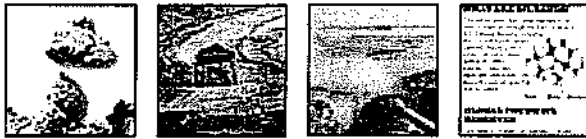


FUELING AMERICA OIL'S DIRTY FUTURE

Canadian oil sands: Vast reserves second to Saudi Arabia will keep America moving, but at a steep environmental cost

Robert Collier, Chronicle Staff Writer
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(05-22) 04:00 PST Fort McMurray, Alberta -- At the end of a long northern highway, surrounded by a flat horizon of spruce forest and muskeg swamp, lies the energy future of the United States: the largest known petroleum deposit in the world outside Saudi Arabia.

This future isn't a pretty sight. Just north of the oil boomtown of Fort McMurray, the forest suddenly falls away into a series of enormous strip mines as deep as 250 feet and covering many square miles each. Viewed from the rim, 60-foot-tall shovel loaders look like toys as they claw ton after ton of tar-like sands from the ground.

Nearby, refineries burn natural gas to steam-cook the sands, separate the tarry residue and purify it into oil.

These oil sands are the world's most expensive, most polluting source of oil under large-scale production. Wringing four barrels of crude oil from the sands requires burning the equivalent of a fifth barrel. The mines and refineries release huge amounts of greenhouse gases -- the equivalent each day to more than a third of California's daily car emissions.

Yet Alberta's oil sands are destined to be the main supply of foreign oil to the United States for at least the next century. The sands hold proven reserves of 175 billion barrels, second only to Saudi Arabia's 262 billion, and far more than the Arctic National Wildlife Refuge's estimated 10 billion.

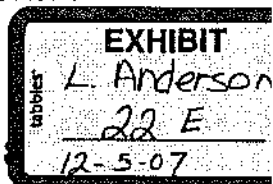
If Americans want to keep filling their gasoline tanks at a reasonable cost, they will need the oil sands industry to push ahead on its expected path of doubling, tripling and even quadrupling production in coming years.

Nowhere else is the conflict between energy use and ecological cost so stark.

"The oil sands are a big challenge," Canada's environment minister, Stephane Dion, who has fought publicly with other Cabinet officials for a tougher line on global warming, said in an interview.

"They are sending out a lot of greenhouse gas emissions."

Anderson Exhibit



"But there is no minister of the environment on Earth who can stop this from going forward, because there is too much money in it," Dion said.

The sands make up three broad oil fields, the combined size of Florida, in northern Alberta 500 miles from the U.S. border. Up close, a visitor quickly enters a world of vast industrial scale, in which the tar-like scent of the sands permeates everything.

The largest of the pits is a 50-square-mile moonscape of slag heaps and tailings ponds owned by Syncrude, a consortium of Canadian and American companies. Next to the pit is a refinery -- or upgrader, in oil sands terminology -- whose towers, tanks, pressure chambers and spaghetti-like piping cover 1,000 acres.

Long white barracks house hundreds of workers, who have been recruited from as near as Alberta's farm country and as far away as Newfoundland province, Venezuela and even the Middle East.

In the pits, the sand sticks to the bottoms of shoes like new asphalt on a hot summer's day. In the cab of a shovel, an operator drinks coffee and makes locker-room jokes while he calmly tweaks the computerized controls and levers that rip apart a hillside, the shovel grabbing and dumping 100 tons of sands at a time as the huge platform bucks and sways.

The sands are carried in trucks with 400-ton payloads to a processing tower and mixed with warm water. The oily slurry that separates from the grains of sand is then sent on to the refining process.

About 20 percent of the oil-sand deposits lie close enough to the surface that they can be strip-mined, and nearly all current production uses this process.

But as these pits are depleted, companies will be forced to go after deeper deposits. Those are extracted by a process known as "in situ," or in position, in which steam is pumped into underground deposits to dissolve the thick oil and allow it to be piped to the surface.

In-situ work is much more expensive than open-pit mining, requiring about four times as much natural gas to create the steam.

In both methods, the extremely heavy oil that is produced, called bitumen, has to be further refined into lighter synthetic crude oil before it can be piped to customers, mostly in the U.S. West and Midwest, for further refining and distribution.

Even though costs have dropped, the oil sands process remains inefficient. Two tons of sand yield a single barrel -- 42 gallons -- of oil. On average, each barrel creates more greenhouse gas emissions than four cars do in a day.

Fort McMurray's boom time has been a long while coming. The first large mine began operations in

the 1960s. But for the next few decades, as oil prices often sank below the \$25-a-barrel cost of recovering crude from the sands, the deposits were viewed as a vast money hole, as an improbable long-term investment play by deep-pocketed oil majors.

But recently, as international prices have rocketed above \$50 a barrel and technology advances have pushed production costs down to about \$18 a barrel, the sands suddenly are stunningly attractive.

Nearly every major U.S. oil company has entered the market, despite initial investment costs that far surpass those of traditional drilling. By industry estimates, companies plan to spend more than \$25 billion over the next decade on developing mines and upgraders.

"This is not for the faint of heart or those short on capital," said Neil Camarta, senior vice president of Shell Canada Ltd., the lead partner in a consortium that has spent \$5 billion in the last five years.

The consortium, which includes Chevron and ConocoPhillips, is producing 155,000 barrels of high-quality synthetic crude a day. It plans to invest more than \$1 billion a year for the next several years to increase its output to 500,000 barrels -- an output that, at current prices, would be worth more than \$8 billion a year.

Camarta's project, like most in the area, has been plagued by delays and cost overruns as it applies new technologies at top speed under severe conditions. Winter temperatures stay at 30 degrees below zero for weeks on end.

A shortage of skilled labor adds to the problems. "Just getting people here, keeping them here and keeping them happy is a big part of the competitive edge," Camarta said. "We're out here in the Canadian north, where it's cold and dark half the time, and we're pulling off one of the world's biggest projects."

Camarta, like most oil sands executives, runs his operations from a skyscraper in Calgary, the nation's oil headquarters. The logistics hub is 300 miles north at Fort McMurray, a city of 56,000 on the Athabasca River, amid the pancake-flat boreal forest that covers thousands of miles of northern Canada.

Fort McMurray is deceptively suburban, with nondescript strip malls, subdivisions and equipment yards spreading for miles. But it is feeling the strain of rapid growth.

Downtown holds a modest red-light district, with a half-dozen bars, a casino, two strip clubs and a Salvation Army shelter that is full year-round with workers who cannot afford housing despite part-time wages of \$30,000 a year. The elite workers who drive the shovels can earn \$60,000.

The four-lane freeway to the oil sands is at a standstill three times a day, when shifts change at the

24-hour-a-day mines.

In the rapidly growing community -- the 2004 census reflects a 33 percent increase in population over four years -- builders of homes and apartments have not been able to keep pace with the dramatic influx. Just 24 percent of dwellings are rentals. The average two-bedroom house sells for \$340,000 Canadian, or about \$300,000 American -- 40 percent more than a similar house in Calgary, and a large amount even for the unionized trade workers who operate the giant pit machines.

For those on government salaries or working lesser jobs, the boom can be a bust.

"If you're a schoolteacher, you're probably shacking up in an apartment with two or three others, and then the first job offer you get anywhere else in Alberta, you'll take it and leave town," said Melissa Blake, the mayor of the Regional Municipality of Wood Buffalo, which includes Fort McMurray and the oil sands.

Blake is calling on Alberta's provincial government to provide \$1 billion during the next five years for transportation, schools, health care and other services.

"The oil sands industry brings in a huge amount of revenue, but this town has not gotten the attention it deserves," Blake said.

She has pledged to block regulatory approvals for oil sands expansions until the town gets more help. Provincial officials are preparing a counteroffer.

Canada is already the leading source of foreign oil for the United States, providing one-sixth of the 10 million barrels imported each day. But output from Canada's conventional drilling areas is in decline.

At the oil sands, in contrast, production is expected to soar from the current 1 million barrels a day to 2 million a day by 2010, rising to 3 million by 2020 and later to as much as 5 million for decades to come. And every rise in oil prices increases the amount of oil that can be profitably produced.

In 2001, as oil was doubling to \$30 a barrel, the U.S. Energy Department quintupled its estimate of "proven" reserves in the oil sands -- the amount that is known to exist and that can be profitably extracted -- to 175 billion barrels.

Now, with \$50-a-barrel oil making it profitable to extract even deeply buried or dispersed formations of oil sands, producers say the reserves could be as large as 314 billion barrels.

"Alaska is an important source, but the level of attention has been disproportionate to the importance of the tar sands," said Greg Stringham, vice president of the Canadian Association of

Petroleum Producers, referring to the battle in the United States over drilling in the Arctic National Wildlife Refuge.

Most industry analysts agree that despite political attention focused elsewhere, the oil sands are North America's main energy gamble for the next century.

"Oil sands production is very expensive and complicated, but with prices as high as they are now, it finally is highly profitable," said Roland George, an analyst at Purvin & Gertz, a petroleum industry consulting firm in Calgary.

"In addition," he said, "it's so close to major markets, and it's in Canada, where you don't have to worry about a revolution or terrorism or getting your investment confiscated tomorrow. And finally, because the reserves are so huge, you know your investment will pay off for a very long time."

Dion, the environment minister, said that the federal government's plan for complying with the Kyoto Protocol includes a mandate for the oil sands industry to reduce its output of greenhouse gases by 12 percent a barrel over its expected 2010 level. The Canadian government and the oil industry note that efficiency improvements have reduced emissions in recent years, and they hope research in new extraction and refining technologies will enable dramatically greater reductions. As a possible solution, for example, companies are experimenting with production methods that turn the bitumen into a gas, which would allow greenhouse gases to be siphoned off and "sequestered" in depleted oil wells in southern Alberta.

But these techniques are many years from being ready for wide use. In addition, analysts say, efficiency improvements from new technologies are likely to be partly offset by a gradual switch to the more energy-intensive in-situ methods and by a shift in refining to higher-grade synthetic blends.

The oil sands industry now consumes about 400 billion cubic feet of natural gas per year, an amount that could triple by 2015 as oil production rises by the same amount.

Environmental groups remain highly doubtful.

"The fact remains that the oil sands are the most dirty, wasteful way of obtaining energy on the planet," said Elizabeth May, executive director of the Sierra Club of Canada. "At a time when global warming is an increasing problem, why should this industry be expanded willy-nilly to make the problem worse?"

Fueling america

Coming Monday: Opposition from native tribes is blocking Canada's construction of a natural gas

pipeline from the Arctic Ocean that would help fuel oil sands processing in Alberta.

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<http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2005/05/22/MNG46CMUPL60.DTL>

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