

Geothermal Resources to Ensure Energy Security During Climate Change

Authors : Debasmita Misra, Arthur Nash

Abstract : Energy security and sufficiency enables the economic development and welfare of a nation or a society. Currently, the global energy system is dominated by fossil fuels, which is a non-renewable energy resource, which renders vulnerability to energy security. Hence, many nations have begun augmenting their energy system with renewable energy resources, such as solar, wind, biomass and hydro. However, with climate change, how sustainable are some of the renewable energy resources in the future is a matter of concern. Geothermal energy resources have been underexplored or underexploited in global renewable energy production and security, although it is gaining attractiveness as a renewable energy resource. The question is, whether geothermal energy resources are more sustainable than other renewable energy resources. High-temperature reservoirs (> 220 °F) can produce electricity from flash/dry steam plants as well as binary cycle production facilities. Most of the world's high enthalpy geothermal resources are within the seismo-tectonic belt. However, exploration for geothermal energy is of great importance in conventional geothermal systems in order to improve its economic viability. In recent years, there has been an increase in the use and development of several exploration methods for geo-thermal resources, such as seismic or electromagnetic methods. The thermal infrared band of the Landsat can reflect land surface temperature difference, so the ETM+ data with specific grey stretch enhancement has been used to explore underground heat water. Another way of exploring for potential power is utilizing fairway play analysis for sites without surface expression and in rift zones. Utilizing this type of analysis can improve the success rate of project development by reducing exploration costs. Identifying the basin distribution of geologic factors that control the geothermal environment would help in identifying the control of resource concentration aside from the heat flow, thus improving the probability of success. The first step is compiling existing geophysical data. This leads to constructing conceptual models of potential geothermal concentrations which can then be utilized in creating a geodatabase to analyze risk maps. Geospatial analysis and other GIS tools can be used in such efforts to produce spatial distribution maps. The goal of this paper is to discuss how climate change may impact renewable energy resources and how could a synthesized analysis be developed for geothermal resources to ensure sustainable and cost effective exploitation of the resource.

Keywords : exploration, geothermal, renewable energy, sustainable

Conference Title : ICRNES 2018 : International Conference on Renewable and Nonrenewable Energy Sources

Conference Location : Dublin, Ireland

Conference Dates : August 16-17, 2018