

## A Short Note on Geothermal Energy Utilization at Oilfields

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### DESCRIPTION

Our Earth has different layers they are crust, mantle, and core. These layers have different temperatures, core have highest temperature. The rate of change of the temperature with respect to the increase in depth from surface is called geothermal gradient. With increase in depth from surface to core the linear rate of increase in temperature is from 17°C to 30°C or more per kilometer. The distance from earth surface to core is nearly 2900 kilometers. The variation in the temperature depends on the various factors like ground water circulation, geological formations. Highest geothermal potential areas are volcanic regions and active plate boundaries. In the sedimentary region this temperature is available in the form of warm or hot groundwater, this energy source is used to produce electricity and for heating homes in cold countries. First geothermal power plant in Italy at Larderello for production of electricity used steam in 1904.

In the extraction process of hydrocarbons at oil fields, water is a co-product and it is treated as sewage water. The sewage water from the oil fields has high value of geothermal energy. It is easy and more productive when this geothermal energy is used to produce electricity. Compared to other conventional geothermal fields this is better. The currently decommissioned and abandoned oil and gas wells are suitable resources to install these geothermal power production set-ups. There are always adverse environmental issues with disposal of oil field water, so generally co-product sewage water is re-injected into the ground. Before re-injection process, this water can use as geothermal energy

resource to produce electricity. The methodology for install a geothermal set-up at an oil field is follow as lithostratigraphic sections were prepared based on data, Gamma Ray (GR), Self-Potential (SP), and Dual Laterolog (LLD). To determine the Bottom Hole Temperature (BHT) temperature logs were considered, and the petrophysical parameter porosity ( $\Phi$ ) is calculated from the data of Neutron and Density Logs by using Archie's equation and by using the empirical formula permeability ( $k$ ) is calculated, from the Buckles' method irreducible water saturation is calculated. The thermal energy is used to produce steam from water and this saturated steam is used to rotate turbines. The power production process is carried by the principle of Rankine's cycle.

The production of electricity from geothermal energy from oil fields is a new and clean method. This energy gives low impact on surrounding environment, low greenhouse gases, continuous output, and available worldwide. In India, Asia's oldest oil field is in Assam state Digboi is running from 1889, it is currently in production of oil and gas. The exploration process is going under two public sector organizations are Oil India Limited (OIL) and Oil and Natural Gas Commission (ONGC) since 1950. The reservoir temperatures of the Upper Assam Basin maintains low to medium enthalpy of 100°C to 200°C and maintains a geothermal gradient as high as 3.92°C/100 m. The reservoir rocks are temporally cover a succession of the Paleogene to Neogene strata with the prolific development of reservoir rocks in each group. Assam state will get benefit in the energy supply process with geothermal energy, it will boost the economy of the state.

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