

ENERGY

# SHIFTING SANDS

*The development of vast oil sands reserves in Canada will keep the oil flowing*

*By Andrew Ashley*





IT IS NEVER FAR from the headlines these days. Both the level of accessible oil reserves and the cost of bringing oil to market are perpetually hot topics. Almost every day, it seems, there is a story about fluctuating oil prices or the urgent need for new sources of supply.

And now there is a new development – enormous reserves of oil in tar-soaked sands that will ensure supplies for a long time to come. Let's start with a look at the background to this exciting story.

There are no signs that the world's seemingly insatiable appetite for oil will decline and many analysts are forecasting that prices will remain at historically high levels. In April new research from Goldman Sachs suggested that we are destined for a long period of volatile oil prices with "super-spikes" of up to US\$105 per barrel.

But it's not just a question of cost. Many of the large fields in such areas as Alaska, the North Sea and the Gulf of Mexico are close to being worked out and new sources must be developed to replace them. The International Monetary Fund recently stated that increased global capacity of three million to five million barrels per day (BPD) is required "to ensure the stability of the world economy".

The combination of rising prices and declining reserves in established fields is encouraging a search for new growth areas. But undeveloped resources are often difficult and costly to exploit, such as "ultra-deep" offshore wells, or in potentially unstable areas, such as west Africa or the Caspian.

Against this background, the oil industry is increasingly looking to "unconventional" hydrocarbons as a new source of supply. Unconventional hydrocarbons tend to be more expensive and more difficult to convert into petroleum products than regular oil reserves. But constantly growing demand and rising prices are making them economically attractive, persuading the industry to take non-traditional sources very seriously. Hutchison company Husky Energy is very active in the move to secure oil supplies through the development of new resources.

### **Buried treasure in the Canadian west**

For the largest and most important of these unconventional sources of oil, look west – to Alberta in western Canada. This huge, sparsely populated province is the setting for one of the hottest stories in the oil business today.

Alberta has long been a treasure-trove for palaeontologists, seeking answers about the origins of life among its fossils and dinosaur remains. But now another sort of treasure is starting

**Left: Fuel for the future: Husky is actively developing non-traditional oil reserves**

to be extracted in potentially vast quantities. For Alberta's oil sands, also known as tar sands, constitute the largest known petroleum deposit on the planet.

Oil sands consist of a tar-like bitumen, originally formed as crude oil, algae and microscopic creatures that were “cooked” under immense pressure over a period of hundreds of millions of years. Relatively recently in geological terms, the oil moved up to sandstone levels nearer the surface where it was reduced to bitumen by bacteria.

Until very recently, it was so hard to extract oil from these bitumen deposits and convert it into petroleum that large-scale production did not seem viable. But things have changed. Technological advances and the global need for proven energy sources are driving the rapid development of Alberta’s oil sands

The likely rewards are enormous. The Energy and Utilities Board of Alberta estimates that there are around 1.5 trillion barrels of bitumen in the province – double the proven oil reserves of the Middle East. It’s not all recoverable with currently available technology but the levels of accessible bitumen are still huge. With around 300 billion barrels currently available for extraction, Alberta’s oil sands can supply more energy than all the wells in Saudi Arabia. That is enough oil to meet the whole of North America’s projected

demand for the next 40 years.

The fast-increasing level of investment in Alberta’s oil sands reflects their significance for the future of energy supplies. Canada’s National Energy Board forecasts that investment will exceed US\$48 billion by 2012.

### Turning sand into oil

It is clear that the Alberta oil sands are going to play a very significant role in meeting global demand for energy in the coming years. But they will not give up their riches easily. Obtaining oil from bitumen deposits is an expensive and complex process. There are two principal methods of extraction, mining and in-situ, both of which are being used in the development of the Alberta reserves.

Mining was the first commercial production technique used in areas of oil sands and it still accounts for the largest proportion of oil extracted from bitumen. It involves the construction of massive open-pit mines, plus the associated extraction facilities, to separate the bitumen from the sand. Huge mechanical shovels – some as tall as a seven storey building – are used to dig up to 100 tonnes of sand, bitumen and rubble in a single scoop. After the bitumen is sepa-



**Above: New construction work for Husky’s first oil sands project. Right: Once the bitumen has been blended with a diluting solution, it can be stored in conventional tanks. Below: Husky facility for converting heavy oil, such as that obtained from bitumen, into high quality oil.**

rated from the sand and other matter, it is converted into synthetic crude oil.

This process works well in oil sands reserves where the bitumen deposits are relatively close to the surface. Much of the bitumen is buried too deep for mining, however, and other techniques must be used. A newer technology, in-

*“We are very encouraged by the long-term potential of our oil sands resources. They will play a significant role in Husky’s medium and long-term growth strategies.”*

John C.S. Lau, President and CEO, Husky Energy Inc.





situ extraction, is used for these deeper reserves. The accompanying sidebar shows how steam assisted gravity drainage (SAGD), the leading in-situ production technique, works.

### Husky's oil sands strategy

Much development work will be necessary to turn on the oil sands tap and keep it running. Husky Energy is at the forefront as the oil industry moves in this new direction. With five leases covering more than 425,000 acres containing more than 33 billion barrels of bitumen, the oil sands of northern Alberta constitute a key strategic development area for Husky.

Husky's first major development is the Tucker Oil Sands Project, located 30 kilometres northwest of Cold Lake, Alberta. The Alberta Energy and Utilities Board approved this project in June 2004, giving the green light for Husky to start implementing its strategy for commercial in-situ bitumen production.

Construction of the Tucker facility is well advanced and commissioning is scheduled for late 2006. Oil will start to flow about three to six months after that. On current projections, production will exceed 30,000 BPD and Husky forecasts that total production will reach 352 million barrels over a 35-year project life.

Tucker is Husky's first venture into oil sands but it is only part of the company's long-term strategy. The Sunrise Oil Sands Project is next in line. Husky has 58,000 acres of very high quality oil

sands at Sunrise, promising vast reserves with lower unit operating costs. This site is projected to produce 3.2 billion barrels over 40 years. Husky has applied for approval for a phased project that will eventually produce 200,000 BPD and is currently undertaking the concept development work to support it.

And there is still more. Husky is now evaluating the commercial prospects of its other three oil sands leases, with a view to developing production capability as the Tucker and Sunrise projects go on-stream.

### Oil for the future

Despite recurring fears that the world's oil wells are drying up, resulting in global energy shortages, the future looks bright. We will be using oil for the foreseeable future, though it is increasingly likely to come from non-traditional sources.

Global energy expert Peter Odell of Erasmus University in Rotterdam has recently published a new book on energy supplies with the unequivocal title "Why Carbon Fuels Will Dominate the 21st Century's Energy Economy". In it, he argues that conventional oil supplies will not peak until nearly mid-century, while unconventional sources, of which Canada's oil sands are the most important, will peak only at the end of this century.

So it looks as though the oil will be flowing for a long time to come. And much of it will be flowing from the oil sands sites now being developed by Husky Energy.

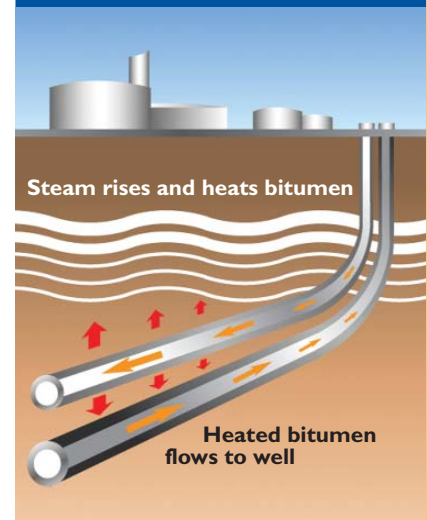
## STEAMING AHEAD

### How Husky gets the oil flowing

**I**N its naturally occurring state, the oil found in the bitumen of oil sands deposits is not viscous enough to flow to a well from which it can be pumped out. More complex technologies are required to obtain oil from these reserves.

Open-pit mining is the method used for some oil sands reserves. But at Tucker, Husky's first oil sands production site, the bitumen from which the oil is obtained is buried

### DYNAMICS OF THE SAGD STEAM CHAMBER



too deep to be extracted this way. So Husky is using the newer technology of steam assisted gravity drainage (SAGD) to recover the bitumen.

SAGD is a form of thermal recovery technology, in which pairs of horizontal wells are drilled into the oil sands. The upper well is the "injector", the lower is the "producer". Steam produced by a series of huge generators is introduced into the injector well of each pair by a continuous injection process, to heat the bitumen and make it more viscous. Gravity then ensures that the bitumen mixed with condensed steam drains into the producer well, from which it can be pumped to the surface.

Once it has been brought to the surface, the bitumen is blended with a diluting solution that means it can flow through a conventional oil pipeline. The SAGD process, in which oil is pumped from a well, is closer to conventional oil production than the open-pit mining method.