www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume – 5 Issue -02 February, 2016 Page No. 15845-15851

Powering Nation

C Anushka Roy

Department of Electrical and Electronics Engineering
S.V. Engineering College For Women, Tirupati
Pin: 517507, Chittoor, Andhra Pradesh, India
e-mail: anushkachakkera@gmail.com

Abstract: Powering Nation means developing nation as powerful nation. It depends on energy. Energy is the chief gauge of all of categories work done by human beings and nature. Energy sources are of two genuses there are renewable and non-renewable. Examples of renewable sources are solar, wind, hydropower, tidal hydropower and geothermal energy. These are generally sustainable and environmentally friendly. Non-renewable sources are extracted or created after considerable damage to the environment. Examples are coal, petroleum, natural gas and nuclear power. Geothermal energy is an unimpeded source of energy and is available from earth crust. Maneuver of geothermal energy resource is a swap resource for conventional energy resources. Geothermal energy is a clean energy resource. It not only produces electricity but also has many applications like space heating, drying, industrial processes. In USA and New Zealand the usage of geothermal energy is very high. In India the convention of geothermal energy is in burgeoning juncture.

Keywords- sustainable; environmentally Friendly; extracted; inexhaustible.

Introduction

The energy strap up from the sizzling rocks present in the interior of the earth is called geothermal energy .The utterance Geothermal approached from Greek word geo and therme, where geo stand for “earth” and therme stand for “heat”. Soaring temperature steam fields exist underneath the earth’s surface in various places. This heat arises from the fission of radioactive substance naturally there in the rocks. In few places, steam or hot water transpire of the ground naturally by means of cracks in the form of natural geysers as in Manikaran, Kullu and Sohana, Haryana. Sometimes, the steam or sweltering water underneath the earth does not discover any place to emerge. We can synthetically drill a hole up to the hot rocks and by laying a pipe in it to make steam or hot water rush out to the pipe at extreme pressure which spins the turbine of a generator to engender electricity. The first power plant to exploit a geothermal well was fetched in Larderello, Italy in 1904. The first geothermal plant in the US was started at northern California in 1962.

Fig.1 Geothermal energy power plant

Literature survey

i. An article entitled in “The status and future of geothermal electric power” by Charles f. Kutscher (2000), attempts to analyze the utilization of

geothermal energy in United States. This contain about generation, transmission, distribution of electric power which is obtained from geothermal energy.

- The production of power in untied states from geothermal energy is started in 1962.
- Untied states is the largest user of power attained from the geothermal energy by exploiting the 2,200 MW of current.
- Geothermal energy is used to generate a total of about 8,000 MW of electricity in 21 countries.
- 1,137 MW is generated at the geysers in Northern California.
- Some important geothermal power plants are located in California, Hawaii, Nevada, and Utah.
- The utilization of geothermal energy is not like other non conventional energy resources because the temperature cannot be mainted same when there are be used for a long time, so, the reinjection and preservation of the fluid is needed.

ii Tatyana Plaksina and Christopher White (2016), in their article entitled "Modeling Coupled convection and carbon dioxide injection for improved heat harvesting in Geopressured geothermal reservoirs" suggested that the methods for carbon dioxide injection for improved heat harvesting in geopressured geothermal reservoirs are convection in flat and inclined porous media, simulation model and setup of numerical experiments, and model initialization and design of experiments. The core of the article suggests that carbon dioxide and geothermal aquifer development are profitable. Analysis of heat fluxes to the wellbore or in and out of the reservoir was used sparingly and qualitatively. The reason for this is limitations imposed by output from TOUGH2 software that does not separate conduction, convection, and radiation. It would be particularly helpful to have such capability for estimation of heat fluxes from bounding layers. Investigation of effects of non-uniform salinity and heat sources due to the presence of salt domes on the natural convection pattern is possible. Thermohaline convection is a factor which might have an influence on recovery of the geothermal heat.

iii. In a literature survey of geothermal energy a conference paper entitled as "Geothermal energy: Indian scenario" by Mukul Chandra Bora (2010), investigated into the existing Conditions of generation, transmission, distribution and other applications of geothermal energy upgrading of geothermal energy registered the maximum growth rate of 22.5% per 5 years between 1980 and 1990 and a slower rate of 16.7% between 1990 and 2000. Geothermal resources vary widely from location to location, depending on the temperature and depth of the resource, the rock chemistry and the abundance of ground water. Geothermal resources are predominantly of two types: high temperature (>200ºC) such as found in volcanic regions and island chains, and moderate to-low temperature (50–200ºC) that are usually found extensively in most continental areas. The type of geothermal resource determines the method of its utilization. The direct use of low temperature geothermal a resource (50–100°C) is in space heating. The Nagpur geothermal field is the one of energy Source for the population of Tibet .It is estimated that India has a competence of 10,000MW from springs. Geothermal provinces in India are Godavari province, the N.E Himalaya province, Cambay Province, the Barren Island West coast province, SONATA province, and bakreswar province.

iv Mr. Subir K. Sanyal (2010) , in his article entitled "Future of Geothermal Energy" , reveals that the geothermal energy on the earth is mostly available in the location of Ring of Fire . Ring of Fire is defined by the boundaries of tectonic plates, tectonic plates are the one which from the earth. Distinctive types of geothermal systems can be exploited:

- Convective systems (hydrothermal).
- Enhanced geothermal systems "EGS").
- Conductive systems ("sedimentary systems").
- Hot water produced from oil and gas fields.
- Geopressured systems, and
- Magma bodies.

The total quantity of heat energy stored up to a depth of 5 km worldwide has been estimated at about **1.46x 1026J.**

v. A research entitled as "Geothermal exploration in Gujarat: case study from Dholera",by Anirbid Sir

car, Manan Shah, Shreya Sahajpal Dwijen Vaidya, Shubhra Dhale and Anjali Chaudhary reveals that hot springs exist over gravity high, which is the surface manifestation of deep and shallow water sources. Dholera is located 30 km away in southwest direction from Dhandhuka village of Ahmadabad district and 60 km away in north direction from city of Bhavnagar. The tectonic trends have controlled Saurashtra Peninsula, Delhi trend (NE–SW), Son–Narmada–Tapti (SONATA) trend (ENE–WSW) and Dharwar trend (NNW–SSE).Here the Methods used are remote sensing analysis, geochemical analysis, Gravity survey, Magneto Telluric method (MT), Source fields of MT signals, MT acquisition and Data processing.

Geothermal energy

Geothermal energy is a spotless, sustainable and renewable resource that supplies energy using heat obtained from the earth. Radioactive substances within the earth discharges heat at very high temperatures, which give progress depending on the distance from the earth's surface. The temperature of the earth's core is expected to be 5 000 °C, and the outer core is about 4 000 °C – a comparable temperature to that on the peripheral of the sun .The steady flow of heat energy from the earth's interior, equal to an approximation of 42 million megawatts (MW) of power, which is predictable to carry on for billions of years.

i. Sources

The Sources of Geothermal energy are geysers, boiling mud pot, volcanoes and hot springs.

a. Geysers

A **geyser** is described by blinking discharge of water driven out powerfully by steam. Geysers are transient geological features. Geysers are usually allied with volcanic region. The creation of geysers particularly requires the amalgamation of three geologic conditions that are generally found in volcanic landscape. So geysers are occupied with extreme temperature .In India more numbers of geysers are present in the state of himachal Pradesh.

Fig.2 Geyser

b.Boiling mud pot

The acid water sluggish crumbles into the rocks and melt them mixture of fine elements of silica and clay. This gelatinous clay-water combination creates a peaty area, with the hot mud boiling and fizzy out, discharge at the surface. Such formations are called mud pots. They diverge in regularity from very soapy to almost hard-baked mud. The mud could be black, white and all blind of grey in between. Few colored mud pots, also identified as **paint pots**. The reason for these colored paint pots is a deficient of sulphur since sulphur can react with the iron oxides forming pyrite, which is a grey mineral. The boiling mud pot in Andaman Islands belongs to Indian peninsula.

Fig.3 boiling mud pot

c. Volcanoes

A **volcano** is a break in the crust of any planet, such as earth, which permits the, volcanic ash, hot lava and gases to flee from a magma passage which is exist under the surface. Earth's volcanoes take place because its crust is wrecked into 17 major, rigid tectonic plates that float on a hotter, softer layer in its mantle. Therefore, on Earth, volcanoes are generally

created where tectonic plates are depart or converging. Some of the volcanoes are Barren Island, narcondam, Deccan traps and baratang.

Fig.4 volcanoes

d. Hot springs

A **hot spring** is a spring produced by the manifestation of geo thermally heated groundwater that emerges from the earth's crust. There are geothermal hot springs in numerous locations all over the crust of the earth. While some of these springs include water that is the proper temperature for bathing, others are too hot to do so and fascination can result in injury or death. So we have to deal carefully in the matter of hot spring .Arti, Ganeshpuri, unkeshwar etc are the some of hot springs in India.

Fig.5. hot springs

ii Uses of Geothermal energy

The Uses of geothermal energy are cataloged into two types. They are direct and indirect uses of geothermal energy.

a. Direct uses

Direct use of geothermal energy is heating of gist like water by using of its thermal energy that is heating. Heating is lucrative at many superfluous sites than electricity fabrication. At natural hot springs or geysers, water can be channeled hooked on directly radiators. In hot, parched ground, earth tubes or down hole heat exchangers can collect the heat. However, even in areas where the ground is frosty than room temperature, heat can often be drag outed with a geothermal heat pump more economically and austerely than by conventional furnaces. They often combine task, including cyclic thermal energy storage, solar collection, in addition to electric heating. Heat pumps are capable of using geothermal energy for space heating effectively anywhere. Iceland is the world leader in direct applications

Table 1

Serial numbers	Na me of the powering nation	Capacity used
01	Untied states	17,415.91
02	Philippines	3.30
03	Japan	2,186.17
04	EL Salvador	3.36
05	Kenya	22.40

Fig.6. Fish drying in a geothermal tunnel dryer

b. Indirect uses

Extreme temperature of geothermal resources virtually always is used for power generation. Wells are penetrated into know geothermal reservoirs where temperatures frequently exceed 360^0c. Steam is fetched to the exterior under its hold pressure where the energy,

DOI: 10.18535/ijecs/v5i2.31

in the mold of steam is used to rotate the turbines of an electrical generator.

Three types of geothermal power plants are at present. They are

i. Dry steam plants, which evidently uses geothermal steam to turn turbine.
ii. Flash steam plants, which drag profound high pressure radiating water into lower pressure reservoir and operate the ensuing flash steam to run turbines and
iii. Binary –cycle plants, which pass sort of hot geothermal water by a secondary liquid with a minor boiling point compared to water. This causes the secondary liquid to flash to steam, which then runs the turbines.

Table 2

Serial numbers	Na me of the powering nation	Percentage of national electricity production
01	Untied states	0.3
02	Philippines	27
03	Japan	0.1
04	EL Salvador	25
05	Kenya	11.2

These are the percentage of national electricity production of few powering nations, by seeing this values we are able to know that generation of electricity by means of geothermal energy is in budding stage.

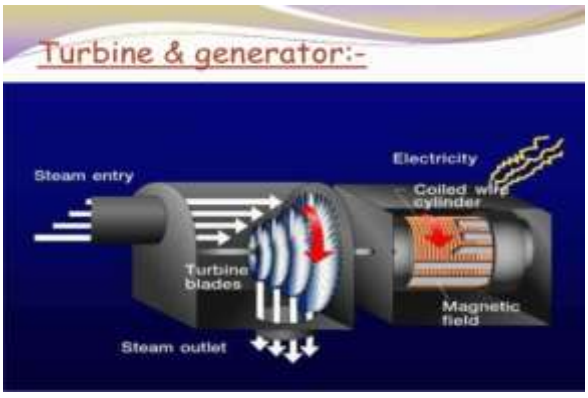

Fig.7.Turbine and generator

iii other applications

Agricultural and agro-industrial uses form a very important part of geothermal energy applications. In general, four types of direct application of geothermal energy in agriculture can be identified as the following

. Greenhouse heating.
. Aqua-culture.
. Agro-industrial processes.
. Soil heating.

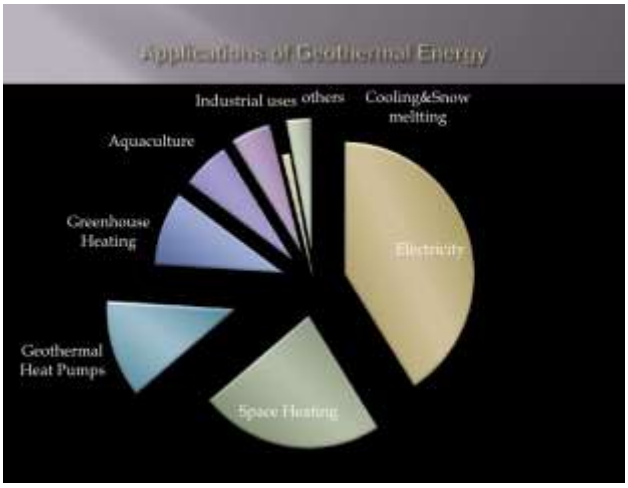

Fig.8.Piediagram of applications

i. Advantages and disadvantages
The geo thermal energy has both advantages and disadvantages. They as following

a. Advantages

1. Geothermal energy is a multipurpose in its use.
2. It is low-priced, weigh against to both zero and fossil fuels.
3. Geothermal energy is the slight polluting contrast to the other non conservative energy sources.
4. The greatest attraction of geothermal energy is its versatile and easily available energy source.

b. Disadvantages

1. The hole making process for inserting pipes into earth for suction of geothermal energy is noisy.

DOI: 10.18535/ijecs/v5i2.31

2. Huge amount of areas are needed for utilization of geothermal energy as a great deal of it is diffused.
3. Overall efficiency for power generation is petite, about 15 percent, compared to 35-40 percent for fossil fuel plants.

Indian scenario

Every annum people of a location will consume more energy than the previous annum. Earth's surface of 80kW/km^2 approximately. This heat flux, however, is not distributed uniformly over the Earth's surface; rather, it is concentrated along active tectonic plate boundaries. Some the geothermal areas which are capable for generation of electricity in India are Son-Narmada Tapti [SONATA], Himalayas, Sohana, cambay and Godavari. If geothermal energy is extracted from this area then this energy is use full for rural electrification schemes. Some powering nations like US, Philippines, Indonesia, Mexico, Italy, New Zealand and Iceland uses electricity obtained from geothermal energy. Iceland is the country which uses highest percentage of geothermal energy and 25 percent of nation's electricity is from geothermal energy. Developing nation like India has 10600MW this figure is estimated but 100MW is constant. More than 340 hot springs are identified by geological survey of India (GSI).The hot springs of temperature 35^0 c between 98^0 c are use full for generation of electricity. If a geothermal power plant is established in puga valley which has the temperature above 160^0 c and up to 240^0 c then 500MWH are produced then ,if this power is supplied to the rural areas in and around of Ladakh where power cuts are frequent. Then the power cuts will be demolished in rural areas of India. If plant is installed near all hot springs like Unapdev and Sunapdeo in Maharashtra then it give power to 41095 villages and 457 towns of the state.Even a power plant is constructed in Kullu district in Beas and Parbati valleys of himachal Pradesh, then this hotsprings can be used for both direct and indirect uses.Currently US capacity of geothermal energy is 2200MW,if india utilize its estimated amount of geothermal energy by geological survey of India (GSI)i.e., 100600MW then india would become a developed nation instead of developing nation. Chhattisgarh will become the first Indian state to have geothermal power plant with capacities ranging from 3 MW to 5 MW.It was estimated that Godavari basin has 1500MW. India has more quantity of geothermal power potential which has to be utilized in a proper way. First operational commercial geothermal power plant is likely to come up in AP with a capacity of 25MW by GEOSYNDICATE PVL LTD .

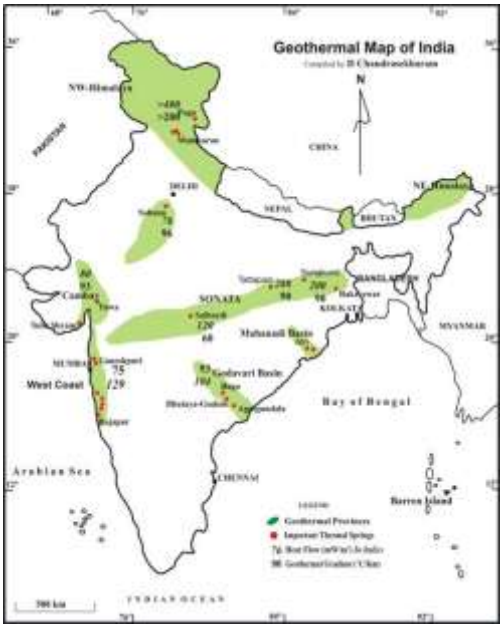

Fig.9 Energy Map of India

Conclusion

The electricity produced by geothermal power plant is a ultimate alternative conventional resource.
US, Japan and many other countries became powering nations by utilizing every form of energy for nations development. India is a developing nation as well as a powering nation. so soon we are going to see the abolishing of hours of darkness .even we have to remember the words of Dr. pachauri because geothermal energy as it not renowned as other alternative resources like solar and wind energies. He says "The real challenge is to exploring new energy solutions".

References

DOI: 10.18535/ijecs/v5i2.31

1. G.D Rai,“ Non conventional energy resource”.
2. https://en.wikipedia.org//
3. “English for Technologists and Engineers
“Orient Black swan publication -2014.
4. Basic Principles and Applications. New Delhi:
Narosa Publication House, 2005.
5. www.eai.in/ref/ae/win/win.html.