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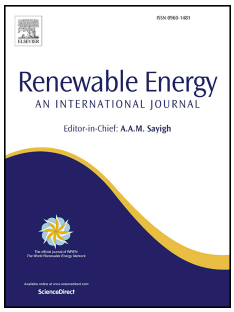

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Sedimentary Basin Geothermal Favourability Mapping and Power Generation Assessments

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Abstract

Globally, sedimentary basin geothermal energy could prove a significant source of low-carbon electricity, but regional resource assessments require collecting high cost sub-surface data. This study applies freely available petroleum production data in a comprehensive approach to: 1) identify favourable locations for geothermal energy development and 2) to estimate electric power generation potential at those locations. A geothermal favourability map identifies favourable locations by overlaying geological and economic criteria. Power generation estimates are based on the Volume Method, which derives power capacity from the thermal energy present in a reservoir. As a method case study, the northeastern British Columbia section of the Western Canada Sedimentary basin is analyzed. Here, four favourable areas are identified (Horn River, Clarke Lake, Prophet River and Jedney) and have a total power capacity of 107.3 MW (distribution mode). Values normalized by reservoir volume range from 1.8 – 4.1 MW/km^3. Geothermal brine flow rates required to produce 1 MW of electric power range from 27.5 – 60.4 kg/s. Reservoir size is derived from stratigraphic cross sections and natural gas pool outlines. Uncertainty in reservoir parameters are modeled using Monte Carlo simulations.

Keywords

geothermal energy; power generation; volume method; favorability map; resource assessment; sedimentary basin