PROJECT RURES

D.T2.2.3 Report of PA 2 to test IWM for increase EE and reduce water consumption in Pałeczinca region

June, 2019

1. Introduction

Project index number and acronym	CE933 RURES
Responsible partner (PP name and number)	Pałecznica Municipality (PP4)
Project website	http://www.interreg-central.eu/RURES
Pilot action number and title	I2 - Intelligent water metering for public water system
Pilot action location	11 st. Jakub str., 32-109 Palecznica, Poland
Delivery date	25.06.2019

2. General information on the pilot action

The Pałecznica Municipality, performing tasks related to providing access to water for residents and institutions located in its area, is the owner and manager of the water supply network. Through a system consisting of a water intake, storage tanks, a water tower, pumping stations and a network length of approx. 80 km, it provides access to water for individual consumers as well as public institutions and other facilities.

Technological development in the water supply industry and in the area of remote monitoring of media consumption caused that the commune authorities consider the possibility of using smart metering and remote reading of water consumption. For this purpose, it will be necessary to replace devices (water meters, valves, pressure gauges, etc.) for those that allow remote, automatic reading of data and give the ability to control network parameters from the control panel, through a computer or mobile device (i.e. tablet, smartphone). Intelligent collecting of current readings would enable faster response to emerging failures, show current consumption of individual objects, and eventually allow smoother and faster settlements with recipients.

As part of the RURES project, the first step was planned: replacement of zone water meters, purchase of software for remote reading and analyzing of data, appropriate devices for storing information (control room, server) and purchase of peripheral devices for operating the system (laptop, tablet). Ultimately this investment will lead to the implementation of a larger investment: equipping all inhabitants of the Pałecznica Municipality with intelligent reading of water consumption and combining them into one intelligent system cooperating with water intake and pumping stations and storage tanks.

Pilot investment requirements:

- adaptation (or replacement) of water meters for transmitting meters,

- GSM/UMTS/GPRS/LTE/other data transmitters and receivers
- software for administration of the system
- training of person(-s) which will take care of the system.

The scope of investment:

a) Purchase of zonal water meters – ultrasound static water meters with data transmitters, 11 pieces, ϕ 50 – 100 mm.
b) Purchase and installation of 3 new wells.
c) Installation of water meters.
d) Purchase of software for intelligent water metering with equipment required for data gathering and transfer (antennas, repeaters, data concentrators, transmitters).
e) Starting of the system and training for employees.

The total cost of the pilot action was around 65 915 €.

Thanks to on-line (at real time) metering, water consumption should decrease around 20%. This will result also with lowering the energy use for water pumps. Moreover the project gives the possibility for combining measures of PV production and real time water consumption. This will allow optimizing water pumps work and use of PV energy at time of the biggest demands.

3. Timeframe of the pilot action

Start date (dd.mm.yyyy.)	2.08.2018
End date (dd.mm.yyyy.)	18.06.2019
Remarks on timeframe:	
Preparation phase: Aug 2018 – Jan 2019 Documentation: Jan - Mar 2019 Procurement announcement: 15.03.2019 Agreement with the supplier: 10.04.2019 Delivery until 20.05.2019 Installations until 18.06.2019	

4. Information on preparation of the pilot action

The preparation phase was the longest when looking on the timeframe of investment realization. It took more time than in was expected to define the detailed scope of this specific investment – intelligent water metering. There are only few examples of such kind investments in Poland. Especially intelligent systems without employees drive-through and reading meters is lacking. Moreover Pałecznica decided to test not so well known in Poland ultrasound water meters. Such kind of meters are used in northern Europe, the knowledge about them got to Pałecznica from previous cooperation with Norwegian municipality. The technology recognition was really difficult – three aspects were studied:

1. Water meters market – different kinds of water meters, with or without data transmitters.
2. Data transfer possibilities – transfer via GSM, wire connection, amplifiers and repeaters, data concentrators, antennas etc.
3. Software for data management – with internal or external data storage, recognition of existing systems but also talks with specialists for creation a new dedicated system.

This work finalized with the pre-investment concept (D.T.2.2.3) and feasibility studies (D.T.1.3.2). Those documents were essential in preparation of description for the public procurement. During that time several meetings with constructors, water management experts, meters producers, automatic technicians and IT specialists. Thanks to RURES project the deep recognition of different variants of the topic could be done.

The preparation phase took around 6 months. No special restrictions or regulations effected that phase, beside Interreg Central Europe rules and Public procurement law. It ended with a public procurement launched in April 2019, delivery of meters, equipment, software and training in May 2019. Constructions works were done by Municipality's maintenance personnel.

5. Information on implementation of the pilot action

The pilot action is located in Pałecznica Municipality, which covers around 48 km2. There are 14 villages in the area, where approximately 3630 people live. Beside commune's residents, the water is transferred to neighbour municipalities (Proszowice and Kazimierza Wielka). In total around 11790 inhabitants are supported by Pałecznica's water network.

The water supply system in Pałecznica Municipality consists of a water intake (2 pumps with a capacity of 94 m^3/h each), two storage tanks, a water tower, three pumping stations and a water supply network with a length of approx. 80 km. Pałecznica Municipality has 1076 individual and 16 zonal water meter clocks registered. The commune is responsible for water supply, maintaining the network and settling accounts with recipients.

Currently, one person visits once a quarter the location of the meter and personally controls its condition and indications. The data is then transferred to the unit responsible for the settlement and a settlement document is issued. The annual cost of employing collectors and paying their business trips within the commune to collect data from meters is about PLN 55 000.00. The pilot investment helps to

start automation of this process: data from meters are collected and transferred to external sever, from where they can be analysed and used directly in real time periods.

The investment was carried out on two equal levels:

1. **Market research, purchase and assembly of water meters.**
   There are several types of water meters on the market with the possibility of remote data reading. The most popular in Poland are "standard" water meters - mechanical, wing type. For the pilot investment ultrasonic water meters were purchased. They use sound waves to measure water flow. Water meters have the function of direct signal transmission or through an overlay mounted on their casing. Producers ensures the longer life of ultrasonic water meters, which has a significant impact on the maintenance costs of these devices.
   Solutions for data collection and reading are similar for all types of water meters: reading and data transmission can be carried out by radio/GSM or using digital transmission (eg M-bus). The pilot investment mixes both methods – if there is possibility of wire data transfer this method is the first option (better stability). All purchased meters and data concentrators gives the possibility to connect them to internet network in the future (when the cables are installed).
2. **Analysis of needs and creation of a tailored system for intelligent monitoring of media consumption.**
   The planned system is designed to collect data directly from water meters, and through a set of concentrators and signal repeaters, using Internet access (cable or GSM connection). Data will be stored and processed in the control panel at external server, allowing for generating reports, viewing consumption or alarms and failures monitoring. Access to data (after logging in) through a readable program have employees obliged to maintain the water supply network.

The public procurement was carried out in line with the Public Procurement Law. It covered delivery of 11 water meters (ϕ 50 – 100 mm), 4 data concentrators, antennas and data repeaters, license for software and training for employees. The total price of the procurement was around 46 000€. The general contractor was Kamstrup Sp. z o.o.

During the preparation phase local authorities decided to create 7 zones of data metering (please check below Figure 1.). Each zone starts with one zonal meter. If the water network goes further (abroad the zone), the second water meter is placed. Such solution was not expected during the application phase at 2017 and was not considered as a part of the pilot investment at that time. Three new wells were purchased and installed with municipalities own resources. Those additional work were fully covered by municipal budget and caused the final cost of the pilot investments increased to 65 915 € (net amount 53 589 €). Exchange rate used for the calculation is 1€ = 4,3117 PLN.

The implementation of the pilot investment, then the maintenance, development and operation of the intelligent monitoring system lies on the side of the Pałecznica Municipality, which means that the durability of the project will remain unchallenged. Moreover the municipality wish to develop the system and connect every individual water meter into this intelligent water metering system.

The maintenance of intelligent water metering system is not only about taking care of water network and programme update. One of the crucial matters is the safety of data transfer and storage. At the case of this pilot investment each water meter encrypts data and the storage is placed on external, duplicated server.

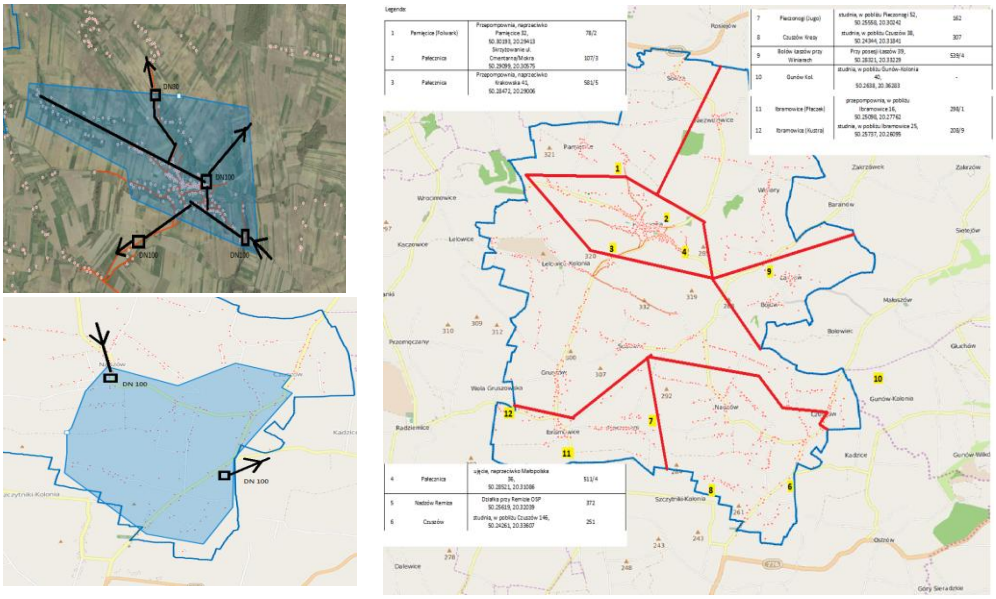


Figure 1. Pałecznica Municipality – division to zones.

6. Cost of the pilot action

Planned cost of the pilot action as in the last approved project Application Form (in Eur)	40 000€
Planned ERDF funding rate (in %)	85 %
Planned ERDF funding (in Eur)	40 000€
Total real cost of the pilot action(in Eur, excl. VAT)	53 589 €
Total real ERDF funding of the pilot action in Eur	46 000 €
Notes (if necessary):	

Budget (application form, 2017):

- 38.000 € - BL 5 equipment
- 2.000 € - BL 6 Infrastructure and works

Estimated costs (market research, Jan 2019): 218 171 PLN = ~50.600 €

Procurement – meters, equipment, system, training (Mar 2019): 198 338 PLN = ~46.000 €

Total cost of the investment: 65 915 €.

Procurement was ordered in a scope foresaw within the application form and the pre-investment concept with the total cost around 46 000€.

Some extra costs, not considered during the application phase, appeared: in the preparation phase it appeared that the best way for data analysis will be creation of 7 zones (dividing the water network on 7 zones). This required installation of 3 new wells, where water meters could be placed. This was unexpected work and costs fully carried from municipality own budget.

(conversion rate 1€ = 4,3117 PLN)

7. Comparability of the pilot actions (according to the results of the pilot actions)

The impact of the pilot action (local, regional, national, global)	Pilot action allows Pałecznica Municipality to test intelligent water metering system. Investment realized thanks to RURES project is a part of work required for bigger system creation – the final goal is to set up the intelligent water metering available for each household in Pałecznica territory.
Number of potential users	11 790
Number of population in city/municipality	3 630
The ratio of investment cost and potential users (€/per user)	5,59
The ratio of investment cost and city/municipality population (€/per capita)	18,16
Impact on the population - No of potential users/Total population * 100 (%)	324,79

8. Transferability of the pilot action

The indicated pilot investment can be implemented in any region of Europe, especially in communes that own water-supply systems or by water-supply companies. The development of ICT systems means that such investments will be the basis for measurements and billing for media consumption in the future. The method of implementation of a similar investment in other regions requires:

1. Inventory of available resources and needs.
2. Meters and equipment installation.
3. Adaptation of the appropriate, remote data reading and analysis system.

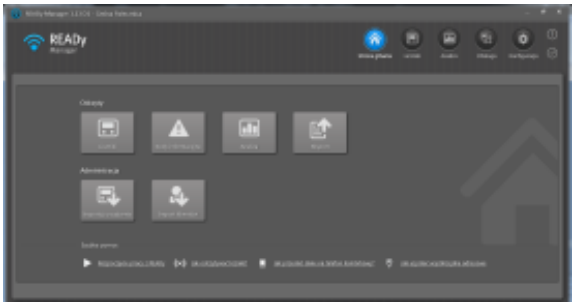
9. Photos of the pilot action

Old water meters:


New water meters:


Equipment

Software



10. Conclusion and further suggestions

As part of the RURES project replacement of zone water meters, purchase of software for remote reading and analyzing of data, appropriate devices/technology for storing information (here external server) and purchase of peripheral devices for operating the system (laptop, tablet) were performed. Ultimately this investment will lead to the implementation of a larger investment: equipping all inhabitants of the Pałecznica Municipality with intelligent metering of water consumption and connect them into one intelligent system.

The scope of the planned investment, replacement of water meters and installation of a remote media consumption monitoring system, does not require any special construction or technical permits. However, for the efficient implementation of the project, it is necessary to pay attention on some

aspects, in particular the exchange of water meters (at functioning system) and the application of appropriate safeguards for data storage and processing (i.e. according to General Data Protection Regulation).

The commune gains a tool to optimize the water supply system and settlements with recipients. Remote monitoring will enable adapting the network capabilities to the needs of recipients and will facilitate supervision of the water supply system in the current time. This stage could be achieved as part of the RURES project, with 85% financial support from Interreg Central Europe Programme.

RURES CE933 project is implemented through financial assistance from European Regional Development Fund (ERDF) and Interreg Central Europe Programme. This publication reflects the author´s view and the programme authorities are not liable for any use that may be made of the information contained therein.