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ScienceDirect

Energy Procedia 47 (2014) 71 – 75

Energy Procedia

Conference and Exhibition Indonesia Renewable Energy & Energy Conservation
[Indonesia EBTKE CONEX 2013]

Finding Geothermal Energy Based on Radioisotopes Technology

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Abstract

Increasing energy consumption in Indonesia won't fulfilled if only rely on availability of available energy nowadays. There are many natural resources that can be used as renewable energy. One of them is geothermal energy. Nowadays, Geothermal known only on the surface of earth with observation from geysers and hot springs. With the sophistication of modern technology, geothermal energy can be found by observing radioisotope to find content silicate and carbonate potential more accurately in groundwater. So it's expected geothermal energy more stronger to turn on a turbine at the power plant on a large scale.

Selection and peer-review under responsibility of the Scientific Committee of Indonesia EBTKE Conex 2013

Keywords: energy; natural resources; geothermal; radioisotopes; power plant .

1. Introduction

Increasing energy needs and oil prices, especially in 1973 and 1979, have triggered countries in world to decrease dependence oil. We need to accelerate development of new and renewable resources. Nowadays, geothermal energy has utilized to power plants in twenty four countries, including Indonesia.

Indonesia's geographical location on the Pacific Ring of Fire has endowed this country with geothermal potential are not paralleled [1].

Geothermal energy is not only clean and renewable, but also requires less space than other renewable energies such as solar energy and wind energy. Geothermal also provides supplies predictable and constant, not affected by weather conditions and time. Geothermal energy is the energy contained as heat in the Earth's interior from inside of earth which has transferred to surface earth by heat conduction from sources occurs through the rock and convection

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Selection and peer-review under responsibility of the Scientific Committee of Indonesia EBTKE Conex 2013
doi:10.1016/j.egypro.2014.01.198

occurs due to contact between the water with a heat source which can be used continuously for heating and electricity generation [2].

The origin of this energy is linked with the internal structure of our planet and the physical processes occurring there. This heat is brought to the near-surface by thermal conduction and by intrusion into the Earth's crust originating from great depths [3]. Geothermal surface manifestation characterized by hot springs, hot mud, geysers and other geothermal manifestations. Geothermal potential is great, that is approximately 30 - 40% of world geothermal potential. Potential of Indonesian geothermal resources are estimated to generate 27,000 megawatts of electricity if fully exploited. Indonesia is currently only using 1,200 megawatts of electricity from geothermal energy shows Indonesian away from taking advantage of the natural condition of Indonesia as shown by figure 1 Indonesia geothermal potential.

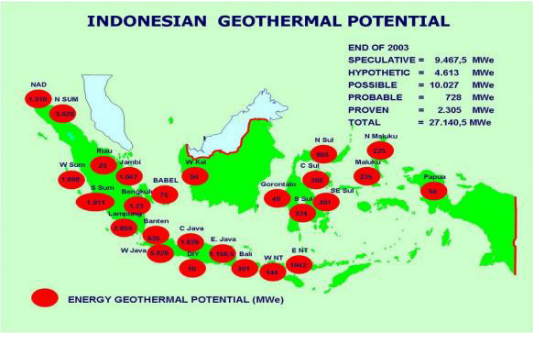

Fig. 1. Indonesia geothermal potential.

There are 256 potential geothermal areas, 84 located in Sumatra, 76 located in Java, 51 located in Sulawesi, 21 located in Nusa Tenggara, 3 located in Papua, 15 located in Maluku, and 5 located in Kalimantan. Nowadays, there are 7 geothermal working areas have been developed with a total capacity of 1,196 MW which located in Darajat (260 MW), Dieng (60 MW), Kamojang (200 MW), Mount Salak (377 MW), Sibayak (12 MW), Lahendong (60 MW), and Wayang Windu (227 MW). Between 1974 to 2009, 430 wells have been drilled [4].

As various initiatives aimed at developing renewable energy sources, geothermal exploitation activities are also affected by the lack of supportive government framework in the field of research on geothermal development in Indonesia. The aim of this paper discusses the potential for discovery of new blocks exploration of geothermal research development collaborating study of nuclear, especially radioisotopes technology. One application of the use of radioisotopes as tracer in hydrological studies. Tracer technique is one of techniques used to gain insight into the character of a system by marking systems with certain materials, such as radioisotopes. By using radioisotope tracer, various problems in the fields of hydrology will be solved by direct way which much faster than conventional way. Radioactive tracers have been used to study the movement of water in several geothermal fields, including Wairakei and Broadlands, in New Zealand.

2. Material and method

Nowadays, Geothermal known only on the surface of the earth with observation geysers and hot springs. With the sophistication of modern technology, geothermal energy can be found by observing radioisotope through groundwater seepage cycle. Radioisotopes are made in a nuclear reactor that has a density (flux) of neutrons by the reaction between the high specific atomic nuclei with neutrons. Radioisotopes are used radioisotope compounds are soluble in water and can detect the presence of gases, such as Cobalt60 [5, 6].

Composition of high-temperature hydrothermal fluids is controlled primarily by the pressure-temperature conditions, reaction kinetics and rock composition in the high-temperature reaction zone [7].

Science geohidrology be key in detecting flow of groundwater. Water seeped into the ground to form a stream which the water is contaminated with material in the ground. The ground water trapped between two impermeable layers. The ground water contains substances that can be detected by cobalt60.