

Husky's New Angle

Cutting-edge horizontal drilling techniques optimise the life of Canada's oil sands.



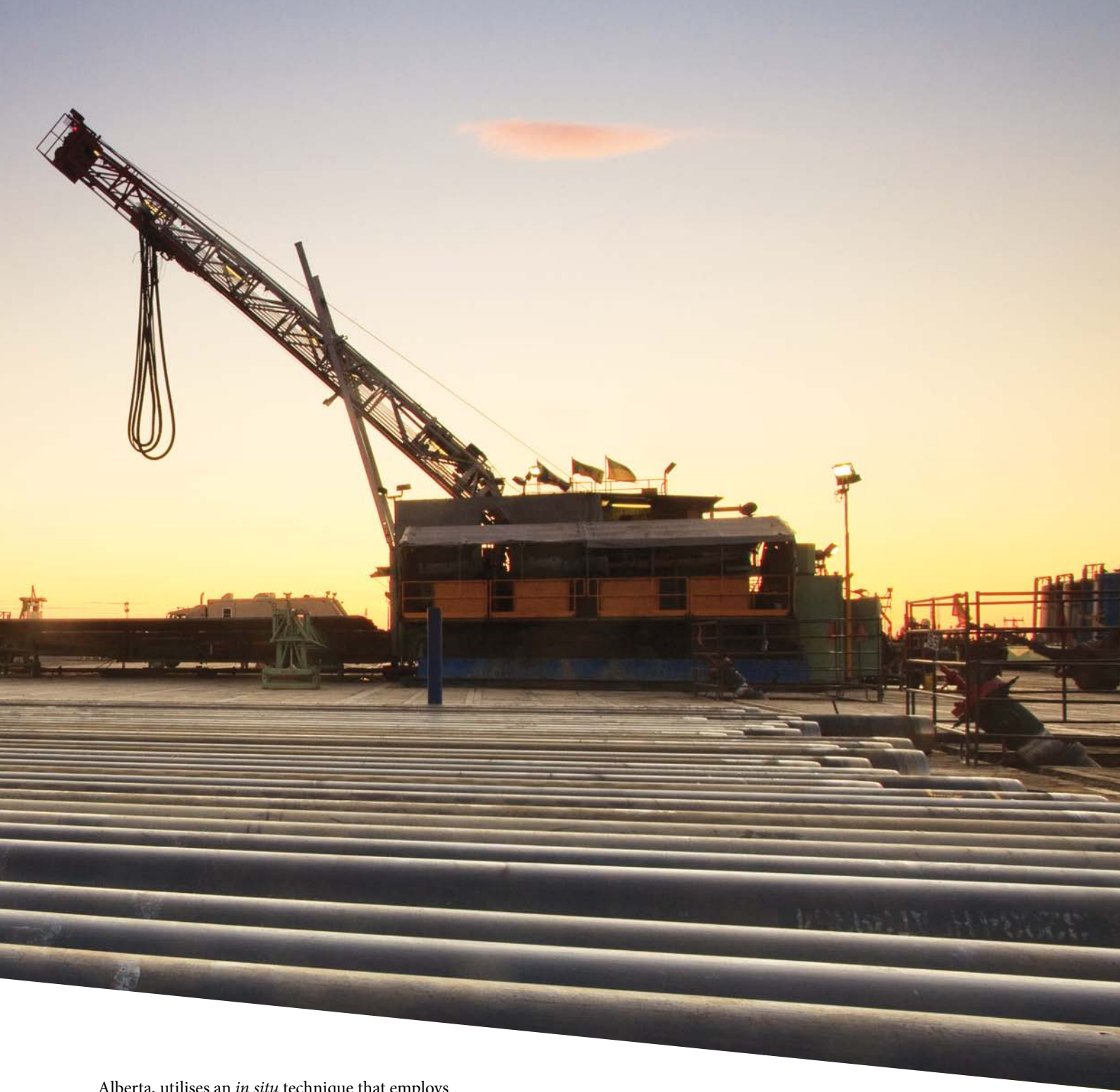
AS THE WORLD'S ENERGY NEEDS continue to grow, more sophisticated, environmentally friendly and efficient methods of extracting the world's remaining oil and natural gas reserves will become increasingly necessary. Husky Energy, one of Canada's largest integrated energy providers and an associated Hutchison Whampoa company, continues to seek out these new methods alongside efforts to optimise existing technologies.

Husky is at the forefront of the use of *in situ* oil recovery methods in extracting some of Canada's most difficult to access reserves, employing modern horizontal drilling techniques. In the thick oil sands of the western Canadian province of Alberta lies one of the largest remaining concentrations

of petroleum resources in the world, estimated at 170 billion barrels of recoverable crude oil by the Alberta Energy Resources Conservation Board.

This extra-heavy crude oil, called bitumen, is more difficult to extract than traditional petroleum because it is highly viscous and thus cannot be extracted under normal reservoir temperatures. The thick bitumen must be heated underground before it can be pumped to the surface. Only then can it be refined into synthetic crude oil and other petroleum products.

Multiple *in situ* methods can be employed to thin the bitumen in order to ease the extraction process, including the addition of solvents or the application of heat through gas or steam. Husky's Sunrise Energy Project in the Athabasca oil sands, located 60 kilometres northeast of Fort McMurray in eastern



Alberta, utilises an *in situ* technique that employs steam-assisted gravity drainage techniques (SAGD), coupled with horizontal drilling methods, to extract the bitumen.

Traditionally, oil wells have been drilled vertically from the surface straight down into oil reserves. However, as easy-to-access resources diminish, this is not always the most practicable method. In Husky's Sunrise Energy Project, the wells are drilled at an angle from the earth's surface, typically 45 degrees, and then deviated to the horizontal 90 degrees, into the shallow target formation.

The concept of horizontal drilling was

first proposed in the 1980s and first used by Husky in the summer of 1989 in an oil-rich area of Canada known as Rainbow. A straightforward concept, horizontal drilling involves drilling a horizontal (as opposed to vertical) well in order to access resources that could not ordinarily be reached easily – or at all – with traditional vertical wells.

This often allows more of the petroleum resources to be accessed than via traditional techniques. Importantly, horizontal drilling has also been shown to increase recovery from older reservoirs under certain circumstances, giving new life to resources

once thought depleted. Other steam-assisted techniques, such as Cyclic Steam Stimulation (CSS), which involves using a traditional vertical well to infuse a reservoir with steam so that the bitumen may be pumped out several weeks later, typically recover less than the steam-assisted methods of horizontal drilling, except in certain situations where CSS is a more suitable recovery method.

Horizontally drilled wells, aside from being markedly more efficient under the right circumstances, are also more environmentally friendly than traditional vertical wells. “Horizontal drilling is better for the environment, because multiple horizontal wells extending in different directions can be drilled from a single pad site, effectively reducing the surface environmental footprint,” explained Marek Bartlomowicz, Technology and Performance Manager for Husky Drilling & Completions Department.

In the Sunrise Energy Project, set to begin oil production in 2014 when 49 pairs of parallel horizontal wells will be used to extract the bitumen during the first phase of bitumen recovery. Steam will be continuously pumped through the upper of the two wells into the bitumen reservoir. A steam chamber

“Although drilling a horizontal well is more difficult than a vertical well...the benefits greatly outweigh the challenges.”

will be created, heating and thinning the bitumen, allowing gravity to pull it towards the lower well and be pumped to the surface. Sunrise has excellent reservoir quality with an average bitumen thickness of more than 30 metres. Over the full life of the project, Husky believes it can achieve more than 40 years of production at the currently proposed rate of 200,000 barrels per day (gross) from over 1,500 well pairs. It is expected that the oil extracted from the Sunrise Energy Project will be processed into various transportation fuels at a Husky/BP jointly owned refinery near Toledo, Ohio in the United States.

At other Husky sites in Canada, from the Western plains to North East British Columbia through to Canada’s East coast, horizontal drilling is being used to successfully develop fields where it is more efficient and practical than vertical drilling. Husky is also using horizontal drilling in its offshore projects, such as the Husky White Rose field and satellite tiebacks in Canada’s




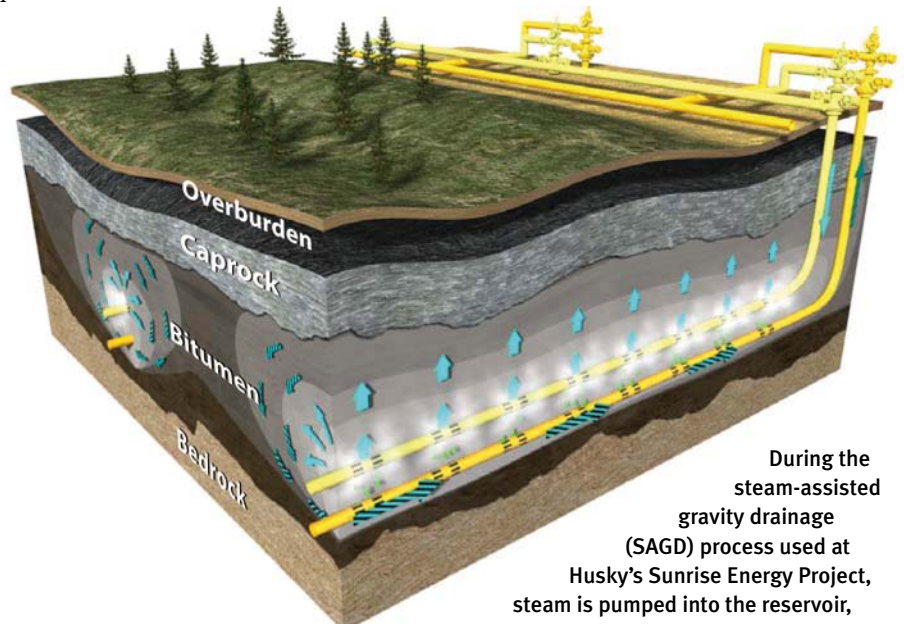
Atlantic Region, where a combined total of more than 175 million barrels have been extracted since production began in 2005.

Outside of North America, Husky is also considering horizontal drilling techniques in developing some of its largest offshore projects, including its natural gas discoveries in the Asia Pacific region, as horizontal drilling will maximise production in these areas. “Although drilling a horizontal well offshore is more difficult than a traditional vertical well, most of the challenges faced are to do with drilling offshore in general,” said Mr Bartlomowicz. “Thus, given the remarkable efficiency in accessing the resources and environmental friendliness of horizontal drilling, the benefits greatly outweigh the challenges.”

Of course, drilling horizontal wells has not come without its challenges for Husky. “Using horizontal wells has introduced more complexity to our operations, such as increased torque and drag, and thus more stress on the equipment,” explained Mr Bartlomowicz. “Additionally, the overall cost of delivering horizontal wells is higher, so all operators must overcome a learning curve before becoming

consistently good at delivering horizontal wells. This is a challenge that the industry and Husky are still navigating today.”

Today, as Husky continues to respond to the world’s changing energy needs, it employs some of the top drilling and completions experts, pushing the envelope with cutting-edge techniques that will continue to contribute substantial value to operations and keep Husky at the top of Canada’s oil production. 



During the steam-assisted gravity drainage (SAGD) process used at Husky’s Sunrise Energy Project, steam is pumped into the reservoir, heating the bitumen so that it becomes thin enough to be pumped to the earth’s surface.

