

Development of Stranded Gas in the Niobrara Shale

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ABSTRACT

Shale gas is often described as a continuous resource, in that it is generally producible across wide areas without the need for conventional structural or stratigraphic traps, migration pathways, or reservoir rock. However, much of this gas is not being produced because it occurs in locations that are too far from existing transmission pipelines. Such “stranded” gas may represent a significant energy resource that can be developed and used locally. With funding from the U.S. Departments of Energy and Interior, a cooperative research program between the Rosebud Sioux (Indian) Reservation and the South Dakota School of Mines and Technology has been assessing the production potential and possible utilization of shallow gas (< 600 m depth) in the Cretaceous Niobrara Formation in South Dakota. The study provided practical, problem-solving challenges to geoscience graduate students, and introduced tribal college students to oil and gas as a possible career choice. Hydrocarbon potential was initially evaluated using publicly-available cores and logs, although none were located close to the reservation. The South Dakota State Geological Survey provided a fresh, local drill core that supplied lithologic, rock eval, and core analysis samples. Results indicate that the Niobrara is a prospective gas resource on the Rosebud Reservation, containing biogenic gas under relatively low pressures that could provide a local energy supply. People on the reservation typically use electricity, propane, fuel oil, and even wood for space heating, all of which are brought in from outside. The shallow depth should allow the development of Niobrara gas to be accomplished by pinnate drilling with a coiled tubing rig at relatively low cost. Such technology has been successful in eastern Colorado, recovering more than a TCF of shallow Niobrara gas since 2005. Potential uses for natural gas on the reservation include heating for homes and businesses, electrical generation, low-cost energy for industrial parks and greenhouses to provide jobs and grow fresh produce, and fuel for natural gas-powered vehicles. Development will require a demonstration well, environmental monitoring, and design of a local distribution and metering system to deliver the gas, all of which are currently in progress. If successful, this could become a model for developing stranded gas resources elsewhere, encouraging local utilization of gas, and improving energy self-reliance on reservations.