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Basin Oil & Gas

Geothermal Possibilities

Master Limited Partnerships

People in the Play
Mike Richey

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Will Texas oil and gas fields also produce geothermal energy in the future? See story on page 4.

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Fort Worth Basin Oil & Gas provides consistent, local communication about the oil and gas business to industry participants and interested parties in the 25-county area called the Fort Worth Basin.

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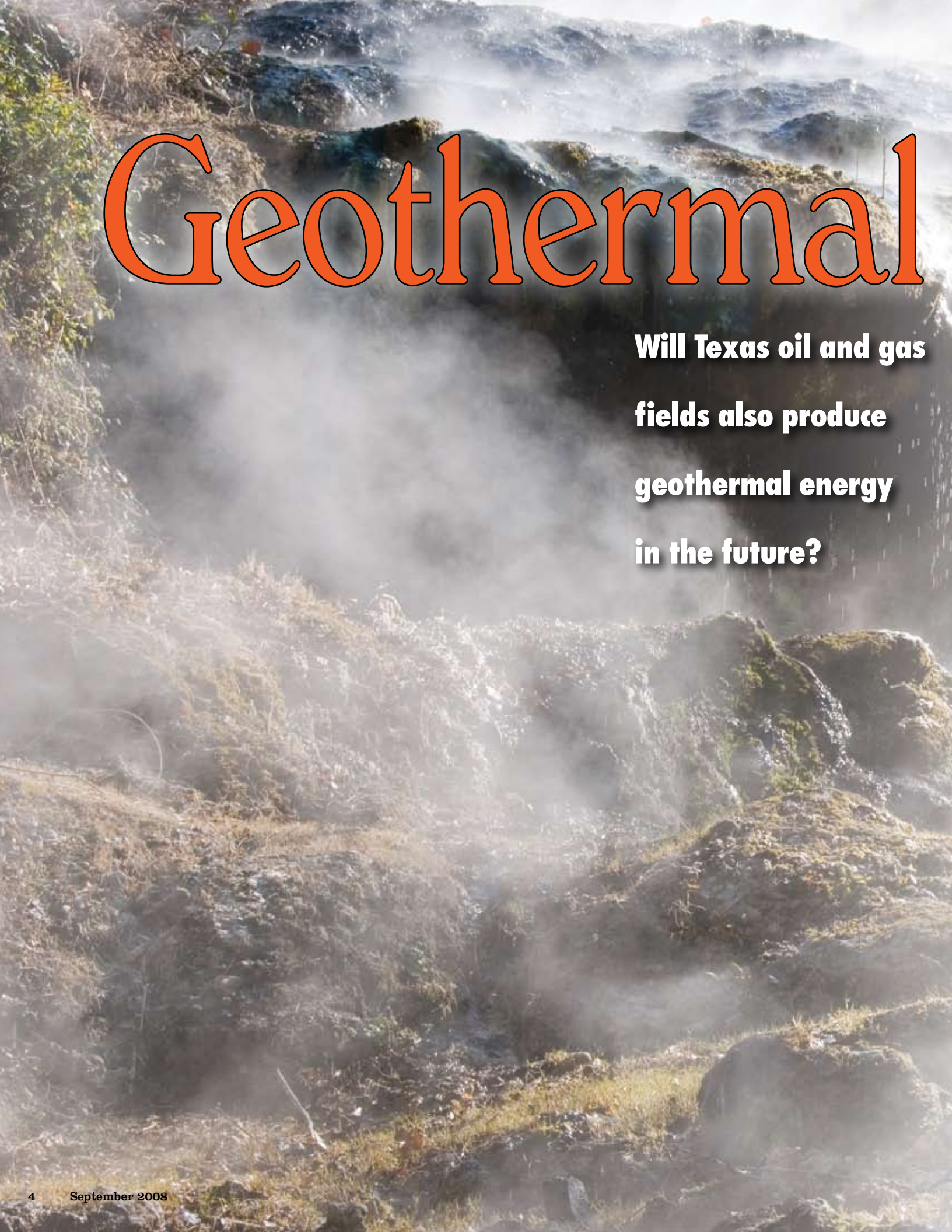
On the Cover:

Chesapeake Energy's Nomac Drilling Rig 26 flies its colors at the Dallas-Fort Worth International Airport, just north of a runway and alongside State Highway 121 and the Interstate Highway 645 interchange.

Jim Domke photo.



Geothermal

Will Texas oil and gas fields also produce geothermal energy in the future?

Possibilities

The Fort Worth Basin is now home to the nation's largest natural gas field. But when the Barnett Shale eventually plays out, could those same gas wells become a source for electrical production from the earth's heat?

"It is certainly possible," replied David Blackwell, professor of geothermal studies at Southern Methodist University in Dallas (www.smu.edu/geothermal/). "The temperatures in the Barnett Shale are a little low for electrical power production, but at the present time there is waste heat from compression units, for example, that could be used."

Blackwell said waste fluids from hydrocarbon wells can now be used to generate electricity for operators' pumping needs with any additional electricity sold to utilities as renewable energy. A small (250-kilowatt or larger) electric turbine is attached between the separation stage and re-injection well. He explained that this can be done on one well or multiple wells with temperatures over approximately 225 degrees Fahrenheit and large amounts of water.

While the wells in the Barnett Shale have an advantage of being close to the electrical power grids for inexpensive connection, Blackwell said they don't produce enough heat or water to generate much electricity at this time.

"It takes about 500 gallons (of water) a minute at 225 degrees to generate 250 kilowatts," he stated. "The hottest temperatures in the Barnett wells are about 200 degrees, and most wells are producing only about 100 barrels of water per day instead of several hundred gallons per minute. I think deeper wells along the Gulf Coast and in east Texas are more likely candidates to produce electricity in the near term."

Blackwell added that the pressure and flow rate of the natural gas itself in the Barnett Shale wells are not enough to generate electricity on their own, either. That is not to say that the Barnett Shale won't play a role in the geothermal production of electricity in the future, however, especially after the shale gas plays out.

"Down the road, the government is very interested in heat extraction experiments," he said. "After the Barnett plays out, there are a lot of interesting scenarios. The horizontal wells could be connected. You could pump water in one and out another with a managed system. Wells could also be re-fractured down to the Ellenberger aquifer to bring that water into the existing wellbore. They are trying to avoid the Ellenberger with their frac jobs currently to keep the water from getting into the well."

The beauty of geothermal energy, according to Blackwell, is that it runs all the time and is not dependent on the sun shining or the wind blowing as are solar energy or wind turbines.

Blackwell said the petroleum energy is understandably

Vulcan Power Company's (www.vulcanpower.com) Vulcan Rig 2 at Salt Wells, Nev., hits a geothermal fluids "gusher." Vulcan's primary focus is the development and operation of baseload electric generating facilities using geothermal resources in the western United States.

focused on the production of natural gas in the Barnett Shale at this time as operators try to take advantage of high prices for the commodity. But interest in geothermal will increase as the play slows down, he asserted.

A tax advantage also exists for energy producers who can generate electricity at the well site. The federal production tax credit provides for a credit of 1.9 cents per kilowatt hour for each kilowatt hour of electricity produced for the electric grid, according to Blackwell.

Federal legislation extending the production tax credit through Dec. 31, 2008, provides the credit for wind, solar, geothermal, and closed-loop bioenergy facilities. Other technologies, such as open-loop biomass, incremental hydropower, small irrigation systems, landfill gas, and municipal solid waste, receive a lesser value tax credit.

Asked to peer into his crystal ball and predict what the Barnett Shale might mean for the geothermal generation of electrical power in the next five years, Blackwell countered, "It won't be a major amount of electrical energy. Some other places in Texas are better candidates for geothermal energy. But I expect we will see several megawatts of electricity produced from the oil and gas industry in the Fort Worth Basin over the next five years." Heating and refrigeration applications may come first as they require lower temperatures and could thus be more generally used, especially since much of the development is in an urban environment, Blackwell added.

While geothermal, wind and solar energy will produce only a small portion of the nation's energy needs, all are green, meaning they won't harm the environment, and all together they will add up to make a difference, according to Blackwell.

"It is important to get the first few things done to see if it can work," he said. "Then we will see if it takes off like wind energy in West Texas."

Waste energy

One example of taking an existing system and generating electricity is a project currently operating on the SMU campus. Gulf Coast Green Energy in Bay City is the exclusive distributor in Texas and Louisiana for ElectraTherm's family of scalable power systems that converts low-grade waste energy into useable, electric power.

Loy Sneary, president and chief executive officer of Gulf Coast Green Energy, said one of his company's units, a Waste Heat Generator, is sitting in the boiler room at SMU as a demonstration site.

"SMU is allowing us to demonstrate the unit on campus, which is the first commercial installation of the Waste Heat Generator," he said. "Some of the hot water comes back after it goes through the campus, and it goes directly through our equipment and then back into the boiler. The heat goes through a heat exchanger, like a radiator. It is gen-

erating 50 kilowatts per hour. The advantage to SMU is that it can take that heat source and generate 50 kilowatt per hour (kW/h) of electricity that goes back into the grid. It uses no fuel and creates no emissions. It is like making something from nothing."

Sneary also listed other uses for ElectraTherm's Waste Heat Generator.

"We are working with a couple of companies to generate electricity from their non-producing gas wells," he said. "The bottomhole temperate and pressure is enough to flow the geofluids (the normal brine that is either produced naturally or flows back after a well is fraced) to generate electricity. "One Louisiana company that we are working with has a gas well that has 100 gallons per minute geofluid flow at 200 degrees Fahrenheit. We can generate 30 kW/h from that well, and we are looking into connecting this well with two other nearby wells to generate a total of 90 kW/h." We also have a conference call coming up with a company that has four big 3606 Caterpillar engines used in the compression of natural gas. We can take the water and heat from those engines and generate 460 kilowatt of electricity with no additional fuel or emissions. A project that we are working on in Louisiana uses a gas fired turbine to compress natural gas. Gas compressor turbines also put off a huge amount of heat. We can capture that and generate 1.5 megawatts of electricity."

Gulf Coast Green Energy Technical Manager Chris VandenBergh checks out his company's "Green Machine" Waste Heat Generator in operation in a boiler room at Southern Methodist University in Dallas. The standalone unit captures waste heat from almost any geothermal or industrial source to generate fuel-free, emission-free electricity.

Another application in which Gulf Coast Green Energy is involved is a landfill in Austin.

"The landfill is currently flaring the methane gas it produces 24/7," he explained. "We can take that flared gas and fuel a boiler. That hot water can generate 400 kilowatt per hour. That's enough electricity to power 350 homes, just from methane gas that is being flared."

Analyze this

Dallas-based Messina Inc. researches, designs and engineers the application of its chemicals – complete lines of chemicals and fluid systems -- to drill, complete, workover, cement, stimulate and produce oil, gas, geothermal and water wells.

Company president Mario Messina is a geothermal energy enthusiast. He urges operators who have shut-in or plugged wells to do an analysis to see if the well is a candidate for producing electricity. Part of that analysis, according to Messina, is determining if the downhole temperature is hot enough and whether an avenue exists to run the fluid through the hot rock. He added that determining the cost also includes ascertaining what it will cost to transmit the electricity to the power grid. He said it also might mean re-fracing the well.

"You have to look at the total economic package," Messina explained. "But most of the cost of geothermal energy is drilling the hole. If you already have a well, you are halfway there."

Sneary, Blackwell and Messina agreed that the ability to generate electricity using geofluids from oil or gas wells depends on bottomhole temperatures and the amount of geofluids produced from the well.

But imagine the possibility of the salt water and brine produced from natural gas wells, which is currently being trucked away from Barnett Shale wells to disposal wells, being used instead to generate electricity, a clean, non-combustible, fuel-free, emission-free source of energy.

"We just want people to start thinking about the possibility," Blackwell emphasized.

By Al Pickett, Special Contributor