

## Plano's Denbury Resources extracts last bit of oil with carbon dioxide

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By ZACHARY WARMBRODT / The Dallas Morning News  
zwarmbrodt@dallasnews.com

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Denbury Resources Inc. kicked off its presentation in New York last week with an illustration of a volcano that rose from the Gulf of Mexico more than 65 million years ago, spewing lava near what is now Jackson, Miss.

"As a result of that volcano," explained Gareth Roberts, the company's president and chief executive, "Denbury is the leading tertiary oil company in the southern U.S."

The Plano-based company owns a valuable remnant of the lava: carbon dioxide trapped in formations 5,000 meters below the surface, which it uses to squeeze the last bit of oil out of depleted oil fields – called tertiary fields.

The carbon dioxide is the key to pumping new life into many fields, and the extinct volcano is the largest known source of the gas east of the Mississippi River.

Denbury's control of this source has put it ahead of its competitors in the region.

"We believe that's our playground," Mr. Roberts said.

But the company is pushing to tap more.

Since 2001, Denbury has been on a buying spree, acquiring depleted fields along the Gulf Coast.

At the same time, it's positioning itself to take advantage of the green movement by signing deals with companies that need to dispose of waste carbon dioxide.

### Man-made source

The most promising sources of future carbon dioxide are man-made – coming from coal-fired power plants and manufacturing sites that release the gas as a byproduct – because the known natural sources in the U.S. have all been claimed.

Denbury has signed three contracts for man-made carbon dioxide from proposed gasification projects, which could provide about 800 million cubic feet of the gas per day, Mr. Roberts said.

And it plans to build a pipeline across the Texas coast that is important to its strategy of acquiring more carbon dioxide because it will pass by a large number of oil refineries, which spit out the carbon dioxide waste.

The company could strike deals with the refineries to obtain the gas and send it along its pipeline to its fields outside of Houston.

Meanwhile, federal and state governments are trying to figure out the best regulation for the growing industry – which in Texas has benefited from tax incentives to dispose of the waste carbon dioxide.

In and out of vogue

Denbury's technique – enhanced oil recovery – has come in and out of vogue in response to oil prices since major oil companies began planning for it about 30 years ago.

Companies built pipelines and source fields to get the most out of old fields when oil prices reached high levels.

They lost their enthusiasm when the price crashed by the mid-1980s.

As the technique became more cost-effective, it experienced a revival in the 1990s.

In 1989, the Texas Legislature created a tax incentive for companies to use carbon dioxide to get oil out of the ground. But the major oil companies were focusing on exploring fields internationally. Over time, the large companies sold their carbon dioxide infrastructure, and smaller players picked it up.

Los Angeles-based Occidental Petroleum Corp. and Houston-based Kinder Morgan Inc. bought properties in the western U.S. and have been producing oil by injecting carbon dioxide into West Texas' Permian Basin.

Mississippi producer

In 2001, Denbury was already the largest producer of oil and natural gas in Mississippi. In February of that year, it purchased a pipeline and carbon dioxide wells drilled by Shell Oil for \$42 million.

"We needed to assure ourselves that carbon dioxide would be available when needed and at a reasonable and determinable cost," the company said in its 2001 annual report.

Denbury has built two more carbon dioxide pipelines in the region; it plans one more that will reach the Houston area; and it has acquired more oil fields depleted by traditional means near the pipelines.

The company is in a better position than most during a shortage of carbon dioxide to inject into oil fields.

The demand for carbon dioxide in the Permian Basin is about a half-billion cubic feet per day greater than the supply, according to data compiled by Steve Melzer, president of the Texas Carbon Capture and Storage Association.

The recent green movement has spurred development in the industry as governments and businesses try to find a way to dispose of carbon dioxide from power generation and manufacturing.

Yet some in Texas are concerned that new federal rules – including groundwater contamination policies under review by the Environmental Protection Agency – might impede the industry's growth.

"The important thing is to proceed with great caution," said state Rep. Myra Crownover, chairman of budget and oversight on the House Energy Resources Committee. "The industry just needs to have kind of a regulatory framework, and it is unclear at this time what that will be."

Investors and the industry are interested in Denbury's focus on carbon dioxide.

By leaving behind the costs of exploration, Denbury's business model resembles a straightforward manufacturing process, said UBS analyst Andrew Coleman.

"It's as pure an oil price play as you can probably get," he said.

## **DENBURY RESOURCES AT A GLANCE**

An oil and gas producer that pumps depleted oil wells using carbon dioxide. Also owns gas wells in the Barnett Shale but has said it might sell them.

**Headquarters:** Plano

**Number of employees:** 764

**How it's different from other oil companies:** Controls one of the largest sources of natural carbon dioxide in the U.S. and is the largest oil and gas producer in Mississippi.

**2008 second-quarter revenue:** \$417.99 million

**Shares:** Closed at \$22.21 Monday, down 79 cents

## Denbury Resources tertiary fields

Plano's Denbury Resources Inc. squeezes oil from once-depleted fields by injecting carbon dioxide, which mixes with the oil and helps it rise to the surface. The sites are known as tertiary fields. The company has broken up its tertiary oil reserves into nine phases, each potentially offering many millions of barrels of oil. Here's a look at the fields and what they are expected to yield:



Phase      Barrels of oil expected (includes past production)

**Phase 1**  86 million  
**Southwest Mississippi:** Several fields along Denbury's 183-mile Northeast Jackson Dome carbon dioxide pipeline.

**Phase 2**  77 million  
**East Mississippi:** Near Denbury's Free State carbon dioxide pipeline. Company achieved its first oil production in 2007.

**Phase 3**  44 million  
**Tinsley Field:** Achieved its first oil production in the second quarter of 2008.

**Phase 4**  31 million  
**Cranfield Field and Lake St. John Field:** Earliest expected oil production is 2009.

**Phase 5**  33 million  
**Delhi Field:** Aims for its first oil production in late 2009.

**Phase 6**  26 million  
**Citronelle Field:** In Southwest Alabama. Production requires a 60- to 70-mile extension of Denbury's Free State pipeline. Extension is not yet scheduled.

**Phase 7**  60-100 million  
**Hastings Field:** Denbury announced plans Sept. 2 to buy the field for an undetermined price. Yield depends on completion of the Green pipeline for a supply of carbon dioxide.

**Phase 8**  25-35 million  
**Fig Ridge and Oyster Bayou fields:** These fields form the Seabreeze Complex outside Houston. Waiting on the Green pipeline.

**Phase 9**  130 million  
**Conroe Field:** Also waiting on the Green pipeline.

SOURCES: Denbury Resources; Dallas Morning News research

TOM SETZER/Staff Artist