Innovative Oklahoma companies are developing new ways to tap old energy sources while still protecting the environment.

Oklahoma has a rich history in the oil and gas industry. And with energy prices soaring, several Oklahoma-based companies are coming up with new and innovative ways to tap into resources that, up until now, have been impossible to access.

An Earth-Shattering Technique

The Barnett Shale is not an area that most are familiar with. But to energy executives, this ancient deposit in north Texas spells gold for their industry.

The Barnett Shale is a 6,000 square-mile area of bed rock that stretches over north Texas. The deposit is about 300 million years old and has been a source rock for oil and natural gas companies to produce from for decades.

Exploration of the deposit began in 1981 by Mitchell Energy, headed by natural gas...
visionary George Mitchell. Prior to his innovations in extracting natural gas from the shale, energy companies had pulled oil and natural gas from the sandstone rock located above the shale deposit, depleting it.

Mining into the shale had always proved impossible because the shale was dense and non-porous and didn’t allow for the passage of natural gas molecules for extraction. Mitchell developed a way to extract the natural gas by pumping water into the rock and essentially shattering it, creating millions of bore holes that would allow natural gas molecules to pass through.


"No one saw what (George Mitchell) was doing in the Barnett Shale as a viable means of extracting natural gas," says Chip Minty, supervisor of external communications for Devon.

"Devon recognized that what he was doing was worthwhile and that we could advance the technology," Minty says. "After Devon announced the acquisition of Mitchell Energy, they also introduced a technique called horizontal drilling that would allow them to maximize their exploration efforts in the shale."

An aquifer runs under the Barnett Shale, and any rupture of the shale that would allow water to seep in would kill the entire well. Devon was faced with the obstacle of boring into the shale without disturbing the water source beneath. Horizontal drilling allowed them to drill vertically down into the shale, then change course and drill horizontally for a few thousand feet.

"Horizontal drilling gives us more contact with the shale itself, and allowed us to produce more gas," Minty says.

Chairman and CEO of Chesapeake Energy Aubrey McClendon at the company’s Oklahoma City campus.

“It’s not the easiest project in the world in an urban area of several million people…”

— Chesapeake Chairman and CEO Aubrey McClendon on drilling for natural gas underneath Dallas/Ft. Worth.
“This technique is literally 180 degrees backward from conventional oil and gas development.”

— New Dominion President and CEO David Chernicky on their method of extracting oil and gas from reservoirs with high saltwater content.

“Devon has about a half-million acres of lease property to drill on, but before we could drill horizontally we only had access to about 180,000 of those. Just through this simple innovation we are able to reach so much more.

“Devon found a good deal of success drilling horizontally, and that allowed us to expand drilling in the Barnett Shale. We showed the rest of the industry that Barnett was viable.”

Minty says the experience taken from the Barnett Shale is helping the company explore similar areas across the country.

“What we learned (in the Barnett Shale) is applicable to all other shale fields as well. We’ve opened up a brand new source of natural gas that the industry didn’t have a decade ago because of what we’ve learned,” Minty says. “We’re now drilling into the Woodford Shale in southeast Oklahoma. We’re pulling natural gas out of it, producing an amount of economic benefit to an area of Oklahoma that could use it.”

Today, a huge number of companies hold positions in the Barnett Shale. It has become one of the largest gas fields in the United States, producing over 2 billion gallons of natural gas a day.

One company holding a large position in the Barnett Shale is Oklahoma City-based Chesapeake Energy Corporation. In October 2006, the energy giant signed a lease with DFW International Airport to begin drilling into the shale deposit located beneath the airport.

On Sept. 28, 2007, Chesapeake’s first wells, drilled into and fractured under the airport, began producing natural gas. There are at least 30 wells now producing at DFW Airport. Chesapeake has five rigs working 24 hours a day to complete the 327-well drilling program over the next five to six years.

One major challenge the Barnett Shale project presented Chesapeake officials was infrastructure.

“Any time you try and dig underground in an urban environment, it’s not the easiest thing to do,” Chesapeake Chairman and CEO Aubrey McClendon said in a February earnings release conference call to analysts. “It’s not the easiest project in the world in an urban area of several million people to be laying pipelines underneath all the urban infrastructure that exists there.”

“Blending the cultures of Chesapeake, DFW Airport and the Federal Aviation Agency was really the key to making this project work,” Dave Leopold, Chesapeake’s DFW Project Manager, recently told the company’s quarterly newsletter, The Play.

“This project was the first of its kind to be attempted on such a large scale. Our partners had no experience to go by, and had to learn to overcome their preconceptions of oil and gas development. Basically, we came to understand each other’s businesses. Now, after building a relationship, we work together very well.”

Chesapeake announced in February another shale exploration project in the Appalachia area of the eastern United States.

Scott Rotruck, vice president of corporate development for the eastern division of Chesapeake Energy, says the company has more than 1.6 million prospective acres for the Marcellus and Lower Huron shale located there. The area offers Chesapeake a tremendous advantage due to its proximity to some of the best natural gas markets on earth. The company will also see a great advantage at their early entry into the area through a $2.2 billion acquisition of Columbia Natural Resources in 2005.

Chesapeake has now drilled 26 vertical and horizontal Marcellus and Lower Huron wells.

“From what we can see today, the upside of
this area will likely be worth more than 10 trillion cubic feet of natural gas net to Chesapeake,” Rotruck says. “Since our leasing program is continuing, we will not release too many details about what we are seeing in these plays, but our success has led us to ramp up our drilling program to drill an estimated 165 Marcellus and Lower Huron Shale wells between now and the end of 2009.”

Chesapeake remains the most active driller and holder of more unconventional and shale acreage than any other company in the U.S. “When the full implications of the domestic clean-burning natural gas exploration industry’s ability to fully develop these resources becomes apparent, an increasing number of experts will include natural gas in the discussion of America’s premium electricity generating and transportation fuel for many more decades to come,” Rotruck says.

Outside the Box

Tulsa-based energy company New Dominion, L.L.C., is also applying new advancements in the oil and gas industry for exploration. “We utilize a wide variety of special techniques and equipment, each of which is specially designed and manufactured to our specific requirements,” says David Chernicky, president and CEO of New Dominion.

The company considers it’s reverse engineering and utilization of the principles of dewatering high water saturation reservoirs the key to its success. “Horizontal drilling techniques are the major technological advancement that enables us to drill more efficiently. Virtually 100 percent of our producing and saltwater disposal wells are drilled and completed horizontally,” Chernicky says.

Having always encouraged its employees to “think outside the box,” Chernicky says the company is constantly searching for a new and better way to operate. New Dominion is currently producing oil and gas from reservoirs that were previously bypassed by other operators because they were not considered economically viable to produce.

New Dominion operates over 250 wells in Oklahoma, all of which are located at the company’s current two projects: one south of Prague, Okla., and one within the city limits of Oklahoma City.

“The reservoirs from which we produce typically contain as much as 90 percent saltwater as compared to more conventional reservoirs containing less than 50 percent saltwater,” Chernicky says.

“This requires a large and time-consuming front-end capital investment to purchase right-of-way and construct high-current, dedicated three-phase electrical power, saltwater, oil and gas pipelines virtually every mile in all four directions. The last thing we do is drill saltwater disposal and producing wells. This technique is literally 180 degrees backward from conventional oil and gas development,” Chernicky says the three-phase mixture of oil, gas and water is produced at the wellhead, then separated into customized vessels. The gas and saltwater is transported by pipeline, and oil is trucked from central delivery points until volume reaches a level sufficient to justify a direct pipeline connection.

Tulsa-based SemGroup, L.P. recently announced plans for a 550-mile pipeline that will mainstream their transport of crude oil from Colorado’s DJ Basin to the Cushing Interchange in Payne County, Okla. Construction began on the project in March. The project, called the White Cliffs Pipeline, was announced by SemCrude, L.P., SemGroup’s crude oil business segment.

“The White Cliffs Pipeline is due to be operational by January 1, 2009. It will provide DJ Basin producers direct access into the Cushing market and to refineries in the Mid-Continent area. It will help producers to have uninterrupted flow capacities and receive maximum value for their crude oil,” says Kevin Fox executive vice president and COO of SemCrude, a division of SemGroup of which he is a co-founder.

The White Cliffs Pipeline will transport 72,000 barrels of crude oil a day. The value of the project is estimated at approximately $8 million.

Protecting Mother Earth

With the new innovations and exploration in the oil and gas industry, energy companies are under increasing pressure to protect the environment in which they operate.

According to a 2006 annual report, Chesa-
peake Energy is committed to protecting the safety of the world by meeting or exceeding environmental compliance regulations throughout the company's areas of operations.

The company's goal is to minimize the environmental impact at the drilling site. The company prides itself on being a leading producer of natural gas, the cleanest-burning conventional energy source.

Devon Energy has found an innovative way to recycle water at the Barnett Shale site.

"In the Barnett Shale we use high volumes of water to pump down into well bores," Minty says. "A portion of that water comes to the surface once fracturing of the shale is complete, and we recycle that water rather than to draw more water than necessary from the fresh water supply."

Water sent into the shale comes back full of impurities, rendering it unsuitable for release on the earth's surface.

"We either have to inject it into a disposal well where it won't pollute, or we can recycle it," Minty says. "We are the only company in the Barnett Shale recycling our water."

Devon also utilizes horizontal drilling techniques to lessen their footprint at drilling sites by gaining access to energy resources without disturbing land above it. This also allows multiple wells to be drilled from a single pad. Horizontal drilling and centralized drilling and production facilities are also key to limiting the impact and utilization of surface for New Dominion.

"We are now able to efficiently drill and produce four complete sections of land from one 10-acre location, whereas with conventional vertical technology, each section of land might have required between four to eight individual wells spread out over the surface," Chernicky says.

"Now, one 10-acre site with four to eight horizontal wells can develop multiple formations and take the place of 16 to 32 wells. We now place all these wells below the surface in concrete cellars so only the separation, storage and electrical equipment are visible."

New Dominion also buries all flow lines and pipelines. Surface electric lines are placed to minimize loss of pasture and other land for surface owners, and the company is burying most of its electric lines in urban areas to minimize the surface impact and to protect them from tornadoes and ice storms.

"Our operations result in a net improvement to the area and community as a result of better roads, better electrical facilities for future use by the community, and an overall improvement in land utilization, drainage, fresh water systems and even neighborhood security," Chernicky says.

ConocoPhillips, who has numerous operations in Oklahoma, is also committed to protecting the environment it occupies.

"In all of the company's operations, the highest environmental standards are implemented to ensure that the company's actions today will not only provide energy, but will also secure a stable environment for tomorrow," says Nancy Turner, public affairs spokesperson for ConocoPhillips. "The company implements environmental policies and procedures to help create sustainable ecosystems, protect wildlife habitats, minimize the impact of our operations and improve the communities in which we operate to ensure a sustainable environment for the future."
Philanthropy
Community
State
Future

NEW DOMINION, L.L.C.
A Natural Resource Producer