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D.T3.3.2 – Pilot actions guidelines **09/2018**

D.T3.3.2: Pilot actions guidelines

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) Energy Agency of the Zlín region (EAZK) (PP3) Regional Energy Agency North (REAN) (PP4) Emilia-Romagna Region (RER) (PP7) Municipality of Velenje (MOV) (PP8) Municipality of Judenburg (JUD) (PP10) European Grouping of Territorial Cooperation NOVUM Limited (EUWT NOVUM) (PP12) City Municipality of Plonsk (CMoP) (PP13)	Fabio Remondino, remondino@fbk.eu Jan Vidomus, jan.vidomus@eazk.cz Damir Mandić, damir.mandic@rea-sjever.hr Attilio Raimondi, Attilio.Raimondi@regione.emilia-romagna.it Apollonia Tiziana De Nittis, Apollonia.DeNittis@regione.emilia-romagna.it Massimo Bottacini, massimo.bottacini@aster.it Špela Šeliga, Spela.Seliga@velenje.si Eva Volkar, E.Volkar@judenburg.at Anna Nowacka, anna.nowacka@euwt-novum.eu Klaudia Buss, klaudia.buss@euwt-novum.eu Kamil Wyrzykowski, k.wyrzykowski@plonsk.pl Julia Chlewicka, j.chlewicka@plonsk.pl

1. Introduction and aims

This deliverable is a kind of guide presenting how to implement measures to improve energy efficiency in public buildings and knowledge on energy consumption data using a tool of 3D building modeling. This document shows what to look for when deciding to start an investment of this type and how to prepare for its implementation. The implementation of the pilot action without funds has also been briefly discussed. This study also includes information on future monitoring energy scheme and energy efficiency indicators, which are indicative of the effects of the project.
The aim of the document is to develop and describe the procedures and methods of work in implementing the pilot actions. The assumption is that they will constitute a ready recipe for how similar investments or activities should be carried out and monitored.

2. Procedures (working methods) of the pilot actions implementation

This chapter describes how the pilot actions (PA(s)) should be implemented. Because investments in individual cases are implemented in two ways - traditional and modern - they are presented and compared below.

2.1. Modern method of the PA(s) investment implementation (PA5, PA7)

The procedure of investment implementation aimed at improving energy efficiency consists of three stages:

Stage 1 – preparation

- public procurement (the tendering process) selection of external expert;
- selecting an external expert who will support the implementation of investment and conducting activities (for those pilot actions that have this in their tasks);
- defining strategic goals and priority directions of activities - achieving reduction of energy consumption, emission of air pollutants, reduction of costs;
- inventory of the initial state - list of used energy carriers and devices, characteristics of buildings in terms of energy demand and energy consumption;
- identification of problem areas - poor quality of used fuel, low efficiency of heating devices, transmission losses in power installations, leaks in building partitions;
- definition of target indicators of the effects of implementing priority actions;
- identification of ways to improve energy efficiency for a given building and making decisions on the type of activities - replacement or modernization of energy installations and equipment, introduction of automation and control in the use of energy, monitoring and energy management;
- determination of the scope of work according to the choice of activities and financial possibilities;

Stage 2 – development and implementation of the investment

- designing a technical solution and cost estimate; public procurement (the tendering process) selection of contractor and equipment; the political decision by the responsible institution; selection and signing of the contract with the contractor of works; verification of technical design and cost estimate;
- purchase of selected equipment;
- supervision and receipt of works;

Stage 3 – operation

- proper operation of equipment and installations - learning to operate equipment, installations and energy-saving behaviors;
- monitoring and evaluation of results.

The above procedure is schematically illustrated in Figure 1.

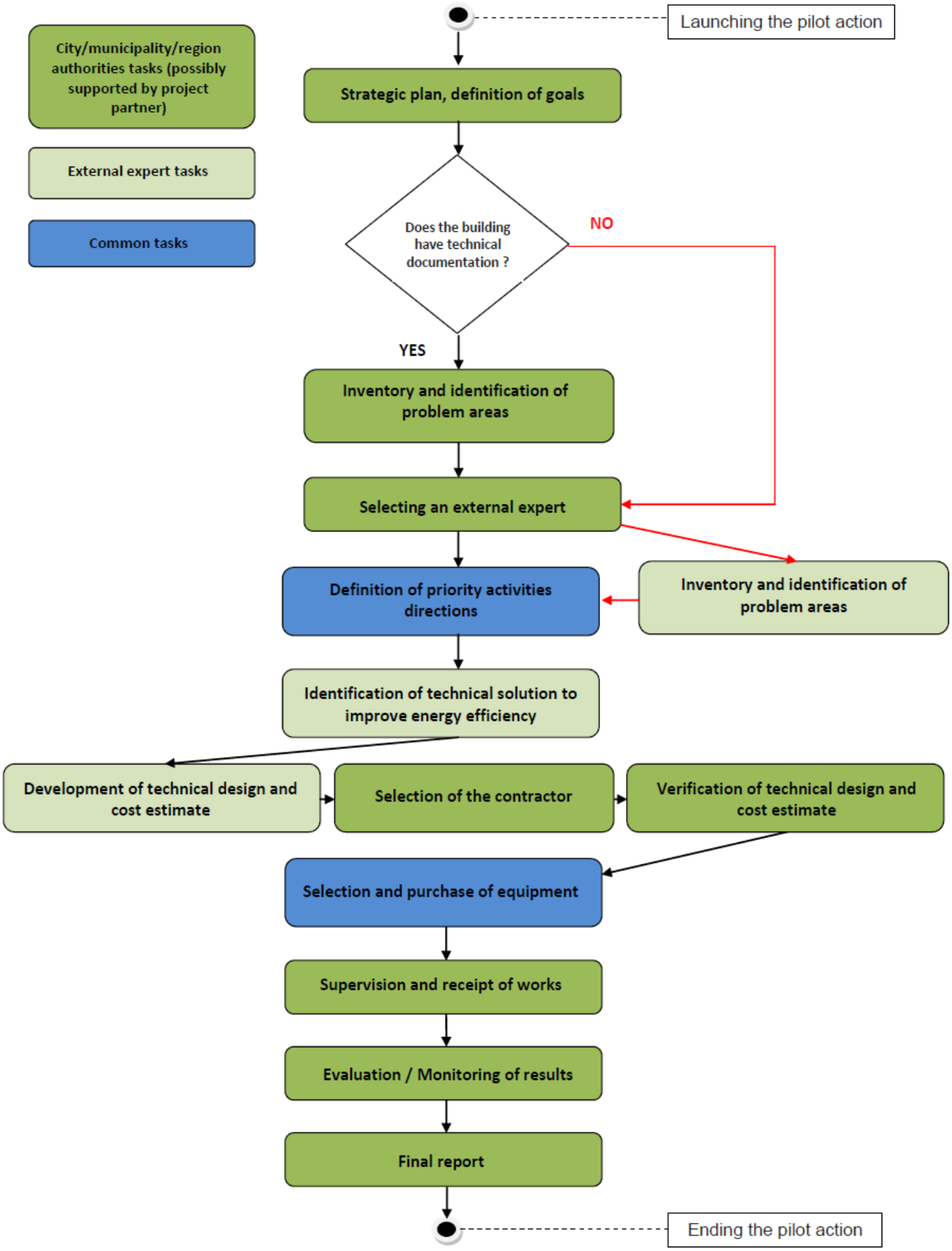

Figure 1: Modern PA implementation procedure diagram.

In the above-mentioned procedure and method of operation, an important element is the work structure, where the key investment players are the investor, designer and contractor. This is shown in Figure 2. This approach is based on close and mutual cooperation of these three entities. Thanks to this, information about the investment is exchanged and shared, which can speed up work and prevent misunderstandings, as the contractor works on the same project as the designer and can submit comments on an ongoing basis. In this way, it eliminates the conflict between the assumptions of the project and the feasibility of implementation. It is connected with incurring mutual benefits but also risk in case of failure. However, this should be a strong incentive to make investments successfully for all interested parties.

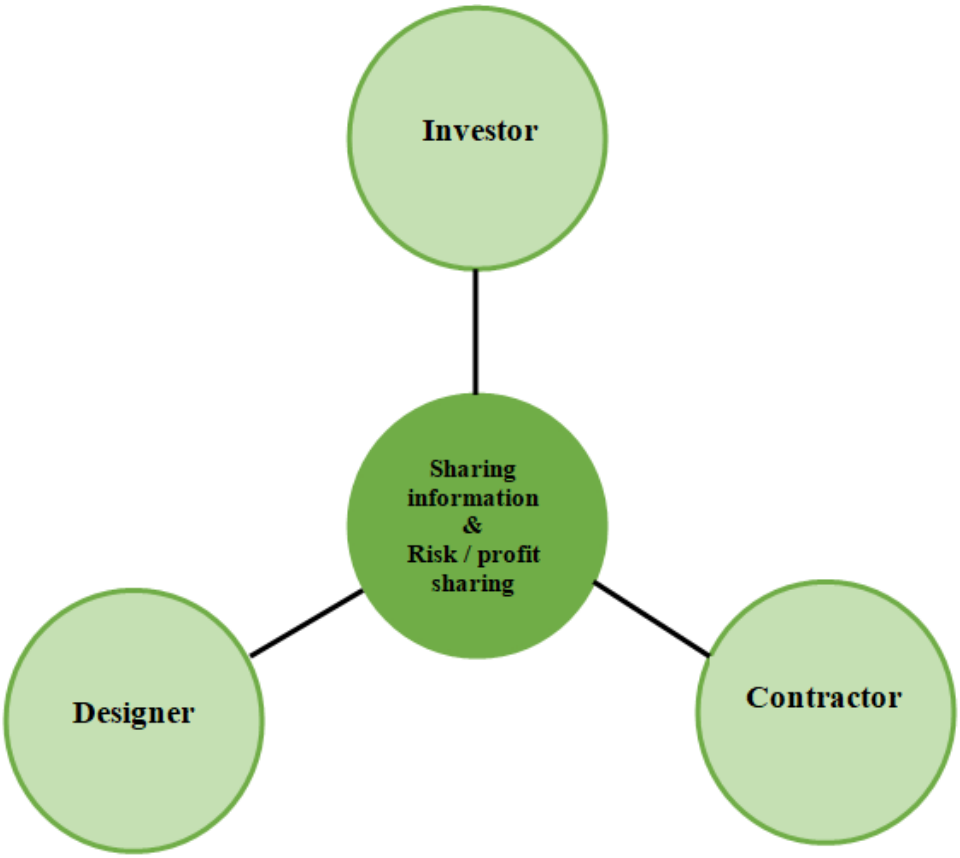

Figure 2: Scheme of key players in the investment cooperation.

2.2. Modern method of the PA3 investment implementation

The procedure of investment implementation aimed at improving energy efficiency consists of three stages:

Stage 1 – preparation

- Energy agency of the Zlín region is in the role of an external expert who will support the implementation of investment and conducting activities
- defining strategic goals and priority directions of activities - achieving reduction of energy consumption, emission of air pollutants, reduction of costs; Energy agency of the Zlín region cooperate with the Zlín region on the strategies

- inventory of the initial state - list of used energy carriers and devices, characteristics of buildings in terms of energy demand and energy consumption; Energy agency of the Zlín region support the external energy expert with energy management.
- identification of problem areas - low efficiency of heating devices, low quality of façade caused by time
- identification of ways to improve energy efficiency for a given building and making decisions on the type of activities - replacement or modernization of energy installations and equipment, introduction of automation and control in the use of energy, monitoring and energy management;
- determination of the scope of work according to the choice of activities and financial possibilities;

Stage 2 – development and implementation of the investment

- designing a technical solution and cost estimate; using the right donation title for the investment, public procurement, selection and signing of the contract with the contractor of works; verification of technical design and cost estimate;
- Building improvement

Stage 3 – operation

- proper operation of buildings - installations and energy-saving behaviors;
- monitoring and evaluation of results. Energy agency of the Zlín region continuously monitor the consumption of the buildings. Furthermore EAZK monitor the CO_2 in the buildings and learn buildings user like teachers about the ventilation.

The above procedure is schematically illustrated in Figure 3.

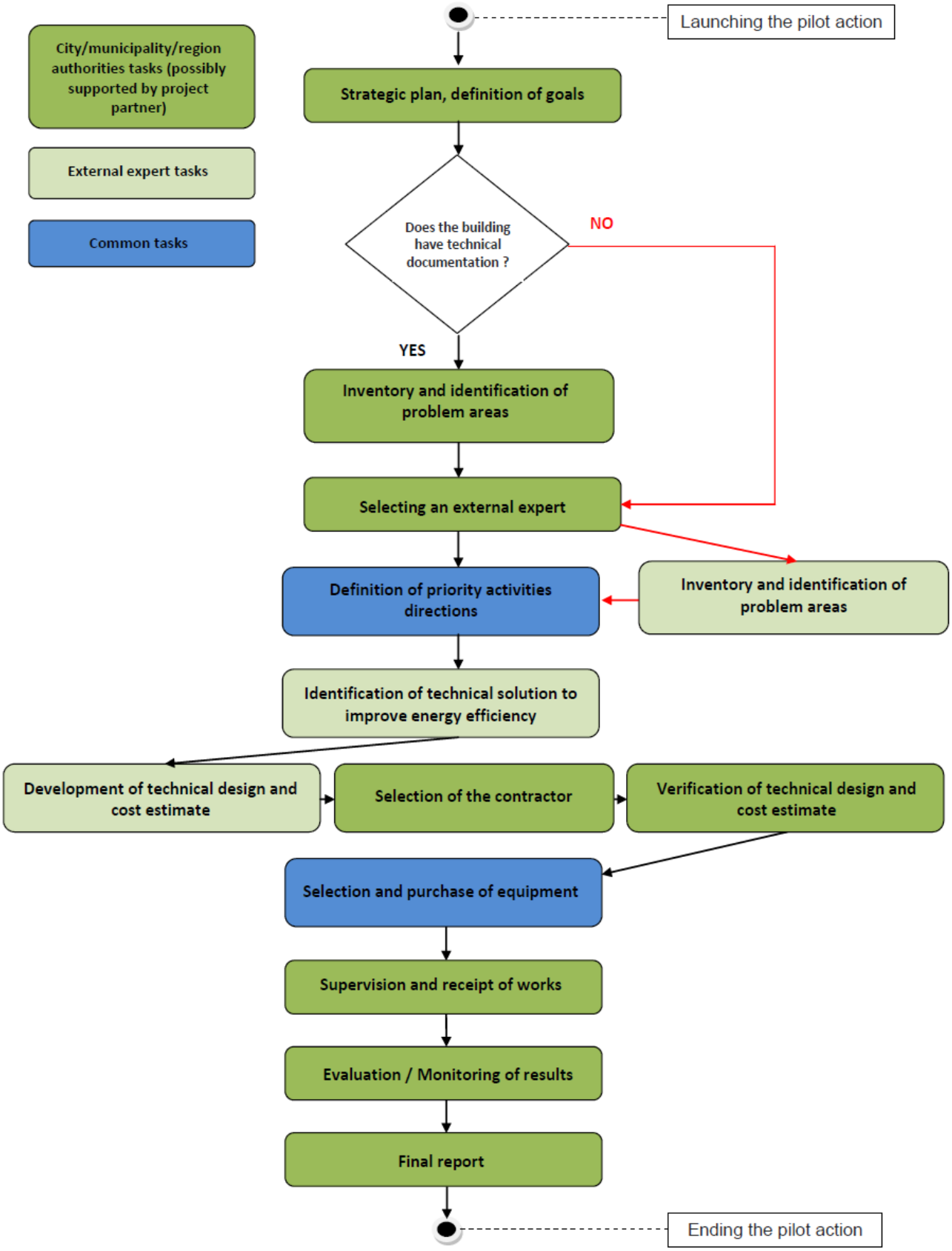

Figure 3: PA3 implementation procedure diagram.

In the above-mentioned procedure and method of operation, an important element is the work structure, where the key investment players are the investor, designer and contractor. This is shown in Figure 4. This approach is based on close and mutual cooperation of these three entities. Thanks to this, information about the investment is exchanged and shared, which can speed up work and prevent misunderstandings, as the contractor works on the same project as the designer and can submit comments on an ongoing basis. In this way, it eliminates the conflict between the assumptions of the project and the feasibility of implementation. It is connected with incurring mutual benefits but also risk in case of failure. However, this should be a strong incentive to make investments successfully for all interested parties.

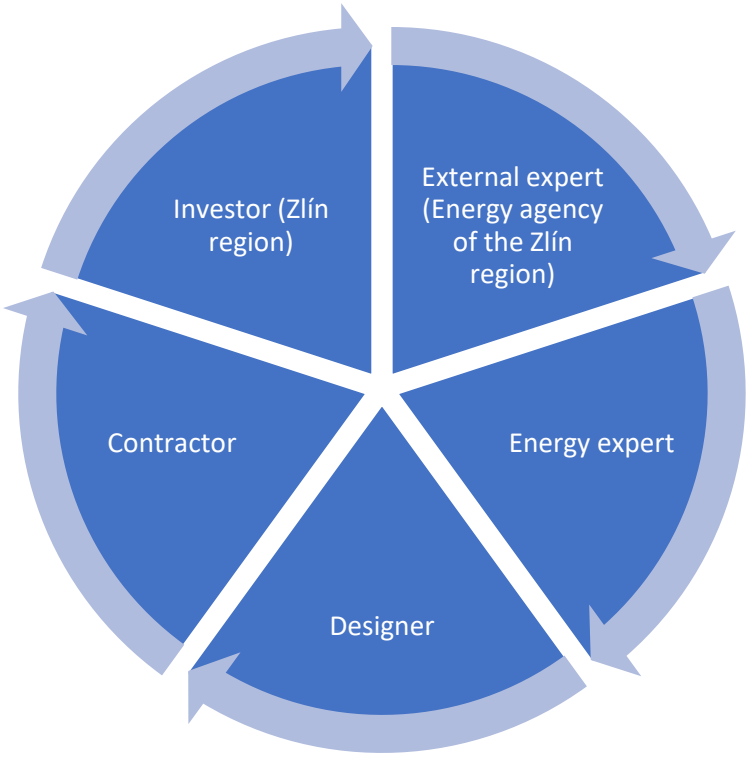

Figure 4: Scheme of key players in the investment cooperation.

2.3. Traditional method of the PA(s) investment implementation (PA2, PA6)

The procedure of investment implementation aimed at improving energy efficiency consists of three stages:

Stage 1 – preparation

- public procurement (the tendering process) selection of external expert (Project Partner – Regional Energy Agency North (REAN) is an expert in PA6);
- selecting an external expert who will support the implementation of investment and conducting activities (for those pilot actions that have this in their tasks);
- defining strategic goals and priority directions of activities - achieving reduction of energy consumption, emission of air pollutants, reduction of costs;

- inventory of the initial state - list of used energy carriers and devices, characteristics of buildings in terms of energy demand and energy consumption;
- identification of problem areas - poor quality of used fuel, low efficiency of heating devices, transmission losses in power installations, leaks in building partitions;
- definition of target indicators of the effects of implementing priority actions;
- identification of ways to improve energy efficiency for a given building and making decisions on the type of activities - replacement or modernization of energy installations and equipment, introduction of automation and control in the use of energy, monitoring and energy management;
- determination of the scope of work according to the choice of activities and financial possibilities;

Stage 2 – development and implementation of the investment

- designing a technical solution and its verification;
- cost estimate and its verification;
- public procurement (the tendering process) selection of contractor and equipment;
- the political decision by the responsible institution;
- selection and signing of the contract with the contractor of works;
- purchase of selected equipment;
- supervision and receipt of works;

Stage 3 – operation

- proper operation of equipment and installations - learning to operate equipment, installations and energy-saving behaviors;
- monitoring and evaluation of results.

The above procedure is schematically illustrated in Figure 5.

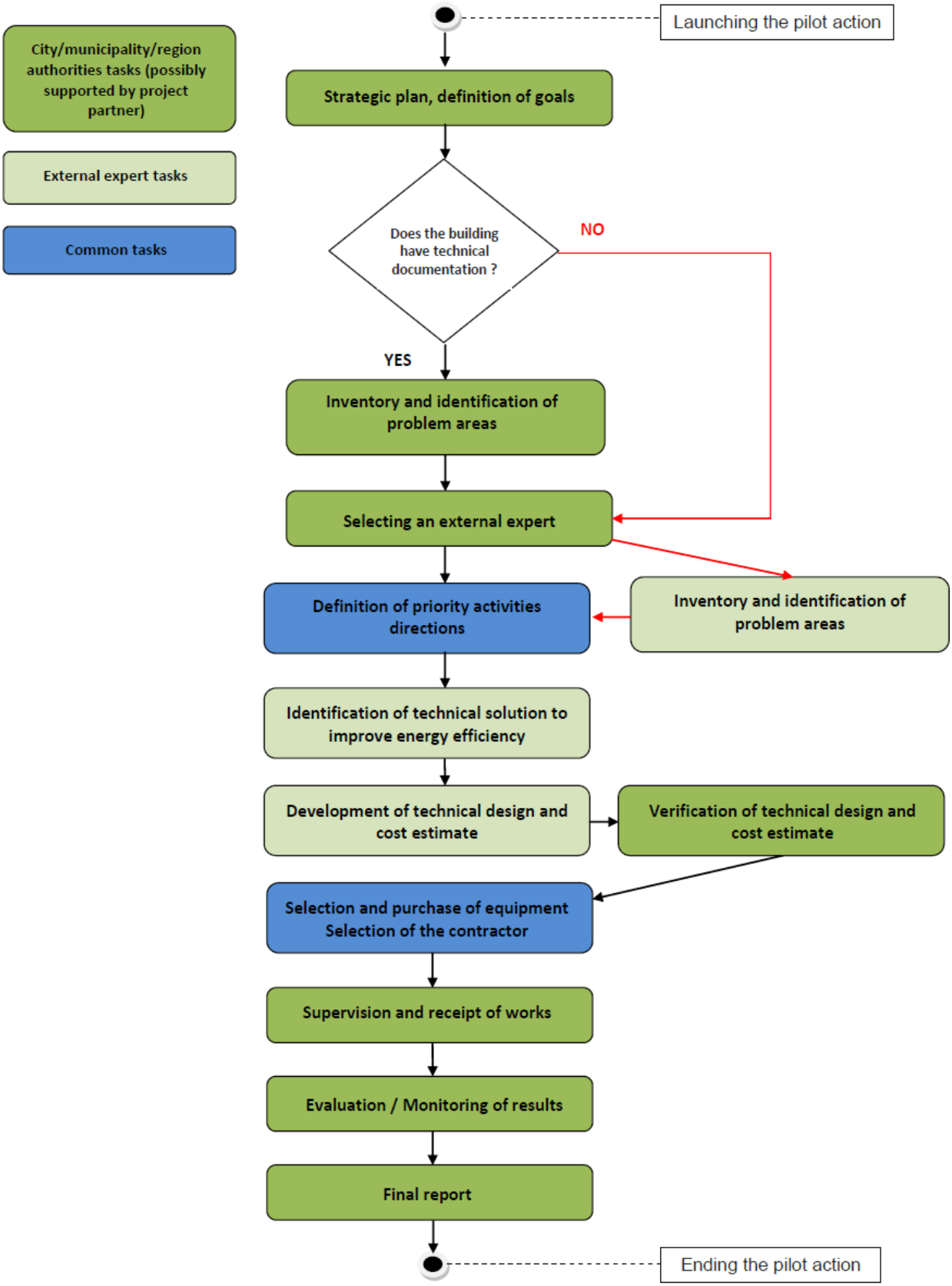

Figure 5: Traditional PA implementation procedure diagram.

Methodologies comparison:
Although the difference between the traditional and modern approach to the implementation of an energy investment may seem slight, it mainly consists in the assumption that the designer's and contractor's work takes place on the same project at the same time, making it possible to detect possible collisions and problems related to different perception of the project by the designer and contractor. The contractor has access to the project also at the design stage, which makes it possible to intervene (if it is needed) and discuss the lack of possibilities or difficulties in transferring the project to the actual facility. It also limits the number of solution variants for a given investment, as it is possible to verify and reject the concept on a regular basis, which may be inconvenient for subsequent implementation.

2.4. Project concept for improving energy efficiency

Each energy project consists of three phases - Design, Build, Operate. This is shown in Figure 6. They have been described above. However, it should be emphasized how important advice for the investor is. Consulting can take a wide range of services - from design, technical and legal support to implementation and further monitoring and verification. If the investor could contract just one company to do all the work, he could get cheaper offer in total unlike individual contracting.

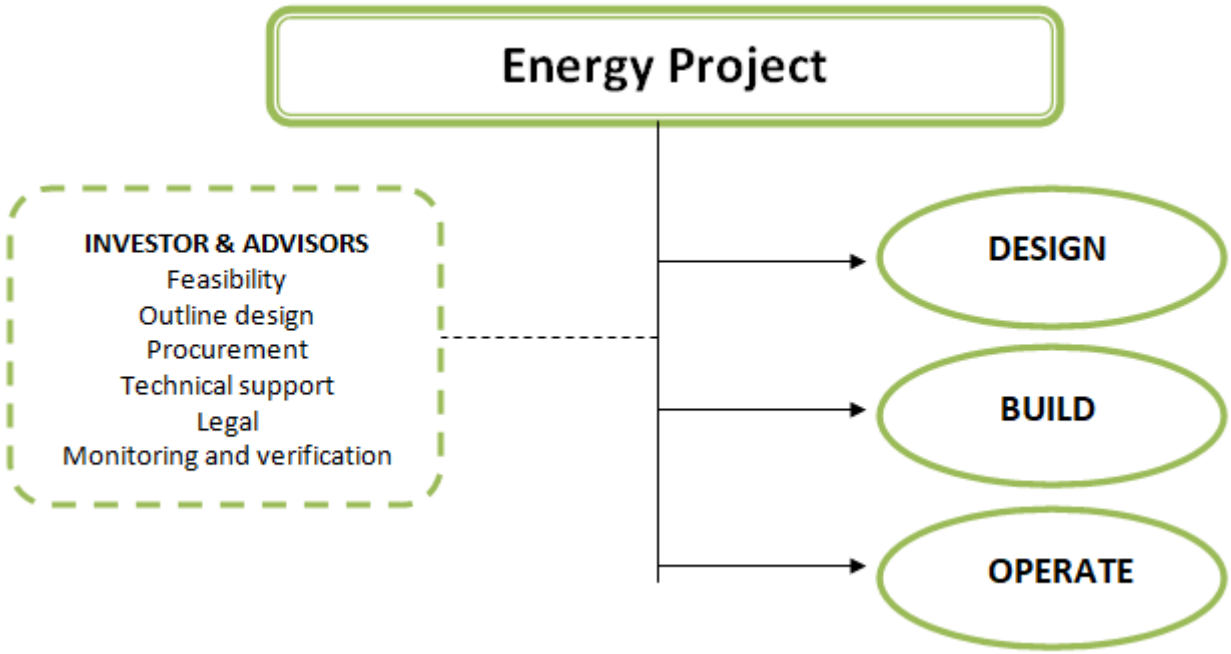

Figure 6: Scheme of energy project.

2.5. Method of no fund PA(s) implementation

The project also includes two pilot actions without realizing the investment. They mainly consist in the implementation of the OnePlace platform for monitoring energy data in selected buildings. In these cases, only care should be taken to find people who will take care of it. Appropriate platform training should be carried out for them.

The procedure of action implementation aimed at improving knowledge on buildings energy use consists of three stages:

Stage 1 – preparation

- inventory of the initial state - list of used energy carriers and devices, characteristics of buildings in terms of energy demand and energy consumption
- definition of the methodology of approach with the developer of the tool and the ownership

Stage 2 – development and implementation of the action

- meeting with the manager of regional energy performance of buildings platform to define set of usable data
- meetings with public operators of:
  - municipalities
  - regional agencies
  - regional laboratory-platforms for energy efficiency in buildings

  with the aim of illustrating the potential of the tool and defining the parameters to be used
- implementation of data on pilot buildings.

Stage 3 – operation

- test performed by public operators on use of tool

2.6. External expert role

The task of an external expert is very important in this project, as it is to serve energy and economic advice in the implementation of the pilot action. The expert should be selected in the course of the tender. The external expert's tasks can be divided into basic and advanced ones.
The expert's basic tasks include:

- support the selection of the contractor, e.g. by assisting in the preparation of the request for quotation;
- advice on the selection of the appropriate equipment needed to carry out the investment or pilot activities;
- development of an executive project for implementing the investment;

The expert's advanced tasks include:

- preparation of a cost estimate of investments or pilot activities;
- exercising investor's supervision over investment implementation;
- coordination of activities.

Due to different needs, the involvement of an external expert is different in individual pilot actions. Not all pilot actions have an external expert. For example, in the case of PA6 in Croatia, internal knowledge and experience in the implementation of smart measurements of the Regional Energy Agency North (REAN), which is an expert in this field, has been used. There was no need to involve an external expert. The same applies to PA3 in the Czech Republic, where an external expert is Energy Agency of the Zlín region (EAZK), which has its own experience and know-how in this field.

2.7. Public-private partnership

Since the implementation of measures to improve energy efficiency under the European Union and national funds is limited, in general, other solutions (not considered in the pilot actions because of long pay-off period or too small investment) may be used. An example is the concept based on public-private partnership, in short PPP. Although this procedure is relatively uncommon on the markets, it is being used more and more boldly. This is undertakings implemented on the basis of a long-term contract concluded between a public entity and a private entity, the purpose of which is to create infrastructure components that enable the provision of public services. The task of the public partner is to provide public services, which is required by law, while the private partner is to run a business and make profits.
PPP replaces the privatization process for a specific period of time. The domain of economic activities and the domain of political and legal responsibility for the provision of public services are separated from each other. Only economic activity is privatized: construction, modernization of public assets, financing, operation and management of an investment project. The availability of public services and their quality remain in the area of public responsibility. The competence for the implementation of public tasks for economic and political competences and assigning them to private partners and public authorities respectively consists in allocating skills to both sides, thus giving the opportunity (with similar, and sometimes smaller expenditures) to increase the volume of public services provided and to increase the efficiency of their work.
Types of contracts that can be covered by the PPP procedure:

1. Operation and maintenance
2. Design and construction
3. Design, construction and operation
4. Expansion around the base
5. Lease and sale
6. Periodic privatization
7. Lease (sale), modernization and operation
8. Construction, operation and transfer
9. Construction, transfer and operation
10. Design, construction, financing and operation

This section only notices and describes an alternative procedure for the implementation of investments improving energy efficiency for ESCO (*Energy Saving Company* or *Energy Service Company*) financing. It could not be used in pilot actions in the project due to the reasons mentioned above.

3. Formulation of the future monitoring energy scheme

In order to facilitate the estimation of whether the goals are achieved, evaluation criteria should be formulated that will monitor progress and show how close or how far we are from the intended goal. In this case, energy, financial, environmental, social and promotional indicators will be these criteria.

Energy efficiency indicators determine in a reliable, measurable and unambiguous manner the level of EE improvement. They show whether the intended goals have been achieved. They can be determined as a percentage or value. For the purpose of pilot actions, the below mentioned indicators will be estimated, which will allow correct verification of activities and will be used to evaluate tasks and progress.

In the project, we use four main indicators:

- ❏ Energy: Reduction of energy consumption
- ❏ Financial: Optimization of costs (financial savings)

- Environmental: Reduction of CO_2 emission, improvement of air quality
- Social: Increasing the comfort of the building use, easier operation of the building

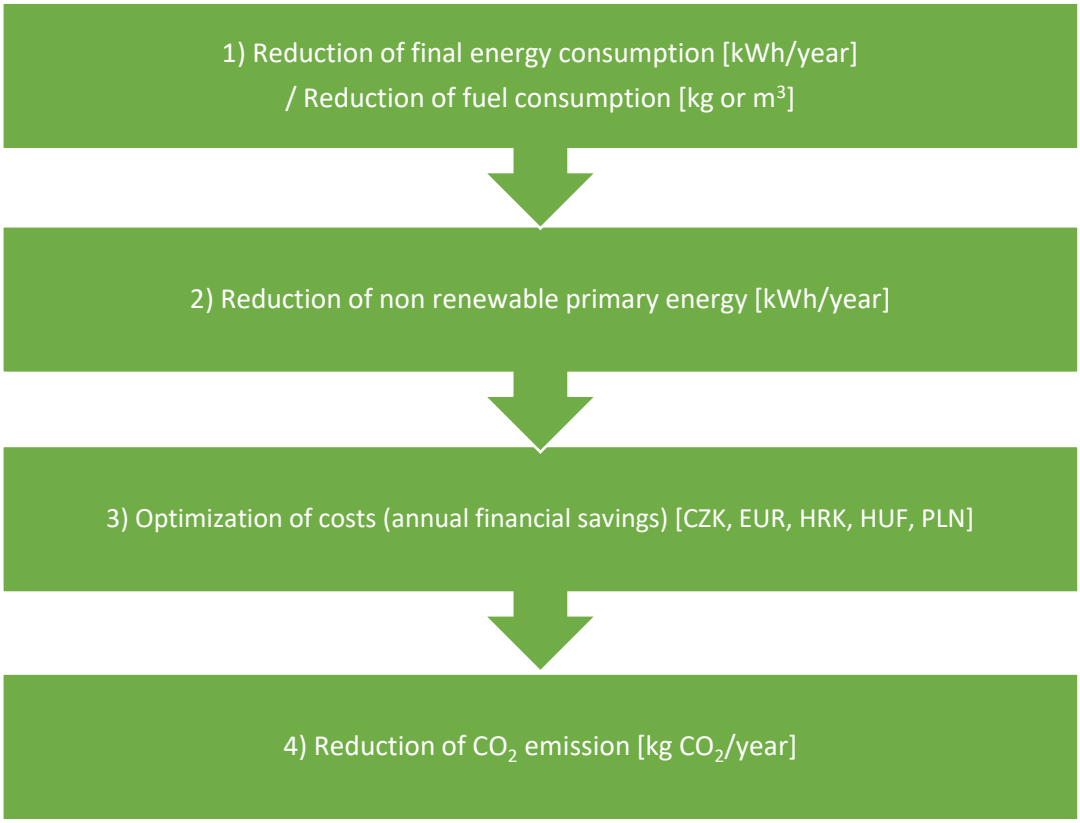

Figure 7: Main energy efficiency, financial and environment indicators.

"Soft" energy efficiency (EE) indicators like promotion of conscious and rational use of energy and dissemination of the project results (seminars, conferences, meetings, training courses etc.) are also taken into account as they complement the energy and financial indicators. In addition, they are also measurable resources through the number of promotional campaigns or organized meetings, seminars and conferences.

Confirmation of the achieved level of energy efficiency will be a process. This will be based on the collection of data from the energy monitoring system. Criteria for assessing pilot actions without investment will be based only on "soft" energy efficiency indicators.

3.1. Monitoring and management energy scheme

The energy monitoring and management system (smart meters) is the most important element of the investment. As part of the pilot activities, its operation and effectiveness will be tested in real conditions in public utility buildings of various purpose and in different locations.

Structure and description of methodology

The smart meter measures the total amount of electricity consumed in a given building. Everyone can use electricity more rationally. Analysis of electricity consumption will allow us to find out, for example, at what times the "electric" activity of the building is the largest.
The smart meter is distinguished by the ability to automatically send measurement data. The data is properly encrypted and flows from the meter after the existing cable installation to the medium voltage (MV) station, and from there they are sent to the energy distributor. The smart meter sends consumption data at set intervals. The information provided by smart meters is aggregated. Thanks to the use of an appropriate telecommunications infrastructure, it is possible to send information in two directions: from and to the meter. This enables consumers to regularly read energy consumption, and suppliers control and manage the load on the grid, which receives data on both the consumption and consumption habits of the recipient, when it consumes more energy during the day and when less. Bi-directional data flow is also the basis for the functioning and development of prosumer energy.
Smart meters allow you to pay for actually consumed electricity and control how to use it. Therefore, no predicted bills will be needed - we will pay for real power consumption.
Another advantage of smart meters is their wide possibilities to read not only power consumption but also other media (including gas and water).

Measurement data can also be monitored by the person managing the building. Table 1 specifies who will monitor energy consumption in individual pilot activities - energy distributor (operator) or a designated person from the building's personnel.
In the case of PA1 and PA8, where the OnePlace platform for energy monitoring plays a major role, it is also important to appoint a person who will operate the tool for selected buildings.

	Person or Institution designated for energy monitoring and management
PA1 Italy	Aster S. Cons. p. A.: Mr. Massimo Bottacini
PA2 Austria	Mr. Horst Schrittwieser, school janitor
PA3 Czech Republic	Energy Agency of the Zlín region
PA4 Hungary	No information
PA5 Poland	Over the next year, the Contractor of the works is required to collect data and provide quarterly reports on energy consumption in monitored rooms. Later, the school employee will monitor energy consumption - the system will be configured to operate within the wireless network in the facility.
PA6 Croatia	Kindergarten Loptica: Mr. Nenad Zamljačanec ; Primary school Brace Radic: Mr. Nenad Radicek
PA7 Slovenia	Mr. Bogdan Jug, head of technical department of public music school, maintainer of the building; Mr. Jure Boček, external expert for the setting up of an advanced automatic data capture system (smart metering) = replacement/modernization of energy installations and equipment, introduction of automation and control in the use of energy; Mr. Jernej Britovšek, selected external expert engaged to support the implementation of investment and conducting activities (preparation of final report)
PA8 Poland/Czech Republic	Department of Investment, Municipal and Spatial Economy, City Hall of Lubawka

Table 1: Organizational structure of energy monitoring and management.

The idea of pilot actions with investment consists of four basic elements:

- MONITOR – first you need to monitor the energy flow in the building;

- CONTROL – after the analysis one should state what distribution of energy consumption occurs and start to control energy consumption in a rational way;
- MANAGE – set up and configure the energy system to ensure optimal energy consumption;
- SAVE – reducing energy consumption, reducing costs.

This idea is shown schematically in Figure 8.

Figure 8: Monitoring and management energy scheme.

The idea of pilot actions without funds consists of four basic elements:

- DEFINE – first you define of the set of usable data;
- ILLUSTRATE – next illustrate the potential of the tool;
- IMPLEMENT – implement of data on pilot buildings;
- TEST/EVALUATE – test performed on use of tool and evaluation.

This idea is shown schematically in Figure 9.

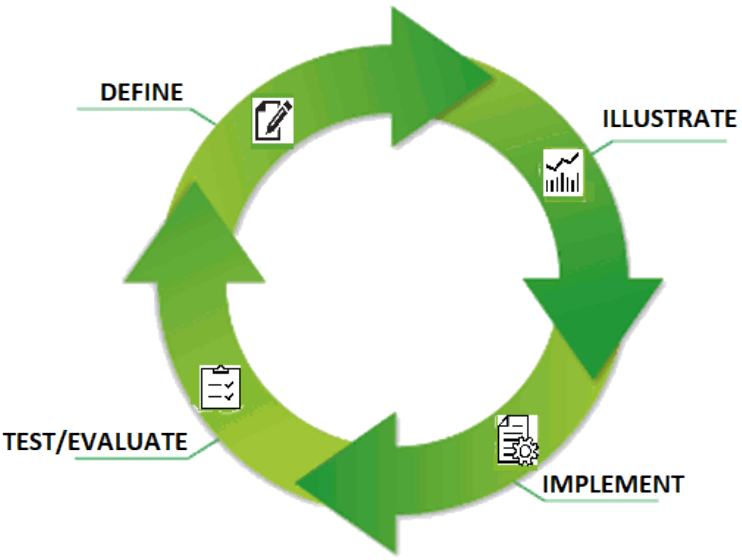

Figure 9: Implementation and testing monitoring tool scheme.

4. Problems solution in the implementation of PA

Each investment or activity may encounter barriers of a financial, administrative, organizational or substantive nature. Therefore, it is important to define possible problems that may arise when investing in energy efficiency.
Table 2 contains problems that appeared at the stage of preparing investments in pilot activities.

No.	Problem	Comments	Solution
1	Exceeding the investment deadline	Planned investment implementation later than expected due to complicated activities (reported by PA2 in D.T3.3.1)	The division of the whole investment into stages, part of which can be settled in the project results. In the general case (not in the project), remember and keep the time flexibility at the planning stage.
2	Exceeding the investment budget	The planned investment budget turned out to be larger than expected due to complicated activities (reported by PA2 in D.T3.3.1)	Decision and talks on the side of the project coordinator
3	Lack of staff in institutions implementing investments or OnePlace	Lack of staff may cause delays in implementation and problems with transferring knowledge about OnePlace to other employees (reported by PA1 and PA8 in D.T3.3.1)	Implementation of activities requiring involvement from municipalities and building management institutions with a time reserve
4	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 (reported by PA1 and PA8 in D.T3.3.1)	Designation of responsible persons and obliging them to transfer their knowledge in the case of leaving work
5	Lack of interest in trainings	The municipalities and managing institutions may not have the time or will to attend trainings and / or conferences (reported by PA1 and PA8 in D.T3.3.1)	Showing the benefits of participating in trainings and conferences and using OnePlace

Table 2: Problems and solutions in the pilot actions.

5. Conclusions

This study is an action plan along with the specification of the organizational form and guidelines for the implementation and monitoring of the activities carried out. Subsequent implementation of pilot projects will be based on the guidelines presented.

Although different procedures for implementing energy investments in pilot actions have been presented and applied, each of them is recommended. The choice depends solely on the needs and capabilities of those involved in the investment process.
Further evaluation of pilot actions will be based on separated criteria for the monitoring of results and will be described in next report (D.T3.2.1).