

## Gas Tech on cutting edge of coal energy

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Mining barely scratches the surface of the world's coal resources, especially in Wyoming. Converting coal to gas far beneath the surface has proven cheaper, cleaner and safer than other existing methods of coal energy production, according to reports of an Australian underground coal gasification project.

That company, Linc Energy of Australia, considered the world leader in this new technology and Gas Tech, Inc., based in downtown Casper will begin a demonstration operation in the Powder River Basin within two and a half years.

They currently are working on adapting technologies used in Australia to the Powder River Basin.

"The energy we're talking about is just absolutely immense," said John Wold, CEO and chairman of Gas Tech, Inc. "The coal resources in that area have an energy equivalent that is more than the energy equivalent in all of the known world oil and gas."

"This is just the Powder River Basin; this doesn't include what you may have down in South Western Wyoming and South Central Wyoming and so forth."

Gas Tech gained a coal resource leasehold in excess of 20 billion tons of coal buried beneath state owned land in the Powder River Basin, 70 miles north of Casper. Linc Energy acquired seven billion tons of the coal.



Wold became an independent oil and gas producer in 1950 with Wold Oil and Gas, now headed by his sons, Peter and Jack. His career includes heading companies in Wyoming's major minerals: oil, gas, coal, soda ash and uranium.

It is this last that he sees as the future of energy.

While coal is abundant now, fossil fuels are finite and will run out. Wold believes nuclear power is the most feasible replacement.

The BP Statistical review of World Energy predicts that oil will run out within decades and gas will not last the century at present rates of use. But the U.S. alone may have enough coal for more than 200 years.

But you have to go deep to get it. Mining accesses only five percent of coal resources, while 95 percent is up to 5,000 feet below the surface.

"That makes coals the richest fossil fuel in the world, with the biggest reserves." Wold said. "And 95 percent of it is not being used!"

To his knowledge, Gas Tech's is the only underground coal gasification program going on in the world that is 100 percent financed privately.

All of the others, Wold said, are leaning entirely on governmental subsidies of one sort or another.

One advantage of that is the speed that allows. Some UCG projects are in the planning stages, while Gas Tech is the only UCG program actively underway in the United States.

"We think that this will be the first significant demonstration of UCG technology in America," Wold said, "and could lead to the first commercial adaptation for electric power or coal-to-liquid results."

The electric power technology is proven although the Fischer-Tropsch process to yield liquid fuels "is a trickier situation," according to Wold.

Wold's long-term goal is multi-billion dollar energy company investments and "clean coal; some underground coal gasification which can be yielding a very significant percentage of the electrical power consumed in the United States."

### Past and future of UGC

Before World War II, Russians were first to gasify coal underground for commercial use. Two of the in-seam gasification projects still are in use. The United Kingdom carried out earlier pursuits on a smaller scale.

UCG technology has not yet been harnessed on a large commercial basis.

"One of the big new developments since World War II," Wold said, "has been the ability that we have developed in the oil and gas industry of drilling horizontal holes so you can link up, underground, two vertical holes."

The second half of the 20th century saw a few more experiments, including three in Wyoming.

In the 1980s, Williams Brothers experimented in Hannah Basin, Gulf Oil in steep coal beds south of Rawlins and Atlantic Richfield had an experimental operation south of Gillette.

Wold remembers when Exxon and other companies were interested in coal as oil was predicted soon to be exhausted.

Gas Tech was the development of coal studies that Wold made in the late 1960s, he said, and turned some 480,000 acres of coal leases in the Powder River Basin to Exxon.

Many major companies bought coal resources, but dropped them when they realized how much oil there as in the Middle East and Africa.

The world is going through another cycle of concern over resources today, Wold said, since we are using it faster than we are finding it.

International interest is growing again and with about 15 programs currently going on in the world.

"We have between a quarter and a third of the total world's coal resources here in the United States," Wold said.

"Those of us who are involved underground coal gasification feel it can give America energy independence."

According the British Petroleum studies, the Powder River Basin has the equivalent of 1.5 trillion barrels of oil equivalent energy in place. The total oil reserves worldwide are about 1.3 billion barrels of oil.

Interest for other energy resources is surging.

"But the fact of the matter is that over 70 percent of world's energy today is coming from oil and gas," Wold said.

Wold's company philosophy is that fossil fuels "will fade out and eventually we'll have to go nuclear."

In the meantime, Gas Tech is interested in "the development of underground coal gasification for generating electricity and for converting coal to liquids such as diesel fuel, gasoline and so forth."

What UCG could mean for Wyoming

"Coal gasification is simply combining the carbon of coal with oxygen," Wold said, with oxygen available from water or air. This currently is done above ground after mining.

In UCG, coal is burned in "a cigar shaped cavity" about 1,000 feet underground, Wold said.

Gas production is greater with deep coal in part due to increased pressures. The Powder River Basin's coal bedding has excellent choices for depth and quality of coal, according to Wold. It also consists of up to 30 percent water, so if surface water is needed it will be minimal.

"We have a fantastic quantity and quality of information of underground coals," Wold said, because of the thousands of wells drilled for coal bed methane and the oil and gas wells in the Powder River Basin.

Major electric power companies could use the energy to generate electricity on a large scale.

"This may be the move that dramatizes the great potential for harnessing those great coal deposits that we have," Wold said.

It would benefit the state, he said, and boost the economy.

"With commercial development, you're talking about some fairly sizable employment activities," Wold said, "equivalent to about what you'd have in refineries today."

That possibility is years away.

"These things move slow," Wold said, "particularly when you're talking about a billion to 2 billion to 3 billion-dollar investment."

Gas Tech is taking it a step at a time and for now plans to show what UCG can do.

"Once it's demonstrated by a prime mover, it could catch fire and you could see a whole bunch of them going in at once."

## UCG and the environment

To use coal today, it must be mined, transported and burned and then the ash must be disposed of.

UCG eliminates the need to disturb the land surface, and ash can remain inside the cavities rather than transported.

Present methods tear up land, Wold said. While Mining land is reclaimed, eliminating the need is preferable and less expensive.

"The beautiful part is that there is no more surface disturbance than what you would have in oil and gas," he said.

The major problems in earlier UCG efforts were ground-water contamination and collapsing cavities.

According to Wold, that can be avoided with proper burning and deep enough cavities.

UCG technology may someday be used on coal three to five thousand feet deep, Wold said.

Linc Energy has been successful in eliminating these pitfalls of earlier experiments.

Its project in Chinchilla, Australia produced gas in quantities indicating commercial viability while meeting all government environmental specifications.

After a continuous run from 1999 to 2003, there was no sign of contamination of the closely-monitored groundwater or surface areas and no gas leakage. Subsidence also was not an issue.

Gasification itself combines carbon with hydrogen and oxygen to form methane, carbon monoxide and hydrogen.

It also produces large quantities (roughly three tons for each ton of coal) of carbon dioxide.

What do you do with the tons of carbon dioxide?

According to Wold, it could be used for enhanced oil recovery in old oil fields.

The used coal burning cavities underground could store it. Also, in the deep part of the Powder River Basin, there are formations that have saline where it might be stored.

"We think this can end up being the premier clean coal operation of the world," Wold said.