Energy saving in water supply and sewerage

Energy saving in water supply and sewerage directly depends on measures to reduce electricity consumption during water intake, treatment, treatment, supply and distribution.

Energy saving measures according to the costs of their implementation are divided into low-cost, low-, medium- and high-cost.

Low-cost and low-cost energy saving measures

No significant costs are required to implement low-cost, and even more cost-free energy-saving measures. They pay for themselves in a few months due to lower operating costs. Among the cost-effective and low-cost energy saving measures in water supply and sewerage include:

1. Compliance with the rules of operation of water supply, sewerage and equipment used in them, which provide for timely scheduled repairs, replacement of packing and tightening of pump seals, valves and valves, replacement of faulty valves, elimination of leaks, etc.
2. Replacement of asbestos-graphite pump seals with Teflon-based seals, which provides an increase in service life by an average of 6 times. Additional costs are recouped over several months (up to 0.5 years).
3. Replacement of obsolete types of fittings with more modern ones (in washbasins, sinks, faucets, toilet cisterns, etc.).

Medium cost energy saving measures

These are events, the costs of which are recouped in 2-3 years. Let's dwell on them in more detail.

1. **Ensuring economic modes of operation of pumps.** The following is recommended for the implementation of energy-saving measures to ensure economical modes of operation of pumps:

- replacement of a group of low-performance pumps with more productive ones;
- replacement of the pump if the hydraulic characteristics of the network do not correspond to its passport data;
- increase of efficiency of pumps to their passport values installation of new consolidations in combination with careful balancing of impellers;
- replacement of units whose torque is transmitted to the shaft from the motor shaft via a gearbox or V-belt transmission, to pumps in which the impeller is located directly on the motor shaft (as a result of which energy losses in the transmission are eliminated);
- implementation of automated control of pumping equipment for the maximum possible loading of pumps;
- regulation of pump productivity by changing the speed of the impeller using a frequency-adjustable electric drive;
- in the absence of a frequency regulator, the regulation of the performance of a pumping unit or station can be performed not only by means of throttle valves (valves or valves, etc.), but also by step-on-off parallel pumps of lower capacity;
- in water supply systems with pump units designed for maximum water consumption at maximum pressure, it is advisable to install storage tanks (accumulators) of water at the required pressure with the device of automatic shutdown of the pump unit when filling the tank with water.

1. **Change of diameter of pipelines, the basic scheme of constructive execution of**

systems of water supply and drainage, use of pipes from polymeric materials. By increasing the pipe diameter by 50%, the friction loss in the pipes can be reduced by 75%. A similar result in solving the problems of energy saving in water supply and sewerage can be achieved by replacing pipes made of traditional materials with pipes made of polymers. As a result of this replacement, the service life of networks increases from 3-10 to 30 years or more. Hydraulic resistance and power consumption for the pump drive with the same pipe diameter and constant water flow are reduced by approximately 25%.

2. **Saving electricity and water in the transition to revolving water supply systems**. The transition from direct to circulating water supply in cooling systems of power and process equipment reduces water consumption from external sources, as well as the load on the pumping equipment of the water intake system and treatment facilities.
3. 4. **Deposition control in water supply and drainage systems** is carried out by both mechanical and chemical methods and requires stopping the network for repairs.

Currently, cheap and automated automated installations for water treatment with additives such as "complexones", which after adding them in small doses (about 0.6 g / m3) to the feed water, have been created and started to be widely implemented in heating, hot and circulating water supply systems. deposits.

1. **Elimination of water leaks**. Localization of these leaks is time consuming and requires the use of special acoustic leak detectors that capture sound vibrations of the jets at the site of damage to the system.
2. An effective means of detecting leaks is to equip the entrances to the building with cold water meters.
3. **Organization of water consumption accounting**. It is carried out in order to avoid uncontrolled technological consumption of water. For this purpose it is recommended to make water balance of the enterprise, to analyze schemes of water use and water consumption, economically.
4. **Dispatching and ASC** in combination with the use of frequency-regulated electric drives can significantly increase energy savings in water supply and sewerage by optimizing the operating modes of the system, more efficient and accurate detection of leaks.
5. **Stimulating the interest of the population and staff of enterprises in energy saving measures to save water and heat**. Equipping apartments with heat and electricity metering units, introducing payment for water and heat in accordance with the actual costs will contribute to greater interest in energy and heat saving.
6. **The analysis of the modes of the drainage system** is reduced mainly to the analysis of the modes of operation of the pumping equipment of pumping stations and treatment plants.
7. **Use of excessive effluent temperature, chemical energy of combustible substances that pollute effluents**. Additional energy saving reserves in drainage systems are associated with the possibility of using excessive effluent temperature, chemical energy of combustible substances that pollute effluents. An example of energy-saving technology of sewage disposal is fiery neutralization of wastewater with a high (about 50%) content of combustible substances (alcohols, gasoline, kerosene, acetone, oils, etc.). Such effluents are actually fuel, and can be neutralized by feeding into the furnaces of boilers.

High-cost energy saving measures

1. Energy saving measures in the electricity sector of water supply and sewerage systems are associated with the introduction of an automatic system of control and accounting of energy consumption (ASKOE) with the subsequent transition from a two-rate tariff for electricity to one-rate.

The expected effect is provided by:

- at the first stage of implementation - due to the reduction of capacity, which becomes possible due to more efficient accounting of electricity consumption;
- at the second stage - the transition to more favorable single-rate zone tariffs, differentiated

by time of day (the transition is allowed only if the company ASKOE).

1. The main reserves of energy saving in hot water supply systems include:

- replacement of sectional (shell-and-tube) water heaters with plate ones, which have smaller overall dimensions and lower heat losses, as well as simplify their tying with pipelines. This leads to a reduction in the power consumption of the pumps for the circulation of the coolant;
- equipping circulating and feed pumps in heat points with frequency-regulated electric drives (CRP), which allow to change the water flow in the systems without resorting to opening or closing the existing valves or other throttle bodies. Such energy saving measures save 10-30% of electricity;
- equipping the entrances to the building with mixing pumps and balancing valves of the BALLOREX type, water meters with outputs for transmitting information to the computer network; creation of a system for scheduling the consumption of heat, cold and hot water and the transition to regulating the consumption of thermal energy for hot.

1. Construction of treatment facilities equipped with equipment for utilization. Economic efficiency is determined not only by obtaining steam or water for heat supply, but also by extracting a number of substances that are then used as secondary raw materials.
2. Significant reserves of energy savings are in the circulating water supply systems, through which a significant amount of heat energy is lost in many industrial enterprises.

The problem of using this reserve for energy saving in water supply is solved with the help of heat pumps, which allow to return heat to the production cycle. Such heat pumps are widely used in Western Europe, USA, Japan. In Ukraine, their use is insignificant - mainly at the level of research facilities.

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