

Increasing the energy efficiency of the water supply system

Eng. Marius Mocanu - RAGC Targoviste

The Autonomous Regia of Public Utilities is involved in Municipal utilities Development Programme II, financed by EBRD, the European Union (by PHARE funds) and the Romanian Government.

One of the investments projects developed by the Regia, having an important impact on improving the efficiency of pumping system is the implementation of "Dynamic technologies in continuous adjustment of booster stations with variable speed depending of the pressure measured at the most disadvantaged customer".

The new method of adjustment contains a high level of innovation, confirmed by the Invention Certificate No. 117270/nov. 2001.

The main advantage is the fact that, when the pressure value at a customer decreases to a minimum, permanently or accidentally, the pressure from the outlet of the booster station is automatically adjusted by a feed-back process, without any human intervention.

The investment is linked to the existence (introduction) of pumping groups with frequency converter, speed adjustment based on the pressure and the identification of the places for the installation of the pressure transducers. The investment cost is of US\$ 30,000 - 35,000 / booster station (turnkey) depending on the necessary flow and pressure.

The Regia has applied this method by installing pressure transducers to higher blocks served by booster stations for the drinking water supply, from where the pressure level is continuously monitored by a PLC installed near the booster station. The speed of the pumps increases or decreases, depending on the pre-established minimum and maximum values of the pressure, the main advantages being:

- Keeping the necessary pressure level to the customers in each and every moment;
- Diminishing the necessary pumping energy by keeping a minimum level of pressure in the hydraulic system;
- Ensuring the transitory functioning conditions without any malfunction in the suction of the pumps;
- Compact construction and low-cost maintenance;
- Ensuring the 24 hours / day drinking water supply in the system with a minimum but sufficient pressure to all customers.

This method will lead to energy savings, decrease of drinking water loss in broken pipes and will improve the water delivery parameters to all customers.

The measurements indicated more than 10% of savings from the electric energy cost. The reliability of the system leads to a decrease in the personnel cost with 15-20% (half of these cost savings for personnel are also resulted after introduction of monitoring system for water network and booster station).

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➤ Zalau municipality received an Ecolinks grant of US\$ 36,000 for the project "Solutions for improving the quality of the management of wastewater". The project has in view the elaboration of a feasibility study and a strategical plan for a better management of the wastewater.

➤ The EC has launched the SAVE II call for projects for the year 2002. Public and private entities in the EU and the candidate countries are invited to submit their proposals by April 3rd 2002. Additional information (eligibility and appraisal criteria, application form and instructions etc.) can be found at the following address: http://europa.eu.int/comm/energy/en/pfs_4_en.html

➤ At the World Bank Mission in Romania, consultation and negotiations have taken place (February 19 - 20) with the Prototype Carbon Fund (PCF) for the DH project in Cluj - Napoca and the Afforestation of degraded agricultural areas project.

PCF's representatives are Mr. Benoit Bosquet and Mrs. Charlotte Streck. The meeting was attended by Mrs. Hanneke Sikkema (Netherlands Ministry of Economical Affairs), Mr. David Lawrence (Rols Royce Power Ventures) and Mr. Cristian Nacu (IFC), together with representatives of the Romanian ministries.

➤ The Regional Infrastructure Program (RIP) offers specialized assistance for the preparation of water supply and sewage projects under the Municipal Utilities Development Program (3rd stage) aimed at small and medium - sized towns. The 1st workshop, held at Targu Mures, has been attended by 32 representatives from 16 counties.

➤ On March 5, 2002, Tarnaveni municipality will organize a tender for the project "Increasing energy efficiency at Tarnaveni water plant". Additional information can be obtained from the investments department, Tel: +40 65 443 613, contact person - Mr. Ioan Oltean.

Pilot study for the detection of leaks in the water distribution network of Iasi municipality

Eng. Mihai Dorus - RAJAC Iasi

RAJAC is a utility company responsible for providing water to the city of Iasi and for operating the municipal sewage system; it serves over 550,000 inhabitants and has a distribution network of 600 km of pipes. RAJAC's annual production of water is of 56 mill m³ and annual client consumption of water amounts to 40 mill m³. Thus, losses due to leaks in the RAJAC system are of 16 mill m³ of water annually and represent a waste of potable water, treatment capacity, energy and, ultimately, a waste of money. For this reason, in 1995, RAJAC developed a general program on leak abatement, whose bottleneck has been the identification of leaks.

The project "Pilot study for the detection of leaks in the water distribution network of Iasi municipality", developed by RAJAC (co-ordinator) and Cavanaugh & Associates (partner) received a US\$ 50,000 grant under the Ecolinks program. The partner supported the acquisition of a performant equipment (a set of loggers assisted by computer and the soft for data processing) for detecting the leaks in the water distribution network and the personnel training. The loggers perform based on the principle of sound propagation in solid environment. Any loss in the distribution network generates a sound whose intensity is variable (depending on the type of the pipes and the land, the pressure in the pipes etc.). The loggers, installed on the distribution network, are programmed for registering the data and the results are collected and transferred in the computer. The method offers the following advantages: there is no longer need to interrupt water supply or to dig in the pavement to detect water leaks; high speed and accuracy of detection. In addition, leak detection can be performed on rather long distances (100 - 150 m) between 2 loggers.

The project has been implemented in an area where the supplied and consumed water volumes were known due to the metering. Using the above mentioned equipment led to immediate results, so that the distribution network has been divided in sectors and a coherent leak detection program has been started.

It was estimated that three of the detected leaks resulted in water losses of 60,000 m³ / year (in financial terms - US\$ 24,000). Since the equipment cost was around US\$ 20,000, the payback period for the equipment was less than one year.

Modernization of the water supply plant

Eng. Petro Gyorgy - RA Aquaserv

The Targu Mures Drinking Water Project was selected to be financed under the PSO program of the Netherlands agency - Senter. This selection was based on a project request submitted by Aquaserv, the beneficiary of the project. Aquaserv consultants are DHV Consultants BV of Amersfoort, in co-operation with Aquanet of Nieuwegein, the Netherlands, Rapidproject Ltd. of Targu Mures and Elite SRL of Bucharest. The project was financed by the Dutch Government - US\$ 1,000,000 and by Targu Mures Local Council - US\$ 14,000.

The Joint Implementation Program comprised the necessary steps for measuring the effects of the investment on the reduction of the energy consumption at the Final Pumping Station, the Water Treatment Plant no. II (FPS-WTP II) and, as a result, the reduction of the greenhouse gas emissions. The mechanism is in conformity with the Kyoto protocol procedures.

The pumping system at the FPS-WTP II was made of 3(+1) pumps with more than 25 years of service, driven by 6kV engines. The efficiency of these pumps was around 55%. Taking into account the available budget, the solution consisted of the substitution of the existing pumps by 4 new pumps in a 3 (+1) configuration, with sufficient capacity to handle the total water production of the 3 treatment lines of WTP II. The pumps were selected according to the system characteristics and their efficiency is higher than 85% at their design point.

A particular technical difficulty to be overcome was the presence of the 6kV-drive system of the existing pumping station. The refurbished pumping station is equipped with an automatic control system based on the use of frequency converters for each pump, supplied independently by 4 transformers of 6kV/0.4 kV.

The equipment was delivered to Targu Mures in February 2000 and the commissioning of the stations was carried out in April 2000.

The project led to the following results:

- reduction of the specific energy consumption from 0.251 kWh/m³ to 0,217 kWh/m³ representing a 15% energy saving (52.000 kWh/month).
- the reduction of the CO₂ emissions as a result of the above mentioned power saving, in 15 years of operation, has been calculated at more than 6,000 tons of CO₂ - estimation based on the conversion factor of 0.6328kg CO₂/kWH
- access to high level equipment and technology
- training of the organization's staff in the field of general and operational management for the improvement of the employees' performances in the benefit of the entire organization and of the city.