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Clean coal: Not a question of if, but when

It promises more than a way to fight climate change, and Canada is investing seriously in it

Column

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Neil Reynolds

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"They gave us," says Ottawa research scientist Bruce Clements, "an explosion-proof cell." With its thick concrete walls and its steel doors, the cell is the perfect place for Mr. Clements and his small team of colleagues to fire up pulverized coal, blow oxygen at the flames and then subject the blazing fuel to very high pressures - eventually, perhaps, as much as 3,000 pounds per square inch. But the cell isn't fully explosion-proof. In the event of a significant blast, its exterior wall will burst outward, releasing the propulsive force of the explosion to the out-of-doors.

In part, it's this goof-proof cell that's keeping Canada in the scientific search for clean coal - a search that is accelerating in laboratories and demonstration plants around the world. With federal financing from the eco-energy Energy Technology Initiative (eco-ETI), Mr. Clements is able to advance his experiments in pressurized coal combustion - which will, in time, require a full-scale test facility. In the meantime, the team needs to determine what precisely happens when coal fire is subjected to higher and higher pressure.

Theoretically, the environmental and economic gains will be impressive. In hypothetical simulations conducted between 2000 and 2006, Mr. Clements determined that one early model, code-named TIPS (for ThermoEnergy Integrated Power System), would effectively cleanse coal of its pollutants and capture coal's greenhouse gas emissions, too. Mr. Clements's work on TIPS heralded a significant advance in clean-coal technology when he published his findings in 2007.

In his labs at CanmetENERGY, the government's research compound in suburban Bells Corners, Mr. Clements subjected TIPS to exhaustive analysis. Devised and patented by an American chemical engineer, Alex Fassbender, TIPS appeared capable of delivering cleaner coal than even its

inventor had imagined. A Massachusetts-based company, Babcock-Thermo Carbon Capture LLC, announced earlier this year that it would develop the

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technology commercially. The company said the model produces clean energy from any "carbonaceous fuel" - coal, oil, natural gas, municipal waste or biomass.

Mr. Clements is certain of the eventual outcome of the global advances in clean-coal research: "History," he says, "is being made." Sooner or later, he says, "this stuff" - zero-emission clean coal - will happen. But history doesn't happen all at once. Breakthroughs of one kind or another are announced with increasing rapidity. More will come. But many breakthroughs fail when tested in real-world conditions.

Clean-coal research is now "a scientific conversation going on around the world," Mr. Clements says. He and Ligang Zheng, a colleague, have both lectured on clean-coal techniques at the North China Electric Power University in Baoding, south of Beijing. Notwithstanding its immense spewing of greenhouse gases - now three billions tons of CO{-2} a year, the most of any country on the planet - China has invested heavily in clean-coal research and is now building its first coal-fired plant capable of capturing pollutants and CO{-2}.

What role have Canada's scientists played in all this? "When scientists succeed," Mr. Clements says, "they usually don't know it." Science, he says, is variations on a theme - followed by variations on the variations. The researchers talk and they publish, bumping into each other at unpredictable tangents, like billiard balls on a global table. Even when they fail, or think that they have failed, they may well have succeeded - without ever knowing it.

Canada has made a serious investment in clean coal, appropriate enough for a country with a supply of coal that will last for many centuries. How much of an investment? In a speech at a session of the American Association for the Advancement of Science in Washington, Science and Technology Minister Gary Goodyear put the federal investment at \$1-billion. Some of this investment will be made in pure research, he said, some on turning past research into "commercialized processes," especially in the carbon-storage technologies that could contribute to an environmentally cleaner oil industry in Alberta.

These technologies will be important, Mr. Goodyear said, for decades - and will be very important in persuading U.S. environmentalists that Canada is serious about achieving a cleaner oil industry. But the more radical implication of clean coal is that it could replace oil, not merely make it cleaner. And it will be as a replacement for oil that clean coal delivers its greatest contribution to humanity - by weaning the world from its dependence on oil from dictatorial or otherwise dysfunctional states.

The Canadian government can be excused for concentrating research dollars in the kind of clean-coal technologies that support the country's oil industry - or, expressed in a different way, that (in Mr. Goodyear's words) "combat climate change." The first argument is economic; the flipside of that is the politics of climate change. But cleansed coal offers much more than this. For many countries around the world, it promises energy independence.

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