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'A new way of thinking about coal'

Synfuels project aims to turn deep reserves into clean energy

BY BILL SASS, FREELANCE MAY 27, 2009

Coal is still king in Alberta, at least when it comes to power generation.

But the king's crown is tarnished and rebels are trying to find ways to topple the throne and replace him with a more benign ruler that doesn't belch toxic smoke into the atmosphere and devastate the landscape with open-pit mines.

But what if the king could be reformed? What if there was a way to extract the power held in a lump of coal without the tonnes of carbon dioxide and other greenhouse and noxious gases ever seeing the light of day?

Those are questions Swan Hills Synfuels is trying to answer at a site about 200 kilometres northwest of Edmonton where a coal seam lies buried 1.4 kilometres under the surface. The coal is too deep to recover through mine shafts or open pits.

It's called "stranded coal," says Synfuels CEO Martin Lambert, and Alberta is loaded with the stuff.

Company estimates put it at 600 billion tonnes of coal -- inaccessible and, essentially, worthless. Until now, the privately held company hopes.

"Our project can turn that wasted resource into something useful," Lambert said. "It's a new way of thinking about coal."

The process is called "in-situ coal gasification."

Using $8.8 million of cash from the government's Alberta Energy Research Institute and about $23 million of its own funds, Synfuels has set up a demonstration project 17 km southwest of the town of Swan Hills. A vertical shaft has been drilled down to the coal bed, and a horizontal shaft runs under it.

The process is a distant cousin to unsuccessful coal-bed methane experiments in the 1970s.

In those, shallow-lying coal was put under pressure and injected with steam to release methane gas that was processed in a plant.

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In the current in-situ process, the coal is already under heat and pressure from the depth.

More heat and steam, created by non-potable saline water, is applied to the coal through the horizontal shaft.

"It cooks the coal," said Synfuels president Douglas Shaigec. "It's a chemical reaction, not burning."

The gas is brought to the surface through the vertical shaft and stripped of CO2 and other contaminants, leaving hydrogen and methane and a synthetic mixture of carbon monoxide and hydrogen -- fuels that can be used to power electric generators and other engines.

"It's much cleaner, Shaigec said.

He estimated there's enough potential fuel stock to generate 6,000 megawatts (mW) of electricity at a cost that's competitive with other fuel sources such as coal, nuclear and hydro.

Initial results of the experimental project are anticipated in June, when the first gas is expected to surface, but the company is already doing engineering work on a commercial-size plant that would produce enough fuel to power 300 mW of generated electricity.

The plant would also have carbon capture and storage (CCS) capability, and the CO2 would be sold to conventional oil and natural gas producers for use in enhanced recovery efforts in depleted wells, Shaigec said.

When a coal seam is exhausted, it could also be used as a repository for excess CO2.

The plant could be up and running by 2014 -- provided Synfuels wins some funding from the provincial government's $2-billion pool set aside to develop CCS technology.

Shaigec also said the company is looking for a partner with "big balance sheets" and experience in the Alberta energy market as well as internationally.

Eddy Isaacs, executive director of the Alberta Energy Research Institute, said the in-situ technique "was developed many years ago by Lawrence Livermore National Laboratory (California) and it's been used both experimentally and commercially."

The former Soviet Union was creating deep coal bed methane 40 years ago.

But this is the first project of its kind in Canada -- and it's the deepest in the world.

Depth is one of the keys, Isaacs said.

"One of the reasons for doing it this deep is to be very far away from any potable water. You do not need fresh water in this project."

He figures the company will know within three to six months how reliable the ignition has been and how reliable the volumes.

"And then they need to make a commercial decision, which is going to be hard to make in view of the low commodity prices we have."

The process won't replace coal as a generating fuel, Isaacs said, but "certainly if it grows over the next 20 years, it means you may not need to develop additional (coal-fired) power plants."

It could also replace the use of natural gas in hydrogen generation, he said.

"The other important feature (is) this will potentially create fractures in the coal bed (where) you may be able to sequester CO2 afterwards. With this fuel, you wouldn't have a greenhouse gas issue."

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