

# ENERGY EFFICIENT USE OF WASTE HEAT AT EXISTING POWER PLANTS

**Ulanov Michael N., Ulanov N.M.**

*Institute of Technical Thermophysics of NAS of Ukraine*

*tel. (044) 424 96 42, e-mail: [e3therm@gmail.com](mailto:e3therm@gmail.com)*

**Purpose** Display the feasibility of using waste heat in existing power plants to improve their energy efficiency.

**Results of work** At existing power stations, including cogeneration power plants (CHP) 45 - 55% of fuel energy is discharged into the environment through water recycling. For the most part, circulating water temperature is 18 - 38 °C throughout the year, and its rate flows amount to 15,000 - 28,000 m<sup>3</sup>/h and it cannot be used directly because it is cooled by using cooling towers or natural cooling ponds, leading to thermal environmental pollution and irreversible loss of water.

The use of heat pumps in CHP benefit not only from a technological point of view (improved vacuum in the condenser of the steam turbine and consequently increases the production of electricity) but also from an economic (real saving of expensive fossil fuels, particularly natural gas or increase thermal power CHP at no additional cost for fuel). To assess the efficiency of heat pumps in CHP were calculated heat pump technology in CHP scheme using as a source of low-grade heat circulating water from the steam turbine condenser temperature 18,7 °C the heating season and 37,5 °C for unheated season, cooling towers instead directed to the evaporator heat pump. When disposing of waste heat circulating water quantity of 1000 m<sup>3</sup>/h using heat pumps will provide additional thermal power station at a rate of 4426 - 7435 kW (depending on the temperature of circulating water, winter and summer mode) with a coefficient of performance at 3,14-5,52 (for the same conditions). This annual replacement of natural gas will amount to 6,67 million. m<sup>3</sup>, and reduce greenhouse gases to the atmosphere to 12,9 ths. tons of CO<sub>2</sub> equivalent. for a year.

**Conclusions** The introduction of heat pumps in existing CHP will provide the production cost of 1 m<sup>3</sup> of hot water 5 times less, and the price of 1 Gcal 2 times less than the current rates and do not depend on the price increase for natural gas and reduce the loss of circulating water and improve the ecological situation around stations.