

OrbEEt in Pernik



Initial Analysis & Baseline Definition



- 1 Selection of pilot offices, pilot audits & business process analysis as part of project foundations

Installation & Deployment



- 2 Installation of metering & sensors, software deployment and In-office Displays

Final Results & Significant Insights



- 3 A 12-month demonstration of OrbEEt framework, insights, impact assessment analysis and end users evaluation



Pernik is a municipality located in western Bulgaria with a population of 80,191; the most populated city after Sofia. The city serves as an administrative center in the region with different public organizations to operate.

The public building selected for the pilot case is an office serving four-storey building, constructed in 1962; different types of services about accounting and social security are offered to the citizens. The heterogeneity of the services offered was the main reason for the selection of the building to demonstrate and disseminate OrbEEt project activities

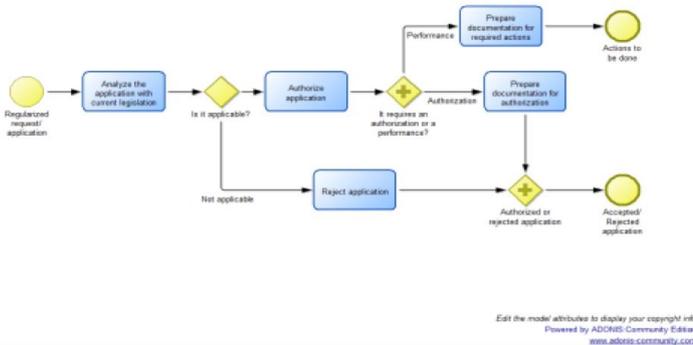
Initial Analysis & Baseline Definition



Pernik Pilot Premises

10 different zones were selected to set the demo environment which are further divided in two departments: Accounting and social security.

The two departments serve the day-to-day administrative activities of the municipality; permanent personnel and visitors set the focus groups for further examination. The type of business activities performed at the different departments and the location of offices in building were the main factors affecting the selection of pilot premises.



Business process & Organizational Activities

The energy audits were performed at the early phase to quantify the potential impact of OrbEEt demonstration in premises.

Heat consumption is the most consuming load counting for 72.60% of total energy consumption. The office loads is also an important load in premises (18.08%) mainly due to the several types of processes in premises while the impact of lighting is limited (9.33%).

The business processes were also defined for the key personnel (20) and external visitors (20). Several micro activities (24) were identified to further select the list of 7 skeleton business activities of the project.

Installation & Deployment



Given the size of the Pernik's administrative building and the selection of devices the number of hardware components installed:

- 4 Z-wave Gateway, 19 Smart plugs, 10 Smart switches, 12 Heat cost allocators, 13 Multi sensors & 10 tablets

The cost of equipment for the demonstration was 2,700€ with zero O&M costs as this task was performed by the facility manager of the building. The trend analysis indicates that the equipment cost may be reduced to 1,983€ for a large-scale demonstration.

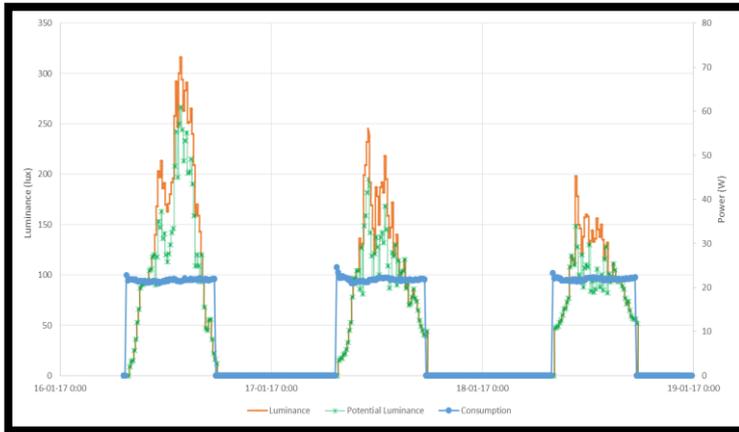
During the first phase of the project, a detailed pilot analysis took place to select the specific device types of interest.

In the **second phase**, the installation of hardware took place from M19 to M21. Due to the size of the pilot, several gateways were mounted further combined with the sensing and metering components deployed in the different pilot departments.

The **third phase** of deployment was about the configuration of sensors & metering units and further the placement of In-Office Displays at the different building zones. The configuration of the software was performed for 35 active users in premises

As an in parallel activity in Pernik municipality and due to the lack of knowledge in the domain, we highlight the implementation of on-site training and awareness workshops to engage end users in project activities.

Final Results & Significant Insights



Following a 12-month demonstration of OrbEEt framework, the level of end users awareness and interest in the domain has been increased.

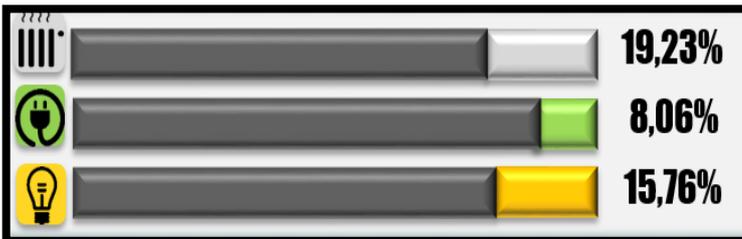
The key personnel is familiar with the idea of energy savings and motivated to participate in project activities (level of engagement 85%). This impacts the total consumption in pilot with a total of 16.88% of energy savings.

The **heat consumption savings** are significant in Pernik premises reaching the amount of 20%. The lack of individual thermostats was a main drawback to reach even higher savings.

What related to lights consumption, the total savings are reported at 15.76%; the selection of short circuits directly affects the percentage of potential savings for this load type. On the other hand, the behavioural motivation of users over vampire loads leads at ~8.00% savings for plug devices.

The end users are getting familiar with the domain & are willing to adopt an energy efficient behaviour after the end of the project; persistence of effect impact is high in Pernik pilot site.

Towards the dissemination of the OrbEEt deployment in the Bulgarian pilot site, we highlight the active participation in local press with some articles and the promotion of the overall framework & the final results in local research & industry community in the energy domain.



The reduction of CO2 emissions & Peak demand was one of the main targets for Pernik Municipality. 

The % reduction of peak demand was 19.0% & CO2 emissions reduction close to 17.0%.

As Pernik is one of the most air polluted cities in Bulgaria, for the municipality it is important to engage citizens to change their behaviour on reducing energy consumption, respectively, from the reduction of harmful emissions.



<http://orbeet.eu/>

<http://avtogara-pernik.eu>