNDS

The financing of energy efficiency projects, as well as non-repayable grants, can be done using financial instruments, among which it is useful to remember the **ELENA - European Local Energy Assistance program**.

It is an initiative promoted jointly by the European Commission and the European Investment Bank (EIB) in December 2009 to grant funding to local and regional authorities to carry out large-scale investments in the energy efficiency, renewable energy sources and of sustainable urban transport. A key condition for the eligibility of projects is that they contribute to the CO2 reduction targets set in the "Covenant of Mayors".

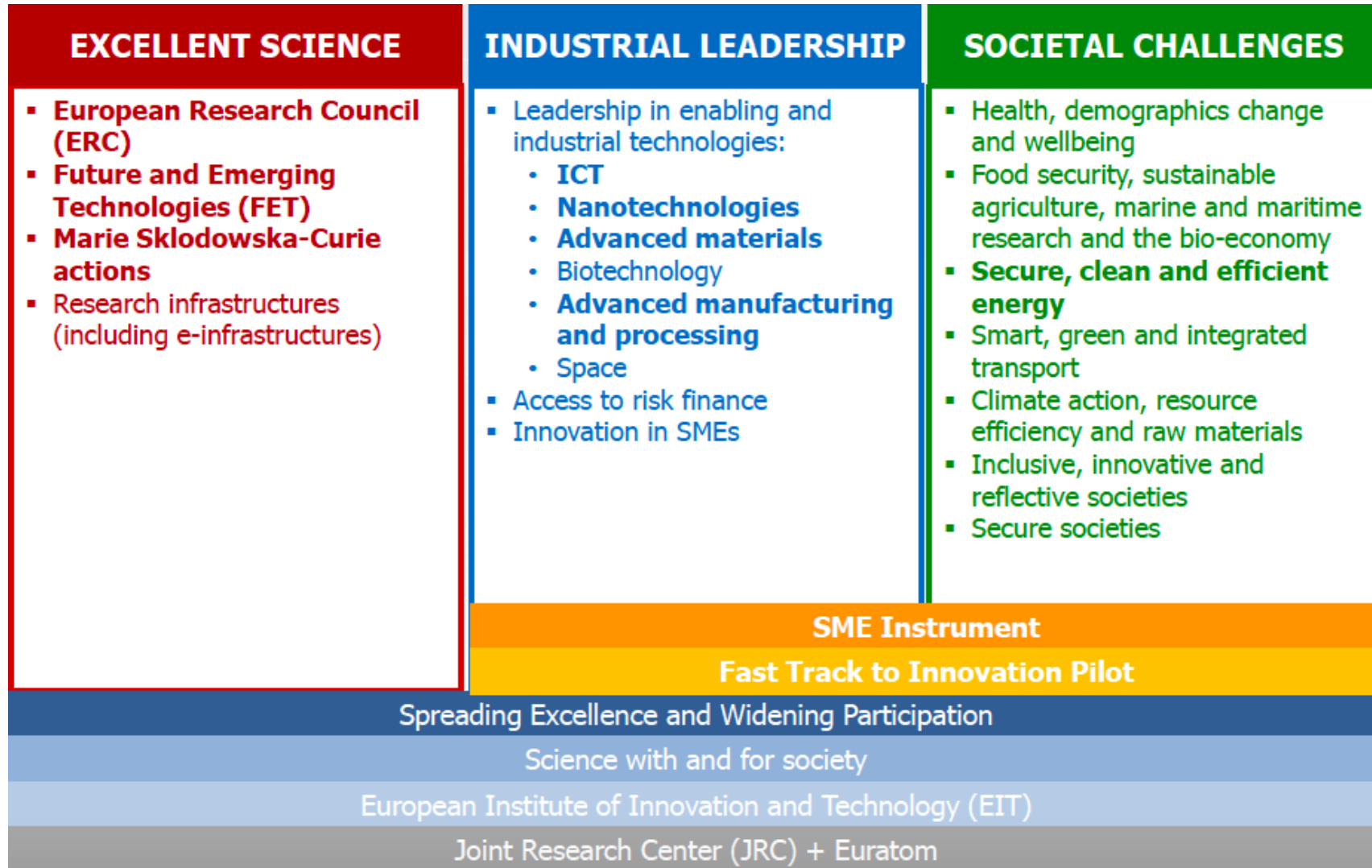
**JESSICA** – *Joint European Support for Sustainable Investment in City Areas* – is an initiative of the European Commission, implemented in partnership with EIB that promotes sustainable urban development through innovative financial engineering tools.

**EBRD** – European bank for reconstruction and development

**WORLD BANK**



# DIRECT FUNDS: focus on HORIZON2020



# DIRECT FUNDS: focus on HORIZON2020

## EXCELLENT SCIENCE

- **European Research Council (ERC)**
- **Future and Emerging Technologies (FET)**
- **Marie Skłodowska-Curie actions**
- **Research infrastructures (including e-infrastructures)**

## SPECIFIC OBJECTIVES:

- Strengthening of frontier research, through the activities of the EUROPEAN RESEARCH COUNCIL
- Strengthening of research in the field of FUTURE AND EMERGING TECHNOLOGIES (FET)
- Strengthening skills, training and career development, through the Marie Skłodowska-Curie initiatives (" MARIE CURIE ACTIONS ")
- Strengthening of European RESEARCH INFRASTRUCTURES, including e-infrastructures



# DIRECT FUNDS: focus on HORIZON2020

## INDUSTRIAL LEADERSHIP

- Leadership in enabling and industrial technologies:
  - **ICT**
  - **Nanotechnologies**
  - **Advanced materials**
  - **Biotechnology**
  - **Advanced manufacturing and processing**
  - **Space**
- Access to risk finance
- Innovation in SMEs

## SPECIFIC OBJECTIVES

- Reinforcement of Europe's industrial leadership through research, technological development, demonstration and INNOVATION IN THE FIELD OF ENABLING AND INDUSTRIAL TECHNOLOGIES (LEIT)
- Improve access to RISK CAPITAL to invest in research and innovation
- strengthen innovation in SMALL BUSINESSES





# DIRECT FUNDS: focus on HORIZON2020

## SOCIETAL CHALLENGES

- Health, demographics change and wellbeing
- Food security, sustainable agriculture, marine and maritime research and the bio-economy
- **Secure, clean and efficient energy**
- Smart, green and integrated transport
- Climate action, resource efficiency and raw materials
- Inclusive, innovative and reflective societies
- Secure societies

## SPECIFIC OBJECTIVE

priority reflecting the strategic priorities of the Europe 2020 strategy and addresses major concerns shared by European citizens and others

## SFIDE

1. Health, demographics change and wellbeing
2. Food security, sustainable agriculture, marine and maritime research and the bio-economy
3. Secure, clean and efficient energy
4. Smart, green and integrated transport
5. Climate action, resource efficiency and raw materials
6. Inclusive, innovative and reflective societies
7. Secure societies



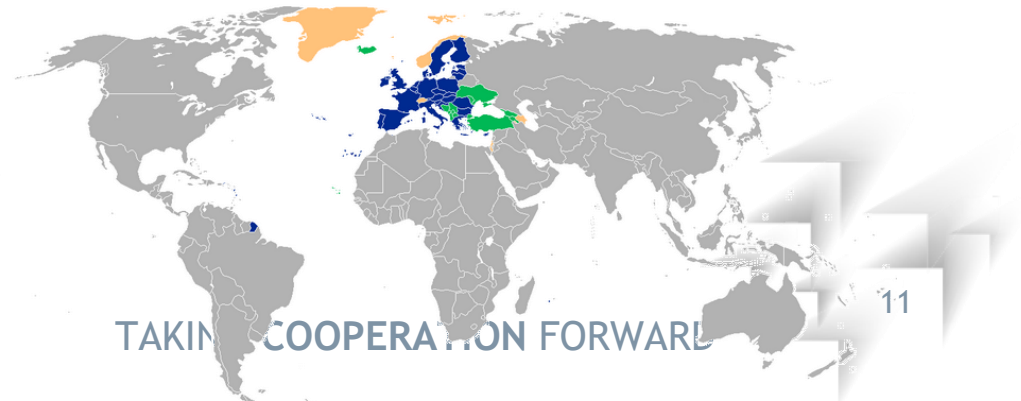
# DIRECT FUNDS: focus on HORIZON2020

## WHO CAN PARTICIPATE?

- any legal entity established in a member or associated state
- subjects lacking legal personality (as long as with contractual and financial responsibility to the legal representatives) established in a member or associated state \*
- Joint Research Center
- international organizations of EU interest (CERN, ESA, etc.)
- international organizations and entities established in Third Countries (in addition to the minimum conditions)
- non-profit legal entities

## WHO CAN RECEIVE FINANCING?

- any legal entity established in a member or associated state
- Joint Research Center
- ICPC countries
- international organizations of EU interest
- international organizations and entities established in third countries not ICPC only if provided for in the Work Programs and bilateral agreements or if essential for the action



# DIRECT FUNDS: focus on HORIZON2020

## MINIMUM CONDITIONS in general:

- at least 3 legal entities
- each of them must be established in a different Member State or associated country
- all three legal entities must be independent of each other

## EXCEPTIONS:

- border research actions of the European Research Council (ERC)
- tool for SMEs (with obvious European added value)
- co-financing of research programs
- Support and Coordination Actions
- Marie Skłodowska-Curie
- where indicated by work schedules or work plans



# DIRECT FUNDS: focus on HORIZON2020

The European Commission has set up a series of facilities funding **Project Development Assistance (PDA)** to support ambitious public authorities - regions, cities, municipalities or groupings of those - and public bodies in developing bankable sustainable energy projects.

The PDA facilities aim to bridge **the gap between sustainable energy plans and real investment** through supporting all activities necessary to **prepare** and mobilise investment into sustainable energy projects. **These activities can include feasibility studies, stakeholder and community mobilisation, financial engineering, business plans, technical specifications and procurement procedures.**

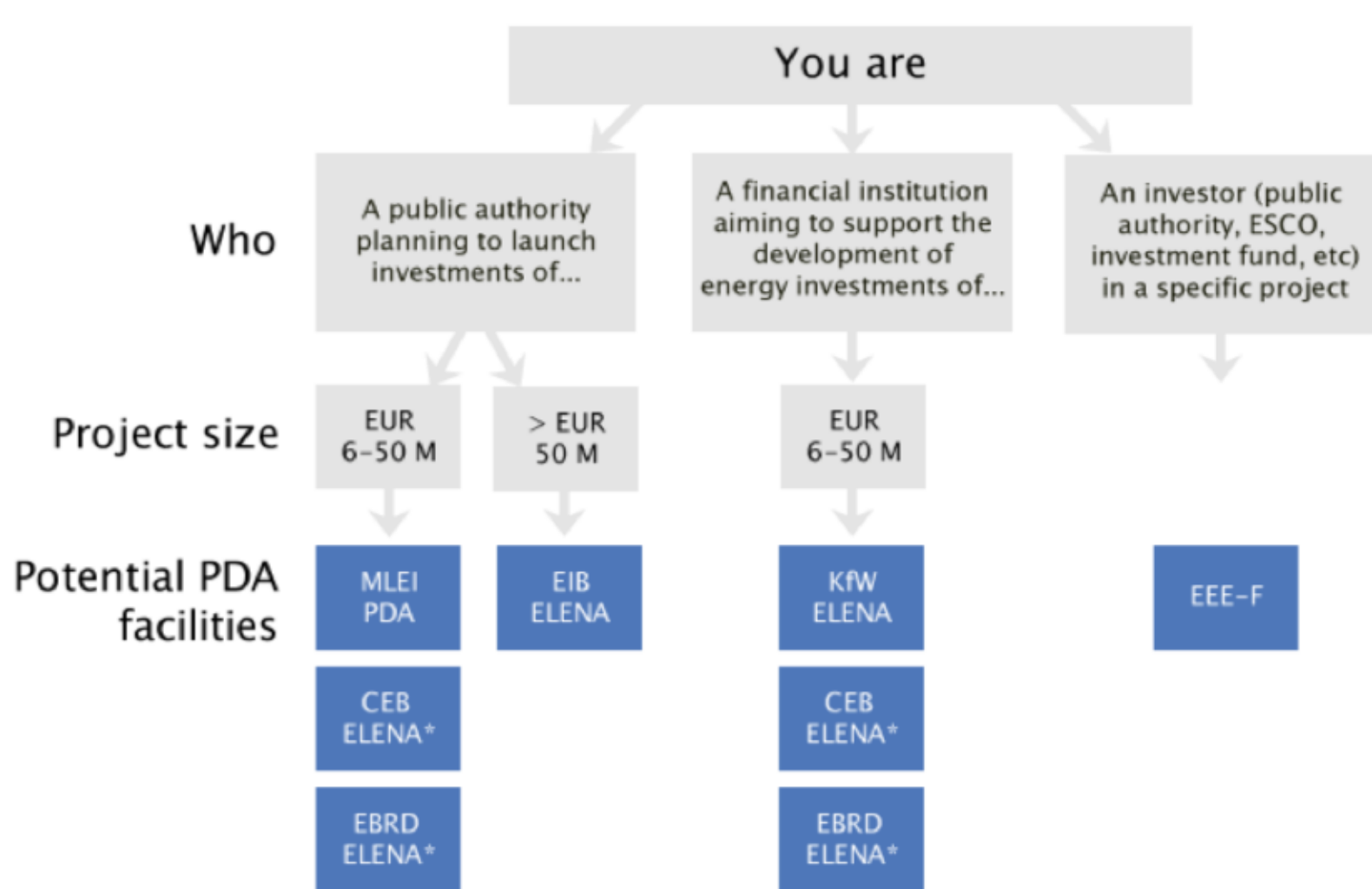


Project development assistance facilities under the IEE Programme





# DIRECT FUNDS: focus on HORIZON2020



*\*Country restrictions apply for CEB-ELENA and EBRD-ELENA*



# DIRECT FUNDS: focus on LIFE

## Private Finance for Energy Efficiency PF4EE

Private Finance for Energy Efficiency (PF4EE) instrument is a joint agreement between the EIB and the European Commission which aims to **address the limited access to adequate and affordable commercial financing for energy efficiency investments.**

The instrument targets projects which support the implementation of National Energy Efficiency Action Plans or other energy efficiency programmes of EU Member States.

### Objectives

to make energy efficiency lending a more sustainable activity within European financial institutions, considering the energy efficiency sector as a distinct market segment.

to increase the availability of debt financing to eligible energy efficiency



# DIRECT FUNDS: focus on HORIZON2020

The proposed action should:

deepen the demand  
side-related  
parameters in  
existing models

include new  
aspects and data  
sources

allow to make  
better projections  
inside energy policy  
development

inform policy  
making at all levels



# DIRECT FUNDS: focus on LIFE

## Private Finance for Energy Efficiency PF4EE

### Objectives

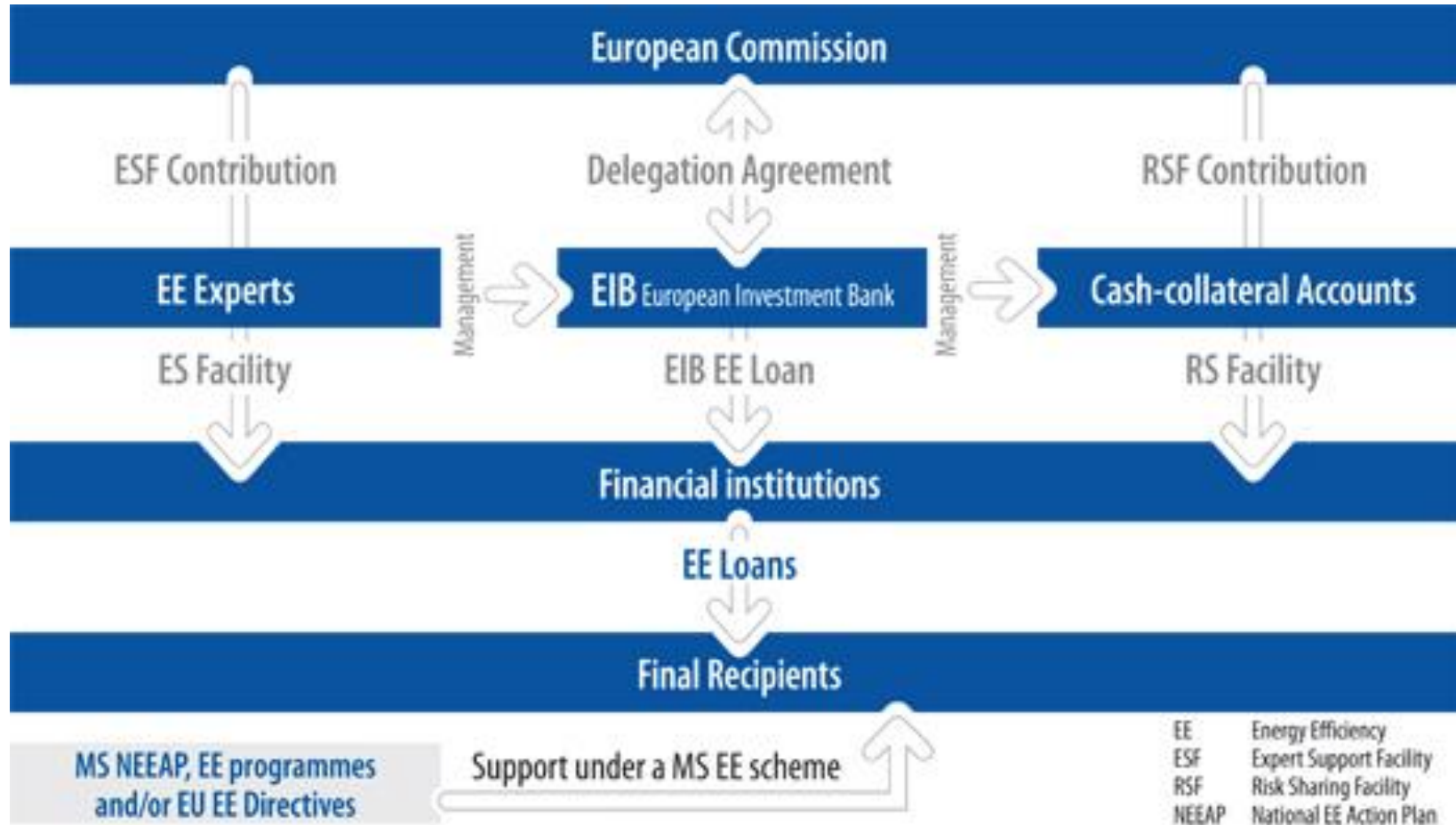
- to make energy efficiency lending a more sustainable activity within European financial institutions, considering the energy efficiency sector as a distinct market segment.
- to increase the availability of debt financing to eligible energy efficiency investments.





# DIRECT FUNDS: focus on LIFE

## Private Finance for Energy Efficiency PF4EE



# ACCESSIBILITY

Programs	Partnership	Projects		Covering	beneficiary	€/Mil
Horizon 2020	yes (EU countries)	research and innovation, coordination and support actions	capital account	100%	Private and Public	1-20
Horizon PDA	yes (local)	technical assistance for feasibility research	capital account	100%	Private and Public, Esco and utilities	0,5 - 2
Life 2014 - 2020	yes (local)	pilot, demonstrative and innovative projects	capital account	60%	Private and Public	1-3
Elena	Yes (local)	technical assistance for feasibility In ELENA the funds necessary to carry out the projects must be made available by the private, but the technical assistance activities financed allow the launching of programs of vast impact on the territory.	capital account	90%	Private and Public, Utilities	1-3
Jessica		technical assistance for feasibility JESSICA aims to make use of the structural funds for urban development in a rotative perspective based on project finance, ensuring the achievement of high performance and the possibility of obtaining new resources in subsequent years.	capital account	90%	Private and Public, Utilities	1EE-3
EEEF	No	Energy Efficiency Investment	capital account	100%	Private and Public, Utilities	5-25
CTE	Yes (EU countries)	Pilot, demonstrative and innovative projects	capital account	100%	Public	2-3
URBACT III	Yes (EU countries)	exchange of knowledge and best practices, pilot projects	capital account	80		
Urban Innovative Actions	Yes (local)	innovative actions in urban areas (only for cities more than 50.000 inhabitants)	capital account		Public	1-5



# URBAN INNOVATION ACTION

- **What it is:** the Urban Innovative Actions initiative promotes urban development in the Member States through the financing of innovative solutions in favor of European cities
- **Objective:** to identify and test new solutions to problems related to sustainable urban development and relevant at European level

## Themes:

- Air quality
- Circular economy
- Demographic change
- Culture and cultural heritage



**Publication:** 16 September 2019

**Deadline:** 12 December 2019

**Link:** <https://www.uia-initiative.eu/en/call-proposals/5th-call-proposals-launched>



# URBAN INNOVATION ACTION



- **RESILIO – Resilience nEtwork of Smart Innovative cLimate-adaptive rOoftops**
- Amsterdam

Amsterdam is experiencing the effects of climate change: flash floods due to heavy rainfall, higher temperatures and increased droughts.

**The RESILIO project aims to address critical urban climate challenges related to flooding, heat, water supply, energy consumption and urban livability by repurposing the rooftops of climate-vulnerable neighbourhoods of Amsterdam.**

The 10,000m<sup>2</sup> area of smart blue green roofs is expected to help the city adapt to climate change by reducing impacts of heavy rain, urban heat island effect and drought while improving building insulation, biodiversity and quality of life

## The project in numbers

**10,000m<sup>2</sup>**

of smart blue green roofs will be built to increase Amsterdam's rainwater resilience and reduce urban heat effect and energy consumption at building level

**96**

urban areas of Amsterdam are highly vulnerable to flood damage from extreme rain fall

**1500**

residents of all socioeconomic levels will be engaged in the development of their residential areas

**EUR 4,814,248.00**

Total ERDF budget granted







- **GBG\_AS2C – Blue, Green & Grey\_Adapting School to climate change**
- **Barcelona**

The GBG\_AS2C project solution relies on a package of measures to adapt schools to climate change. By nature, schools are relevant spaces where actions can be implemented to adapt the city to climate change for the benefit of all. Moreover, not only their spatial distribution in the city ensures great capillarity and penetration in the communities, but they also offer the possibility for continuous use throughout the year.

Therefore, schools playgrounds will be transformed into climate shelters and be open to the wider public in non-school period. Playground transformation will be operated through a threefold intervention - Green, Blue, and Grey - essentially articulated around the introduction of an aquatic (blue) component at the heart of the cities, as accessible municipal recreational point of refreshment. This will be combined with greening and applying traditional solutions (grey) to school facilities in order to combat heat.



# URBAN INNOVATION ACTION



## Partnership



- Barcelona City Council
- Public Health Agency of Barcelona - sectoral agency
- Barcelona Consortium of Education
- Barcelona Cycle of Water - Public Service Provider
- Barcelona Institute for Global Health - Higher Education Institute
- Institute for Environmental Science and Technology I
- Vila Olimpica School

## Partnership



- City of Amsterdam
- Hogeschool van Amsterdam - higher education and research institute
- Vrije Universiteit - higher education and research institute
- Waternet - public water management company
- MetroPolder Company - SME
- Consolidated - SME
- Stadgenoot - social housing company
- De Key - social housing company
- De Alliantie - social housing company
- Rooftop Revolution - foundation



# SOME EXAMPLES FOR DIRECT FUNDS



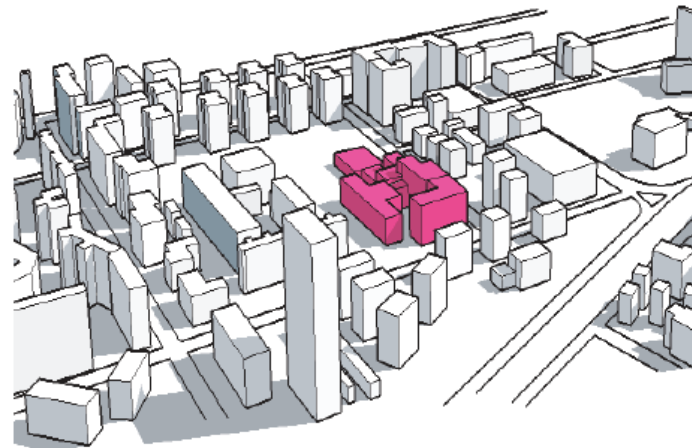
<https://impulse.interreg-med.eu>  
E-mail: [impulse@cres.gr](mailto:impulse@cres.gr)

Project co-financed by the European  
Regional Development Fund

## Integrated Management Support For Energy efficiency in Mediterranean Public buildings

IMPULSE introduces an integrated management support system for planning energy efficiency interventions in public buildings. The transnational approach foresees extensive testing in **pilot MED Cities** in 6 countries, for the conclusion of MED public building typologies, accompanied with **cost-optimal interventions** and **financial plans**. The results are organ-

ized into a transnational purpose **GIS-based information system**, being a user-friendly decision making tool for affordable buildings' **energy efficiency action plans**.



# SOME EXAMPLES FOR DIRECT FUNDS



























<https://impulse.interreg-med.eu>  
E-mail: [impulse@cres.gr](mailto:impulse@cres.gr)

Project co-financed by the European  
Regional Development Fund

## Buildings Library

### Classification criteria:

- Type of use.
- Year of construction.
- Number of floors.
- Gross usable area (m2),
- Construction system
- Heating system.
- Cooling system.
- ...

	Region	Construction Year Class	Additional Classification	SFH	TH	MFH	AB
				Single-Family House	Terraced House	Multi-Family House	Apartment Block
1	Mediterranean climate (Clima Mediterráneo)	... 1900	generic	 0_ME_SF01_Gen	 0_ME_TH01_Gen	 0_ME_MFH01_Gen	 0_ME_AB01_Gen
2	Mediterranean climate (Clima Mediterráneo)	1901 ... 1936	generic	 0_ME_SF02_Gen	 0_ME_TH02_Gen	 0_ME_MFH02_Gen	 0_ME_AB02_Gen
3	Mediterranean climate (Clima Mediterráneo)	1937 ... 1959	generic	 0_ME_SF03_Gen	 0_ME_TH03_Gen	 0_ME_MFH03_Gen	 0_ME_AB03_Gen
4	Mediterranean climate (Clima Mediterráneo)	1960 ... 1979	generic	 0_ME_SF04_Gen	 0_ME_TH04_Gen	 0_ME_MFH04_Gen	 0_ME_AB04_Gen
5	Mediterranean climate (Clima Mediterráneo)	1980 ... 2006	generic	 0_ME_SF05_Gen	 0_ME_TH05_Gen	 0_ME_MFH05_Gen	 0_ME_AB05_Gen
6	Mediterranean climate (Clima Mediterráneo)	2007 ...	generic	 0_ME_SF06_Gen	 0_ME_TH06_Gen	 0_ME_MFH06_Gen	 0_ME_AB06_Gen





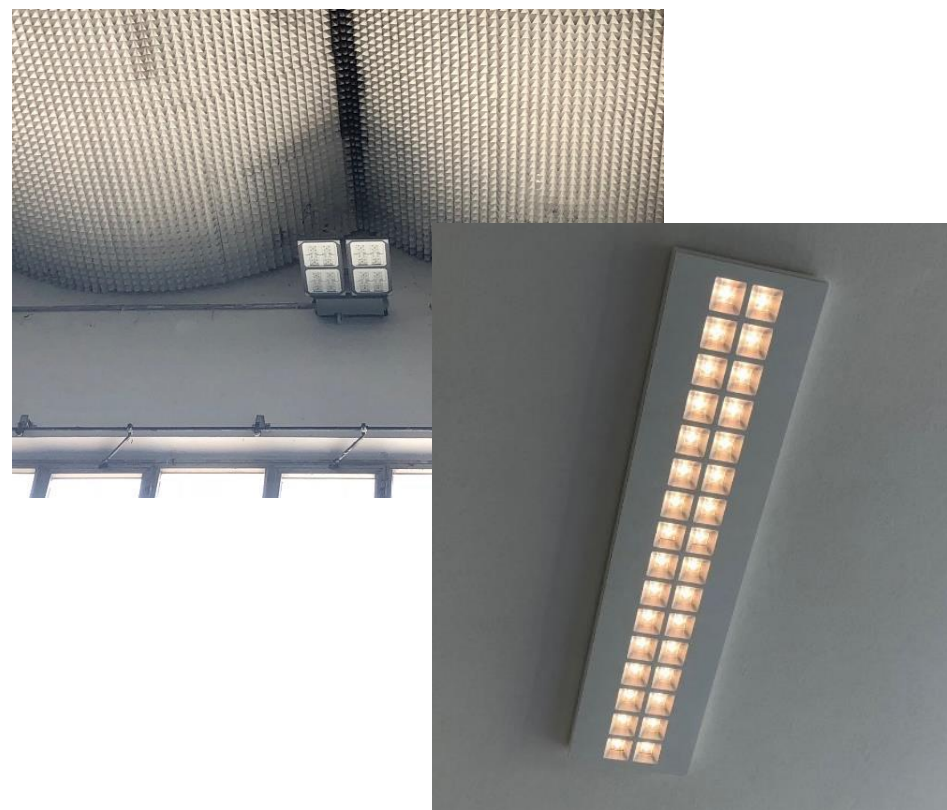
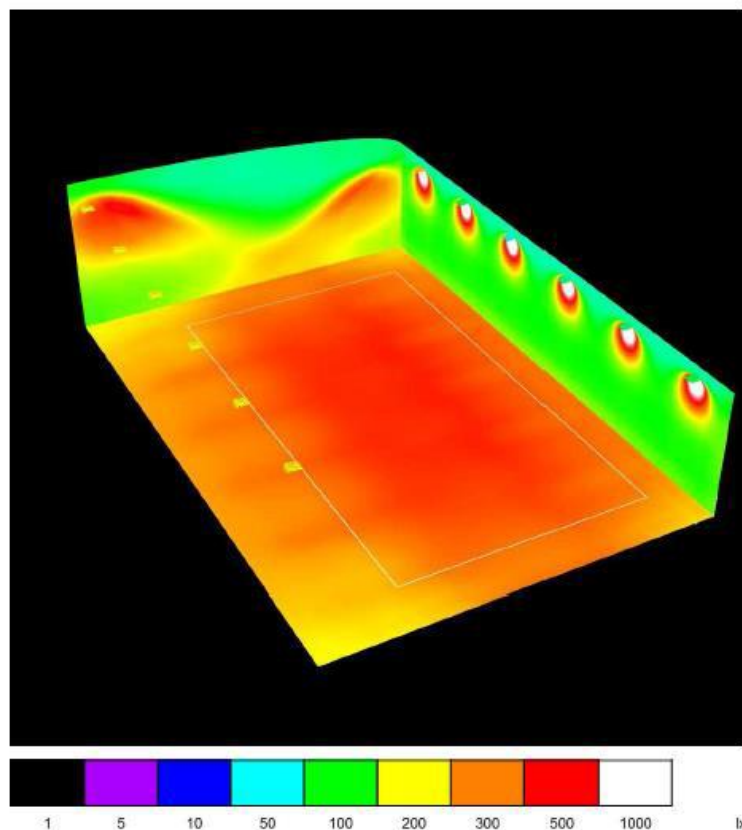
# SOME EXAMPLES FOR DIRECT FUNDS



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E-mail: [impulse@cres.gr](mailto:impulse@cres.gr)

Project co-financed by the European  
Regional Development Fund

## Energy Diagnosis and Small scale pilot project



# SOME EXAMPLES FOR DIRECT FUNDS



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E-mail: [impulse@cres.gr](mailto:impulse@cres.gr)

Project co-financed by the European  
Regional Development Fund

## Energy retrofit 20 years plan

Relative retrofit area annualy		3%	%					
Total floor area		105.768	m <sup>2</sup>					
Retrofit area annualy		3.173	m <sup>2</sup>					
Combination		Year		1	2	3	4	
Minor	15%	Floor area retrofited	m <sup>2</sup>	3.725,77	3.836,63	3.234,88	3.815,17	
Medium	30%	Annual investment	NC	317.270	666.853	106.646	230.532	
Major	90%	Savings - currency	NC/a	60.680	129.009	18.331	31.887	
Deep	100%	Savings - CO2	tCo2/a	152	294	51	90	
		Savings - kWh	kWh/a	655.994	666.608	148.804	312.386	
		1	PBT6 - Bacino Canottaggio Stadiana - Minor Retrofit	PBT9 - Uffici Circoscrizione Prima - Minor Retrofit	PBT4 - Scuola Secondaria di primo grado Don G. Minzori	PBT4 - Scuola Secondaria di primo grado S. P. Campiano	PBT4 - Scu	
		2	PBT6 - Polisportivo Darsena - Minor Retrofit	PBT9 - Palazzo Rasponi "Del Cavaliere" (Palazzo Rasponi)	PBT4 - Accademia Di Belle Arti - Minor Retrofit	PBT4 - Scuola Secondaria di primo grado C. Viali - Minor	PBT4 - Acc	
		3	PBT6 - Palestra Scuola Secondaria S. Pietro in Vincoli R.	PBT9 - Uffici VV.UU. - Medium Retrofit	PBT4 - Scuola Secondaria di primo grado S. Pietro in Vir	PBT4 - Scuola Primaria V. Randi - Minor Retrofit	PBT4 - Scu	
		4	PBT6 - Palestra Scuola Secondaria di primo grado Guido	PBT9 - Residenza Municipale - Medium Retrofit	PBT4 - Scuola Secondaria di primo grado Guido Novelli	PBT4 - Scuola Secondaria di primo grado Ricci-Muratori	PBT4 - Scu	
		5	PBT8 - Circoscrizione di Mezzano - Minor Retrofit	PBT9 - Uffici Circoscrizione Prima - Medium Retrofit	PBT4 - Scuola Primaria A. Torre - Minor Retrofit	PBT8 - Circoscrizione di Mezzano - Medium Retrofit	PBT4 - Scu	
		6	PBT8 - Azienda Ausl S. Pietro in Vincoli - Minor Retrofit	PBT10 - Museo Didattico - Minor Retrofit	PBT4 - Scuola Primaria Goffredo Mameli - Minor Retrofit	PBT8 - Azienda Ausl S. Pietro in Vincoli - Medium Retrofit	PBT4 - Scu	
		7	PBT8 - Uffici Circoscrizione Piangipane - Minor Retrofit	PBT10 - Casa Vignuzzi - Minor Retrofit	PBT4 - Scuola Primaria Iqbal Masih - Minor Retrofit	PBT8 - Uffici Circoscrizione Piangipane - Medium Retrofit	PBT4 - Scu	
		8	PBT5 - Palestra Scuola Secondaria di primo grado M. Montanari	PBT10 - Biblioteca Guerrini - Minor Retrofit		PBT4 - Scuola Secondaria di primo grado M. Montanari		
		9	PBT5 - Palestra Scuola Secondaria di primo grado Don G.	PBT10 - Biblioteca Oriani - Minor Retrofit				
		10	PBT5 - Palestra Scuola Primaria A. Torre - Minor Retrofit	PBT10 - Centro Lettura Albergo dei Bimbi (Ex Lucertola)				
		11	PBT5 - Palestra Piangipane - Minor Retrofit	PBT10 - Palazzina Museo Natura - Minor Retrofit				
		12	PBT5 - Palestra Scuola Media Statale C. Viali - Minor Ret	PBT10 - Biblioteca S. Stefano - Minor Retrofit				
		13	PBT5 - Palestra Scuola Elementare Riccardo Ricci - Min	PBT4 - Scuola Secondaria di primo grado M. Montanari				
		14	PBT5 - Palestra Scuola Primaria V. Randi - Minor Retrofit					
		15	PBT5 - Palestra Scuola Secondaria di primo grado Ricci-					
		16	PBT5 - Palestra Scuola Dell'Infanzia Garibaldi - Minor Re					
		17	PBT5 - Palestra Scuola Scuola Primaria G. Garibaldi - Mi					
		18	PBT9 - Palazzo Rasponi "Del Cavaliere" (Palazzo Rasponi)					
		19	PBT9 - Uffici VV.UU. - Minor Retrofit					
		20	PBT9 - Residenza Municipale - Minor Retrofit					
		21						
		22						



# SOME EXAMPLES FOR DIRECT FUNDS



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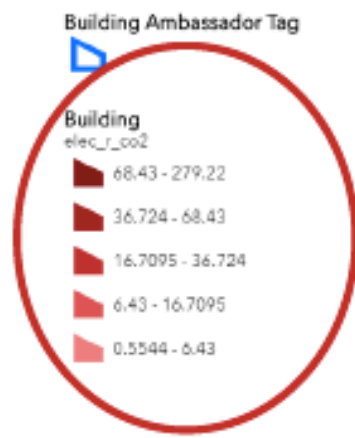
Project co-financed by the European  
Regional Development Fund

## Energy retrofit 20 years plan

### Energy

### Environmental

### Economy



The values of the indicators are adapted to each type of indicator selected.  
The values listed are homogenized for all 6 partner cities (without following the regulations by country).





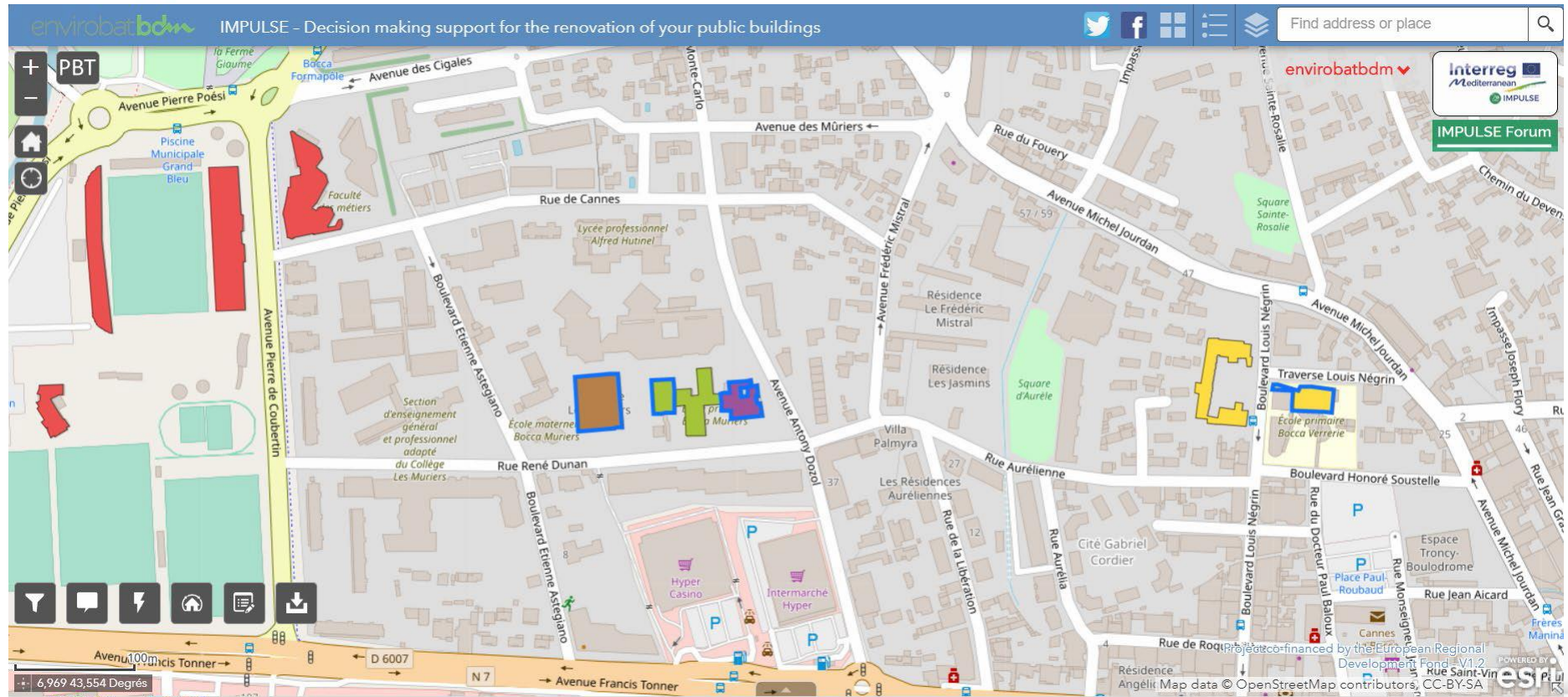
# SOME EXAMPLES FOR DIRECT FUNDS



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Project co-financed by the European  
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## GIS Platform – [impulseonline.eu](https://impulseonline.eu)





# SOME EXAMPLES FOR DIRECT FUNDS



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E-mail: [impulse@cres.gr](mailto:impulse@cres.gr)

Project co-financed by the European  
Regional Development Fund

**Fiche descriptive du bâtiment**

**SCHOOL GROUP LES MURIERS - ELEMENTARY**  
Av René Dunan, 06150 Cannes, France  
Typologie : PBT2  
- Usage/typologie de bâtiment : Educational  
- Année de construction : 1949-1973  
- Etages : 1-3  
- Superficie brute (m²) : 1001-16000

**Description**

Superficie de la construction	1161.62
Adresse (incl. code postal)	Av René Dunan, 06150 Cannes, France
Latitude	43.55145
Longitude	6.968594
Usage/typologie de bâtiment	School
Année de construction	1972
Nb de niveaux	3
Superficie brute (m2)	1161.62
Type de construction - Géométrie de toit	Flat roof
Type de construction - Matériaux de toit	Gravel roof
Type de construction - Structure/Cadre	Reinforced concrete structure
Type de construction - Enveloppe/Façade	Brick factory façade
Type de construction - Isolation d'enveloppe	
Type de construction - Type de vitrage	
Type de construction - Type de menuiserie	Aluminum Thermal Break Windows
Système de chauffage	GAS boiler
Système de refroidissement	/

## GIS Platform – impulseonline.eu

- Informations Générales
- Préconisations générales
- Rénovation mineure
- Rénovation moyenne
- Rénovation majeure
- Rénovation profonde



# SOME EXAMPLES FOR DIRECT FUNDS



<https://impulse.interreg-med.eu>  
E-mail: [impulse@cres.gr](mailto:impulse@cres.gr)

## GIS Platform – [impulseonline.eu](https://impulseonline.eu)

Project co-financed by the European  
Regional Development Fund

**Informations Générales**

**Préconisations générales**

**Rénovation mineure**

**Rénovation moyenne**

**Rénovation majeure**

**Rénovation profonde**

### RÉNOVATION MOYENNE

Gain de 25% minimum en conso d'énergie primaire. Budget < 100 000 €

Scénario 1    Scénario 2    Scénario 3

\*Reduction of T°C in the night by 1°C and during the week end + replacement of the heating system with new condensing boiler (130kW) + thermostatic valves on radiators + Relamping LED with change of the luminaires and absence detectors + Insulation of the crawl space + insulation of the ceiling in the yard "

Classe énergétique :

**Impacts sur les indicateurs de performance énergétique**

Economies annuelles totales d'énergie primaire  
96436.98 kWh/an | 83.21 kWh/m²/an | 43.69 %

Economies annuelles d'énergie finale pour le chauffage  
84799.00 kWh/an | 73.17 kWh/m²/an | 45.66 %

Economies annuelles d'énergie finale pour la climatisation  
kWh/an | kWh/m²/an | %  
**Plus**

**Impacts sur les Indicateurs environnementaux**

Emissions totales de CO2 évitées  
20206.84 kg/an | 17.43 kg/m²/an | 45.51 %

Emissions de CO2 évitées liées à la consommation d'électricité  
360.48 kg/an | 0.31 kg/m²/an | 39.32 %

Emissions de CO2 évitées liées à la consommation de combustibles fossiles  
19846.36 kg/an | 17.12 kg/m²/an | 45.64 %

**Impacts sur les indicateurs de coûts**

Economies sur le coût opérationnel annuel total lié à l'énergie  
5384.35 €/an | 4.65 €/m²/an | 43.49 %

Economies annuelles de coûts liés à l'électricité  
719.61 €/an | 0.62 €/m²/an | 33.32 %

Economies annuelles de coûts liés aux combustibles fossiles  
4664.74 €/an | 4.02 €/m²/an | 45.64 %  
**Plus**

Scenario choices (if available).

Detailed description of the retrofit scenario selected.

Energy performance impacts

Environmental performance impacts

Economic performance impacts



# SOME EXAMPLES FOR DIRECT FUNDS



<https://impulse.interreg-med.eu>  
E-mail: [impulse@cres.gr](mailto:impulse@cres.gr)

Project co-financed by the European  
Regional Development Fund

In this case, the direct funds have financed the study, the technical toolkits and the definition of policy recommendation.



# SOME EXAMPLES FOR DIRECT FUNDS



**ABRACADABRA** – **Policy Recommendation on Financial Toolkit**  
Assistant Buildings' addition to Retrofit, Adopt, Cure And Develop the Actual Buildings up to zeRo energy, Activating a market for deep renovation





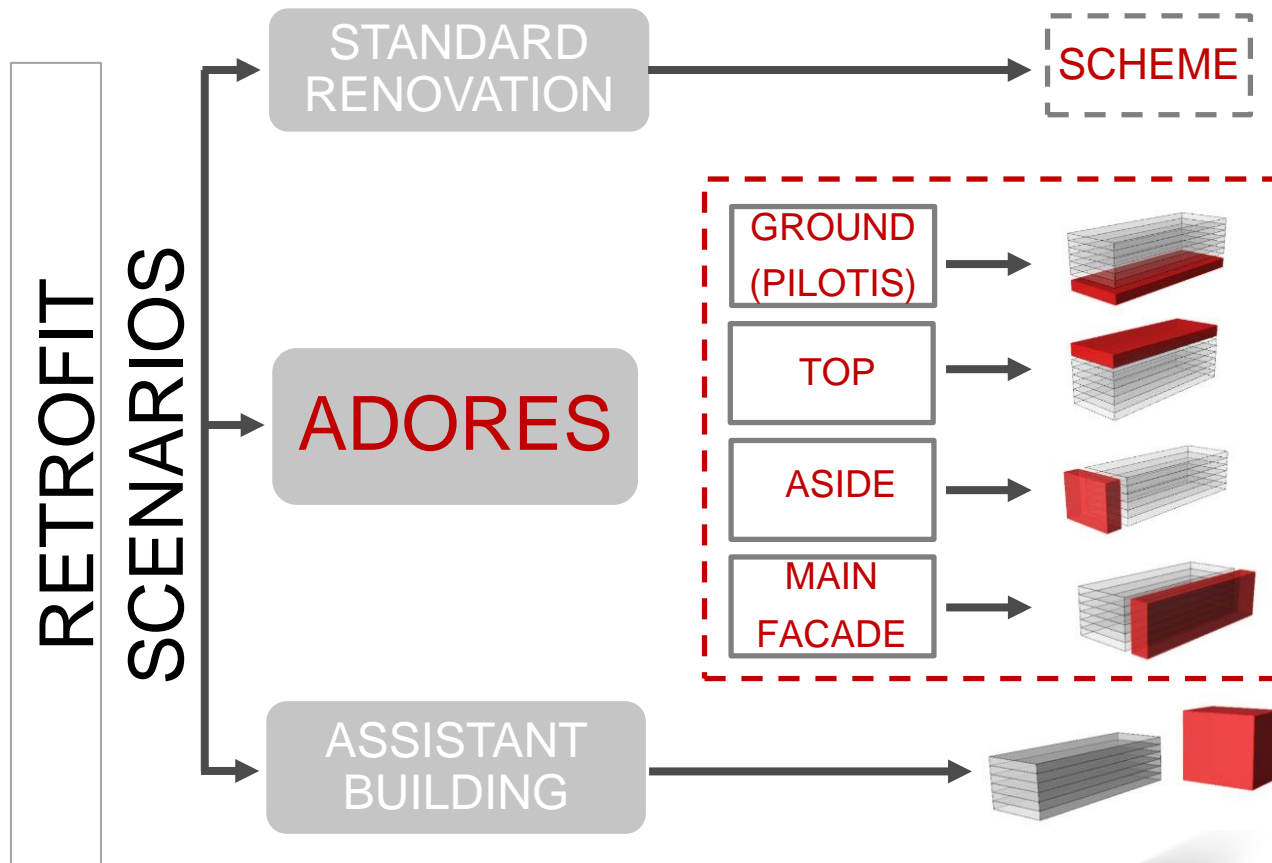
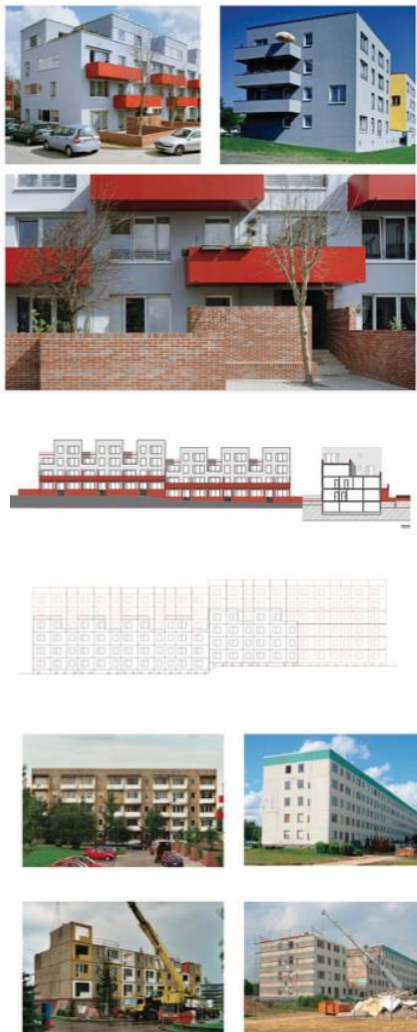
Abracadabra wants to find the sustainable solution to **transform existing buildings into NZEB buildings**. The economic savings generated by the increase in energy efficiency of buildings is not economically sufficient to justify the intervention: the PBP can be over 33 years old. Then I can calculate how much new volume I should create to balance the whole investment.

**The Public Administrations can "manage" the energy requalification processes of private developers by granting new volumes, obtaining in exchange a reduction / cancellation of the CO2 emissions, the building requalification (even at the neighborhood level), the "non-consumption of land" and a possible social redevelopment: if the investment pays for itself with the new volume, the tenants receive the restructuring both energy and building free of charge.**

In this case, the direct funds have financed the study, the technical toolkits and the definition of policy recommendation.



# SOME EXAMPLES FOR DIRECT FUNDS



# SOME EXAMPLES FOR DIRECT FUNDS

ADRES CASE STUDIES	ITALY 4250 m <sup>2</sup>	GREECE 2310 m <sup>2</sup>	ROMANIA 1160 m <sup>2</sup>	THE NETHERLANDS 1000 m <sup>2</sup>	BULGARIA 3720 m <sup>2</sup>	LATVIA 1650 m <sup>2</sup>	NORWAY 1076 m <sup>2</sup>	SPAIN 1480 m <sup>2</sup>
GROUND								
TOP	 ADDED 2100 m <sup>2</sup>	 ADDED 330 m <sup>2</sup>	 ADDED 366 m <sup>2</sup>	 ADDED 1000 m <sup>2</sup>	 ADDED 446 m <sup>2</sup>	 ADDED 435 m <sup>2</sup>	 ADDED 270 m <sup>2</sup>	 ADDED 756 m <sup>2</sup>
ASIDE	 ADDED 1337 m <sup>2</sup>	 ADDED 1000 m <sup>2</sup>			 ADDED 945 m <sup>2</sup>	 ADDED 715 m <sup>2</sup>	 ADDED 435 m <sup>2</sup>	
FAÇADE		 ADDED 630 m <sup>2</sup>	 ADDED 254 m <sup>2</sup> M	 ADDED 370 m <sup>2</sup>	 ADDED 416 m <sup>2</sup>	 ADDED 537 m <sup>2</sup>	 ADDED 202 m <sup>2</sup>	 ADDED 270 m <sup>2</sup>
ASSISTANT BUILDING		 ADDED 1800 m <sup>2</sup>	 ADDED 600 m <sup>2</sup>	 ADDED 1000 m <sup>2</sup>	 ADDED 720 m <sup>2</sup>	 ADDED 720 m <sup>2</sup>	 ADDED 900 m <sup>2</sup>	



# SOME EXAMPLES FOR DIRECT FUNDS

## ADD-ONS

### ADORES to support investment in renovation

Add-ons and renewables (ADORES) can be built next to existing buildings in a number of ways, according to different contexts and building types.

- **Additional units** and/or surfaces attached to blind facades or the ground
- **Rooftop extensions**
- **Extra living space in existing units**
- **Additional 'assistant buildings'**

## JOIN US

- **Join the ABRA community!**  
Exchange knowledge with stakeholders from market and financial actors to policy-makers
- **Learn and exchange at ABRA events**  
Participate in stakeholder community meetings and international workshops
- **Let's combine our thinking!**  
Policy-led and market-led approaches are needed. ABRA will bring these two frameworks together

[www.abracadabra-project.eu](http://www.abracadabra-project.eu)

## POLICY

### Innovation energy renovation initiatives

ABRACADABRA activates market actors and public bodies to support and implement its strategy and achieve:

- **Self financing schemes** with beneficial environmental and societal outcomes for public bodies and citizens
- **Reduced risk in renovation** through standardised procedures based on reduced payback times
- **Increased investors confidence**

Economic Profit  
+  
Added value

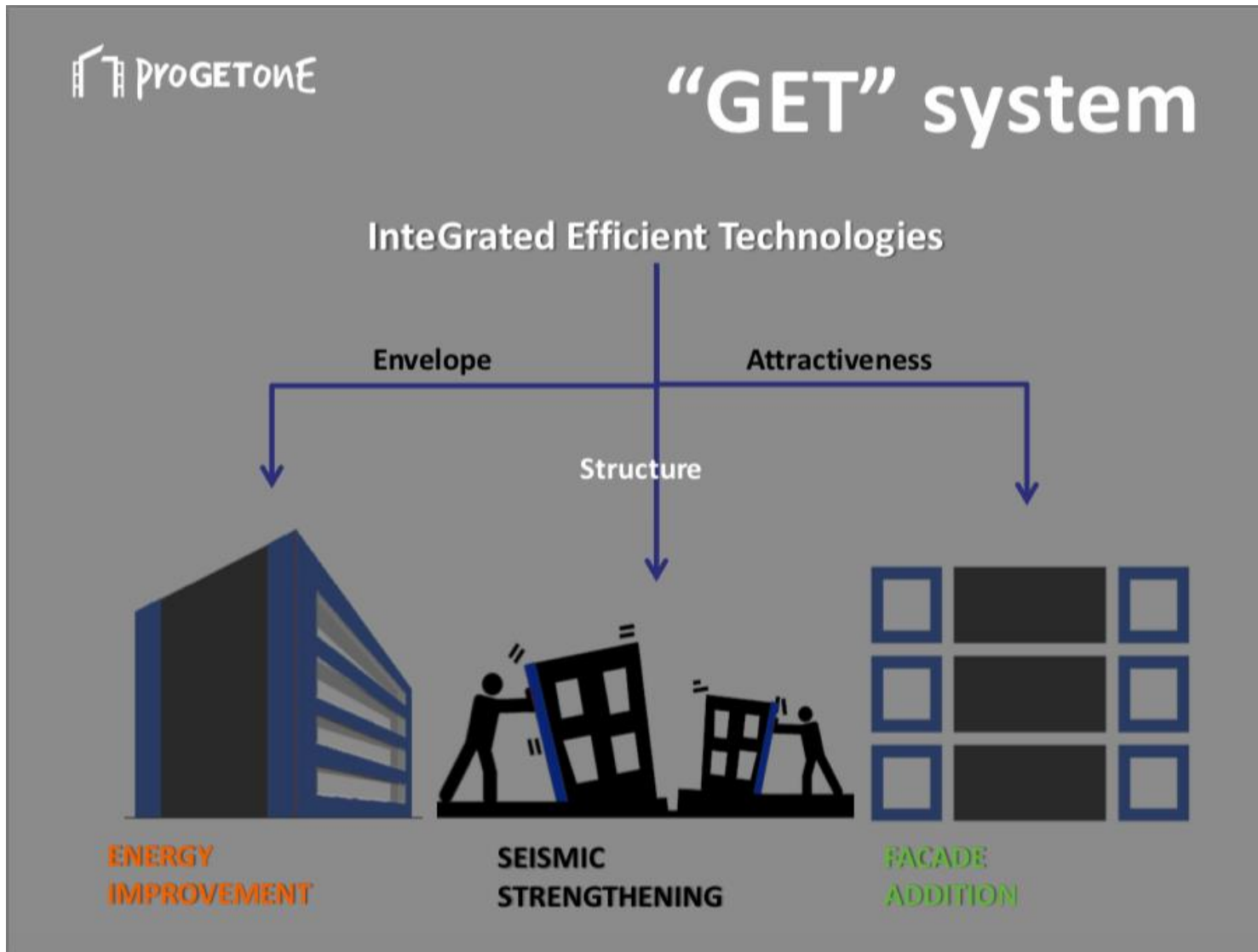


Energy Efficiency  
+  
Savings





# SOME EXAMPLES FOR DIRECT FUNDS



# SOME EXAMPLES FOR DIRECT FUNDS

**Time reduction**

**Energy reduction**

**Cost reduction**

	TYPICAL DEEP RENOVATION			PRO-GET-ONE SYSTEM RENOVATION		
<b>MEET ENERGY REQUIREMENTS</b>	<b>INTERVENTIONS</b>	Cost €/m <sup>2</sup>	Days	<b>INTERVENTIONS</b>	Cost €/m <sup>2</sup>	Days
	External thermal insulation + finishing systems	60	90	PRO-GET-ONE standard system (structural not included)	90	60
	Windows replacement	70	30	Windows replacement	80	30
	HVAC and water heating system improvements/replacements	80	90	HVAC and water heating system improvements/replacements, plug and play	80	60
	Related demolitions and reconstructions	30	30	Related demolitions and reconstructions	0	0
	Scaffoldings and safety installations	30	240	Scaffoldings and safety installations	10	0
	New renewable energy systems	100	30	PRO-GET-ONE standard renewable energy systems	100	30
	<b>TOTAL CONSTRUCTION COSTS AND DURATION</b>	360	240	<b>TOTAL CONSTRUCTION COSTS AND DURATION</b>	380	60
Maintenance and replacements (25 years cycle, heating/cooling running costs not included)	135	---	Maintenance and replacements (25 years cycle, heating/cooling running costs not included)	115	---	
<b>MEET SAFETY REQUIREMENTS</b>	<b>INTERVENTIONS</b>	Unit Cost €/m <sup>2</sup>	Days	<b>INTERVENTIONS</b>	Unit Cost €/m <sup>2</sup>	Days
	New reinforced concrete structures (e.g. shear walls) + foundations	350	180	PRO-GET-ONE steel and wood structure + foundations.	320	60
	Demolitions and reconstructions related to new structures (e.g. floor replacement)	40	60	Demolitions and reconstructions related to new structures	10	10
	<b>TOTAL CONSTRUCTION COSTS AND DURATION</b>	390	240	<b>TOTAL CONSTRUCTION COSTS AND DURATION</b>	330	70
	Maintenance and replacements (25 years cycle)	5	---	Maintenance and replacements (25 years cycle)	25	---
<b>MEET USER REQUIREMENTS</b>	<b>INTERVENTIONS</b>	Unit Cost €/m <sup>2</sup>	Days	<b>INTERVENTIONS</b>	Unit Cost €/m <sup>2</sup>	Days
	Inhabitants relocation (no tailored design)	100	360	Inhabitants relocation (user-oriented design)	0	0
<b>ALL REQUIREMENTS</b>	<b>TOTAL CONSTRUCTION COSTS</b>	<b>850</b>		<b>TOTAL CONSTRUCTION COSTS Per m<sup>2</sup> of existing UFA</b>	<b>710</b>	
				<b>TOTAL CONSTRUCTION COSTS Per m<sup>2</sup> of existing UFA plus extra surface (+20% of UFA)</b>	<b>560</b>	
	<b>LIFE CYCLE COSTS (after 25 years, excluding energy running costs)</b>	<b>990</b>		<b>LIFE CYCLE COSTS (after 25 years, excluding energy running costs)</b>	<b>850</b>	
	<b>EXPECTED REAL ESTATE VALUE AFTER INTERVENTION</b>	<b>+15%</b>		<b>EXPECTED REAL ESTATE VALUE AFTER INTERVENTION</b>	<b>+50%</b>	

[1 - (710/850)] = 16%. If we include the value of extra surface by 50%, the reduction will be [1 - (560/850)] = 34%.

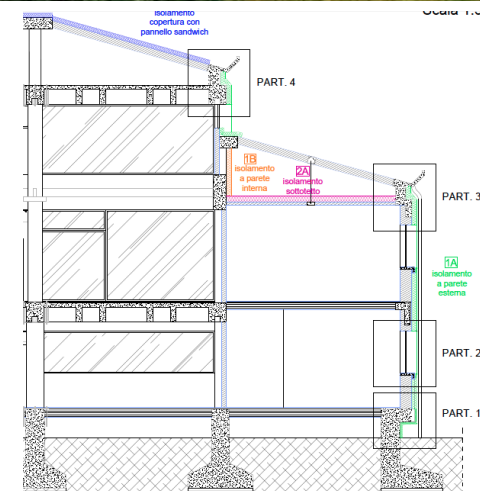
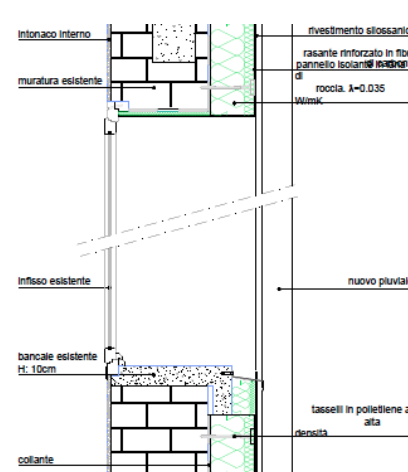
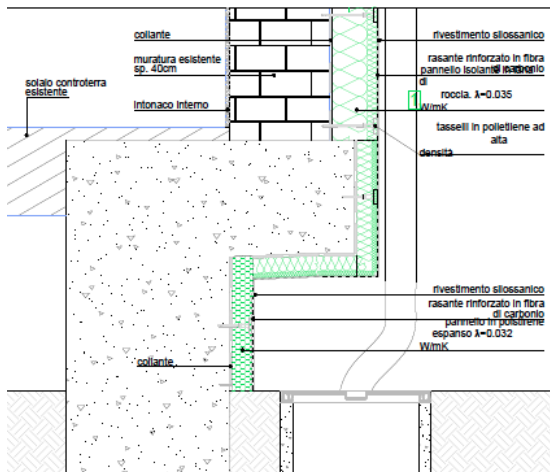
# SOME EXAMPLES FOR STRUCTURAL FUNDS

Project: transformation of an existing school building into a NZEB school building





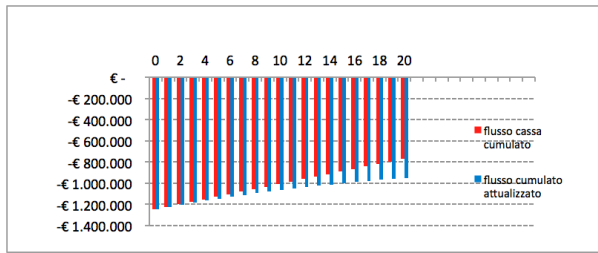
# SOME EXAMPLES FOR STRUCTURAL FUNDS





# SOME EXAMPLES FOR STRUCTURAL FUNDS

Business plan:  
 Investment € 1.248.000  
 Energy saving €/year 23.861  
 BPB: infinity



VAN	-€	950.639
TIR		-8%
VAN/Investimento		-0,76
Tempo di rit. semplice		-
Tempo di rit. attualizzato		-

**ANALISI FLUSSI DI CASSA (inserire i valori dei benefici economici e dei costi attesi)**

T (anni)	Benefici economici attesi	INVESTIMENTO	Costi attesi	FLUSSO DI CASSA NETTO	FLUSSO DI CASSA CUMULATO	FLUSSO NETTO ATTUALIZZATO	FLUSSO CUMULATO ATTUALIZZATO
0		€ 1.248.000		€ 1.248.000	€ 1.248.000	€ 1.248.000	€ 1.248.000
1	€ 23.861	€ -		€ 23.861	€ 1.224.139	€ 22.725	€ 1.225.275
2	€ 23.861	€ -		€ 23.861	€ 1.200.278	€ 21.643	€ 1.203.633
3	€ 23.861	€ -		€ 23.861	€ 1.175.417	€ 20.612	€ 1.183.021
4	€ 23.861	€ -		€ 23.861	€ 1.152.556	€ 19.631	€ 1.163.390
5	€ 23.861	€ -		€ 23.861	€ 1.128.695	€ 18.695	€ 1.144.694
6	€ 23.861	€ -		€ 23.861	€ 1.104.834	€ 17.805	€ 1.126.889
7	€ 23.861	€ -		€ 23.861	€ 1.080.973	€ 16.958	€ 1.109.931
8	€ 23.861	€ -		€ 23.861	€ 1.057.112	€ 16.150	€ 1.093.781
9	€ 23.861	€ -		€ 23.861	€ 1.033.251	€ 15.381	€ 1.078.400
10	€ 23.861	€ -		€ 23.861	€ 1.009.390	€ 14.649	€ 1.063.752
11	€ 23.861	€ -		€ 23.861	€ 985.529	€ 13.951	€ 1.049.801
12	€ 23.861	€ -		€ 23.861	€ 961.668	€ 13.287	€ 1.036.514
13	€ 23.861	€ -		€ 23.861	€ 937.807	€ 12.654	€ 1.023.860
14	€ 23.861	€ -		€ 23.861	€ 913.946	€ 12.051	€ 1.011.809
15	€ 23.861	€ -		€ 23.861	€ 890.085	€ 11.478	€ 1.000.331
16	€ 23.861	€ -		€ 23.861	€ 866.224	€ 10.931	€ 989.400
17	€ 23.861	€ -		€ 23.861	€ 842.363	€ 10.410	€ 978.990
18	€ 23.861	€ -		€ 23.861	€ 818.502	€ 9.915	€ 969.075
19	€ 23.861	€ -		€ 23.861	€ 794.641	€ 9.443	€ 959.632
20	€ 23.861	€ -		€ 23.861	€ 770.780	€ 8.993	€ 950.639



# SOME EXAMPLES FOR STRUCTURAL FUNDS

Business plan:

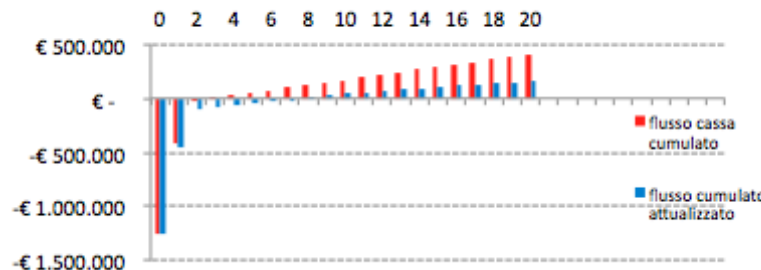
Investimento € 1.248.000

Energy saving €/year 23.861

Regional funds (POR FESR): 389.261 €

State funds (conto termico): 835.261 €

PBP: 3 years



VAN	€	153.551
TIR		10%
VAN/Investimento		0,12
Tempo di rit. semplice		3
Tempo di rit. attualizzato		8

T (anni)	Benefici economici attesi	INVESTIMENTO	Costi attesi	FLUSSO DI CASSA NETTO	FLUSSO DI CASSA CUMULATO	FLUSSO NETTO ATTUALIZZATO	FLUSSO CUMULATO ATTUALIZZATO
0		€ 1.248.000		€ -1.248.000	€ 1.248.000	€ 1.248.000	€ -1.248.000
1	€ 835.261	€ -		€ 835.261	€ -412.739	€ 795.487	€ -452.513
2	€ 389.261	€ -		€ 389.261	€ -23.478	€ 353.071	€ -99.442
3	€ 23.861	€ -		€ 23.861	€ 383	€ 20.612	€ -78.830
4	€ 23.861	€ -		€ 23.861	€ 24.244	€ 19.631	€ -59.200
5	€ 23.861	€ -		€ 23.861	€ 48.105	€ 18.696	€ -40.504
6	€ 23.861	€ -		€ 23.861	€ 71.966	€ 17.805	€ -22.698
7	€ 23.861	€ -		€ 23.861	€ 95.827	€ 16.958	€ -5.741
8	€ 23.861	€ -		€ 23.861	€ 119.688	€ 16.150	€ 10.409
9	€ 23.861	€ -		€ 23.861	€ 143.549	€ 15.381	€ 25.790
10	€ 23.861	€ -		€ 23.861	€ 167.410	€ 14.649	€ 40.439
11	€ 23.861	€ -		€ 23.861	€ 191.271	€ 13.951	€ 54.390
12	€ 23.861	€ -		€ 23.861	€ 215.132	€ 13.287	€ 67.677
13	€ 23.861	€ -		€ 23.861	€ 238.993	€ 12.654	€ 80.331
14	€ 23.861	€ -		€ 23.861	€ 262.854	€ 12.051	€ 92.382
15	€ 23.861	€ -		€ 23.861	€ 286.715	€ 11.478	€ 103.859
16	€ 23.861	€ -		€ 23.861	€ 310.576	€ 10.931	€ 114.790
17	€ 23.861	€ -		€ 23.861	€ 334.437	€ 10.410	€ 125.201
18	€ 23.861	€ -		€ 23.861	€ 358.298	€ 9.915	€ 135.116
19	€ 23.861	€ -		€ 23.861	€ 382.159	€ 9.443	€ 144.558
20	€ 23.861	€ -		€ 23.861	€ 406.020	€ 8.993	€ 153.551



# SOME EXAMPLES FOR FINANCIAL OPPORTUNITIES

## ESCO AND EPC CONTRACT

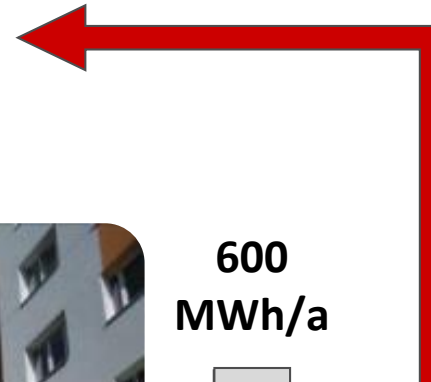


Before

600  
MWh/a

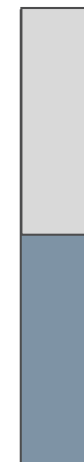


ESCO



After

600  
MWh/a



50 % = 300  
MWh/a

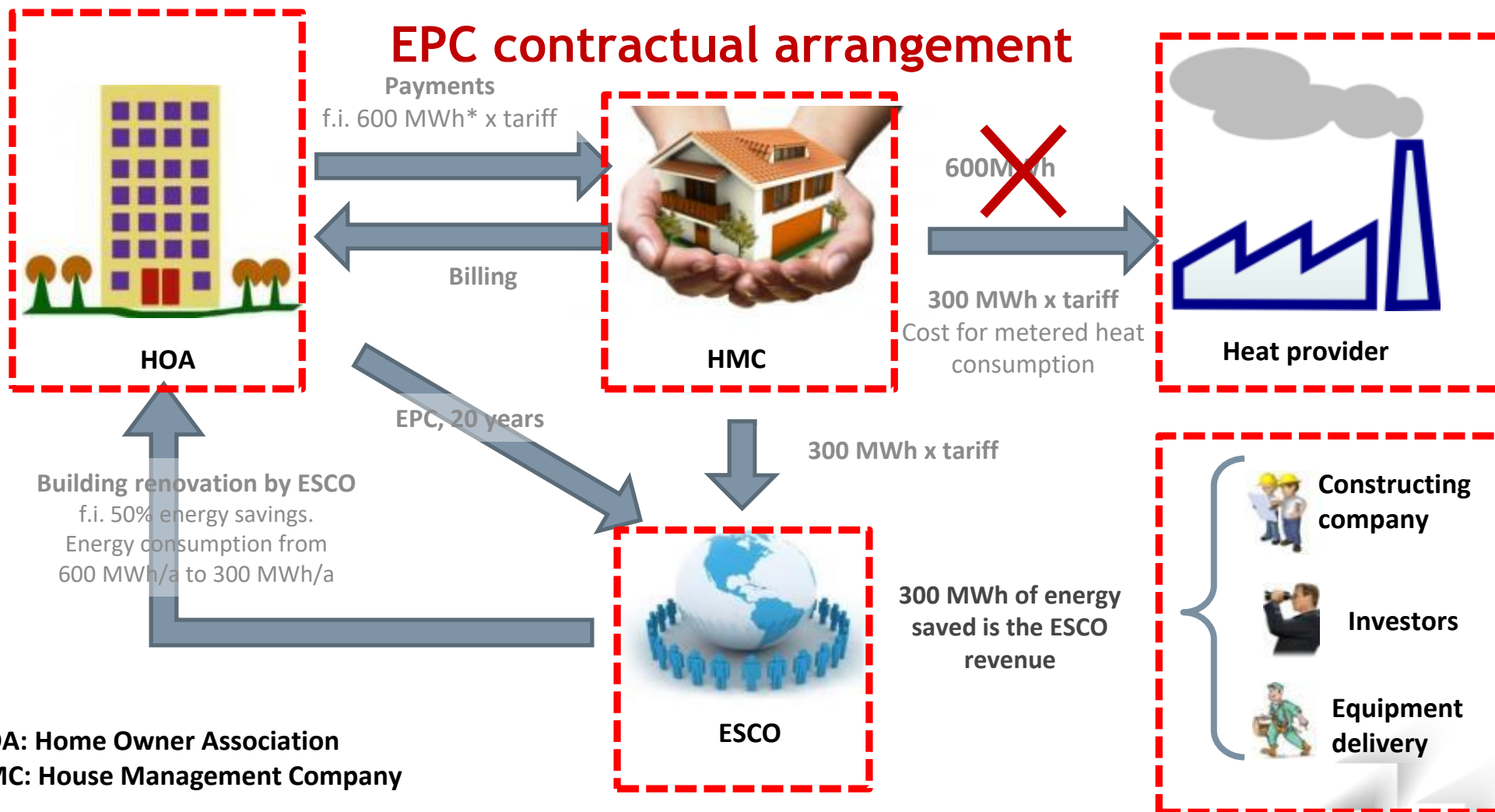
+ =

600  
MWh/a

50 % = 300  
MWh/a



# SOME EXAMPLES FOR FINANCIAL OPPORTUNITIES



HOA: Home Owner Association  
HMC: House Management Company





## 2006/32/CE Directive

### Energy Performance Contract (EPC)

The main types of contracts:

- **First out:** global sale
- **Shared savings:** shared savings
- **Guaranteed savings:** shared savings

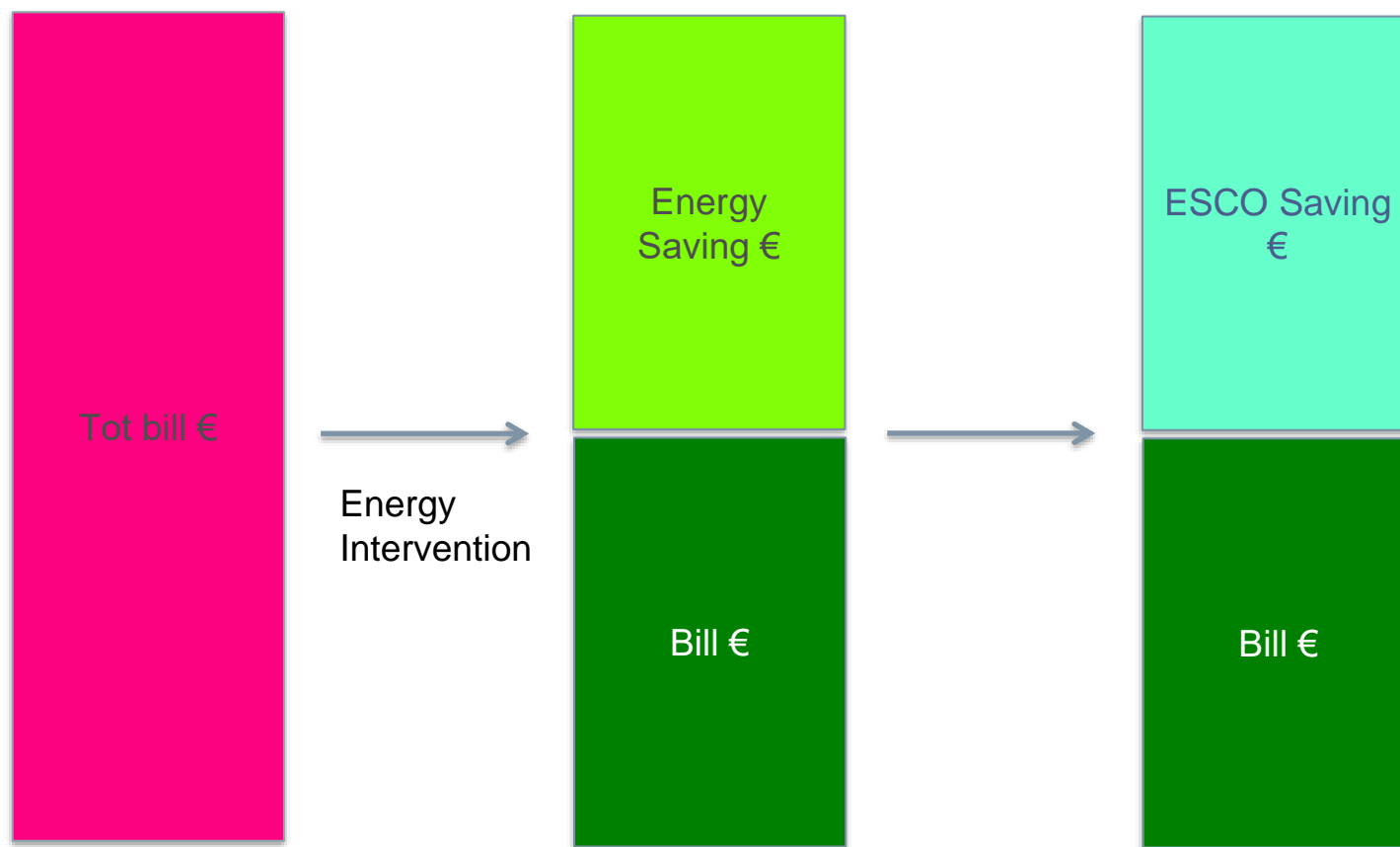


## First Out Contract - EPC

- the ESCo itself provides the capital or uses third party lenders.
- The energy savings achieved are entirely used to repay the financing of the intervention and remunerate the activity of the ESCo;
- the contract usually lasts about **3-5 years**.
- On expiry of the contract, the savings go entirely to the customer who becomes the owner of the plants and the works performed.
- With this type of contract, the ESCo collects 100% of the savings actually obtained up to the contractual expiry; all costs and profits are declared in advance and the savings are used first of all for the complete coverage of these costs.
- The ESCo retains ownership of the plant until the expiry of the contract, after which it transfers to the customer's ownership;



## First Out Contract - EPC



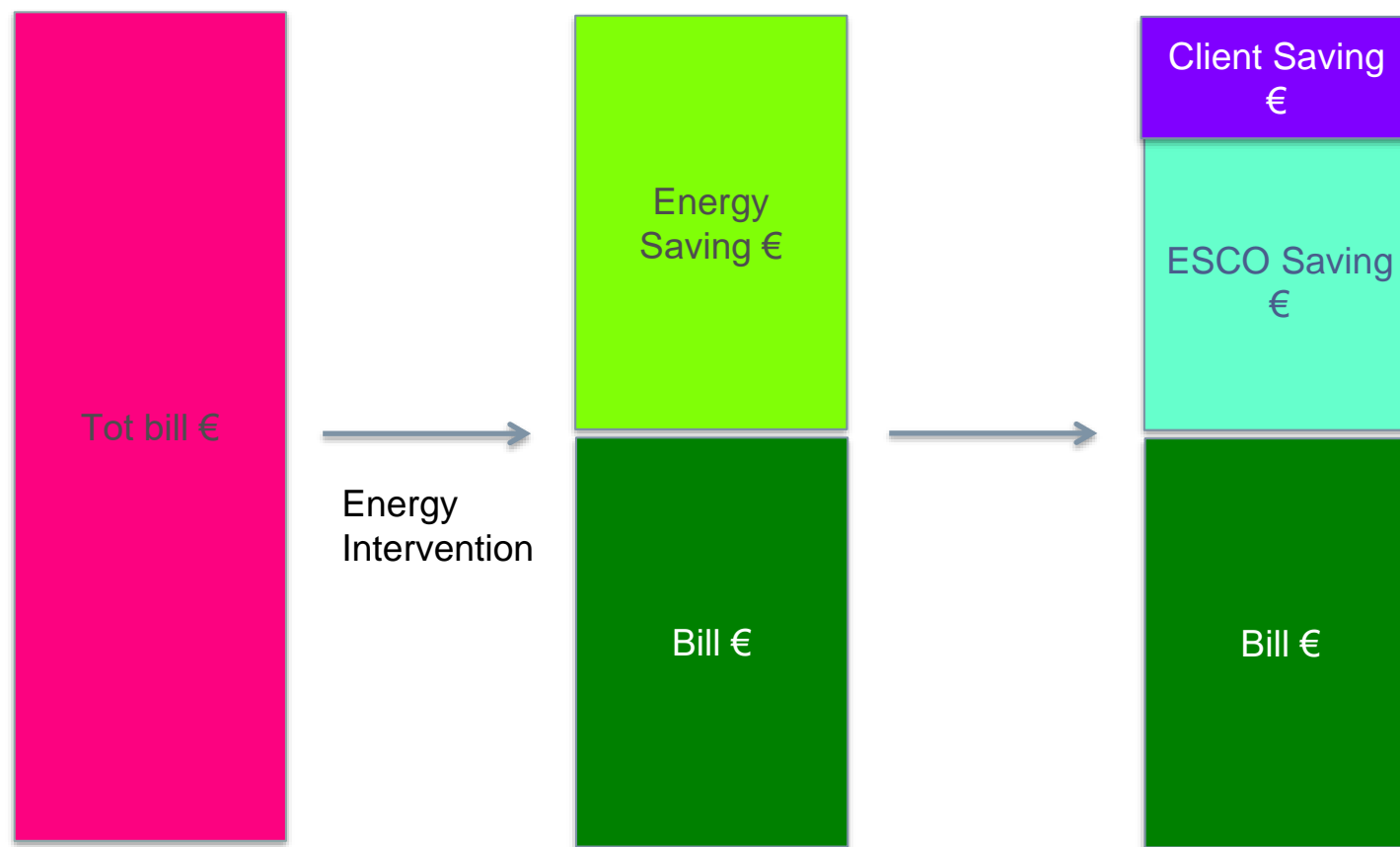
## Shared Savings Contract - EPC

- the ESCo supplies the capital with its own sources or through third party financiers;
- the parties agree on the division of the proceeds of savings.
- The contracts have a duration of about 5-10 years in consideration of the fact that only a portion of the savings contributes to the recovery of the initial investment.
- During the execution of the contract, the ownership of the plants and works remains with the ESCo and at the contractual expiry it is transferred to the customer.
- In a contract with shared savings, therefore, the investment is repaid on the basis of an agreement, between the ESCo and the end user, to divide the savings amount determined by the feasibility study.
- As in the First Out model, the ESCo, in addition to the technical risk inherent in the performance to which its remuneration is linked, also assumes the financial risk;





## Shared Savings Contract - EPC

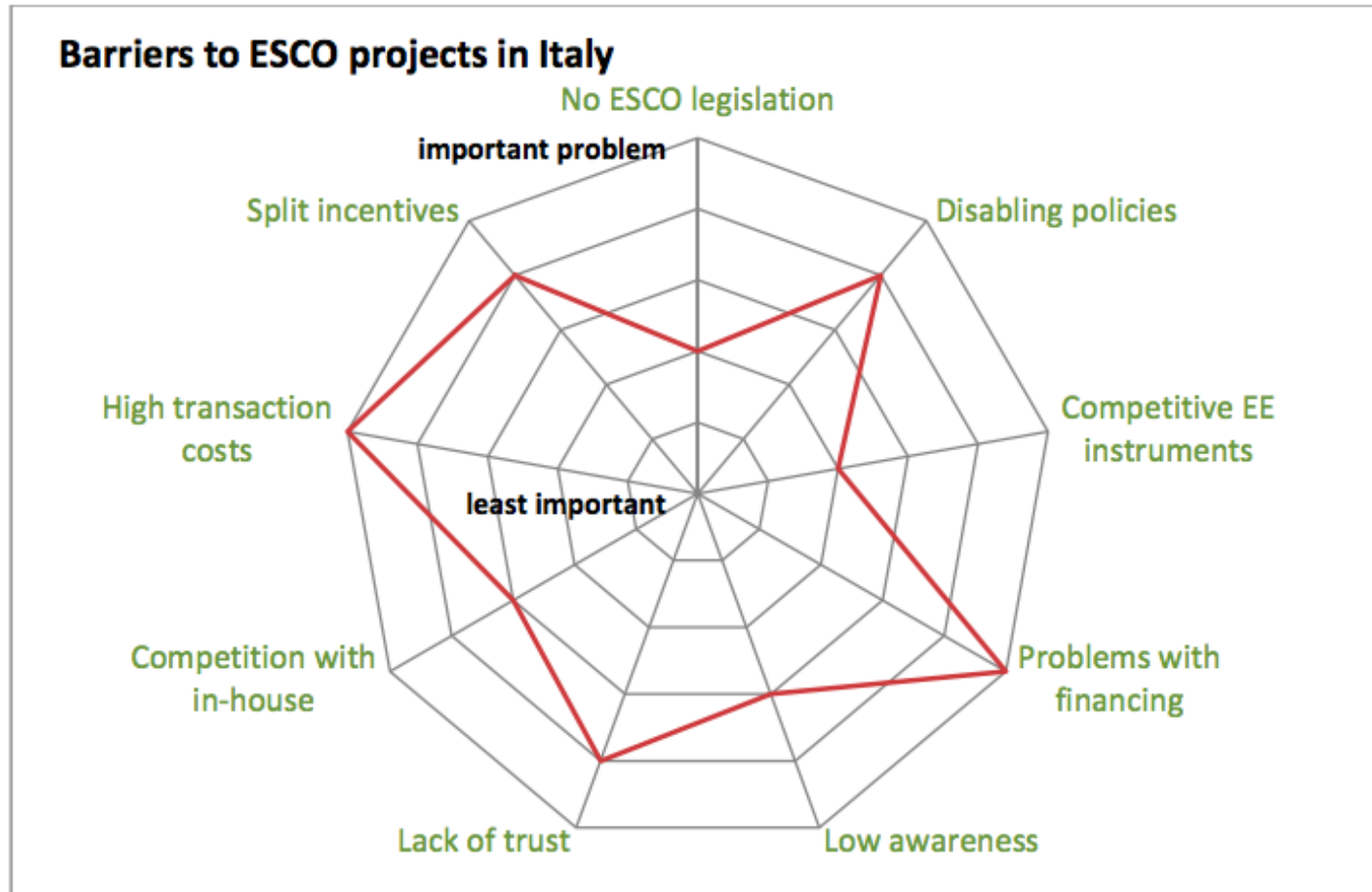


## Guaranteed Savings Contract - EPC

- the lender is a third party other than the ESCo and the customer
- it is the customer who signs the loan, while the ESCo normally assumes the role of finding and organizing the loan, as well as guaranteeing a certain level of return based on which it receives the compensation from the customer.
- The contract normally lasts about 4-8 years.
- the ESCo undertakes essentially to guarantee that the savings are not lower than an agreed minimum, established on the basis of the feasibility analysis.
- The savings guarantee is expressed through formulas that provide for compensation in favor of the customer in the event of greater consumption than those guaranteed; if, on the other hand, savings are achieved that exceed those expected, these will normally benefit the customer.



## Italian Situation - ESCO and EPC



## Italian Situation - ESCO and EPC





**The credit assignment:** some interventions of energy restructuring of existing buildings give the right (in Italy) to a tax relief up to 65%. In this way, whoever supports the energy renovation of the building, can take advantage of a tax discount of up to 65% in 10 years. Some ESCOs are offering the energy redevelopment of buildings by "anticipating" the tax credit of the tenant who assigns this credit to the ESCO.

By this way, the tenant can take advantage of the entire tax credit at the beginning of the entire tax credit, with a lower initial cost. The rest of the investment (reduced by over 50%) can be supported by the tenant or anticipated by the ESCO in the form of an EPC contract.

Thanks to this "financial" mode, it is also possible to propose all those interventions, above all of a building nature, which would have very long PBPs but which nevertheless contribute to increasing the value of the building (for example, the replacement of windows or coats).



## Europe – Regions – Municipalities

Energy management: figures with similar skills are needed at European level, as envisaged for the figure of Energy Management Expert by CEI UNI 11339. Similar figures speak a similar language and analyze the issue of energy efficiency in a similar way. For example, energy audits must comply with UNI 16247.

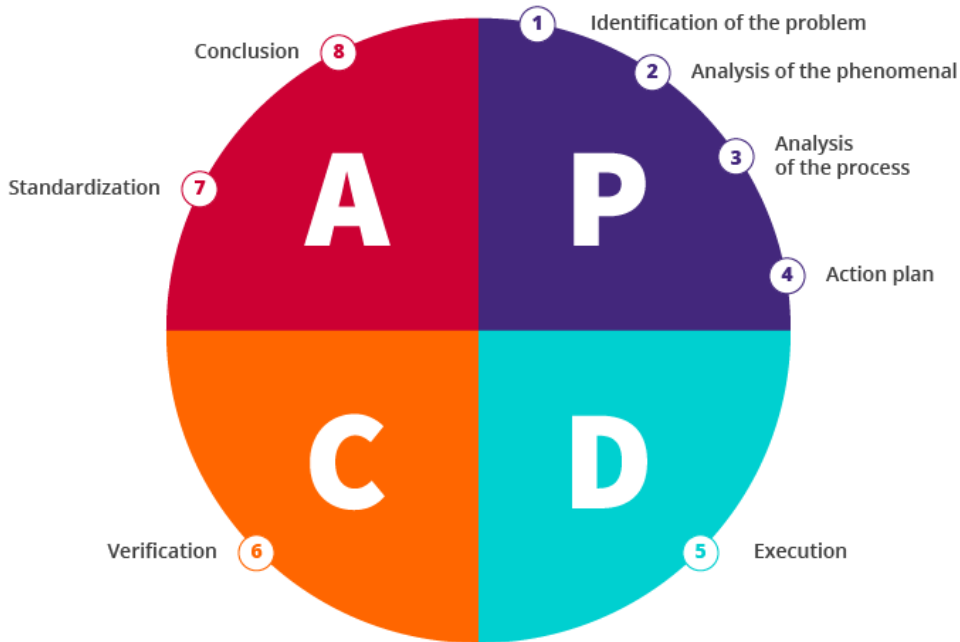
By December 2015, all energy-intensive companies or large companies (over € 50,000,000/years and more than 250 employees) will have to deliver energy audits while Public Administrations are not required to do so. Why? There Public Administrations (for example Paris Habitat that manages 125238 accommodations) that have Quality Management System (ISO 9001) and an Energy Management System (ISO 50001).

What do you think if the PAs adopted an EMS?  
Can't find the EMS similar to the Sustainable Energy Action Plan?

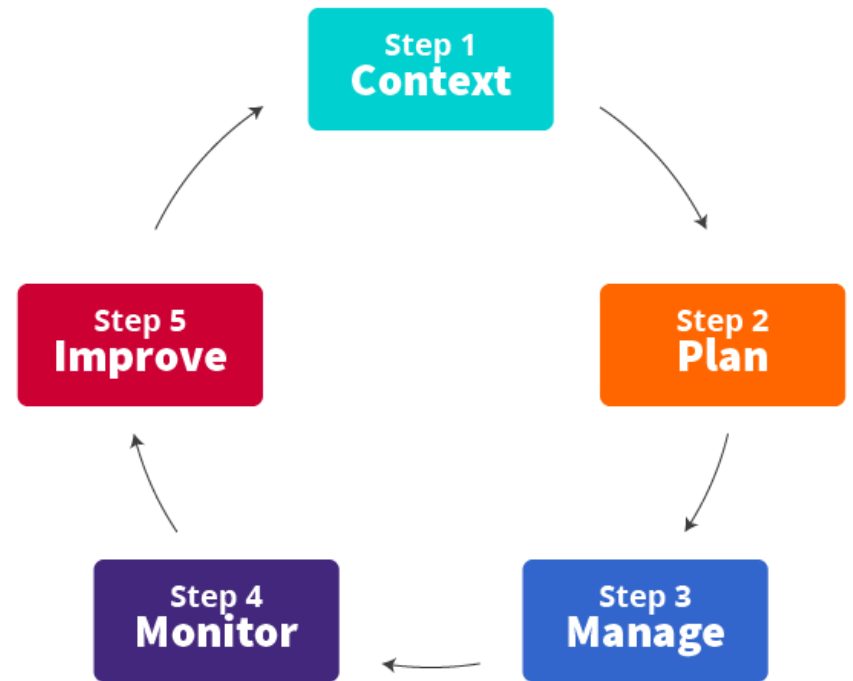


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## PDCA Cycle



Source: Falconi, 2015



Source: Guide for applying the ABNT ISO 50001 standard - Procobre



# BLOCKCHAIN FOR BUILD

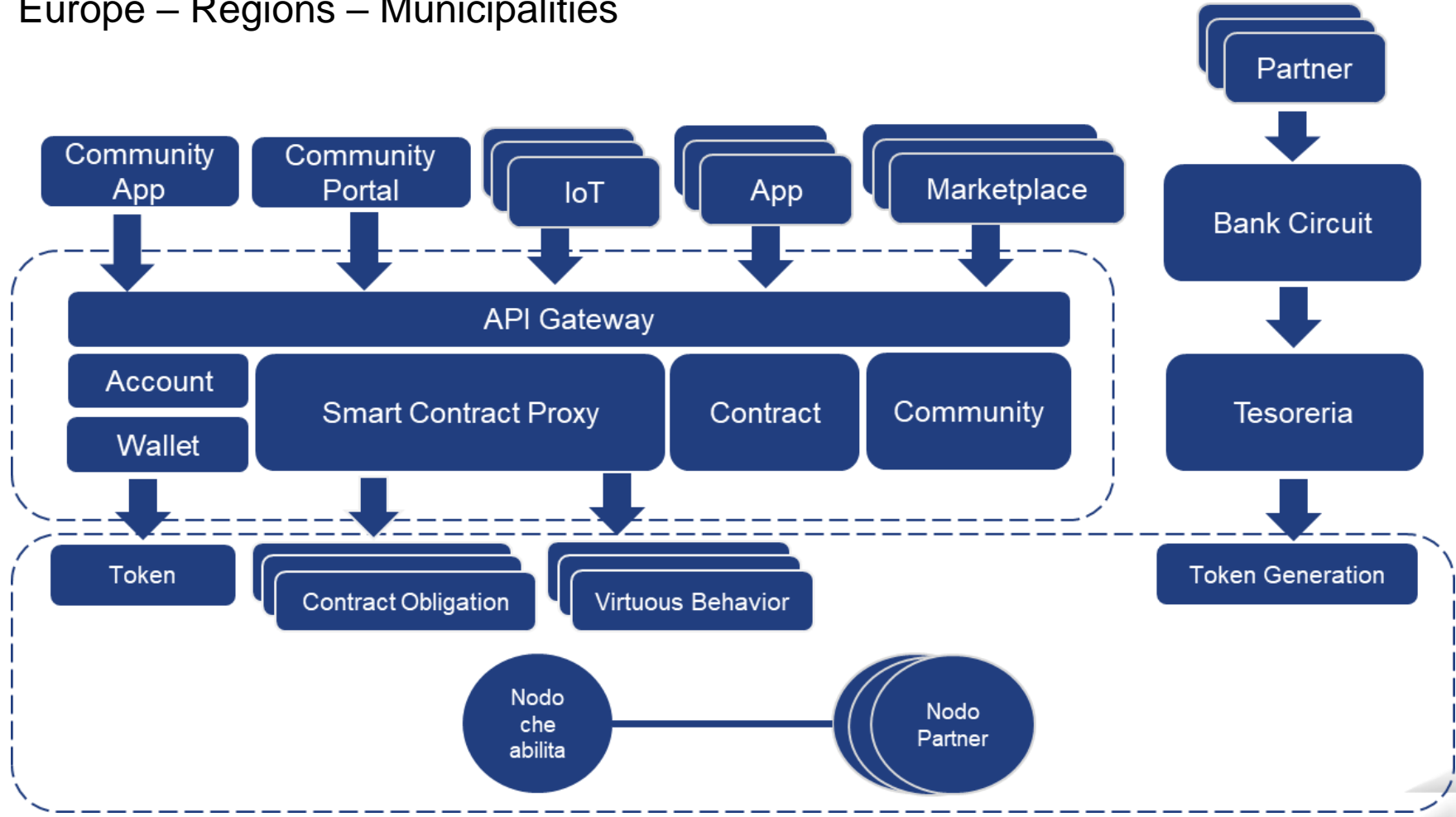
Europe – Regions – Municipalities



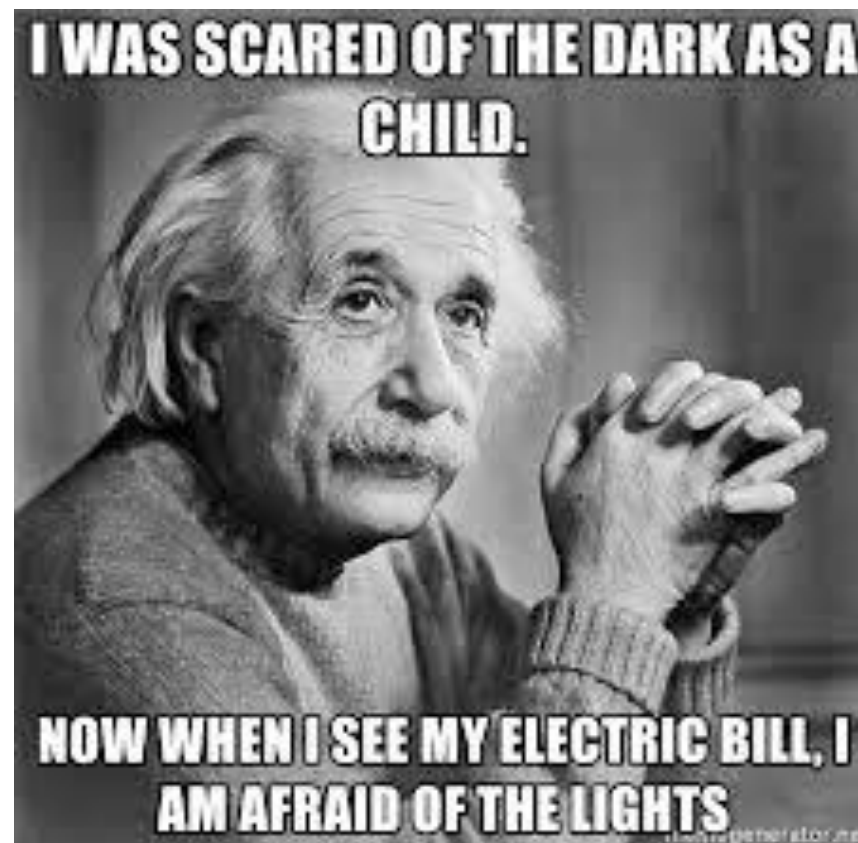


# BLOCKCHAIN FOR BUILD

Europe – Regions – Municipalities



Thanks for your attentions





## Annex 3 - Questionnaire

# BOOSTEE-CE TRANSNATIONAL TRAINING EVALUATION QUESTIONNAIRE



Please select your country:

- |   |                                   |
|---|-----------------------------------|
| <input type="checkbox"/> Austria        | <input type="checkbox"/> Italy    |
| <input type="checkbox"/> Croatia        | <input type="checkbox"/> Poland   |
| <input type="checkbox"/> Czech Republic | <input type="checkbox"/> Slovenia |
| <input type="checkbox"/> Hungary        | <input type="checkbox"/> Other    |

1. To which of the following themes do the activities of your organization relate ?

- |  |  |
|--|--|
| <input type="checkbox"/> energy performance        | <input type="checkbox"/> cadastral / GIS data              |
| <input type="checkbox"/> buildings management      | <input type="checkbox"/> administrative units              |
| <input type="checkbox"/> urban planning / land use | <input type="checkbox"/> utility and governmental services |

2. To what extent do you use the following aspects of training in your organization ?

- |   |            | 1 | 2 | 3 | 4 |           |
|---|------------|---|---|---|---|-----------|
| a) Energy and climate planning in public buildings          | Not at all | ● | ● | ● | ● | Every day |
| b) GIS tools  | Not at all | ● | ● | ● | ● | Every day |
| c) External databases / repositories on experts and devices | Not at all | ● | ● | ● | ● | Every day |
| d) Funding sources and financing energy efficiency          | Not at all | ● | ● | ● | ● | Every day |

3. Was the selected form of training suitable ?

- |            |   |   |   |   |            |
|------------|---|---|---|---|------------|
|            | 1 | 2 | 3 | 4 |            |
| Not at all | ● | ● | ● | ● | Definitely |

Do you have any suggestion for improvement ?

.....  
 .....  
 .....

4. Was the duration of the training suitable ?

- |            |   |   |   |   |            |
|------------|---|---|---|---|------------|
|            | 1 | 2 | 3 | 4 |            |
| Not at all | ● | ● | ● | ● | Definitely |

Do you have any suggestion for improvement ?

.....  
 .....  
 .....

5. Did you find the training content appropriate and adequate ?

- |            |   |   |   |   |            |
|------------|---|---|---|---|------------|
|            | 1 | 2 | 3 | 4 |            |
| Not at all | ● | ● | ● | ● | Definitely |

Do you have any suggestion for improvement ?

.....  
 .....  
 .....



# BOOSTEE-CE TRANSNATIONAL TRAINING EVALUATION QUESTIONNAIRE



6. Was the content of the training provided in a comprehensible and accessible way ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

Do you have any suggestion for improvement ?

.....  
.....  
.....

7. Was the quality of the training rewarding ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

8. Was the training material pertinent, clear and exhaustive ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

9. Did the training meet your expectations ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

10. Do you think that training could facilitate the understanding of energy efficiency planning and help to better define energy efficiency actions ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

11. Has your knowledge and skills increased thanks to the training ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

12. Do you think that the acquired knowledge and skills will be useful in your daily work ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

13. Could you please select the field where training could help your organization or your city/region ?

- |   |   |
|---|---|
| <input type="checkbox"/> promote energy performance | <input type="checkbox"/> indicate financial incentives / loans and facilitate their acquisition |
| <input type="checkbox"/> give an information        | <input type="checkbox"/> increase the rate of refurbishment                                     |
| <input type="checkbox"/> support urban planning     | <input type="checkbox"/> other .....  |

14. Would you recommend this training to other employees / organizations ?

1      2      3      4  
Not at all ●   ●   ●   ●   Definitely

If you have additional comments or suggestions, share them with us

.....  
.....  
.....

**Thank you for participating in the survey!**