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## **INNOVATIVE ELECTRICAL EQUIPMENT IN THE FIELD PRODUCTION AND TRANSMISSION OF ALTERNATIVE ENERGY**

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The highly reliable energy security system currently operating in the Republic of Azerbaijan was created in the 70s and 80s of the twentieth century, during the period of the first leadership (1969-1982) of the National Leader of the Azerbaijani people, Heydar Aliyev. Thanks to a clear and balanced economic policy pursued after the Republic of Azerbaijan gained political independence, a powerful energy complex was created in the country. The country's energy complex was reconstructed and modernized during the second leadership (1993-2003) of Heydar Aliyev in Azerbaijan, which continuously developed under the leadership of the President of the Republic of Azerbaijan Ilham Aliyev. Today it not only provides the population of the republic with high-quality energy, but also ensures the export of finished energy and energy raw materials, obtained from traditional and alternative sources, to neighboring countries, as well as through transit routes to Europe. In addition to traditional energy resources (oil, natural gas, various fuel products), Azerbaijan also has favorable conditions for the production of renewable energy (solar energy, wind energy, water energy, etc.). Currently, comprehensive work is underway to produce "green" or regenerative energy based on natural processes occurring and repeating in the country (sun rays, water flows, geothermal heat, sea waves and fences, fast air currents, etc.) [1].

It should be noted that renewable natural processes and organic sources (for example, ethanol, natural oils, wood, etc.) are considered as the energy of the future. Such energy sources, in addition to ensuring uninterrupted energy supply, also create conditions for maintaining a sustainable environmental balance. Since 2005, for the first time in the territory of the former USSR, internal combustion engines were used at low-power power plants in Azerbaijan. Today Azerbaijan is one of the countries in the world with rich energy resources. According to statistics from the European Union (EU), the official website of the European Union (EU), as of December 2015, the total energy reserves in Azerbaijan (k lifetime equivalent) amounted to 2.801 billion tons.

Today, the power grid of the Republic of Azerbaijan has a very complex layout. It connects hundreds of closely interconnected substations and power

lines carrying different classes of current. The substations to which the electrical transmissions are connected also operate at different currents (35, 110, 220, 330 and 500 kV). In order to diversify the export corridors of electricity produced in the Republic of Azerbaijan and reliable delivery of electricity to the energy systems of Georgia and Turkey, in February 2011, an interstate power transmission line with a capacity of 500/330 kV and a capacity of 500 kV was built on the territory of Azerbaijan ("Azerbaijan Electric Power Substation "Samukh" with the entrance and exit of the Gardabani substation). Currently, work is underway to further increase the capacity of the European Electricity Corridor (Azerbaijan-Georgia-Turkey) and in the future (until 2030) to expand the cross-sections of 500 kV power transmission lines along the Central Asian Regional Economic Cooperation. All this is an indicator of the progressive development of electricity production in Azerbaijan. If in 2020 our republic consumed 21.970 million kWh of electricity, then in 2021 this figure reached 23.435 million kWh. Compared to 2008 (811.6 million kWh), in 2021, 1673.4 million kWh of electricity was exported from Azerbaijan to foreign countries [3, p. 1-8]. In 2019, 26.8% of the world's electricity was generated by renewable energy sources. Most of this energy (16%) comes from hydroelectric power plants [2, p. 20-21]. Azerbaijan has greater potential for the use of solar energy. This potential is estimated at 5,000 MW in Azerbaijan, where a significant part of the year is sunny. For comparison, we note that the number of sunny hours per year in the USA and Central Asia is 2500-3000 hours, in Russia - 500-2000 hours, and in Azerbaijan this figure is 2400-3200 hours. If the amount of solar energy per 1 m<sup>2</sup> of the earth's surface is 1500-2000 kW in the USA, 1800-2000 kW in France and China, then in Azerbaijan this figure is 1500-2000 kW.

Geothermal energy sources on the territory of the Republic of Azerbaijan also have high potential. The potential power of these sources is determined to be 800 MW. Today, the natural heat of the earth is widely used in industry, agriculture, everyday life, public utilities and medicine in countries around the world. Currently, there are more than a thousand geothermal water pools in our country. The temperature of more than half of them is 33-82°C.

### References

1. Armaroli, Nicola; Balzani, Vincenzo (2016). "Solar Electricity and Solar Fuels: Status and Perspectives in the Context of the Energy Transition". *Chemistry – A European Journal*. 22 (1): 32–57.
2. International Energy Agency (IEA). *Key World Energy Statistics*. - 2012. - 80 p. -C. 20-21.
3. Report of the Ministry of Energy of the Republic of Azerbaijan for 2021. Official website of the Ministry of Energy of the Republic of Azerbaijan.- P. 1-8.