

Geothermal Power Potential in Absheron oil and gas region: Using Binary Cycles for Sustainable Energy

Научный руководитель – Memmedov Perviz

Memmedov Parviz

PhD

Национальная академия наук Азербайджана, Баку, Azerbaijan

E-mail: pervizmmmdv@gmail.com

Binary power plants. Binary and Kalina cycles are commonly utilized in the conversion of medium-low temperature geothermal resources into electricity [3]. In a closed loop cycle, binary cycles employ two fluids, namely the geothermal resource fluid and the organic fluid [2]. The geothermal fluid flows through a heat exchanger, where heat is transferred to a low-temperature boiling fluid that serves as the working fluid [1]. Subsequently, this working fluid vaporizes and expands through a turbine, thereby causing the rotation and generation of electricity in a generator. Following this, the working fluid undergoes condensation and is circulated through the heat exchanger multiple times. It is worth noting that the geothermal fluid, which exits the heat exchanger in a single pass, is often reintroduced back into the reservoir [4].

This scholarly investigation evaluated the capacity of incorporating geothermal energy within the context of oil production in the Bibiheybat field, located in Azerbaijan. The primary emphasis was placed on the X stratum, wherein an analysis was conducted to determine the distribution of temperature, pressure, and flow rate. The X stratum is characterized by an anticlinal fold structure, wherein the depths of the wells range from 450 to 670 meters. The temperatures of the wells exhibit variation, with a range of 46 to 24°C. These temperatures decrease as one moves towards the center, but increase in the wings. Similarly, the pressure within the stratum experiences a decrease towards the center, with a range of 46 to 4 atm. In terms of the geothermal energy potential, the total estimated value for the 70 wells under study is 307,578 kWh. Out of this, 25,090 kWh is derived from oil, while the remaining 282,488 kWh is obtained from water. By utilizing a binary cycle power plant, it is anticipated that approximately 107,652 kWh of electricity can be generated. This electrical power has the capability to operate two wells, as well as support the functioning of field facilities. Moreover, it possesses the potential to provide energy to nearby households.

References

- 1) Kabeyi M.J.B., Feasibility of wellhead technology power plants for electricity generation. International Journal of Computer Engineering in Research Trends. 2020a. Vol. 7 №2. pp. 1–16.
- 2) Kabeyi M.J.B., Geothermal electricity generation, challenges, opportunities and recommendations. International Journal of Advances in Scientific Research and Engineering. 2019. Vol. 5 №8. pp. 53–95.
- 3) Meng D., Liu Q., Ji Z., Performance analyses of regenerative organic flash cycles for geothermal power generation. 2020 Energy Convers. Manag. Vol. 224. 113396. pp. 1-13.
- 4) Windrem P.F., Marr G.L., Environmental problems and geothermal permitting. Nat. Resour. Lawyer. 1982. Vol. 14 №4. pp. 675–685.