model of good practices, constituting a specific set of guidelines for the entities administering the abovementioned areas.

References

1. **Zouros N.** The European Geoparks Network – Geological heritage protection and local development, Episodes: 2002, 27, 3, 165-171.

2. **Poros M. and Sobczyk W.** Directions of post-mining land reclamation in the Chęciny-Kielce area in the context of their use in active geological education. Annual Set the Environment Protection: 2014, 16, 386-403.

3**. Poros M., Sobczyk W. and Sobczyk E.J.** Model of post-mining land reclamation planning in the light of the geological park's operational strategy, Total Logistic Management, XVIII Applied Logistics Conference, Zakopane: 2014, 1.

UDC 621.577

M. V. OVERCO, PhD (Engineering), Associate Professor,
Donetsk National Technical University, Ukraine
S. O. VIRICH, PhD (Engineering), Associate Professor,
Donetsk National Technical University, Ukraine
M. O. BABENKO, PhD (Pedagogical), Senior Lecturer,
Donetsk National Technical University, Ukraine

USAGE OF HEAT PUMPS FOR REGULATING AIR TEMPERATURE IN RESIDENTIAL AREAS

Reliability of power supply is an index of effectiveness of economic policy in any government. The issues of global warming, rise of price for energy sources, growing addiction from fossil fuels demand alternative solutions of energy production. The field of housing construction especially needs new energetical technologies. Since the process of realization of water supply and heating arises the problem of providing the necessary energy.

Traditionally, fossil fuel (coal, oil, gas) was used for generating heat and separate system of air conditioning was used for cooling the buildings. The usage of heat pump which uses up to 75% of cheap low-potential energy extracted from the environment, might be an alternative solution to the problem of regulating temperature in the air [1]. Heating and cooling supply with the help of heat pumps relates to the sphere of energy-saving ecologically clean technologies and spreads more and more around the world. This technology according to the conclusion of a numerous authoritative international organizations, along with the other energy-saving technologies relates to the technologies of the XXI century.

Air-to-water heat pump can be related to the innovative projects of such type. This household appliance is able to heat the premises of any purpose and helps to provide the object with hot water. Also, one of his functions is room air conditioning during the warm season.

Operational principle of the ground-to-water heat pumps is accumulating and transporting dissipated solar heat, which is found in various natural sources, to the heating system. Besides the transporting

function, heat pump is also responsible for transformation of the heating energy through the converting the huge volume of low-potential energy into heat to cover the needs of the heating system.

Water-to-water heat pumps use the heat of ground-waters, opened water reservoirs or process cooling water. In Donetsk region, water from mines is considered as a low-potential source of heating, therefore a water-to-water heat pump is the most perspective for heating systems [2, 3].

Authors of this work substantiated the expediency of implantation the heat pump using pumpable to the surface mine waters to heat the settlements of residential area around functioning and non-functioning mines.

The parameters of the vapor compression cycle of heat pump with heat regeneration and an intermediate heat exchanger were investigated in order to achieve the set goals. The analysis of existing heat pump's constructions determined the choosing of the rational scheme of vapor compression heat pump with heat regeneration and an intermediate heat exchanger.

It was found that installing the heating system as a heated floor will allow to provide the heating supply of the object with heat pump unit during the whole heating period because of minor changes in temperature of ground waters during the year. During the heating period, the unit can also provide the heating of water in the hot water supply system.

Using heat pump just to boil water requires installing additional equipment. That is why after the end of the heating period, water boiling must be realized in a different way, for example by direct electric heating.

As a results of estimating the actual heat loosing during the transportation of the coolant, taking into account the technical condition and real terms of usage in heating networks, it was settled that the locating of the heat pump system is advisable directly near consumer, since it reduces heat loses.

Calculations of the options were made for the schemes of the vapor compressing heat pump, including versions with the heat recovery and sub cooler. It was found from the analysis of the energy efficiency indicators of calculated options, that the specific heat load of the heat pump characterizes the freon consumption, and therefore affects the cost of the compressor and heat exchangers. The compression ration determines its cost. The energy conversion factor and the specific primary energy consumption characterize the efficiency of the heat pump operation. The exergy efficiency shows the thermodynamic excellence of the process in the heat pump.

As a result of the conducted research was made the following conclusion: obtaining the cheapest by installing heat pumps requires large material costs; a significant reduction in the payback period is possible with the optimal design of heat exchanger in heat pump installations.

References

1. **Trubaev P.A., Grishko B.M**. Heat pumps [Text] - Belgorod: BSTU named after Shukhov Publishing house, 2009.- 142 p.
2. **Ray D., McMichael D.** Heat pumps [Text]. Translated from English – Moscow: Energopublishing, 1982. - 224 p.
3. **Yantovskij E.I., Levin L.A.** Industrial heat pumps - Moscow: Energoatompublishing, 1989.- 124 p.