DELIVERABLE T3.3.1

D.T3.3.1 – Pilot actions preparation **11/2018**

D.T3.3.1: Pilot actions preparation

A.T3.3 Preparation and procurement of pilot actions

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Authors		
	Name (organization)	Name, e-mail
WP leader	Mazovia Energy Agency (MAE), PP5	Aleksandra Luks, a.luks@mae.com.pl
Contributing participants	Fondazione Bruno Kessler (FBK) (PP1) Emilia-Romagna Region (RER) (PP7)	Fabio Remondino, remondino@fbk.eu Attilio Raimondi, Attilio.Raimondi@regione.emilia-romagna.it Apollonia Tiziana De Nittis, Apollonia.DeNittis@regione.emilia-romagna.it Massimo Bottacini, massimo.bottacini@aster.it

1. Introduction and aims

This deliverable contains all information and data about buildings that allow for a description of the condition of the buildings and the pilot action. This pilot action has no funds.
Conducting research and analysis of selected buildings as pilot actions is necessary to ensure the identification of energy-related problem areas. Data collected from building owners, given in the chapters below, determine the current state of the facilities. It also provides the information needed to specify the energy profile of the buildings. In addition, it defines the measures and actions that were taken to implement the pilot action.
The aim of the document is presentation of the plan preparatory activities as part of the tasks undertaken for the PA.

PILOT ACTION - **PA1. Testing 3DEMS in a dense urban area of Emilia Romagna region (IT)**

2. Description of the PA buildings

The description of the buildings provides basic building and administrative information. It allows to determine the location, the prevailing geographical conditions, the surroundings of the building. In addition, construction data is an example for similar construction solutions.

Type of building: Residential public buildings - 3 buildings
Owner: Emilia-Romagna Region
Year of construction: 1976
Gross building area [m^2]: 3 x 7.767,5
Building volume [m^3]: 3 x 25.277,0
Shape factor of buildings: 0,36
Typology: 62 flats on 16 floors x 3 buildings
Number of building users: 550 (estimated)
Location: Via Ortolani 15-17-19, Bologna

Available technical documentation: (•) **Yes** ( ) **No**
Energy Certification Year: 2017

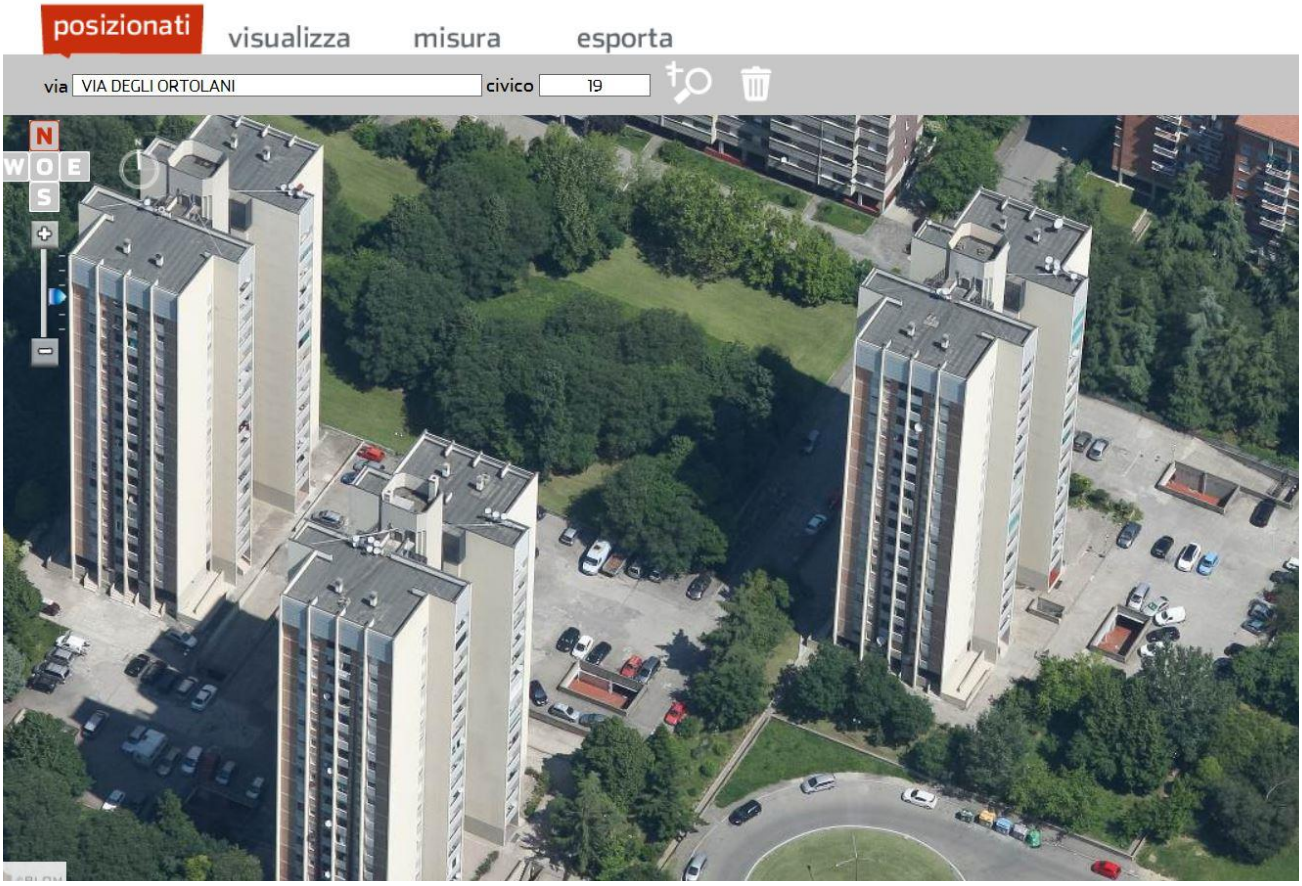


Figure 1: Photos of buildings available for the PA1 (source: Regional Cartographic Service).

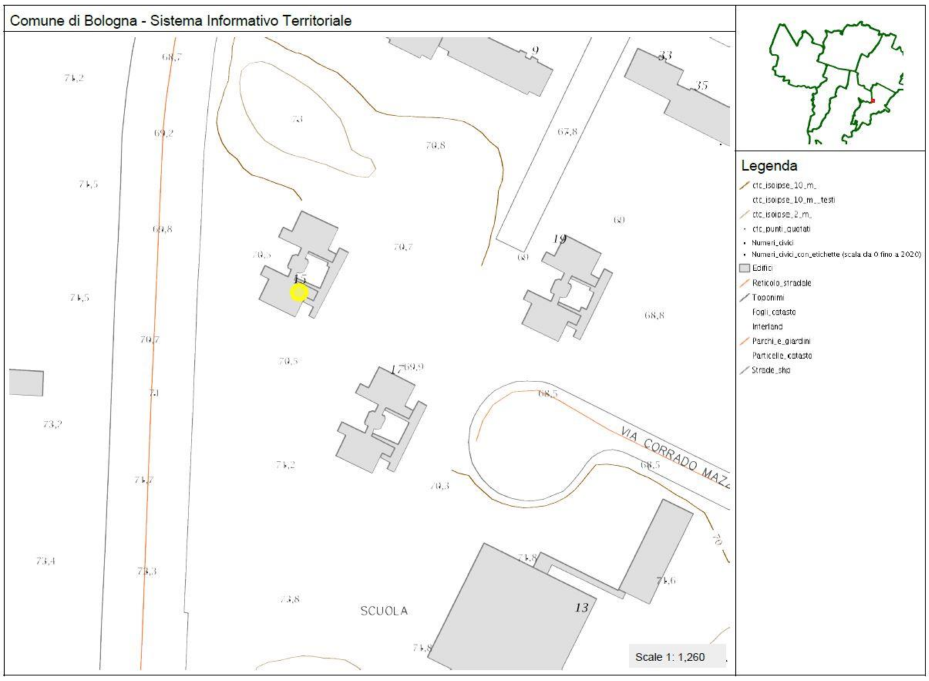


Figure 2: Example of technical drawings available for the PA1 (source: Regional Cartographic Service).

3. Energy PA buildings profile

Collecting energy data allows to determine the energy profile of the building. It provides information on the insulation of external partitions and the condition of energy systems (heating/cooling, ventilation, electricity, hot water preparation) in buildings.

3.1 External partitions

The technical and construction status of the building envelope influences significantly the heat loss to the environment. The used construction and thermal insulation material is important. In order to improve standards, a norm, regulation is established for each partition in each country. For existing buildings in the case of low insulation, it is recommended to carry out thermo-modernization.

3.1.1 External walls

1. **Total surface area** [m^2]: 3 x 7.668,0

   Envelope material (different layers):

No.	Material	Thickness [m]	Thermal conductivity (equivalent) [W/mK]	Heat transfer coefficient for external wall [W/m2K]	Defined heat transfer coefficientfor external wall (according to the norm, national regulations) [W/m^{2}K]
1	plaster of lime cement	0,02	0,700	1,10	0,26
2	brick	0,08	0,400		
3	air gap	0,09	0,390		
4	brick	0,12	0,400		
5	plaster of lime cement	0,02	0,700		

Table 1: Features of type 1 external wall

2. **Total surface area** [m^2]: 3 x 864,0

   Envelope material (different layers):

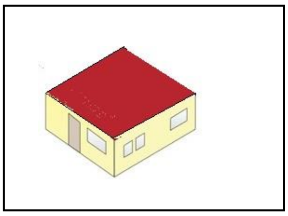
No.	Material	Thickness [m]	Thermal conductivity (equivalent) [W/mK]	Heat transfer coefficient for external wall [W/m^{2}K]	Defined heat transfer coefficient for external wall (according to the norm, national regulations) [W/m^{2}K]
1	plaster of lime cement	0,02	0,700	1,00	0,26
2	brick	0,12	0,400		
3	air gap	0,07	0,390		
4	brick	0,12	0,400		

Table 2: Features of type 2 external wall

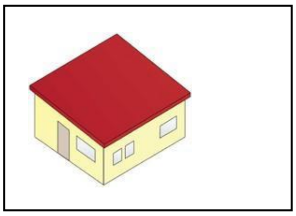
3.1.2 Roof

Type of roof

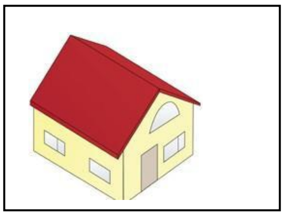
☒ Flat roof



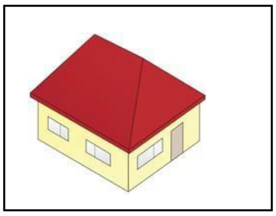
☐ Pent roof



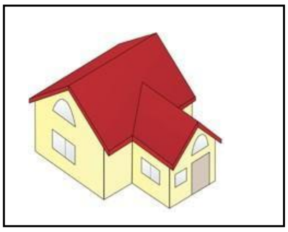
☐ Gable roof



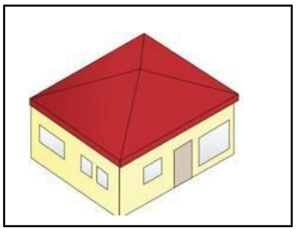
☐ Hip roof



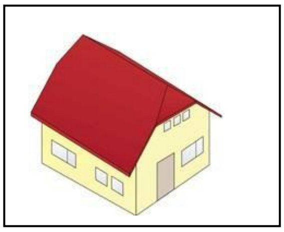
☐ Multi-hip roof



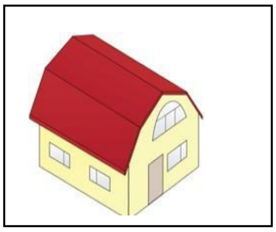
☐ Tented roof



☐ Half-hipped roof



☐ Mansard roof



Roof slope [°]: 0.5 **in direction**: -
Roof total surface area [m^2]: 3 x 472,0
Envelope material (different layers):

No.	Material	Thickness [m]	Thermal conductivity (equivalent) [W/mK]	Heat transfer coefficient for roof [W/m^2K]	Defined heat transfer coefficient for roof (according to the norm, national regulations) [W/m^2K]
1	plaster of lime cement	0,02	0,700	1,53	0,22
2	brick-concrete slab	0,30	0,810		
3	concrete screed	0,06	1,060		
4	bituminous waterproofing membrane	0,01	0,170		

Table 3: Features of roof

3.1.3 Ground floor

Total surface area [m²]: 3 x 472,0

Envelope material (different layers):

No.	Material	Thickness [m]	Thermal conductivity (equivalent) [W/mK]	Heat transfer coefficient for floor [W/m²K]	Defined heat transfer coefficient for floor (according to the norm, national regulations) [W/m²K]
1	plaster of lime cement	0,02	0,700	1,46	0,26
2	brick-concrete slab	0,30	0,810		
3	concrete screed	0,06	1,060		
4	ceramic tile	0,01	1,470		

Table 4: Features of ground floor

3.1.4 Windows

Type:

☐ single window, single glazed
☐ combined window, double glazed
☐ combined window, three panes
☐ single-frame window, double low-emission glass, argon chamber
☐ single-frame window, three glass panes, two (external) glasses are made of ordinary glass, and the inner glass of low-emission glass, the chambers between the glasses are filled with argon
☐ single-frame window, three glass panes, all glasses are made of low-emission glass, the chambers between the glasses are filled with argon
☒ single-frame window, double glazed

Shading (sun protection):

☐ curtains
☒ roller shutters
☐ wooden shutters
☐ internal blinds
☐ awnings
☐ other

Material (PVC, wood, aluminum, wood-aluminum): aluminium
Number of windows: 3 x 448
Windows total surface area [m²]: 3 x 931,2
Diffusers in windows (YES or NO): NO
Heat transfer coefficient [W/m²K]: 3,10
Defined heat transfer coefficient (according to the norm, national regulations) [W/m²K]: 1,40

3.1.5 Doors

Material (wood, aluminum, PVC etc.): wood
Number of doors: 3 x 62
Doors total surface area [m^2]: 3 x 170,5
Heat transfer coefficient [W/m^2K]: 3,50
Defined heat transfer coefficient (according to the norm, national regulations) [W/m^2K]: 0,80

3.2 Energy systems data

Efficiency of energy systems and the type of energy source determines its consumption. Also important is the issue of installed control and control systems that help ensure optimal thermal conditions.

Energy parameters characterizing the building:

Total non renewable primary energy demand for heating and DHW [kWh/year]: 3.221.434
Efficiency of the heating system [%]: 85,5
Efficiency of the hot water preparation system [%]: 64,7
Type of energy source (gas boiler, coal boiler, electricity, municipal heating network, biomass boiler, cogeneration, RES etc.): gas boiler
Regulation and control of systems in the building:

- [x] thermostatic valves
- [x] heat dividers
- [ ] motion sensors
- [x] electricity meters
- [x] water meters
- [ ] other

Annual fuel consumption [Sm^3]: 300.186
Electricity consumption for heating and DHW [kWh/year]: 45.346
Ordered power [kW]: 3 x (64 x 3 + 1 x 15)
Lighting type: traditional incandescent lamps; halogen bulbs; fluorescent lamps; LED lamps
Power of light bulbs [W]: n.a.
Number of lighting points: n.a.
Ventilation type: natural

Building energy profile
The energy consumption in construction is distinguished by three types of energy: primary energy (EP), final energy (EK) and utility energy (EU). Primary energy refers to the energy contained in sources, including fuels and carriers, necessary to cover the final energy demand, taking into account the efficiency of the entire chain of acquisition, conversion and transport to the end user. A concept that is important from the point of view of a sustainable development strategy. The ratio of non-renewable primary energy inputs to the generation and delivery of an energy or energy carrier for technical systems is the difference between primary energy and final energy. The final energy is heat and auxiliary energy, which must be delivered to the boundary of the heating system (building) with a given efficiency in order to cover the energy demand for heating and ventilation of rooms. A concept that is important from the point of view of the building's user who incurs costs related to the operation of the building. The efficiency of the system is a conversion of final energy into utility energy. The utility energy concerns energy for heating and ventilation as well as for preparing domestic hot water, regardless of the type and efficiency of the heating device. A concept that is important from the designer's point of view, characterizing thermal insulation and building tightness. The concepts are presented below:

$$EU \xrightarrow{\eta} EK \xrightarrow{w_i} EP$$

Annual demand for non renewable primary energy EP [kWh/m²/year]

Non renewable primary energy demand for heating	Non renewable primary energy demand for cooling	Non renewable primary energy demand for ventilation	Non renewable primary energy demand for preparation of hot water	Non renewable primary energy demand for electricity	Sum (1+2+3+4+5)
1	**2**	**3**	**4**	**5**	**6**
No data	No data	No data	No data	No data	No data

Table 5: Primary Energy data

Annual final energy demand EK [kWh/m²/year]

Final energy demand for heating	Final energy demand for cooling	Final energy demand for ventilation	Final energy demand for preparation of hot water	Final energy demand for electricity	Sum (1+2+3+4+5)
1	**2**	**3**	**4**	**5**	**6**
No data	No data	No data	No data	No data	No data

Table 6: Final Energy data

Annual utility energy demand EU [kWh/m²/year]

Utility energy demand for heating	Utility energy demand for cooling	Utility energy demand for ventilation	Utility energy demand for preparation of hot water	Utility energy demand for electricity	Sum (1+2+3+4)
1	**2**	**3**	**4**	**5**	**6**
No data	No data	No data	No data	No data	No data

Table 7: Utility Energy data

Energy class of the building: G

The EU indicator is a building quality indicator. In general, the smaller the EU, the less energy we lose through the outer baffles of the building. It refers to the energy which is consumed and goes from the building's heating system to the individual rooms, and the heat loss (through penetration and ventilation) to the environment. The EU indicator value in the table below includes only heating/cooling (average value of flats):

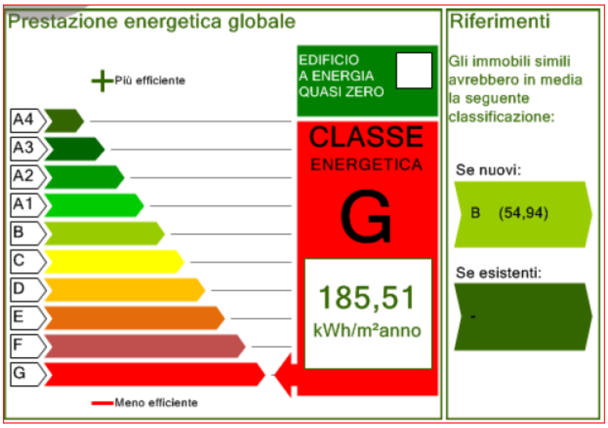


Figure 3: Average Energetic Class

Electricity price [EUR]

Fixed fee [per MW-month]: no data
Variable fee [per kWh]: no data
Subscription [per month]: no data

Energy (heating) price [EUR]

Fixed fee [per MW-month]: no data
Variable fee [per GJ]: no data
Subscription [per month]: no data

Summary and evaluation of the energy building status

The external walls, ground floor and basement ceiling don't meet the **current** technical requirements in terms of the value of heat transfer coefficient. The building's energy system includes the heating and DHW system and the power system. In total, the buildings uses annually 3.266.780 kWh, 98,6% of which is for heating and DHW.

4. Definition of the required resources to run the project activities

This chapter describes the measures and activities that were implemented to start the work in the appropriate order and assign a time schedule. These are only preparatory activities.
The steps that were taken in order to carry out activities without funds are presented in the appropriate order.

PA1			
No.	Preparatory work	Preparatory work description	Time schedule
1	Data collection	Based on the technical documentation delivered by local authorities as well as owners of the building the data are being selected	12.2018-04.2019
2	Meetings	with the: - WPT1 responsible partner - local authorities from Emilia-Romagna Region	12.2018-04.2019

Table 8: Time schedule of preparatory activities in the PA1

Table 9 shows the time periods for the period of activity preparation, implementation of activities and subsequent monitoring and evaluation of results. All works must take place before April 2020.

	2018												2019												2020				
Month	Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May
Project month	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
PA1																													

Table 9: PA1 Activities plan.

start of WPT3	PA preparations	PA implementation	PA monitoring/evaluation	end of PA	end of WPT3

Explanation:

PA preparations – A set of activities that are used to initiate the activities, such as collecting data and information, and other administrative work.

PA implementation – A set of activities like implementation of the OnePlace platform, promotional activities.

PA monitoring/evaluation – Checking whether the expected results are received.

5. Definition of problems in the implementation of PA

Each activity may encounter barriers of administrative, organizational or substantive nature. Therefore, it is important to define possible problems that may arise during in energy efficiency.

Problems (with expected delays):

1. Lack of staff in institutions implementing OnePlace – lack of staff may cause delays in implementation and problems with transferring knowledge about OnePlace to other employees;
2. Personnel changes in municipalities and managing institutions – there is no person responsible for the OnePlace platform and the danger of "take with them the knowledge" by outgoing employees;
3. Lack of interest in trainings – the municipalities and managing institutions may not have the time or will to attend trainings and / or conferences.

6. Conclusions

Commitment of ownership to allow administrative description and energy data collection of the building is valuable and necessary when developing energy audits and conducting activities aimed at improving energy efficiency.