A Review on Geothermal energy and its applications

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Abstract

Geothermal energy is a form of Non-conventional source of energy. It is considered to be a sustainable form or source of energy as heat which get extracted is very less in quantity as compared to Earth's heat content. Nowadays, due to increasing demand of electricity, there is a need to look for some other alternative form of energy which in abundance so dependency on fossil fuels can be reduced. As of now there are so many renewable sources of energy like Solar energy, Ocean energy, Tidal energy, Geothermal energy etc. Among all researches are going on in almost for all the resources but there is a big scope of research in the area of Geothermal energy. So, this paper presents the contribution of various researchers on Geothermal energy and their applications with their usage in day to day life.

Keywords: Geothermal energy, Geothermal power stations, Electricity.

Introduction

Geothermal energy is generally defined as the heat which is generated within the Earth's surface and depending on its various characteristics and properties is then be used for different purposes like for heating, cooling or generating electricity. Generally, Geothermal energy is used to produce electricity and the production of electricity through this mode is done in Geothermal power stations. These works similar to Thermal power stations; the difference is that they Earth's core to heat water. Then the working fluid is used to rotate the turbine, thereby producing electricity.

The Geothermal power stations are generally of three types:

1) Dry steam power stations.
2) Flash Steam power stations.
3) Binary cycle power stations.

The oldest of the Geothermal power stations are Dry steam power stations. They are not often found easily. In these sites, directly steam is produces from the Earth's surface and is directly used to rotate the turbines. These are the oldest and most efficient Geothermal power stations.

The Second type of Geothermal power stations are Flash steam power stations, in which flashed steam is used to drive the turbines.

The third type is Binary cycle power stations, these are the most recent ones which can work at a very low temperatures also which can be as low as 57˚C.

There are some advantages as well as disadvantages of Geothermal energy. These are as follows:

Advantages:

1) Pollution free source of energy.
2) Maintenance cost is very low.
3) Space required is less as compared to the other power plants.

Disadvantages:

1) Investment and Set-up cost is high.
2) Site selection requires time.
3) It may lead to Greenhouse emissions.

Up-to now many researchers are doing their work on the exploration of Geothermal energy.

Contribution of some of the researchers in chronological order are given below:

Researcher	Year	Type/Parameters	Findings
Kutscher [1]	2000	Review covers the status of latest research and issues faced in geothermal energy.	Focussed on geothermal sources in U.S. and in International markets.
Barbier [2]	2002	Overview of geothermal energy heat transfer mechanism.	Defined Earth's heat flow and geothermal gradient.
Hammons [3]	2004	Medium and large-scale electricity generation.	Optimization in design of geothermal power plants.
Sadiq et al. [4]	2014	Review on 94 geothermal plants.	Highest conversion efficiency is found to be 21% approximately in vapour- dominated system.
DiPippo et al. [5]	2015	Performance assessments of geothermal power plants.	Analysed power plants in Africa and Italy with their energy conversion systems.
Assad et al. [6]	2017	Comparison between, Single flash, dual flash and Binary power plants.	Power production annually by Binary is highest among all others.
Salazar et al. [7]	2017	Electricity generation through geothermal.	Electricity generation in Columbia will fulfil 20% of the energy demand by 2025 through geothermal energy.

Kewen [8]	2018	Utilizing shallow geothermal energy for space heating.	Developed a new space heating system coupled with underground energy storage system.

Conclusion

Demand of energy is rapidly growing on day by day due to increase in population. The major concern nowadays is electricity production. As number of consumers have exponential increase in past 20 years. And the power plants like Thermal power plants, Hydro power plants etc. have their own pros and cons. So, there is a need to switch over to some other resources which are in abundance. This paper dealt with various applications of Geothermal energy and its use in various systems. It is concluded that geothermal energy is used generally to produce electricity but it does have other applications too. But the major portion of geothermal energy usage is in the production of electricity hence minimizing the load to produce electricity from other power plants. So, it is concluded from the above paper that geothermal energy is the energy which is to be focussed now for fulfilling the electricity needs if works effectively and efficiently.

References

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