Demand Side Management Tools

Interreg CENTRAL EUROPE
European Union European Regional Development Fund
TOGETHER

D.T.3.3.6 Report on PA5 realised by PNEC in 9 buildings in Poland

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Introduction

The present document reports on the Polish pilot action involving 9 public buildings from 3 AP municipalities (3 administration buildings, 4 educational buildings and 2 service buildings) in energy saving activities integrating analytical (smart metering) and behavioural (change of users' behaviours) approach to reducing energy consumption and related costs. The pilot included: (1) carrying out energy audit of each pilot building, (2) installation of smart metering systems, (3) setting up of a Negotiating Panel and a Building Alliance and (4) implementing set of analytical and behavioural measures aiming at reducing energy consumption, which in case of Poland involved launching competition for "energy-saving master" with specific guidelines for building teams and a set of tasks ensuring that they address all relevant consumption aspects and involve all key groups of users. The teams are rated both for level of savings achieved and for completing relevant tasks on the path leading towards them (with some extra points to be obtained for special creativity and finding "untypical" ways for energy saving). After completion of the pilot, in 2019, the points will be calculated and the "energy-saving master" announced during official award ceremony. The experience will be also used for delivering "Reinvestment action plan" (for reinvesting financial savings achieved in further EE measures) and an "Action plan for energy efficiency in public buildings" (aimed at introducing tested and other project tools in a wider range of buildings).

The Polish pilot is one of 8 pilots implemented in PP regions in order to demonstrate effectiveness of DSM (Demand Side Management) measures integrating behaviour-based interventions with auditing and monitoring devices, as well as other relevant tools (financial tools, contracting tools, EnMS) for improving energy efficiency of public buildings. Each PP is working on a cluster of buildings (85 in total) that are either directly owned & managed by him or are owned & managed by involved Associated Partners. In case of Poland the 9 pilot buildings are owned by 3 Associated Partners - municipalities of Besko, Raciechowice and Żyraków.

The present document summarises the Polish pilot and its already known results, as well as its added value and main lessons learnt.

Summary description of the pilot action (including investment, if applicable) explaining its experimental nature and demonstration character. Overview of the Pilot Actions implemented, general introduction. Write max 2 pages that introduce your local activities, the target group engagement, results. Please give evidence of the approaches implemented in the different buildings in particular if they are not belonging to the same category (educational, institutional, others). Include some pictures in the "GALLERY".

The Polish pilot engaged 9 public buildings from 3 AP municipalities (3 administration buildings, 4 educational buildings and 2 service buildings) in energy saving activities integrating analytical and behavioural approach to reducing energy consumption & related costs. **Analytical measures** included carrying out energy audit and installation of smart metering systems with dedicated software enabling better energy management, setting up alarms, etc. **Behavioural measures**, on the other hand, included encouraging change of building exploitation and maintenance routines, as well as change of user behavior based on better awareness of the building, energy and energy saving methods.

In order to create sense of rivalry and strive for the highest possible savings a competition for the "energy-saving master" was organised with the building teams being rated both for level of savings achieved and for completing relevant tasks on the path leading towards them (with some extra points to be obtained for special creativity and finding "untypical" ways for energy saving). 6 tasks were prepare and given to the building team and PNEC's staff helped with the execution of some of them on the spot. The tasks prepared are:

(1) internal energy review/audit of the building;

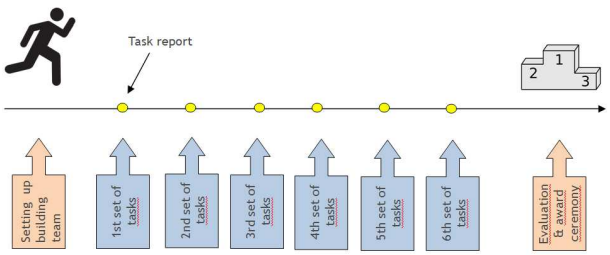
(2) social audit of the building;

(3) exploring and using heat saving potential;

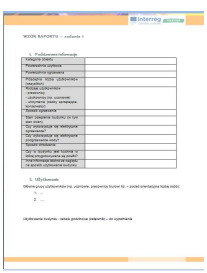
(4) exploring and using electricity saving potential assoc. with lighting;

(5) exploring and using electricity saving potential assoc. with electric appliances.

Each task was accompanied by a task report to be filled in by the building teams. Below there is a scheme showing the course of competition:



Exemplary task and task report:



The teams were encouraged not only to explore building's energy saving potential but also to implement some of the measures identified (mostly low-cost and no-cost). Their job was to also engage building users in energy saving efforts as much as possible. In between the tasks the building teams received short thematic newsletters with further food for thoughts and energy-saving tipis.

Installed smart metering systems are very important element of the pilot action, as they not only enable real-time monitoring of electricity & heat consumption and seeking possible optimizations, but also give immediate feedback on the results of implemented measures. They have been described in detail in the Investment Factsheet delivered with the previous report. Since the systems have been installed and launched into operation in more or less parallel time than start of the competition, historic data from energy bills and meters will be used to calculate achieved annual savings. These data have been already collected and analysed by PNEC.

Once energy savings are calculated (as final values) for each building and collected points summarized, the "energy-saving master" will be announced during official award ceremony planned in Spring 2019. The experience is also being used for delivering "Reinvestment action plan" (for reinvesting financial savings achieved in further EE measures) and an "Action plan for energy efficiency in public buildings" (aimed at introducing tested and other project tools in a wider range of buildings).

Experimental nature of pilot action: the pilot action encourages and tests integration of different DSM measures, including smart metering systems, that in this case are not only used for optimizing energy consumption ("traditional" approach) but also for educational purposes (through dashboards placed in building' halls) and as a feedback system. The pilot also tests some of the innovative tools developed within the project such as e.g. social audit or users' involvement measures proposed in D.T2.2.2 Good Governance Handbook or D.T2. 3.3. DSM tools.

Demonstration character of pilot action: the whole pilot, as well as its respective components (e.g. smart metering system, competition, "tasks" helping to fully explore building's energy saving potential) can be replicated in other building, municipalities and regions (after some adaptation).

Indicate the NUTS (Nomenclature des unités territoriales statistiques) regions concerned by the pilot action

Pilot action was implemented in 9 public buildings in 3 Polish municipalities (Associated Partners) located in the following NUTS region(s):

1. Municipality of Besko – NUTS 3: PL323
2. Municipality of Raciechowice – NUTS 3: PL214
3. Municipality of Żyraków – NUTS 3: PL325

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

Sustainability of pilot action results: Smart metering systems installed in pilot buildings will remain there and will be further used to monitor and optimize energy consumption and quickly react to any anomalies and other issues identified. Buildings' personnel have been trained in using the systems and data analysis therefore they should be able to do it individually in the long term. Also new knowledge passed to building users and energy-saving solutions proposed will remain with them and it is expected that at least some of encouraged habits will be kept in the long term. To ensure that PNEC will further work with the building owners (APs being members of the network), possibly also within new projects and initiatives that could build on the existing experience. The pilot action also improved pilot municipalities (local authorities and administrations) capacities to work on their own energy –related projects in the future and increase their commitment to work on energy issues. This commitment should be exposed i.a. in the reinvestment plans and action plans for energy efficiency foreseen within WPT4.

Transferability of pilot action results: All elements of the pilot action are transferrable to other municipalities, regions and countries. Regarding smart metering systems, although different technologies, equipment and solutions may be available in different of them, the whole knowledge and experience acquired (e.g. concerning ways of using monitoring data to optimize energy consumption, educate and involve users, etc.) can be applied also in other contexts. Regarding other tools tested, they are mostly of behavioural nature and foresee building users exploring their own energy-saving potential and creating sense of competition among them, therefore also can be transferred outside and replicated (after some possible adaptations). To enable that all pilot action documents and experiences are progressively published on project-related webpage on PNEC's website.

Lessons learned and added value of transnational cooperation of the pilot action implementation

Main lesson learnt from the pilot action are following:

1. There is significant energy-saving potential associated with low-cost and no-cost measures that is often underestimated and even if such measures are implemented, their results are often not properly followed, measured and verified. TOGETHER project and pilot actions implemented within it (also in Poland) propose alternative approach, showing that there is a lot that can be done in terms of improving building management, maintenance and users behaviours and there are tools (smart metering systems) that can prove effectiveness of such actions. Tested tools should be further explored and promoted to encourage others to follow.
2. Awareness raising and behavior change activities seem simple and easy, but in fact achieving real change is more difficult that doing thermal retrofitting works. The TOGETHER project developed and tested several tools facilitating that, some of which were part of the pilot action like social audit (which proved that – to plan improvements – you need to know what users think about the building and what

motivates them) or competition, which creates sense of rivalry and thus engages people more deeply in seeking energy saving solutions.

3. Change of behaviour is a process that cannot be initiated and just left alone. It requires constant work (like giving new tasks to building teams), support (participating in some of the tasks) and reminders (energy-saving hints in between the tasks).

4. It is easier to work with buildings with established routings and more "permanent" groups of users (like schools, sports centers, etc.). In case of buildings with multiple and varying group of users, it is better to focus efforts on those who can really make a change (i.e. have influence on how building systems are used). For the rest it is just enough to remind them on closing the doors, turning off light, etc. (e.g. visitor of the city hall most probably will not have any contact with electronic equipment used there or engage in airing rooms).

Added value of transnational cooperation: Transnational cooperation was very important for developing and executing Polish pilot. It is very much based on the tools developed together in WP2 and was fine tuned during many discussions and meetings (also Skype) meetings with partners planning similar activities. We learnt from each other, inspired each other and explored each other's best practices. Very important were so called peer reviews, during which partners looked with critical eye on discussed pilots and provided many useful suggestions.

Describe the Strength, Weakness, Opportunities and Threats that you have registered when implementing the pilot activities

Strengths:

- dedicated and experienced staff, deeply interested and engaged in the project;
- long-term experience with and deep knowledge of energy efficiency issues gained in the course of previous projects;
- long-term experience with and deep knowledge of users' engagement issues gained in the course of previous projects (especially 50/50 projects focusing on school buildings);
- Innovating TOGETHER approach and tools;
- Engagement in peer reviews with other partners that helped to polish and improve the pilot action.

Weaknesses:

- frequent staff changes within the pilot action timeframe (new staff needed time to dig into the project);
- too many other duties of staff engaged in the project;
- moderate experience with smart metering systems;
- pilot buildings belonging to APs, not PP;
- location of PP far from some of the pilot buildings (different region), which makes it harder to support and follow their work on daily basis.

Opportunities:

- dedicated APs, understanding why they engaged in the project and supporting involvement with pilot buildings;
- increasing environmental and energy awareness of the citizens and increasing acceptance for environmental actions, especially now, when air quality and air protection issues are strongly debated on the national level;
- developing civil society, which makes people more keen to engage in local initiatives (though the process could be faster);
- increasing market and decreasing prices of smart metering systems and their components;
- existence of inspirational experiences and good practices on DSM that could be consulted when planning and executing pilot action.

Threats:

- malfunctionings of smart metering systems causing breaks in data delivery;
- lack of historic data to properly assess energy savings achieved by the project, especially in case of buildings, which changed heating source or share heating source with other buildings;
- limited possibilities to introduce significant changes in some buildings;
- reluctance of some of the users to actively engage and change own habits;
- threat that increased knowledge and capacities will not result in long-term change (KAP gap);
- change of local authorities that may influence their engagement in the project.

Timeline

Pre-pilot implementation
Energy audit
Negotiation Panel
Building Alliance

January 2018- December 2018
Planning and implementation of pilot action, including installation of smart metering systems and launching and executing competition for the "energy-saving master."

January -March 2019
Finalisation of pilot action
Data analysis and reporting

February - April 2019
Elaboration for the political level (reinvestiment plan + action plan for EE

Follow up: APs and pilot buildings continue to use the smart meters even after the closure of the monitored period and PP monitors their activities and performance

Estimated savings

Total energy saved (in kWh) within the monitoring period, which is one year (please considered your pilot buildings altogether)

Electricity consumption 55 654 kWh (for 8 months - compared to 8-months average from baseline consumption)

Thermal consumption 388 907 kWh (for 8 months - compared to 8-months average from baseline consumption)

What the baseline refers to? (audit, historical data etc? You have to indicate what type of data was used. Please, give a short description about the type of data used

The baseline data is historical data for the period 2015-2017 based on the invoices collected by the buildings' administration staff. Average electricity and heat consumption for each building has been calculated.

Electricity							
	total heated floor area	baseline consumption	baseline period	consumption after pilot	monitored period after pilot	saved energy*	kWh/m2 after pilot
	m2	kWh	start date, end date	kWh	start date, end date		
UG Besko	890,5	39289	2015-2017	33525,54	05.2018-12.2018	-7333	56,472
ZS Besko	2221,2	46869		16380,75		14865	0,221
ZGK Besko	225,5	NA		2708,27		NA	18,015
Przedszkole w Czesławiu	162,1	2134		1362,01		61	12,603
PUK Raciechowice	1174,4	13434		309,699		8646	0,396
UG Raciechowice	991	40630		25438,93		1648	38,505
UG Żyraków	744,5	37706		8829,1		16308	17,789
ZS w Straszęcinie	3245,3	75095		45861,4		4202	1,06
ZS w Żyrakowie	2752,5	48785		15265,92		17257	0,832

*compared to 8-months average from baseline consumption

Gas							
	total heated	baseline consumption	baseline period	consumption after pilot	monitored period	saved energy	kWh/m2 after pilot

	floor area				after pilot		
	m2	kWh	start date, end date	kWh	start date, end date		
UG Besko	890,5	14086	2015-2017	34373,04	05.2018-12.2018	-24982	57,9
ZS Besko	2221,2	285608		15246,24		175159	10,296
ZGK Besko	225,5	11411		9142,85		-1536	60,817
Przedszkole w Czesławiu	162,1	18086		9923,4		2134	91,827
PUK Raciechowice	1174,4	NA		19625,71		NE	25,067
UG Żyraków	744,5	16531		90126,28		-79106	181,584
ZS w Straszęcinie	3245,3	415723		8982,02		268167	4,152
ZS w Żyrakowie	2752,5	239824		0		159883	0

*compared to 8-months average from baseline consumption

Other - heating oil							
	total heated floor area	baseline consumption	baseline period	consumption after pilot	monitored period after pilot	saved energy	kWh/m2 after pilot
	m2	kWh	start date, end date	kWh	start date, end date		
UG Raciechowice	991	97801	2015-2017	16130,13	05.2018-12.2023	49071	24,415

*compared to 8-months average from baseline consumption

Do you have some issues with gathering the consumption data? Have you lost some data? (for various reasons such as the router stopped working, the wrong predefined constants in concentrator, same basic arithmetic issues that programmers did wrong by mistake, etc) How did you solve it?

There were issues with meters not working properly – especially heat meters: some of them were broken and had to be replaced. There were also problems with transmission of the metered data over the internet. As a result there are some data gaps.

PNEC's contractor has been informed about the issues and resolved most of them, however some difficulties still occur, which are being currently handled by the contractor of the monitoring system.

For the savings calculation PNEC used calculated – estimated data based on historical data and invoices.

How have you solved this problem ? what are the advices and suggestions that you might stress out so the others that will replicate similar investments could use them?

For the future PNEC would recommend:
- using dedicated internet connection over the wire for the data transmission
- ensure that the contractor chooses good quality components of the system (e.g. heat meters). Dedicated provisions should be included in the procurement documentation, however it needs to be taken into consideration that also national procurement rules (e.g. forbidding suggesting specific providers/solutions) need to be respected.

Describe the investment costs and indicate what are they.

Total investment cost came to 221 031,00 PLN (51 406,14 EUR). It includes:

- cost of the installation of smart metering systems in 3 public buildings in the municipality of Besko – 73 677,00 PLN (17 135,38 EUR), including:
    - cost of the equipment – 49 077,00 PLN (11 414,05 EUR)
    - cost of the works – 24 600,00 PLN (5 721,33 EUR)
- cost of the installation of smart metering systems in 3 public buildings in the municipality of Raciechowice – 73 677,00 PLN (17 135,38 EUR), including:
    - cost of the equipment – 49 077,00 PLN (11 414,05 EUR)
    - cost of the works – 24 600,00 PLN (5 721,33 EUR)
- cost of the installation of smart metering systems in 3 public buildings in the municipality of Żyraków – 73 677,00 PLN (17 135,38 EUR), including:
    - cost of the equipment – 49 077,00 PLN (11 414,05 EUR)
    - cost of the works – 24 600,00 PLN (5 721,33 EUR)

The cost reported includes VAT.

Total energy metered from the installation (fully working) to December 2018:

Electricity: 149 681,6 kWh
Heat: 203 549,67 kWh

How many Building Alliances were signed? Please provide information about the involved pilot buildings/institutions that agreed to officially sign a building alliance and give an overview of their terms of reference (e.g. energy reduction goal, % of division of the energy savings etc). Has been the building alliance internally disseminated and shared with all the buildings players (e.g. teachers, students, janitors etc). How have you informed all the interested buildings players about the alliance and its aims and conditions?

Building Alliances were drafted for all buildings, however not formally approved, which will be done together with the whole "package" of pilot action-related documents (incl. reinvestment plan and action plan for energy efficiency). They include more "soft" commitments (work on specific issues, users engagement, heading towards continuous improvement of energy and resource efficiency), without specifying energy reduction goal in % or division of energy savings achieved (this will be done through reinvestment plans). In each case, representatives of major "interest" groups were involved (PP, AP, building manager, representatives of key groups of users).

Describe the unexpected positive events/situations that you have registered during the implementation of the pilot activities. What changes in user behaviour can be experienced and how it was measured? Please provide information and give examples/specific references.

Smart metering system installed significantly increased building managers awareness of building's energy situation and encouraged them to think about possible optimisation measures. Dashboards also raised great interest among the building users and visitors, although it is not always clear for them what all the graphs/number represent (maybe it would be useful to add some additional, simple explanation or modify dashboards a bit). What is interesting, the systems demonstrated not only potential for reducing energy consumption but also reducing other costs related with energy use. See example below of the Town Hall of Besko:

Good practice of the Town Hall of Besko:

Since the installation of central UPS (uninterruptible power supply) the Town Hall of Besko, Poland, has been experiencing problems with reactive power, i.e. a circulating power in the electrical system. Such

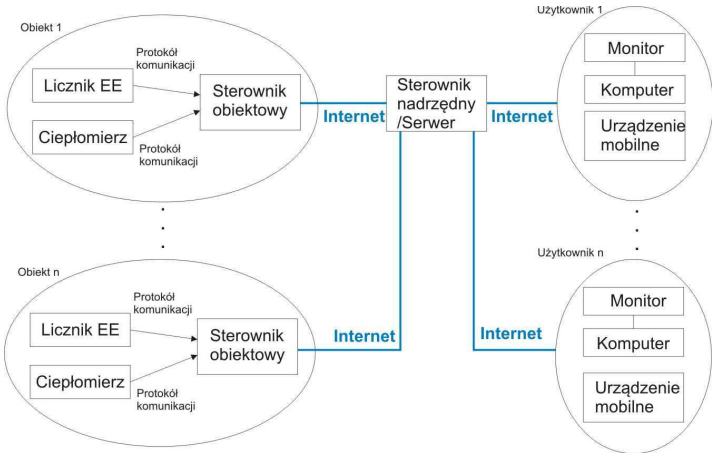
energy is not included in the energy consumption but is treated as an undesirable phenomenon and scrupulously measured by modern energy meters. In a bimonthly billing cycle the charges for reactive power only reached 500-800 PLN (approx. 120-190 EUR) depending on the season. Two companies undertook effort to compensate this power but with limited success as nobody could precisely indicate the times the phenomenon occurs and its intensity. In early 2018, thanks to the TOGETHER project, smart metering system was installed in the town hall, including an electricity meter enabling permanent monitoring of both electricity consumption and other parameters, including reactive power. Within few days only the meter registered enough data to enable building personnel to correctly estimate the capacity of the necessary reactive power compensation unit. Since July 2018 the charge for reactive power is either not present on the electricity bill or comes to few PLN (1-2 EUR) for a two-month period.
What is very important, both the systems and the pilot action itself (as a part of holistic vision oft he building and the concept of integrating different energy-saving solutions) raised great interest among other Polish municipalities that closely follow the action and pose questions concerning.

The energy monitoring system installed

Energy monitoring system installed in 9 Polish pilot buildings consist of:

- electricity meter collecting data from the electricity system;
- heat meter collecting data from the heating system;
- local controller;
- server space, where data are collected and stored;
- platform for archiving, managing and visualizing the data – available after logging in from any computer or mobile device;
- related software;
- monitor/dashboard placed in the building hall, displaying current consumption data.

All the elements are communicating through adequate communication protocols, using internet connection available in the building. The data are gathered and processed automatically. The architecture of the whole system (for all 9 pilot buildings) is shown below (where “Obiekt 1” is “Building 1” etc.):



The system measures:

- real-time electricity consumption in kWh;
- real-time heat consumption in GJ and kWh;
- network parameters (use of reactive power; overconsumption of contracted power);
- environmental parameters.

The system is also connected with the weather platform to be able to address current consumption to the weather conditions.

The measured data is collected on a storage unit (local controller) located in the building. Already from there they are available for the remote access. The data are also transferred to the external server, which is operated by the contractor, who is also responsible for data safety, back-ups, etc. The data are available from any computer or mobile device for selected users (representatives of PNEC, building owners and building managers responsible for monitoring and optimizing energy consumption). They are available after logging in using personal username and password. Adequately visualized data are also displayed for the building users at the monitors/dashboards place in the buildings' halls and on-line.

The contractor (Pracownia Informatyki NUMERON sp. z o.o.) was selected in an open tender and the contract includes also servicing of the systems for at least the 7 years from the installation.

Indicate the investment costs

Total investment cost came to 221 031,00 PLN (51 406,14 EUR). It includes:

- cost of the installation of smart metering systems in 3 public buildings in the municipality of Besko – 73 677,00 PLN (17 135,38 EUR), including:
    - cost of the equipment – 49 077,00 PLN (11 414,05 EUR)
    - cost of the works – 24 600,00 PLN (5 721,33 EUR)

- cost of the installation of smart metering systems in 3 public buildings in the municipality of Raciechowice – 73 677,00 PLN (17 135,38 EUR), including:
    - cost of the equipment – 49 077,00 PLN (11 414,05 EUR)
    - cost of the works – 24 600,00 PLN (5 721,33 EUR)
- cost of the installation of smart metering systems in 3 public buildings in the municipality of Żyraków – 73 677,00 PLN (17 135,38 EUR), including:
    - cost of the equipment – 49 077,00 PLN (11 414,05 EUR)
    - cost of the works – 24 600,00 PLN (5 721,33 EUR)

The cost reported includes VAT.

Provide information on how you have calculated the baseline

Baseline data has been calculated based on historic invoices, verified and corrected, however some data gaps and inaccuracies exists.

For heat consumption, natural gas/ heating oil consumption (2 buildings) has been used. An average efficiency factor for heat production in existing boilers has been assumed (the heat data is fuel consumption based). Due to the changes in heating systems in Municipal Services Company in Raciechowice there is no comparable baseline data. Kindergarten in Czasław and City Hall in Raciechowice use one heating source shared with other buildings – the baseline data has been calculated using net floor area of each building. Also, Kindergarten in Czasław has changed it heating source in 2017 (from heating oil to natural gas).

For electricity consumption, historic invoices (meter readings) have been used. There is no electricity consumption data available for one building (Municipal Services Company in Besko).

Describe how the dashboard/data visualisation is operated and what is the feedback that receive the buildings' visitors. Whom is addressed the dashboard to? habitual visitors or occasional visitors? Please describe the target. Provide information Do it in max 1 pages and include some pictures in the "GALLERY" .

The dashboards are placed in each building's hall and show the building users and visitors data visualisations based on the data collected by the systems. In each case dashboards show two screens which change every several minutes. The first screen shows real-time electricity and heat consumption, as well as other key parameters (e.g. reactive power). The second screen compares current consumption with historic consumption, for now established on the basis of historic invoices and meter readings (that will be later replaced with smart metering system readings). The screen also gives feedback on weather current consumption is lower than (green smiley face), similar to (yellow, neutral face) or higher than

(red, sad face) than the reference value. The visualisations on the screens can be also accessed on-line (open access) at https://gminy.numeron.pl/ui/#/3

Relevant for D.T3.3.10 about the involvement of the target groups: describe the involvement of relevant Target Groups in the implementation of your Pilot Action. Report on the target groups' involvement in Pilot Actions from the negotiation to its assessment. Please write at detail what, when, who and how. Do it in max 1 pages and include some pictures in the "GALLERY".

The pilot action foreseen involvement of following target groups:
- building decision makers (local politicians/authorities);
- building owners (representatives of the municipality responsible for managing public buildings and/or energy issues);
- building managers (e.g. school principals);
- building technical managers (staff responsible for building's operation and maintenance);
- primary users (employees, administration and cleaning staff, frequent users, e.g. regular sports clubs at sports center);
- secondary users (visitors).

Relevant for D.T3.4.1 about the SUPPORTING STRUCTURE. Describe your LOCAL SUPPORTING STRUCTURE (how it is composed, who are the members etc). Describe the actions/decisions realised by the Local Supporting Structure that you have organised for supporting the pilot actions. Please write max 2 page with completed information or in any case an adequate information. Detail what, when, who and how.

The main supporting actors helping with the design and implementation of the pilot action are the following:
- representatives of experienced municipalities, who already implemented smart metering systems and advanced users' engagement measures (e.g. municipality of Niepołomice)
- representatives of the NUMERON company (provider of the smart metering system)
- representatives of thematic NGOs, working in the field of energy efficiency and energy awareness (e.g, Polish Foundation for Energy Efficiency)

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

Expected impact/benefit for the concerned territory: Pilot action should contribute to the popularization of smart metering systems and more conscious energy management on a building level. We can already

observe significant interest in pilot buildings' experiences from other municipalities and promoting these experiences (and also providing reliable information on encountered problems and solutions found) can encourage next building owners/managers to follow. The pilot action also affect local inhabitants – monitors installed in pilot building halls, which display data on energy consumption, catch the eyes of the visitors and draw their attention to the issue of energy efficiency. The PP and APs are working on exploiting this interest and using it to raise general energy awareness. Thus the activities and experiences of the pilot action are widely promoted and all relevant material and tools accessible to public. There is also an open access to the webpage, where the content of the monitors (real-time data) can be accessed remotely. What is also important, the pilot action demonstrates that there is important energy saving potential associated with "soft" measures such as DSM and change of behavior. Thus the experience should be widely promoted both as a single action or possible integrated action accompanying investment projects.

Expected impact/benefit of pilot action for the target groups: Pilot action improved knowledge and understanding of energy issues among pilot building owners, managers, technical managers and users. It made them better aware of the energy situation of their own building and encouraged to adopt energy-saving measures and behaviours. It is to be hoped that these will be transferred to their own homes and other places that they visit.

Expected impact/benefit of pilot action for the leverage of additional funds: Although yet to be calculated and verified, it is expected that the pilot action will result in concrete energy and financial savings, at least part of which shall be spent to further energy saving measures (through the "reinvestment plans"). Example of the City Hall of Besko shows that also additional savings can be achieved (not related with energy consumption) thanks to the smart metering systems installed (reduction of excessive reactive power resulting in 120-190 EUR less spent every two months).

Describe if any of the involved administrations have invested own resources (e.g. for retrofitting the pilot buildings and or for extending the smart meters system in the involved buildings or in other buildings) already during the pilots implementation.

No, no technical measures were implemented in pilot buildings in the course of pilot action. Such measures involve long-term planning and finding appropriate funding sources, which also requires time. However, the energy audits carried out within the project showed the energy renovation potential of all buildings, identifying most appropriate energy conservation measures. This may be a basis for future technical interventions and application for funding.

Indicate if any of the involved administrations have taken a commitment to invest own resources

Please give numbers, dates and describe shortly the type of levered investment

Not at the time of the delivery of this report. Once the final results of the pilot action are evaluated and verified, reinvestment plans and action plans for energy efficiency in public buildings will be developed, including such commitments.

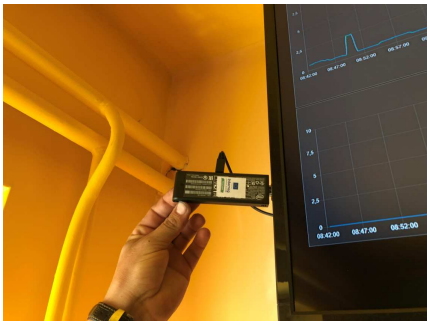
Full time employee (relevant for INDICATORS)
Indicate if you have hired new staff for the implementation of the pilot actions and if the contract will be renovated after the end of the project

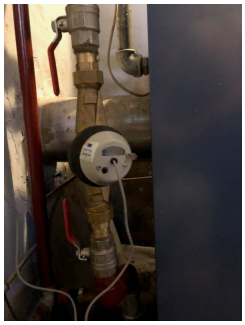
No new staff was hired for the purpose of the pilot action implementation. Regular PNEC's staff was responsible for its design, execution, monitoring and verification.

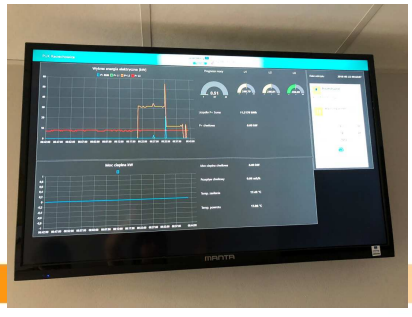
PHOTO GALLERY

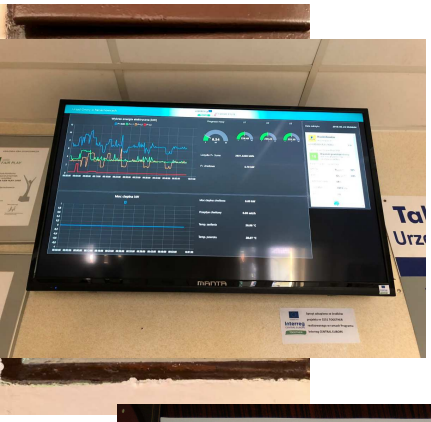
Smart metering systems installed



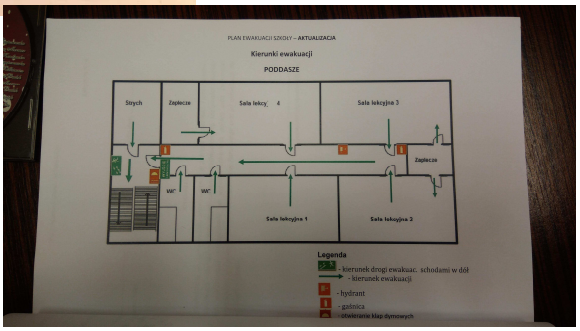


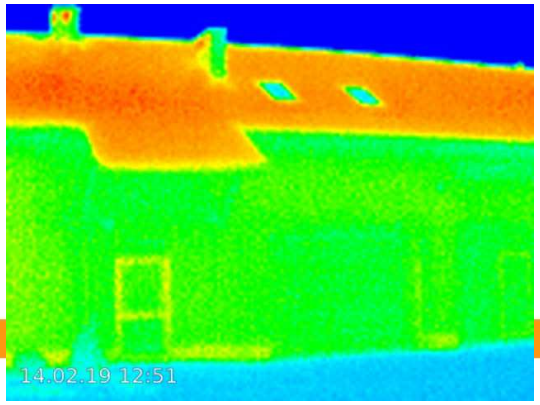



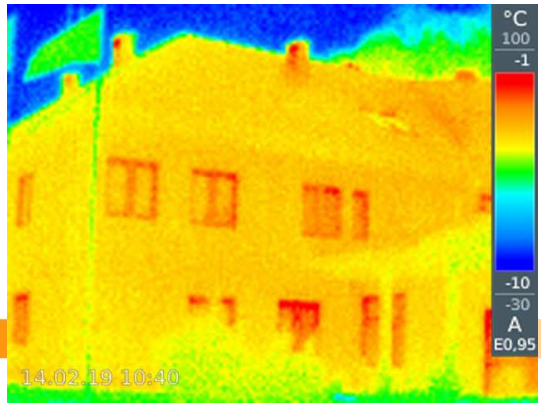


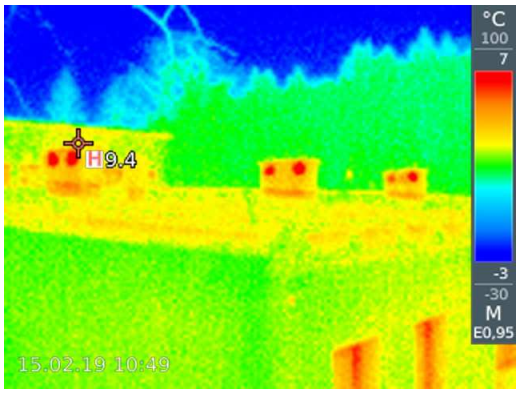



Carrying out competition tasks





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