Rural Alaska Coalbed Methane: Application of New Technologies to Explore and Produce Energy

DE-FC26-01NT41248 2.03.2

Program

The project was selected under a non-competitive five-year cooperative agreement with the University of Alaska-Fairbanks (UAF) to conduct arctic energy research in two broad categories: fossil energy and remote electrical power generation. The DOE Arctic Energy Office and UAF are collaborating with the energy industry and state agencies to better identify Alaska's unique research needs.

Project Goal

The objectives of the project are to 1) determine the actual coalbed natural gas energy requirements and surface facility needs for a medium-sized rural village such as Fort Yukon (population ~650), 2) determine if low-rank coals, are capable of CBNG production, 3) determine if slimhole drilling technology can be used to greatly reduce gas production and dewatering costs, 4) determine if production of low volumes of gas at temperatures well below freezing during winter months can be achieved, and 5) assemble a database of information on gas and water flow rates, gas content, coal seam properties, well drilling, completion and stimulation techniques, and pumping and injection systems for dewatering and water management.

Performers

University of Alaska (UAF)
Fairbanks, AK

Alaska Division of Geological and Geophysical Surveys
Anchorage, AK

U. S. Bureau of Land Management (BLM)
Anchorage, AK

U. S. Geological Survey (USGS)
Denver, CO

Project Results

The study found that Fort Yukon needs 250-450 thousand standard cubic feet per day (Mscfd) of gas through 2015. The overall rate of return for conversion from diesel to CBNG as a fuel source is estimated at 3-12%. Phase I results suggest that slimhole drilling should be successful, and operational tests were to be conducted in the Summer of 2005.

Slimhole drilling is under way to test the Fort Yukon CBNG resource.

Benefits

Preliminary results of gas content analysis put the Fort Yukon coals' gas saturation levels at an average of 20-30%. Such low gas saturation levels may require drilling a greater number of wells or pumping large volumes of water from the coal seams in order to sustain commercial gas production. Early analysis indicates that the water is potable and could be marketed for beneficial use.

One side benefit of the project may help improve the local environment while cutting project costs. The project team is seeking approval from the Alaska Department of Environmental Conservation to spray drilling waste over an old landfill near the site, a step that could help seal the landfill in order to close it out.

Background

Coal is widely distributed in Alaska, but most remote power generation depends on diesel electric generators. Over 37 rural Alaska villages are situated on or adjacent to coal fields that are potential CBNG sources. CBNG production wells, particularly from low-rank coals, may offer an alternative energy source, but the cost of drilling production wells must be reduced to make CBNG economic. Exploiting the nearby CBNG resource could provide a long-term source of low-cost, clean energy to rural Alaskans, who usually must reply on diesel-fueled generators for heat and power. The logistics of supplying liquid fuels to these remote locations drive rural Alaskans' energy costs to more than five-fold that in Fairbanks and Anchorage.

Project Summary

The project calls for a three-year program to test the producibility of these low-rank coals at Fort Yukon, using slimhole drilling technology to significantly reduce mobilization and drilling costs. The success of initial drilling and testing results could lead to development of an innovative production scheme whose feasibility would be tested in the second and third years of the program.

Economic analysis of the fuel gas and surface facility requirements at Fort Yukon were tested in the first year of the project. Fort Yukon is about 120 miles northeast of Fairbanks. With Fort Yukon needing 250-450 Mscfd of gas through 2015, the conversion from diesel to CBNG for a fuel source would cost $5-7 million. At $8 per Mcf, the overall rate of return for the project would be 3-12%, depending on the tax status of the project.

The Phase 1 field season was completed in 2004. Initial drilling started in August 2004, and cores were collected beginning with the first coalbeds encountered at 1,280 feet. Coal cores were analyzed for gas content and composition, and coal seam water was sampled for chemical analysis. In Phase 2, slimhole drilling began in the summer of 2005. Production wells are planned for a five-spot pattern of closely spaced, small-diameter wells, with a central production well surrounded by four dewatering wells.

Current Status (August 2005)

A peer-reviewed final report on the application and feasibility of small-diameter CBNG well technology in rural Alaska was due at the end of the September 2005.

Project Start: June 29, 2003
Project End: June 30, 2006

Anticipated DOE Contribution: $1,049,997
Performer Contribution: $1,003,672 (49% of total)

Other Government Organizations Involved: BLM, USGS

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