



GEOHERMAL-A EXPOSURE TO THE RENEWABLE RESOURCES

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ABSTRACT: Geothermal electricity production is most widely used in US. Most of the production of electricity first began in 1960. Energy produced by 50 plants from geothermal resources. Geothermal energy is produced in 4 steps. It is the efficient way to produce energy, from the Earth's interior and it is cleanest from all other sources. This is cost efficient, reduce dependency on fossil fuels and pollution free resources of power. This review paper covers about the all over production of electricity, 8,000 MW of electricity is produced through this source to 21 countries, latest research and the issues faced is also discussed in this report, while main focus is on production of electricity in US.

KEYWORDS: Geothermal Energy, Renewable Energy, Energy Sources

I. INTRODUCTION

It is an energy that originates from the interior of the earth. This heat occurs produced from earth interior is a combination of two sources: heat produced by the gravitational collapse and by the decay of various radioactive isotopes. It is divided into four types: Hydrothermal, Geo pressured, Hot dry rock and magma. Currently it produces 8,000MW of electricity in 21 countries. Among these in US 2200MW of energy then only the small percentage of this energy would electricity is used, which is largest among all countries. This energy is used in 50 states of US. US Geothermal energy sources sufficient to provide current electric demand for man thousand of Earth interior temperature reaches greater than 4,000°C this energy flows continuously in the interior, but there is no proper utilization make a very large difference in nation's energy supplies years. (Geothermal is not renewable as compare to solar and wind but it is very clear source of energy)

II. DESCRIPTION OF RESOURCES CATEGORIES OF GEOHERMAL HYDROTHERMAL

Current generation of electricity from hydrothermal resources divided into two type:- Steam and Binary Steam plants are most costly in view of technology. Electricity is Co-produced geothermal resources like geo pressured resources can some energy, These plants have higher costs than flush plants. Because it transfer all geothermal

generate from in these plants, steam expanded from turbine. The steam can used directly. This is may be single or double stage process.

III. CO-PRODUCED GEOHERMAL FLUIDS:-

Geo pressured:-

This consist of reservoirs of hot brine which are deeply buried water high pressure, having dissolved methane. Geothermal brine reservoirs having pressure approximately equal to lithostatic load are occur onshore and offshore Along pacific coast near Gulf of Mexico coast, Appalachia and in sedimentary basin. It consist 3 energy forms: Methane, hydraulic pressure and heat.

DOE also conducted research in the past on geo pressured reservoirs, The energy from this resource can operate a power plant of 1 MW by using heat and Methane.

IV. HOT DRY ROCK RESOURCES

This is quite simple process this technology extract heat from the hot rocks and found almost everywhere at some depth beneath the surface of the earth. it was conceived and developed at LOS ALAMOS, between the year 1970 to 1996..

fluid from to ground. Current installed cost are about \$700/KW for steam plant turbines. These plants are binary plants become in this process used secondary fluid



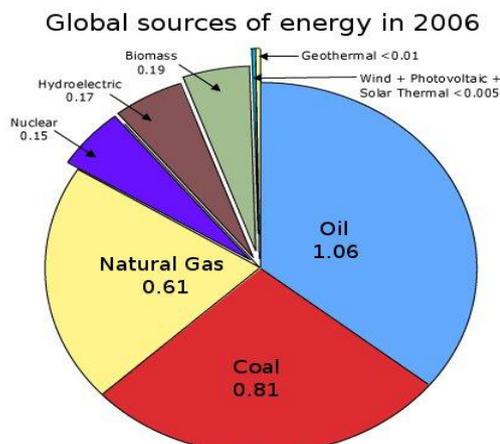
in power cycle heat into volatile working fluid from Geothermal. It is also named as 'Produced water cut' and 'Produced water' coproduced geothermal fluids

PERCENT OF TOTAL ENERGY CONSUMPTION

TABLE 1: U.S. GEOTHERMAL POWER PLANTS

	Locality	Electrical Output ¹ (MWe)	Year	Units	Comments
California	The Geysers	1,137	1960-89	23	Dry steam plants
	Coso	260	1987-89	9	Flash plants
	Salton Sea	267	1982-96	10	Flash plants
	East Mesa	105	1979-89	71	Binary plants
	Heber	80	1985-93	14	Flash and Binary
	Mammoth Lakes	43	1984-90	4	Binary plants
	Honey Lake	30	1989	1	Hybrid (geothermal/wood waste)
	Amadee Hot Springs	2	1988	2	Binary plants
Susanville (Wineagle)		1	1985	2	Binary plants
Hawaii	Puna	25	1992	10	Flash/binary plants
Nevada	Dixie Valley	66	1988	1	Flash plant
	Steamboat Springs	35	1986-92	13	Flash and binary plants
	Soda Lake	17	1987-91	9	Binary plants
	Beowawe	16	1985	1	Flash plant
	Stillwater	13	1989	14	Binary plants
	Desert Peak	9	1985	2	Flash plants
	Empire	4	1987	4	Binary plants, crop drying
	Brady Hot Springs	21	1992	3	Flash plants
	Wabuska	1	1984-87	2	Binary plant
	SBH3	14	1988	1	Flash plant
Utah	Cove Fort	11	1985-90	5	Dry steam and binary
	Roosevelt Hot Spring	20	1984	1	Flash plant

¹Actual output for The Geysers, rated output for others.

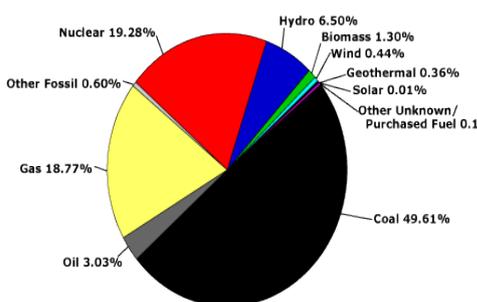


V. FUTURE OF GEOTHERMAL ENERGY

geothermal power is consider as third or fourth important renewable source of energy as compare to solar ,wind, and hydro .but till now it accounts just a small portion if world's power capacityin 2010 it accounted only 10,709.7 MW of total capacity. But according to researcher analysis it may rise to a new clip. This technology is simple; In Larderello the first power plant was built, there are many types of power plant they all do the same thing, they just capture rising steam and use it as power for electric generator.

As we are now drilling geothermal wells having more efficiency, so that more amount of energy capture easily. Engineers also proposed a improved 'binary cycle' plants which release only water vapor as emission. Greenhouse gases are emitted by traditional dry steam plants which is only 1/8 of coal plants. These plants trap steam which is coming from hydrothermal zone.

PERCENTAGE OF TOTAL ENERGY GENERATION CHART



With the improvement of technology geothermal is now getting cheaper. Since 1980 its cost decreases upto50%.Enhanced Geothermal Energy is the biggest looming technology around 10% of world total area is fit for production or geothermal power. According to USUCUS notes 50,000 times more energy produce from 10,000 meters as compare to oil and natural gas resources all over the world.

Geothermal holds greater potential than any other sources sit is the cleanest form of energy like the Wizaal Griffith ,it accounts for around 1/6 the of the power supply of the world.



VI. PROBLEMS OF GEOTHERMAL ENERGY

As US have the massive potential for producing geothermal power. But this exploitation of resources may cause earthquake because of this this exploitation is slowed down.

Blackwell says that with the help of technical potential we easily estimate the actual amount of electricity can be extracted. According to him if the depth is greater than 6.5 km they are impractical to access. Basel, Switzerland and United State have struggled for getting off the ground because EGS blamed that due to these activities. There may be chances of earthquake activity.

The executive director of Geothermal Energy Association, Karl Gawell, says that without indication of safety any project won't move forward.

And he promise to the people of United States that he want let them see another Basel, Switzerland,

Another major factor which is hurdle in the generation of geothermal energy is cost. Infact ,this is a primary barrier. USGS's Williams says in terms of cost as compare to other energy sources geothermal energy is in "ballpark". A report in 2009 by the investment bank credit 3.6 U.S. cents per kilowatt-hour, is the conventional geothermal cost. And it is below than 5.5 cents for coal.

According to report 2007 it has been estimated by Geothermal Ex, A consulting firm that the best possible cost in the future is 5.4 cents per KWH for EGS systems and this technology want be cost computative until 2050.

VII. CONCLUSION

The Earth geothermal resource is a vast house of energy supply. United state supplies the largest energy at current 30,000 energy is supplied by a domestic resources. it is used in all 50 states of united state. But till now it has not reached to a full potential because of issues which it faced due to technology or cost. These issues also affect the economic computitiveness. This energy can be extracted by various forms such as from hydrothermal, .deep geothermal ,from magma, coproduced and geopressured . There is table also shown in this which shows the division of energy in different states of US, this geothermal energy can produce upto 10% from the total earth geographical area are port in 2009 by the investment bank credit 3.6 U.S. cents per kilowatt-hour, is the conventional geothermal cost. And it is below than 5.5 cents for coal now this energy is getting cheaper, and in future it may provide 50% more energy than other sources. But now it has certain issues which has to be solve after that we can use itsafely .These issues are related to cost and technology. Also one major issue is there of seismic activity which may happen because of drilling inside the earth geographical are. Once these issued solved, this is the

best source of energy. And electricity can be easily generated from this source according to EDG.

REFERENCES

1. USGS Circular 790 (p. 157), includes identified and unidentified resources; 2015 and later estimates are a consensus of the experts at the workshop. Estimated accessible figure includes identified (~30,000 MW) and unidentified (~120,000 MW) (i.e., hidden or showing no surface manifestations) hydrothermal resources.
2. USGS Circular 790, *Geothermal Electric Power Supply Possible from Gulf Coast, Midcontinent Oil Field Waters*, "Oil and Gas Journal," September 5, 2005, and SMU Geothermal Laboratory *Geothermal Energy Generation in Oil and Gas Settings Conference* findings, March 13 – 14, 2006.
3. Based on Mafi Trench Unit on offshore platform now in operation.
4. *Energy Recovery from Enhanced/Engineered Geothermal Systems* (EGS), Massachusetts Institute of Technology (MIT), September 2006.
5. OIT Geo-Heat Center, using analysis based on USGS Circulars 790 and 892.
7. Muffler, L.J.P., ed., *Assessment of Geothermal Resources of the United States*, 1978, U.S. Geological Survey Circular 790, 1979.
8. Rybach, L., Megel, T., Eugster, W.J., *How Renewable are Geothermal Resources?*, Geothermal Resources Council Transactions, Vol. 23, October 17-20, 1999.
9. EPRI, *Renewable Energy Technology Characterizations*, DOE Report TR-109496, December 1997.
- 11 table of US Geothermal power plant from report status and future of geothermal power plant.
12. Problem or challenges to geothermal energy..by google funded research by Dave Levitan.