The Gulf Coast Geopressured-Geothermal Gas Resource: A Multipurpose, Environmentally Safe and Potentially Economic Reality in Today's Market?

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The geopressured-geothermal resource consists of gas-saturated brines contained in sandstone reservoirs under higher than normal confining pressure and temperature. Such reservoirs are present in several sedimentary basins worldwide and those in the United States are shown in Figure 1. The northern Gulf of Mexico is the largest of such basins in the United States and is also one of the best known due mainly to the intensive exploration and production activities in this area. The northern Gulf of Mexico geopressured-geothermal resource has been estimated by Dorfman (1988) to contain approximately 250 TCF (trillion cubic ft) of recoverable natural gas and other researchers have provided various estimates ranging from 150 to 5,000 TCF and up to 11,000 quads of thermal energy in sandstone pore fluids to a depth of 22,500 ft. These estimates are all equivalent to many times more than the presently known conventional methane resources in the United States. The geopressured-geothermal resource contains chemical energy in the form of methane dissolved in pressurized brine, thermal energy consisting of high temperature brines (250°F) which could be used for secondary hydrocarbon recovery and/or electricity generation, and mechanical energy generated through high brine flow rates (20,000+ barrels per day) which could be utilized to drive turbines to generate electricity. The U.S. Department of Energy conducted a geopressured-geothermal research program in the northern Gulf Coast to gather reliable geological engineering, environmental and economic information about this resource to determine its viability for development from 1975 to 1992. A comprehensive summary of the research program is provided in John *et al.* (1998). The program identified geopressured-geothermal fairways in Louisiana and Texas, determined that high brine flow rates (20,000-40,000 barrels per day) are possible forlong periods of time without significant reservoir pressure drawdown, found that gas/brine ratio ranged from 24-55 SCF/STB (standard cubic ft of gas per stock-tank barrel) (Table 1) and found that used brine could be reinjected into sands below the freshwater aquifers without contamination. Inhibitors controlled corrosion and scaling, and a hybrid power system generated electricity using both separated methane and geothermal heat. In addition to generating electricity, there are a large number of the other potential applications of this resource as shown in Figure 3 and these other uses have not been tested. Profitable commercial development of this resource at that time was unfavorable. The energy picture today has changed and the gas and oil prices are considerably higher. With predicted worldwide shortages in a world dependent on fossil fuels, the costs are very likely to increase resulting from increasing consumption and demand for these resources. With the prevailing improved technology the development of the geopressured-geothermal resource in combination with its numerous direct and relatively environmentally safe uses will significantly lower the breakeven price for exploitation of this resource and could potentially be part of the answer to the country's energy problem. It is time for industry to reconsider the commercial viability of this unconventional alternative energy resource.