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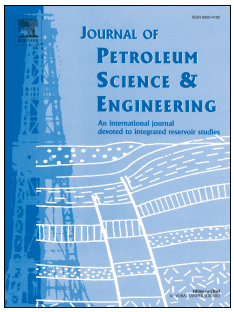

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A Comprehensive Review of Geothermal Energy Extraction and Utilization in Oilfields

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Abstract

By the nature of reliability, sustainability, abundant resource and minor impact on environment, geothermal energy is considered as one of the future resources to meet the world's growing energy demand. Harnessing geothermal energy from oil wells by existing assets, data and technologies features significant advantages over traditional geothermal wells, especially in reduced capital expenditure and operational risks. To raise awareness and promote discussions on oilfield geothermal development, this paper comprehensively characterized the oilfield associated geothermal resource, reviewed the current geothermal development in worldwide oilfields, pinpointed the existing challenges and introduced multidisciplinary technologies as possible solutions to unlock the potential and promote extensive development of geothermal energy from oilfields. Moreover, an integrated risk/opportunity assessment and management framework is proposed to improve the outcomes of diverse oilfield geothermal projects in practice.

Keywords

Low-temperature geothermal resource; Geothermal power generation; Geothermal direct use; Mature Oilfields; Coproduction; High water-cut wells; Abandoned wells

1. Introduction

Geothermal energy is a renewable and sustainable energy and features weather independence, stable, operational reliable, and environmentally friendly nature. It has been extensively studied to mitigate global warming, reduce air pollution and meet the need of global energy consumption. For decades, the utilizations of geothermal energy mainly in regions with high geothermal gradient with intense volcanic or hydrothermal activities, such as the Geysers in USA and Iceland in Europe. In addition to those areas, geothermal stored in hydrocarbon reservoirs also presents a great potential, not only because massive geothermal energy is existing in oil and gas reservoirs but also oilfields have enormous advantages to develop those geothermal energy.