# Geothermal Play Types in Lower Cretaceous Carbonates of South Texas

**Eric Stautberg[1] and Steve Sonnenberg[1]**

[1]Colorado School of Mines

## Abstract

Sedimentary basin geothermal is an emerging energy sector with the potential to provide renewable, dispatchable, baseload electricity to residential, commercial, and industrial markets above sedimentary basins. The Texas Gulf Coast contains the necessary reservoir temperatures required for electrical power generation (>250° Fahrenheit), and Texas is the largest consumer of electricity in the United States. 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 and encourage geothermal energy development in this region. A 12,000 square mile area in south Texas was chosen to be a case study for identifying and characterizing geothermal play types along the Texas Gulf Coast. Based on data from 273 digital logs and 1,590 bottom hole temperature (BHT) measurements within this research area, Aptian and Albian carbonate reservoirs are identified as potential geothermal targets for both electrical power generation and direct use applications. The carbonate depositional trends, depths, and reservoir temperatures in these formations set up two important geothermal play types for open-loop well designs: 1) shelf margin reefs and shoals and 2) platform interior shoals. Shelf margin reefs and shoals in the Sligo Formation (Stuart City reef trend) are buried at depths greater than 16,000 feet within the research area and are at temperatures near or greater than 350°F. The Edwards and Glen Rose shelf margins are at depths of approximately 9,500 ft and 12,000 ft respectively with reservoir temperatures that range between 250°F and 300°F. Platform interior shoals within the Sligo and Glen Rose formations are buried at depths of 10,000 ft and 14,000 ft respectively and have reservoir temperatures that range from 250 to 300°F. The platform interior facies of the Edwards Formation are not perspective for electrical power generation because the reservoir temperatures are less than 250°F, but direct use applications may exist here. Further petrophysical analysis and detailed temperature mapping will identify specific areas within these carbonate geothermal play fairways that have the most potential for electrical power generation from open-loop well designs. Additionally, the Edwards shelf margin reef trend contains existing oil and gas fields that are nearing the end of their production life and many wells have bottom hole temperatures that exceed 250°F. Considerations should be made to understand if some of these wells can be repurposed for geothermal energy development. These Aptian and Albian carbonates extend regionally across the Gulf Coast and need to be considered for their geothermal resource potential where they have adequate temperatures and reservoir properties for geothermal energy development.