

OUTPUT FACT SHEET

D.T3.3.4 PA3 design for 7 buildings in Slovenia

Project index number and acronym	CE51 TOGETHER
Lead partner	Province of Treviso
Output number and title	D.T3.3.4
Investment number and title (if applicable)	I4 - Investment in an energy monitoring system for pilot actions in 7 public buildings
Responsible partner (PP name and number)	University of Maribor, PP3
Project website	https://www.interreg-central.eu/Content.Node/TOGETHER.html
Delivery date	20.01.2019

Summary description of the pilot action (including investment, if applicable) explaining its experimental nature and demonstration character

The pilot actions are based on the introduction of the concept of Behavioural and analytical demand-side management (DSM). Behavioural DSM focuses on educating consumers and encouraging individual participation to attain energy saving, whereas analytical DSM finds opportunities for saving energy through equipment monitoring and data analytics.

PA3 wanted to trigger the process of change or, better still, for change, by focusing on all users who live and manage buildings, giving them an instant measure of the effectiveness/ineffectiveness of activities undertaken. The first activity to stimulate awareness is, therefore, visualization and immediate and objective evaluation provided, in the case of TOGETHER project, by investments in devices for the real-time detection and monitoring of electricity and heat consumption.

Two modes of system interventions were carried out and are detailed in the Investment fact-sheet, available on the website. The pilots have been concretely involved in a project of technological and behavioural experimentation. While technological experimentation consists of the installation of devices, as well as relevant training and the increased ability to analyse consumption scenarios, behavioural experimentation comprises a series of activities common to all the buildings and for specific activities defined by the single Negotiating Panel.

The PAs process was as follows:

1. Constitution of a mixed work group, composed of as many subjects representing the building and sub categories of users, called the **Negotiating Panel**;
2. Implementation of a **SWOT survey** of issues concerning buildings realised by the working group;
3. Implementation of **energy audits** which suggest a list of necessary interventions to improve energy efficiency in each building;
4. **Verification and analysis** by the working group of the results of energy audits;
5. **Acquisition of skills** and knowledge to leverage the potential of sensors;
6. Identification of **critical points** and definition of an Action plan per pilot building, including technical, financial and Demand Side Management activities;
7. Verification and monitoring of the energy curves and consumption targets;
8. **Signing the Statements** on considering recommendations of TOGETHER project.

The specific activities of each building reflect the contents of the intervention plan defined by each negotiating panel based on framework of suggested interventions, to include “nudges” through the process of training, animation and support triggered by TOGETHER team. To raise awareness and to trigger changes in behaviour of pilot and other public buildings users the TOGETHER team of PP3 implement the following activities: production of posters, leaflets, labels, tips on energy efficiency, creating graphic/video tools, organising local awareness events to activate the process of reflection and behaviour change.

Target groups actively involved in the project by participating training, awareness raising events (local workshops, negotiating panel, communication campaign, etc.): staff working at student dormitories and at faculties: 50; end-users of the public buildings: 250 students, 80 professors and 150 other staff.

Results: (1) Improved capacity of managers of the buildings to engage the whole chain of the users in the decision-making process related to usage of the spaces and time of usage; (2) **3 Negotiating panels (by the end of January there will be implemented 12 meetings with them)**. It is a group of people on a specific object/building who work together in a joint effort to reach the set energy saving goals, to achieve mutual benefit (economic and environmental). The Negotiating Panel Concept is made up of representatives of owners, managers and users (including end users, i.e. occupants), contributing together to the energy management of the building; (3) **Establishment of a Negotiation Panel was the first step in introducing full-scale energy management system in a building**. It comprises all relevant stakeholders and envisages open discussion principles to define measures and deliver desired energy saving targets at the level of an individual building.

By the end of January 2019, it will be signed **6 Statements on considering recommendations of TOGETHER project** (2 are already signed).

NUTS region(s) concerned by the pilot action (relevant NUTS level)

(SI032) Drava Statistical Region and (SI036) Lower Sava Statistical Region.

Pilot Actions was implemented in seven public buildings:

1. SI036 Lower Sava Statistical Region (Spodnjeposavska statistična regija): Faculty of Energy Technology, Krško
2. SI032 Drava Statistical Region (Podravska statistična regija): Student Dormitory Number 1, Maribor
3. SI032 Drava Statistical Region (Podravska statistična regija): Student Dormitory Number 2, Maribor
4. SI032 Drava Statistical Region (Podravska statistična regija): Student Dormitory Number 3, Maribor
5. SI032 Drava Statistical Region (Podravska statistična regija): Student Dormitory Number 4, Maribor
6. SI032 Drava Statistical Region (Podravska statistična regija): Student Dormitory Number 5, Maribor
7. SI032 Drava Statistical Region (Podravska statistična regija): Faculty of Education, Faculty of Arts and Faculty of Mathematics and Natural Sciences, Maribor.

Investment costs (EUR), if applicable

The contracted value for the SMS installation included:

- 1) BL5 - thematic equipment (Mechanical, electrical and communication equipment; Services and education (delivery of the material, elaboration of the program, establishment of the system, implementation of energy monitoring, commissioning, education of the client) - total amount of 42,395.94 € with VAT ((ERDF: 36,036.55 €)
- 2) BL6 - works for installation the thematic equipment - total amount of 7,490.80 € with VAT (ERDF: 6,367.18 €).

Total investments - contracted amount is 49.886,74 € with VAT (ERDF: 42.403,73 €).

	Cost/unit	units	subtotal	VAT	Total
THEMATIC EQUIPMENT, SERVICES & EDUCATION					
Mechanical, electrical and communication equipment (hardware, electrical and communication equipment) for 4 buildings	6,363.70	4	25,454.79	5,600.05	31,054.84
Setting up a CNC system	3,600.00	1	3,600.00	792.00	4,392.00
Setting up communication, picking devices in the SCADA system	1,500.00	1	1,500.00	330.00	1,830.00
Creating visual representations for each object, including the parameters for parameterization and management, and the transfer of measurements into the SQL database	1,310.00	1	1,310.00	288.20	1,598.20
Implementation of the energy management and monitoring system	1,100.00	1	1,100.00	242.00	1,342.00
Run startups, training of users	446.50	4	1,786.00	392.90	2,178.90
WORKS					
Works related the installation of mechanical, electrical & communication equipment	6,140.00	1	6,140.00	1,350.80	7,490.80

Expected impact and benefits of the pilot action for the concerned territory and target groups and leverage of additional funds (if applicable)

The expected impact on the territory is that pilot activities cover many people who are familiar with energy efficiency measures. The results of those measures will, as an example of good practice, also affect other similar institutions in the territory to join the activities that enable energy efficiency as they will try to reduce costs devoted to energy products. They will recognise that the introduction of effective data collecting can help to better plan energy regimes and, consequently to save energy and other resources (water). Disseminating project results and educating pilot buildings' users will be extended to all users of buildings in this area, which can have a multiplier effect on the wider surroundings, as they could implement acquired knowledge outside the pilot area, for example to indicate the behaviour of informed users at home and in all other buildings. An important role here is also the raising and education of the youngest members of our society, because we know that for the shift in the minds of a wider society, it is necessary to start education from an early age. In this way, we expect that savings and investments will be multiplied in the efforts for efficient use of energy.

In terms of **benefit**, the experimentation of the new technical equipment installed, combined with behaviour-based energy efficiency programmes, gave a concrete opportunity to improve the current energy monitoring system that is principally based on a "passive" payment of the monthly bills, without a critical verification of the real consumption and the reasons leading to a specific energy consumption.

Sustainability of the pilot action results and transferability to other territories and stakeholders.

The sustainability of pilot activities is reflected in the fact that expanded data capture will contribute to better planning and management of devices and installations related to the economical use of energy and other sources. We believe that measurable results will contribute to reducing costs, at the expense of lower energy consumption and resources. It is a motive for such measurement, along with all other measures, to be passed on, as a good practice also to the level of the entire University in Maribor, and later to other institutions, while one is teaching a wider crowd of people to become aware that energy and drinking water goods, that are increasingly limited and valuable to human use, as they also affect other stakeholders that are important for survival on our planet.

The investment in SMS has a significantly positive effect on the environment and climate through the behavioural change expected to occur at the building users facing them with their own energy consumption data. In addition, this gives an opportunity to buildings owners to monitor daily consumption, which can lead to implementation of more advanced energy efficient measures. Practice shows that the introduction and proactive use of SMS can result in up to 15% of savings. Even more, if we combine such system with proper involvement of building users (Behavioural Demand Side Management), additional 5% can be achieved. This can result in reduction of energy demand, consequently reduction of emissions and CO2 impact. In other words, it can be said that implementation of SMS can be the main figure in setting up a sustainable development of public buildings in case of the TOGETHER Project.

Lessons learned and added value of transnational cooperation of the pilot action implementation (including investment, if applicable)

The knowledge and value added of transnational co-operation is reflected in various approaches to implement pilot actions, which can often also be constrained by local/national regulations. One such example is the extinguishing of lights in buildings, when there is no working time and there is no one in the building, the regulation stipulates that a certain number of lights must on due to the fire. The installation and application of the SMS primarily contribute to the achievement of energy efficiency in the involved buildings. However, the partnership has different dissemination tools through which the results and the lesson learned about SMS are and will be disseminated also at transnational level. Such tools are for instance the newsletters, the library on the project website, Integrated Tools, international conferences and workshops. In addition, an article is planned to be publish in a specialized magazine explaining the different technical approaches of the partners related to smart metering and the lessons learned from the application of the different metering systems. The pilot results will be disseminated on national/transnational level motivating municipalities to invest in the installation of such system in their public buildings.

Contribution to/ compliance with:

- relevant regulatory requirements
- sustainable development - environmental effects. In case of risk of negative effects, mitigation measures introduced
- horizontal principles such as equal opportunities and non-discrimination

The characteristics of the systems used for the pilot buildings comply with the laws and regulations in force at the date of the contract and, particularly must comply with:

- the requirements of the fire department and local authorities;
- the provisions of the Energy Act (EZ-1/2014 and 2015).

Sustainable development: the pilot actions combined with the investment contribute to: stimulating market transformation towards more efficient buildings; mobilising public & private investments, rationalizing public expenditure; participants will be stimulated to adopt more efficient behaviour that can be replicated in other contexts (e.g. at home).

Equal opportunity: The use of monitors for the visualization of the consumption data (real-time based) does not exclude the possibility that disabled people, such as the visually impaired, can be involved in the use of the energy monitoring data, as it is possible to remotely extract the data and transform them into excel tables and graphs that can be explained by other colleagues and/or schools fellows. Negotiating Panels were established without any gender limitations or pre-fixed quota. It must be underlined that in the Italian school system, most of the teachers and women. The percentage of male of female students is conditioned by the type of schools.

Equality between men and women: Any activity based on understanding/targeting differences in patterns of consumption for women and men (e.g. awareness raising activities, design of key messages etc.) guaranteed the respect of non-discrimination and are not to be used against the gender equality principle.

Environment: a profitable use of the smart meters combined with demand side management activities can leverage EE retrofit investments, that could create conditions to improve the users well-being and environment conditions.

References to relevant deliverables (e.g. pilot action report, studies), investment factsheet and web-links

If applicable, additional documentation, pictures or images to be provided as annex

References to the relevant deliverables:

- D.T3.1.1 Preparatory analysis of the technical and management requirements for instilling smart meters
- D.T3.2.3 PA3 design for 7 building in Maribor and Krško - Slovenia
- D.C.6.4 Video guidelines to promote the transferability of the TOGETHER approach (under realization)
- D.C.4.7 Infographic tutorial containing guidelines on how to read and use smart metering systems
- D.C.4.4 Project e-book (under realisation)

Additional documentation:

- Pictures
- Labels
- Power point presentations
- Amateur videos recorded in the pilot buildings available in the Facebook profile of the project.