

Geothermal energy research paper

[Environment](#), [Plants](#)



Engineering is perceived as one of the most crucial fields in the modern society, especially as a result of the growing urgency in addressing the various environmental issues. Development of environmental friendly sources is one area that has attracted the attention of most engineers. Geothermal energy is one of the sources that have been developed, which is also gaining popularity in most parts of the globe. Geothermal energy is described as the energy that is resultant from the heat of the earth (Hansen, 31).

Scientists argue that the center of the earth is molten because it is extremely hot. As a result of this, heat is conducted outwards to the outer rock layers, commonly known as the mantle. In some places, the mantle melts into magma, just beneath the earth's surface. Rain water oozes down via geographical fault lines, which then become super-heated upon reaching the heated rocks (Huenges and Patrick, 24). The highly heated water finds its way out to the earth's surface where it surfaces as hot springs or geysers. The hot water that is ensnared below the earth's surface forms a geothermal reservoir. It is this form of geothermal energy that is harvested and utilized in various ways. This type of energy has gained popularity recently because of its various characteristics. For instance, it is perceived as being environmental friendly because of low pollution. Besides, it is a renewable source of energy, unlike other energy sources such as fossil fuels. Furthermore, geothermal energy can take various forms including production of electricity (Gleason, 9).

Geothermal energy is applied in various areas. One its common application is production of electricity. Subject to the features of the geothermal resource,

generation of electricity is done in binary plants and conventional steam turbines. Generating electricity using geothermal energy is seen as the best alternative of other methods of electricity generation, especially those involving the use of fossil fuels (Huenges and Patrick, 27).

The other utilization, perhaps the most resourceful and most common, of geothermal energy is direct heat uses. These include space and district heating; aquaculture, thermoculture and horticulture; industrial and agricultural uses; as well as food processing. With regard to space and district heating, geothermal energy is used in heating different types of buildings including homes, barns, farms, and businesses (Gleason, 20).

Engineers have developed a sophisticated temperature control system which cannot only be used in heating, but also in cooling homes. This has so far has contributed to reduction of cost of energy in countries that experience varying temperature throughout the year (Gupta, Sukanta, and Harsh, 11).

The other direct use is in aquaculture, thermoculture and horticulture. It can be utilized in enhancing plant growth and marine life. Particularly, it is utilized in greenhouses as a source of warmth and moist for plants. The third direct use is industrial and agricultural uses. Various industries use geothermal energy in different processes. For instance, it is used in paper mills and in drying timber. It is also used in drying crops after harvesting. Lastly, this source of energy is used in food processing. Particularly, it is utilized in sterilizing facilities of processing food, producing powders and concentrates, and cooking food (Gupta, Sukanta, and Harsh, 15).

The United States is among the leading countries that producing and consuming geothermal energy. It is argued that the country produces about

3 GW. More plants are being constructed, and upon completion they are expected to produce about more 2. 4GW (Tabak, 49). California is ranked among the leading states with the highest number of geothermal energy plants, followed by Nevada, Utah, Hawaii, Idaho, Alaska, Oregon, New Mexico, and Wyoming, respectively. It is approximated that currently about 80% of geothermal projects in the United States are located in California and Nevada (Tabak, 56). Globally, it is estimated that the United States produces about 29% of total geothermal energy. Furthermore, the country has a potential of producing more geothermal energy based on the argument that it has a total of about two million square kilometer of geothermal areas, especially in the western states (Ueckermann, 7).

Philippine is the second highest producer of geothermal energy, producing about 18% of the total geothermal energy globally. Philippines utilize this source of energy to produce about 27% of its national electricity (Tabak, 62). It is followed by Indonesia, with a capacity of about 11% of global geothermal energy. Mexico, Italy, New Zealand, Iceland, and Japan respectively, are the other top producers of geothermal energy in the world. Other countries produce geothermal energy, but have a low capacity to influence the global market (Hansen, 77).

In conclusion, geothermal energy has emerged as one of the important sources of energy in the modern era, especially with regard to the efforts of dealing with increasing environmental challenges. It is a source of energy that is obtained from the earth, hence a renewable energy source. This type of energy is used in generation of electricity, as well as various direct uses. The United States is the leading producer of this energy, producing up to

about 29% of the total global supply of these sources of energy. Philippine is ranked second, followed by Mexico, Italy, New Zealand, Iceland, and Japan.

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