

## Wattenberg Field - a bottomless well? Weld County oil and gas play just gets stronger

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The rolling cornfields and meadows flanking Interstate 25 north of Denver sit atop one of the nation's oldest and most prolific oil and natural gas plays - the Wattenberg Field.

Discovered in the 1970s, the field is about 50 miles long and 50 miles wide sprawled across Weld County, but parts extend into Adams, Boulder, Broomfield and Larimer counties.

It was expected to produce for only a few years. But, much to the surprise of geologists and oil executives, the Wattenberg not only has outlived expectations but continues to get stronger.

Just three years ago, energy companies said they could pump 2.4 trillion cubic feet of gas from depths of 5,000 feet to 8,500 feet in the ground - up from the 1.6 trillion cubic feet reserve estimate at that time - if state regulators allowed more wells on the same pads.

Today, companies say the field probably contains as much as 5.2 trillion cubic feet of gas trapped in layers of tight sandstone formations deep in the earth - enough to heat America's homes for one year.

Now that, too, could be an underestimate.

"Technology tends to favor natural gas more than oil," said Vince Matthews, director of the Colorado Geological Survey. "Who knows what new gimmick will be tried to increase the Wattenberg's reserves."

The Wattenberg already has yielded 2.8 trillion cubic feet of gas. It ranks eighth in gas reserves among the nation's energy-producing regions, including Alaska and the Gulf of Mexico.

Companies have long operated in the Wattenberg with little or no protest from environmental groups and conservationists. That's probably because the field, straddling private plots and housing subdivisions, has little if any wilderness value of interest to activists.

"It is a stealth field," said Theo Stein of Resource Media, an environmental communications firm in Boulder. "It has developed largely out of most people's attention, and a tremendous amount of wells have popped up out of anyone's radar yet."

## Concentrated drilling

Yuanhai Yang pores over what looks like a doctor's chart with squiggly lines tracing heartbeats.

The lines actually trace various levels of pressure in the Wattenberg Field, the highest pressure areas signaling the presence of the most robust natural gas deposits.

Yang, an engineer at Anadarko, and his colleagues, have developed a technique in which he maps the pressures in the field to identify the best locations to drill wells.

He works with reservoir engineers who identify geological fault lines where companies won't sink wells, and field engineers who figure out the optimum locations on surface.

Anadarko drills gas mostly from five underground formations in the Wattenberg called Sussex, Shannon, Niobara, Codell and J-Sand at depths ranging from 5,000 to 8,500 feet.

For the first six months, a well produces robust amounts. But it begins to decline within a year when production falls off to a modest rate. A well typically lasts 30 years or longer.

Techniques such as directional drilling where several wells sunk on the same pad snake out in different directions also allow Anadarko to recover more gas from the Wattenberg than previously thought, said David Howell, Anadarko's general manager of Colorado.

"It's kind of a co-ordinated effort where we have the geological engineers, the reservoir engineers, the field engineers and our land people - everybody doing their part to make the machinery move forward," Howell said.

Houston-based Anadarko is among the biggest independent oil and gas producers in the nation. Since acquiring Kerr-McGee and Western Gas Resources a couple of years ago, Anadarko has become one of the biggest players in the Rockies.

This year, the company plans to spend \$350 million in the Wattenberg - up from \$205 million in 2007.

A 2005 decision by the Colorado Oil and Gas Conservation Commission allowing companies to drill 60 percent more wells - or three new wells in addition to five existing ones on 160 acres - has further increased production.

Today, companies drill up to 32 wells per square mile.

"In the 1970s, if anybody said they'd be drilling 32 wells per square mile in the Wattenberg Field, they'd be laughed out of the company," Matthews, a former oil and gas executive, said. "It was impossible, it could never happen. But it has. And there's always the possibility that more technology could get more gas out of the rocks."

## A major producer

\* 2,500 square miles

- Sprawled across mostly Weld County, but parts extend into Adams, Boulder, Broomfield and Larimer counties
- Ranks eighth in gas reserves among the nation's oil- and gas-producing states, including Alaska, as well as the Gulf of Mexico.
- Energy company Anadarko estimates it contains 5.2 trillion cubic feet of gas. Since its discovery in the 1970s, the field has produced 2.8 trillion cubic feet of gas.



Jonathan Hunt, left, and Gary Hensz keep an eye on running the drill rig at the Milky Way Well. Many wells in the Wattenberg Field are drilled to a depth of 5,000 to 8,500 feet. A well typically produces for about 30 years.

Shawn McIntyre climbs a rig at the Milky Way Well near Frederick. Companies say the Wattenberg Field could contain 5.2 trillion cubic feet of natural gas.



A crew works at a well in the Wattenberg Field near Frederick. Discovered in the 1970s, the natural gas and oil field was expected to produce for just a few years, but it has defied expectations as production has grown.