

The Identification and Characterization of Sedimentary Geothermal Play Types on the Texas Gulf Coast for Power Generation

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Abstract

Sedimentary geothermal is an emerging energy sector with the potential to provide renewable baseload electricity to residential, commercial, and industrial markets above sedimentary basins. The Texas Gulf Coast contains reservoir temperatures necessary for electricity production, and Texas is the largest consumer of electricity in the United States with a high demand for dispatchable baseload electricity.

Identifying and characterizing the major geothermal play types in this basin will help to reduce the exploration and development risks associated with these geothermal resources.

Currently, the main sedimentary geothermal play type identified on the Texas Gulf Coast is the Tertiary geopressured-geothermal sandstones of the Wilcox, Vicksburg, and Frio formations. In addition to these geopressured-geothermal systems, other sedimentary geothermal play types have yet to be identified. Cretaceous and Jurassic formations in South and East Texas should have the necessary reservoir properties to be used for power generation but have not yet been investigated thoroughly. Additionally, salt diapirs across the Gulf Coast are a potential source of geothermal energy due to their high thermal conductivity, but this concept has yet to be evaluated for resource potential.

Preliminary results show that South Texas is optimal for sedimentary geothermal exploration. Eocene Wilcox geopressured-geothermal sandstones are in relatively close proximity to multiple salt diapirs and Cretaceous formations with reservoir temperatures greater than 300°F. The proximity of multiple potential geothermal play types here provides an ideal location to compare the characteristics of each reservoir and resulting resource potential. This research project is focused on using oil and gas exploration techniques to answer essential questions about the use of hot sedimentary aquifers for power generation. How should these geothermal reservoirs be characterized? What are the key risks associated with different play types? What type of subsurface technology should we employ to develop these resources? Answering these questions will help progress sedimentary geothermal to become a major energy sector capable of providing renewable baseload electricity to markets in this region.

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