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Challenges in Development of Geothermal Energy in India

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ABSTRACT

Geothermal exploration in India is continued intermittently since 1980. Preliminary investigation was carried out in areas with major geothermal prospects to collect the basic information including geology, water composition, and structural control around the geothermal areas. Exploration drilling was carried out in selected geothermal prospects viz. Puga in Ladakh, Tattapani in Chhattisgarh, Ganeshpuri and Unhavre (Khed) in West Coast area, Bakreshwar in West Bengal, Manikaran in Himachal Pradesh, Joshimath in Uttarakhand. Surface investigation by geological mapping, geochemical survey, shallow drilling was conducted in Manuguru in Telangana, hot springs of Jalgaon; Dholera and Unai geothermal prospects in Gujarat.

Though geothermal investigation is continued in various part of the country, the first geothermal power plant is yet to be installed. The assessment of important geothermal fields to deeper levels is still to be completed. The insufficient data on deep level exploration and actual reservoir parameters is restricting the decision making for geothermal power generation. Geothermal power plant installation needs more funds compared to solar or wind power, this is considered a factor in the slow development of geothermal power in India. The main constraint in geothermal exploration is scarcity of machinery to conduct deeper level drilling. Besides, there is need to provide some incentive for exploration activity which is expensive and time consuming with uncertain outcome. A main share of investment is required for exploration by drilling, for which the government shall provide necessary funding or subsidy. Furthermore, it is essential to finalize the power policy for sale and transmission of power generated by geothermal energy.

The challenges faced by geothermal industry in India and the role of government in boosting the exploration and development of geothermal power generation in India is discussed here.

1. INTRODUCTION

The investigation for geothermal resources was initiated in India based on the report of hot spring committee in 1973 for geothermal potential assessment (Seth Vedantam, 1996). Geological Survey of India initiated the investigation for geothermal resources at Puga in Ladakh, Jammu & Kashmir state; Tatapani in Chhattisgarh state, Manikaran in Uttarakhand state and the hot springs of West Coast of India (GSI 1991). Resource assessment at a shallow level was carried out by drilling in these areas. Assessment of potential in the deep level reservoir could not be carried out due to the unavailability of proper machinery in India. The situation remains same after a period of three decades. The present status of geothermal resource assessment and development activity is discussed in this article. The main constraint in development of geothermal resources in India is lack of equipment for deeper level (> 2000m depth) exploration by drilling, and involvement of private entrepreneur as end user of the geothermal energy (Sarolkar 2015).

The present installed power generation capacity in India is 3,57,875 MW (Ministry of Power, 2019). The share of non-conventional energy sources is 79,372 MW, around 22% of the total. Most of the non-conventional power is contributed by wind and solar energy. Considering the long period of stagnation in development of geothermal resources, it is needed to start geothermal power production in India now. The following aspects may be considered for development of geothermal energy in India.

1.1

Government of India has issued policy for the development of wind and solar power plants (MNRE, 2016). Similarly, it will be useful if the policy for exploration and development geothermal energy is made public. The guidelines in this regard will help private entrepreneurs to decide the exploration strategy and funding needs.

1.2

There is need to decide the power purchase policy for geothermal energy and facility for transmission of the power generated. Most of the places, it is possible to use the power in nearby towns like Tatapani in Chhattisgarh and Puga in Ladakh, reducing the cost of transmission. The availability of transmission facility needs to be ascertained before planning a project. Geothermal power projects need an assured power purchase scheme to plan plant capacity.

1.3

Geothermal energy is useful for power supply in remote locations. MNRE has encouraged decentralized renewable power projects using wind energy, biomass energy, hydro power and hybrid systems in the country to meet the energy requirements of isolated communities and areas which are not likely to be electrified in near future (Power min, 2018). MNRE may give priority to geothermal projects in remote areas giving full incentive for exploration and power plant installation.

1.4

MNRE has initiated Green Energy Corridor scheme for evacuation & integration of the renewable energy (RE). MNRE has proposed setting up a Renewable Energy Management Centre (REMC) and the control infrastructure such as reactive compensation, storage systems, etc. The evacuation of new generated power can be planned through this corridor. The green energy corridor may be planned to transmit geothermal power.

1.5

Ministry of New & Renewable Energy supports R & D activities to make non-conventional energy systems more reliable and cost-effective including field testing, for strengthening manufacturing base. MNRE supports solar PV Roof-top Systems for abatement of diesel for power generation in urban areas. Similarly, MNRE should support small geothermal plants to provide power in remote areas. Small geothermal plants are useful for off grid renewable energy-based electricity generation. The financial support by MNRE was made on kW basis (not percentage of the cost as was in previous scheme) on reimbursement basis (no advance release as was in earlier scheme). MNRE may give incentive for installation of geothermal power plant.

1.6

It is essential to support exploration activity by providing financial assistance at initial stage to promote geothermal energy utilization. MNRE should support installation of geothermal demonstration power plant which will show case viability of geothermal energy in India. MNRE is planning to encourage the industry to establish demonstration projects at the first stage to assess the technical viability of the project before going to the commercial models. Geothermal power plant installation needs more funds as compared to solar or wind power, which is considered as a factor in slow development of geothermal power in India. As per the international reports a 1 MW Geothermal Power Plant generates about 8.3 Million Units (MU) per MW per annum(IGA, 2010) compared to Solar 1.6 MU per MW, Wind 1.9 MU per MW and Hydro 3.9 MU per MW (Gov.in, 2016). Thus, geothermal energy is more viable as compared to the other renewable energy sources.

1.7

A magneto- Telluric survey has to be carried out in main geothermal fields to assess the deep reservoir parameters which will help in assessing the extent of reservoir and possible resource potential.

1.8

The worldwide average capital cost for geothermal energy power plants is around Rs. 30 - 35 crore per MW at the rate of power purchase tariff of around Rs. 10-12 per Kwhr (MNRE 2018). This is due to high drilling cost, uncertainty of project specific exploration, etc. Interested stakeholders may investigate secondary products like space cooling & heating, desalination, etc. for achieving reasonable rates. The government should encourage exploration for geothermal energy by providing financial assistance for geothermal energy development.

1.9

International collaboration may be encouraged to get funding and technology transfer, as presently the deep drilling machinery and geothermal power plants must be imported from countries having geothermal development.

2. GROUND SOURCE HEAT PUMPS (GSHP)

MNRE should encourage Ground Source Heat Pumps (GSHP's) as direct heat use of geothermal energy or ground source heat to use the earth's relatively constant temperature between 16 – 24°C (MNRE, 4) at a depth of 20 feet to provide heating, cooling, and hot water for homes and commercial buildings. The encouragement to GSHP will help in large scale substitution of conventional energy thus reducing the pressure on conventional energy sources. The National Building Code 2016 has also included new and energy efficient options of air conditioning, heating and mechanical ventilation, such as geothermal cooling and heating. (BIS, 2016) Thus, the main challenge in the development of geothermal energy is the high cost of exploration and more gestation period required for resuming production as compared to the other renewable energy sources. The solar and wind energy sources are considered priority in development activity. Geothermal energy may be given similar facility at initial stage to establish feasibility of geothermal resource production in India. Geothermal energy development projects may be evaluated independently. Comparing the geothermal project with well-established solar or wind energy project is disadvantageous in planning geothermal installation.

3. CONCLUSION

Geothermal energy sources in India need proper encouragement for exploration and development. Guidelines may be circulated for exploration and development of geothermal resources. Incentives for exploration and installation are required to overcome the risk factor in assessment of geothermal energy potential to encourage entrepreneurs to take up geothermal projects. Assessment of geothermal projects may be done independently, keeping in view the long-term production capability of geothermal energy sources and heavy investment required for exploration and development.

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