INTEGRATION OF THE HEAT PUMP HEAT EXCHANGE PROCESS FOR HOT WATER SUPPLY AND HEATING

Selikhov Yury Anatolyevich, **Kotsarenko V.A., Kostenko O.V.**
National technical University "Kharkiv Polytechnic Institute", Ukraine, Kharkov
tel: (057)707-60-96, Fax (057) 711-59-90, e-mail:syua2016@ukr.net

Objective. A developed and implemented project of replacing a universal boiler with a fuel oil burner to a ground-water heat pump is presented.

Results. A prototype boiler with a fuel oil burner was selected and its operation was studied. Deficiencies are identified both in the work and in the construction of individual nodes. According to the analysis of literary sources, new efficient equipment was selected. This is a double-circuit solar installation of a flat-capillary free-flow type with a collector of a special design made of a polymer film in which the heat carrier (antifreeze) moves under the action of gravity on an inclined surface in the form of a liquid film for hot water supply and a ground-water heat pump for a private house heating system. Replacing the old equipment with the new one was carried out according to the method of heat engineering calculation and optimization calculation according to the sum of the specific costs of exergy. We have developed and introduced a new technological scheme of the combined hot water supply and heating system of a private house. A system automation scheme has been developed using a workstation and technical automation tools have been selected. The economic and exergy calculations of the payback period of the new combined hot water supply and heating system were carried out.

As a result, the calculation and further operation of a dual-circuit solar system and a heat pump showed the correctness of the replacement of equipment and materials.

Conclusions. 1. A dual-circuit solar system heats the coolant to a temperature of 35 ° C, after which it is fed into the second circuit of the double-circuit heat exchanger for intermediate heating of the coolant to 45 ° C.

2. Such heating allows you to increase the temperature of the coolant, which is supplied from the heat pump to 85 ° C and save energy.

3. The automation system allows you to control the combined installation without human intervention.

4. The payback period of the combined installation was 2,6 years.