Enhancement Production and Development of Hot Dry Rock System by Using Supercritical CO2 as Working Fluid Instead of Water to Advance Indonesia's Geothermal Energy

Authors : Dhara Adhnandya Kumara, Novrizal Novrizal

Abstract : Hot Dry Rock (HDR) is one of geothermal energy which is abundant in many provinces in Indonesia. Heat exploitation from HDR would need a method which injects fluid to subsurface to crack the rock and sweep the heat. Water is commonly used as the working fluid but known to be less effective in some ways. The new research found out that Supercritical CO2 (SCCO2) can be used to replace water as the working fluid. By studying heat transfer efficiency, pumping power, and characteristics of the returning fluid, we might decide how effective SCCO2 to replace water as working fluid. The method used to study those parameters quantitatively could be obtained from pre-existing researches which observe the returning fluids from the same reservoir with same pumping power. The result shows that SCCO2 works better than water. For cold and hot SCCO2 has lower density difference than water, this results in higher buoyancy in the system that allows the fluid to circulate with lower pumping power. Besides, lower viscosity of SCCO2 impacts in higher flow rate in circulation. The interaction between SCCO2 and minerals in reservoir could induce dehydration of the minerals and enhancement of rock porosity and permeability. While the dissolution and transportation of minerals by SCCO2 are unlikely to occur because of the nature of SCCO2 as poor solvent, and this will reduce the mineral scaling in the system. Under those conditions, using SCCO2 as working fluid for HDR extraction would give great advantages to advance geothermal energy in Indonesia.

Keywords : geothermal, supercritical CO2, injection fluid, hot dry rock

Conference Title : ICEERET 2017 : International Conference on Energy Efficiency and Renewable Energy Technologies **Conference Location :** Tokyo, Japan

Conference Dates : November 13-14, 2017

1