

# TEMPLATE

Investment report

Version 1

## 13 - Investment in an energy monitoring system for pilot actions in 9 pilot buildings in Hegyvidék (PA7)

Project index number and acronym	CE51 Together
Responsible partner (PP name and number)	Hegyvidék (Municipality of 12 <sup>th</sup> District of Budapest)
Linked to pilot action (number and title)	D.T3.3.8 - Report on PA7 realised by Hegyvidék in 9 - offices, community and sport centre, swimming pool in city - HU
Project website	<a href="http://www.interreg-central.eu/Content.Node/TOGETHER.html">http://www.interreg-central.eu/Content.Node/TOGETHER.html</a>
Delivery date	15.01.2018

Description of the investment (including technical characteristics) explaining its embedding into the linked pilot action

Smart meter systems have been installed in the 9 pilot buildings.

For the smart meter systems the following hardware is used:

- Temperature and humidity sensors with signal transmitters
- Electricity consumption/production meters (1 and 3 phase direct or alternate current)
- Galvanic isolator for signal reading of electricity and gas meters
- Calorimeters for heating systems
- ICP data collector

The software creates a database from the collected data. With the software the data can be visualized with different time intervals (15 mins, hourly, daily, monthly and yearly). The measured data can be grouped by measurement or consumer type. The data can be accessed online without any installed software, and multiple users can log in at one time. The webserver is password protected. The collected data can be exported in XLS, XML, CSV and TXT format, which enables the data evaluation in external softwares e.g. MS Excel.

Data transmission to the storage units in the buildings is done via Ethernet/LAN. The storage units are connected to the internet, where the data are transferred to the central server. In case of connection problems the measured data is stored on the storage units in each building, so data loss is not occurring in case of a communication problem between the central server and the buildings.

In order to visualize and communicate the measured data to the building users dashboards were placed which have access to all measured data, collected in the building. This includes the following data: temperature, humidity, electricity consumption & production and heat / gas consumption.

All collected data can be visualized on the dashboards, which includes data comparison for different time intervals: 15 mins, hourly, daily, monthly, yearly. The dashboards are located close to the entrance of the building, so all personnel and visitors can see them.

### Investment location

NUTS 3	Address (Street, house number, postal code, city, country)	GPS coordinates
HU10, Közép-Magyarország	MOM Kulturális Központ/MOM Cultural Centre 1124 Budapest, Csörsz u. 18. - HUNGARY	47°29'26,10"N; 19°01'07.83"E
HU10, Közép-Magyarország	KIMBI Óvoda/KIMBI Kindergarden 1121 Budapest, Tállya u. 22. - HUNGARY	47°29'20.51"N; 18°59'57.61"E
HU10, Közép-Magyarország	Normafa Óvoda/ Kindergarden 1121 Budapest, Normafa út 30-32.	47°30'04.39"N,18°58'47.51"E
HU10, Közép-Magyarország	Táltos Óvoda/ Kindergarden 1124 Budapest, Lejtő u. 41.	47°29'08,63"N; 19°00'37,61"E
HU10, Közép-Magyarország	Budapest Főváros XII. ker. Polgármesteri Hivatal/Municipality Office Building 1126 Budapest, Böszörményi út 23-25	47°29'35,65"N 19°01'01,17"E

HU10, Közép-Magyarország	Böszörményi úti irodaház/office house 1126 Budapest, Böszörményi út 23-25.	47°29'35.34"N; 19°01'00.90"E
HU10, Közép-Magyarország	Kiss János altábornagy utcai irodaház/office house 1126 Budapest, Kiss János altábornagy u. 31.	47°29'35.25"N; 19°01'14.30"E
HU10, Közép-Magyarország	Budai Rajziskola - Alapfokú Művészeti Iskola és Szakgimnázium/Drawing School 1123 Budapest, Alkotás u. 45.	47°29'33.35"N; 19°01'25.35"E
HU10, Közép-Magyarország	MOM Sportközpont/Sport Centre 1123 Budapest, Csörsz u. 14-1	47°29'23,4"N; 19°01'19,86"E

### Duration and process of investment implementation

Start date	End date
01.09.2017	31.12.2017

### Major milestones of investment implementation

There was a technical schedule of the investment: the first step was the installation of the smart meters into different places of the building. Second, the dashboards were located to the well-visible and accessible places of the building. It was followed by the work on setting up a data storage system. The next step was to provide internet connection between smart meters and the storage system. In parallel, the installer company reconciled with the different service providers and building managers.

Regarding the milestones of the smart meter installation into Hegyvidék's pilot buildings, the first installation was carried out in the Municipality Office building in September. In October, the installations were implemented in all the pilot kindergarten buildings except the Kimbi one which was done in November. In the rest of the pilot buildings, the smart meter installation was finalized by the end of December. In January, testing of smart meters and dashboard visualizing contents were under progress in most of the buildings, however all smart meters were already in work.

### Investment costs (Total costs and ERDF in EUR) including a break-down of main cost items

The contract of the company being responsible for the smart meter installation includes two tasks:

- 1) Setting up smart meter data collection system including the installation of smart meters, operation of smart meters, data analyses and monthly consultation - 12 231 760 HUF +VAT = 39 419,14 EURO
- 2) Installation of dashboards in order to visualize the measured data; setting up and operating the technical background of the dashboards - 1 630 800 HUF +VAT = 5 255.56 EURO

Total contracted amount: 13 862 560 HUF+VAT = 44 674,70 EURO

Declared amount (PR3, PR4): 33 895,99 EURO

ERDF: 28 811,59 EURO

### Ownership and durability of the investment (e.g. maintenance, financing)

The Municipality of Hegyvidék is the owner of the smart meter systems even in the pilot buildings operated partly by private companies. Therefore, the municipality has the responsibility for the sustainability of the systems including the maintenance and enlargement of the system. Currently, the installer company is taking care of the maintenance and operation of the system as these activities are also included in their contract during the project implementation period. As after the project closure the Green Office of the Municipality will be responsible for these tasks, some of the employees of the Green Office will participate in a training about smart meter system operation in order to be able to operate the system independently from the expertise knowledge of the installer company.

Furthermore, the Municipality plans to extend the system installing smart meters into - if possible - all public buildings owned by the Municipality in the district. Moreover, a district level energy management plan will be elaborated including energy and social audits in order to plan the way of installing smart meters into all public buildings and plan the way of data analyses and application of DSM tools addressing building users.

### Transnational effect and added value of the investment to the partnership

The installation and application of the smart meters primarily contribute to the pilot implementation and serve the local energy efficiency goals of the involved buildings. However, the partnership has different dissemination tools through which the results and the lesson learnt about smart metering are and will be disseminated also on transnational level. Such tools are for instance the newsletters, the library on the project website and the international conference organized by Hegyvidék on the 2<sup>nd</sup> of October, 2017 where also the installed system were presented to the audience. In addition, the partnership plans to publish an article in a specialized magazine explaining the different technical approaches of the partners related to smart metering and the lessons learnt from the application of the different metering systems. Yet, the pilot reports will summarize the main experiences gained from the implementation of the investment which will be also disseminated as project results on transnational level motivating municipalities of other countries to invest in the installation of such system in their public buildings.

Regarding the added value of the investment to the partnership, Hegyvidék organized a site visit during the partner meeting followed by the conference in October where partners could have a look on the system in work, learn from Hegyvidék and gave suggestions how to further improve the system - for instance the visual design or the presented content of the dashboards.

Finally, the municipality submitted a tender to Energy Globe applying for the most sustainable municipality award. The municipality managed to go further to the national round and expected to participate in the international competition disseminating the results of the investment on transnational level.

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

The impact of the investment on the target group is thanks to the fact that the building users and managers receive a direct and on-time feedback about their energy consumption through the dashboards on which the data measured by the smart meters are presented. This way significant change - towards energy efficiency - in the behavior of the building users are foreseen in the pilot buildings. However, the way of achieving this change therefore the way of communicating the measured data to the building users will be different depending on the type of the target groups. For instance, the building managers are interested in the rough data and the detailed analyses of the data in order to detect the energy weaknesses of the building which motivate them to initiate energy efficiency reconstruction of the building. While for the building user children the measured data will be communicated on simple and gamified way. As the municipality would like to complete the investment supported by the project with installing smart meter systems into all public buildings, the lessons learnt and experiences gained from the implementation of the investment will be spill over in the whole district and hopefully in other districts of Budapest and the country.

The leverage fund generated by the investment can be also considered a positive impact of the investment. The Municipality wanted to create a complete smart meter system in the pilot buildings for which, beside the project budget, own funds were necessary. The system plan of the 9 pilot buildings were elaborated from the own contribution of the Municipality of Hegyvidék. Additionally, the Municipality paid the half of the cost spent for the smart meters purchasing and installation.

If applicable, compliance with relevant regulatory requirements (e.g. environmental, building regulations, authorisations)

Not relevant.

Contribution to sustainable development - potential effects of the investment on the environment and climate. In case of negative effects, mitigation measures conducted

The investment has a significantly positive effect on the environment and climate through the behavioral change expected to occur at the building users facing them with their own energy consumption data. By achieving the reduction of the energy consumption by the smart meter system, the municipality can indirectly reduce pollution emission resulted in the protection of the environment. Consequently, the installation and operation of the smart meters contribute to the sustainable development of the district.

No negative effects are foreseen due to the investment.

Consideration of other horizontal principles such as equal opportunities and non-discrimination (e.g. barrier-free accessibility)

One of the advantages of the dashboards are that they are located at such places where every building users and visitors can see. Therefore, all building managers, users and building visitors can receive information about the consumption of the building meaning that the information is equally available for everybody. It was a specific intention of the installers to create such visualizing system of data which transfer the information on an informative and easy-to- understand and gamified way.

References to relevant deliverables (e.g. pilot action report, studies) and web-links  
If applicable, additional documentation, pictures or images to be provided as annex

References to relevant deliverables :

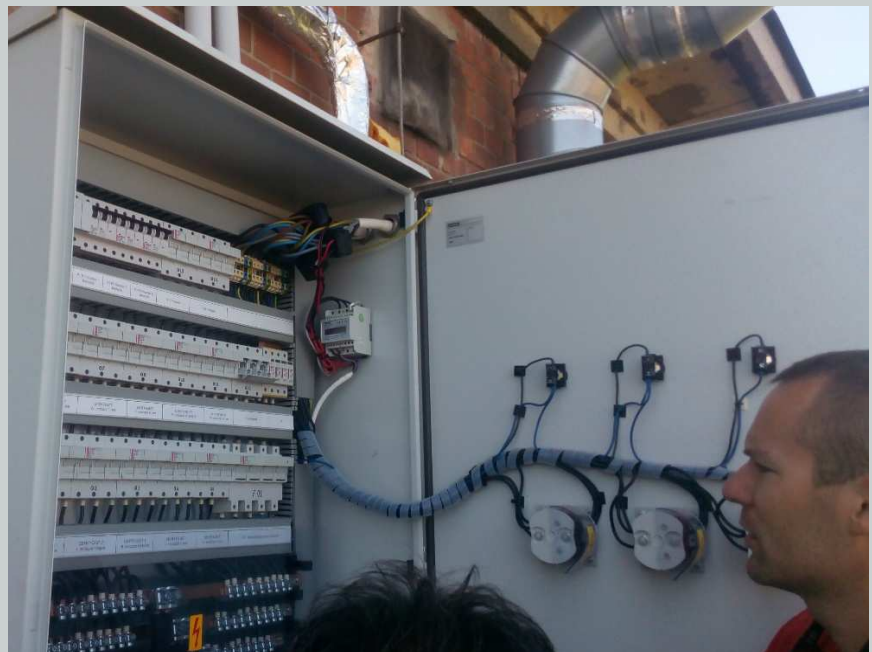
- Deliverable D.T3.2.7 - PA7 design for 9 offices, community&sport incl. swimming pool&schools in Hegyvidek HU.Report+EN sum
- Deliverable D.T3.3.8 - Report on PA7 realised by Hegyvidek in 9 -offices,community&spo rt centers, swimming pool in city- HU

Pictures of hardware for data collecting



Temperature and humidity sensor

3 phase Electricity meter





Server electricity consumption meter

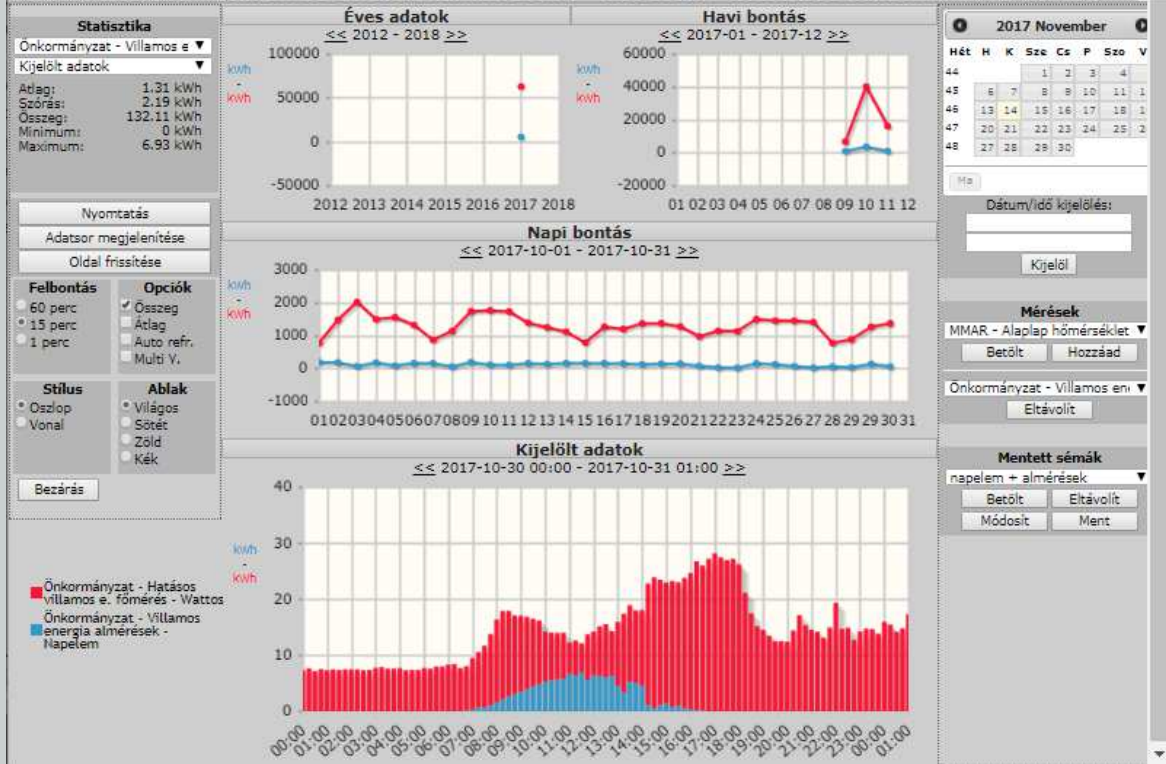


ICP

Screens of software/programme for data collecting

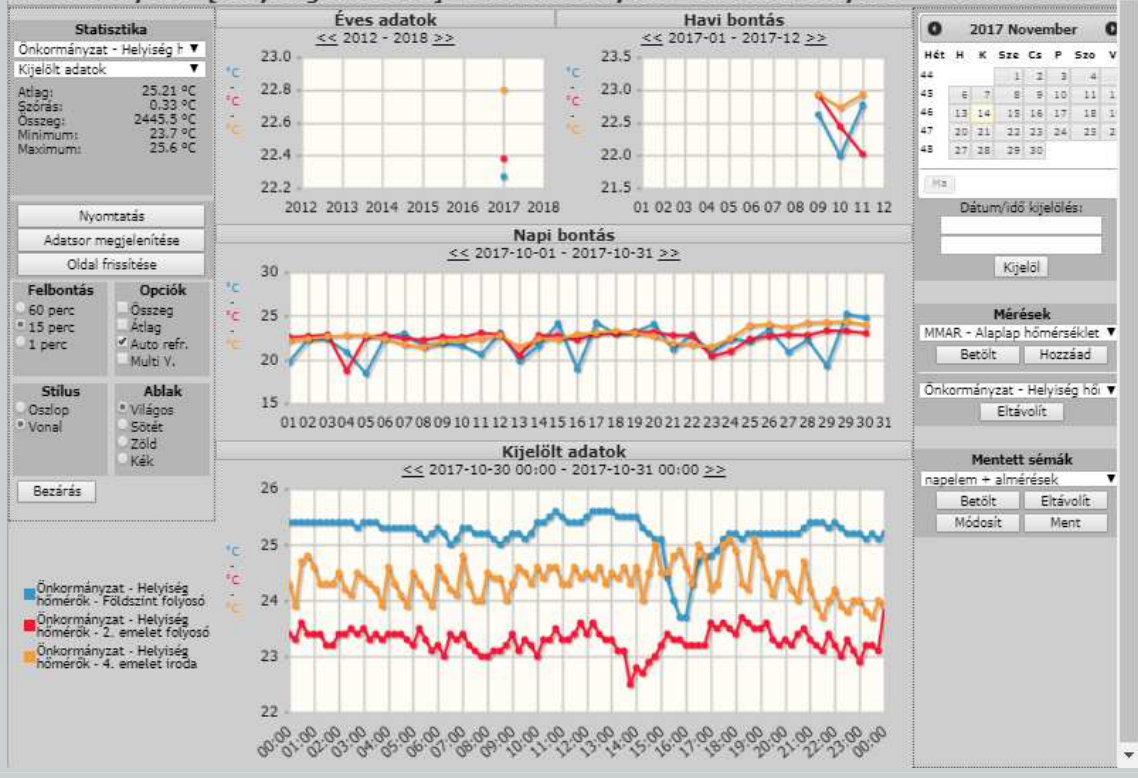


Önkormányzat - [Villamos energia almérések] - Napelem - [Hatásos villamos e. főmérés] -

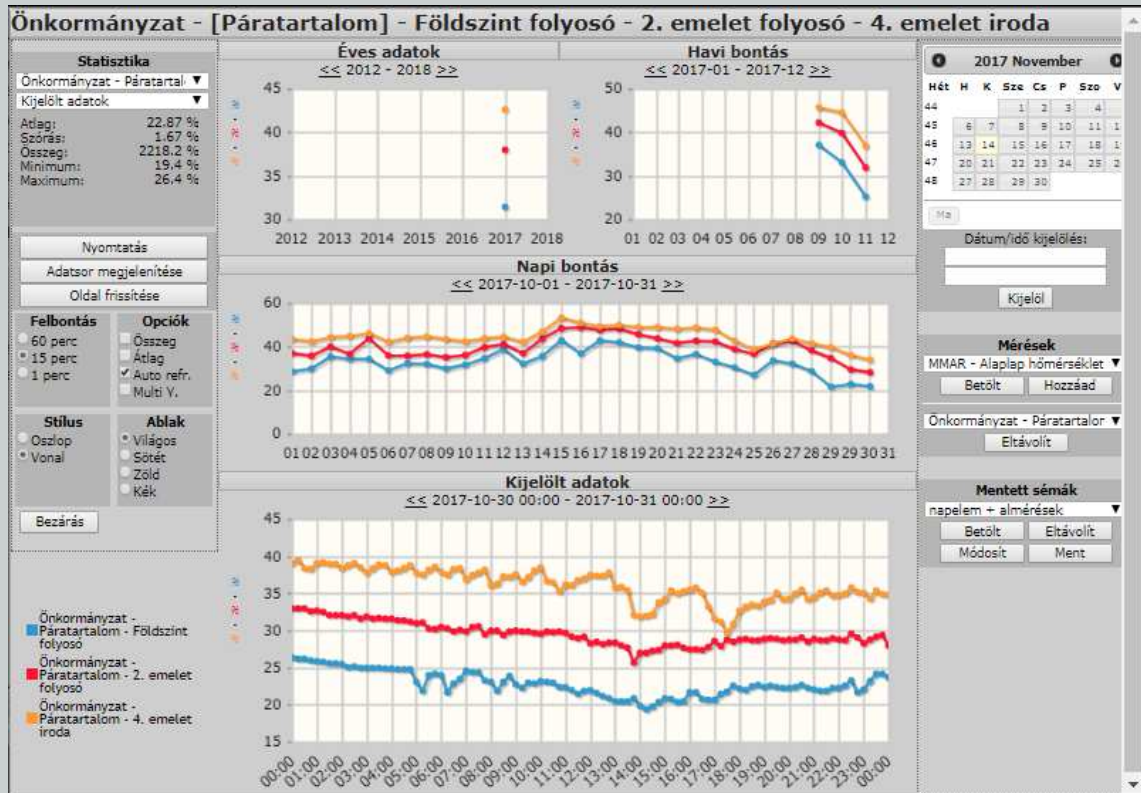


Electricity consumption; Red: electricity from the grid, Blue: electricity from the PV

Önkormányzat - [Helyiség hőmérők] - Földszint folyosó - 2. emelet folyosó - 4. emelet iroda

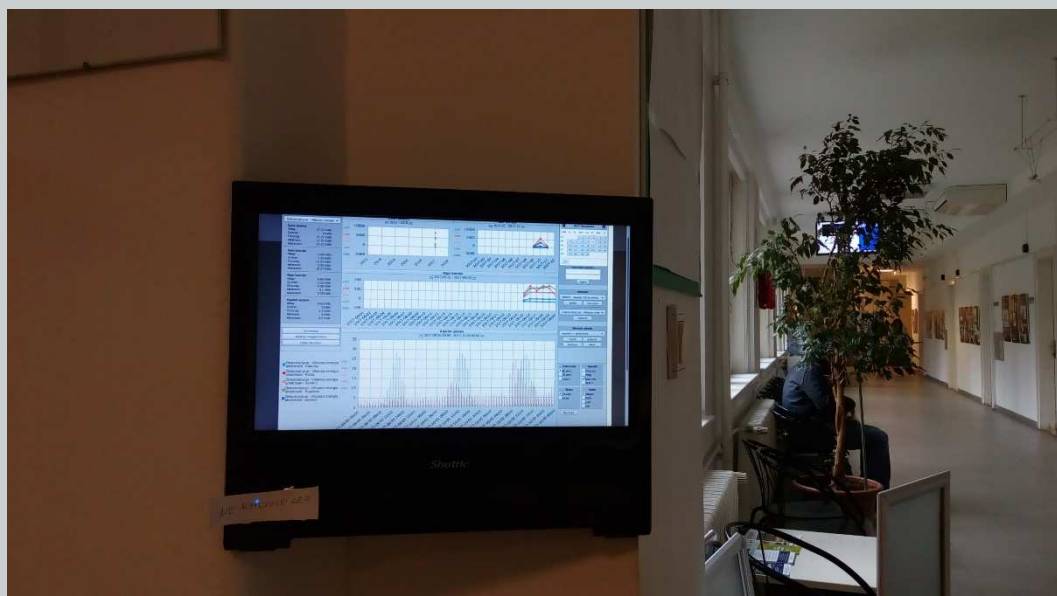


Temperature measurement; Blue: ground floor corridor, Red: 2<sup>nd</sup> floor corridor, Green 4<sup>th</sup> floor office



Humidity measurement; Blue: ground floor corridor, Red: 2<sup>nd</sup> floor corridor, Green 4<sup>th</sup> floor office

### Pictures of dashboards



Block diagram showing how the system works

