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The Possibility of Using Geothermal Energy in the Energy Sector

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As we know, the main sources of energy today are various types of fossil fuels that are used in various energy enterprises. This is the main problem of the entire world energy industry, because all resources are finite, and, moreover, it is much harder to assess the damage from combustion products at stations than to calculate how many years the remaining fuel reserve of our planet will last.

The current policy of most European countries, countries of Asia and America is aimed at overcoming this “dependence”. At the moment, scientists see the main replacement for combustible substances in the form of renewable energy sources. For example, in the form of solar energy, energy received at hydroelectric power plants, from windmills, etc., but we would like to consider in more detail geothermal energy sources and the possibilities of their use in modern energy.

Geothermal energy is heat from the earth and is a natural, renewable resource for generating electricity. The heat of the Earth is inexhaustible in terms of volume, it is millions of times greater than all energy resources combined. At the moment, it is considered the most promising.

Often, naturally heated underground reservoirs are located very close to the surface. In this case, geothermal heat is visually determined by the naked eye. This is the erupting lava of volcanoes, geothermal springs – geysers.

The advantages of geothermal energy are that the reserves of such heat are 10 times higher than the reserves of organic fossils, the main fuel of the planet.

At the moment, the development of geothermal energy is actively engaged in: the United States, Iceland, New Zealand, the Philippines, Italy, El Salvador, Hungary, Japan, Russia, Mexico, Kenya and other countries, where heat from the bowels of the planet rises to the surface in the form of steam and hot water, breaking out, at temperatures reaching 300 ° C.

The famous geysers of Iceland and Kamchatka can be cited as striking examples. Considering the first, we can say that Iceland is rich in hydrothermal sources. Their energy is used by geothermal stations. The dynamo turbine is rotated by heated steam rising from a drilled well. Typically, each station contains a plurality of wells. For example, the largest geothermal station on the island is the 303 MW Hedlisheidi station, which has about 50 wells. For example, Iceland has completely abandoned fossil fuels as an energy source, although this was made the largest contribution by the huge number of hydroelectric power plants located throughout the country.

According to the calculations of scientists, the inexhaustible energy resources of the planet will be enough for the needs of human civilization. The undoubted advantage is that it is a free coolant. For comparison, at thermal power plants and nuclear power plants, energy consumption costs range from 50 to 80%.

However, this energy source has its pros and cons. The main ones are collected in a small plate below.

Advantages of geothermal energy

Disadvantages of geothermal energy

Inexhaustible source

It is required to drill wells up to several kilometers deep. This is not feasible in all regions.

Autonomy at any time of the year, day, under any weather and climatic conditions and other environmental factors

Large heat losses during extraction and transportation.

Efficiency. Installed capacity utilization factor (KIUM) - 80%

Strict geographic requirements for the placement of stations.

Large areas are not required, as in the construction of hydroelectric power plants.

The presence of toxic and radioactive impurities.

Do not pollute the atmosphere, ease of extraction in areas of volcanic eruptions and geyser deposits, where hot water lies on the surface.

The impossibility of discharges of waste into surface water bodies.

Low water consumption compared to hydroelectric power plants and thermal power plants, nuclear power plants. 20 l per 1 kW. In others - up to 1000 liters

From this we can conclude that geothermal energy (Table 1) can serve as a good alternative to current resources, however, due to the various characteristics of this type, some limitations may arise.

Table 1 – Geothermal Energy

Advantages of geothermal energy	Disadvantages of geothermal energy
Inexhaustible source	It is required to drill wells up to several kilometers deep. This is not feasible in all regions
Autonomy at any time of the year, day, under any climatic conditions and other	Large heat losses during extraction and transportation

environmental factors	
Efficiency. Installed capacity utilization factor-80%	Strict geographic requirements for the placement of stations
Large areas are not required, as in the construction of hydroelectric power plants	The presence of toxic and radioactive impurities
Do not pollute the atmosphere, easy of extraction in areas of volcanic eruptions and geyser deposits, where hot water lies on the surface	The impossibility of discharges of waste into surface water bodies
Low water consumption compared to hydroelectric power plants and thermal power plants and nuclear power plants. 20 L per 1 kW/ in others- up to 1000 liters.	

In the future, it seems very likely to use the thermal energy of magma in those regions of the planet where it is not too deep under the Earth's surface, as well as the thermal energy of heated crystalline rocks, when cold water is pumped into a drilled well several kilometers deep and hot water is returned to the surface. or steam, and then receive heating or electricity generation.

The scale of the use of thermal waters for heat supply is much larger than for the production of electricity, however, they are still small and do not play a significant role in the energy sector.

Geothermal energy is only making its first steps, and ongoing research and pilot work should give an answer about the scale of its further development.