



Tar sands deposits are composed of sand, silt, clay, water and about 10-12% bitumen. They have a dark colour and a strong hydrocarbon smell. The technical term for the oil extracted from tar sands is crude bitumen, which is defined as a viscous (thick), heavy oil that does not flow into a well in its natural state. At 9°C, the tar sands are as 'hard as a hockey puck'. After extraction from the sands, the bitumen needs an energy intensive upgrading process before it has a quality resembling crude oil from the North Sea. The tar sands deposits in Canada cover an area the size of the state of Florida.

In addition to the extremely energy intensive and polluting extraction process, these sources of unconventional oil contain more CO₂ emissions than the planet can afford.

Greenpeace is an independent global campaigning organisation that acts to change attitudes and behaviour, to protect and conserve the environment and to promote peace.

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The two main means of bitumen extraction:

Open pit mining of tar sands are sent through a 'washing machine' to separate the bitumen from sands, toxins and clay. Today open pits dominate the tar sands business, yet only 20% of the reserves are available to surface mining. Extracting tar sands in open pits with huge machines and trucks are responsible for the characteristic 'moonscape' of open mines and the large and highly toxic ponds from used washing water. Excessive water use and leakage from the toxic tailing ponds are escalating in the area.



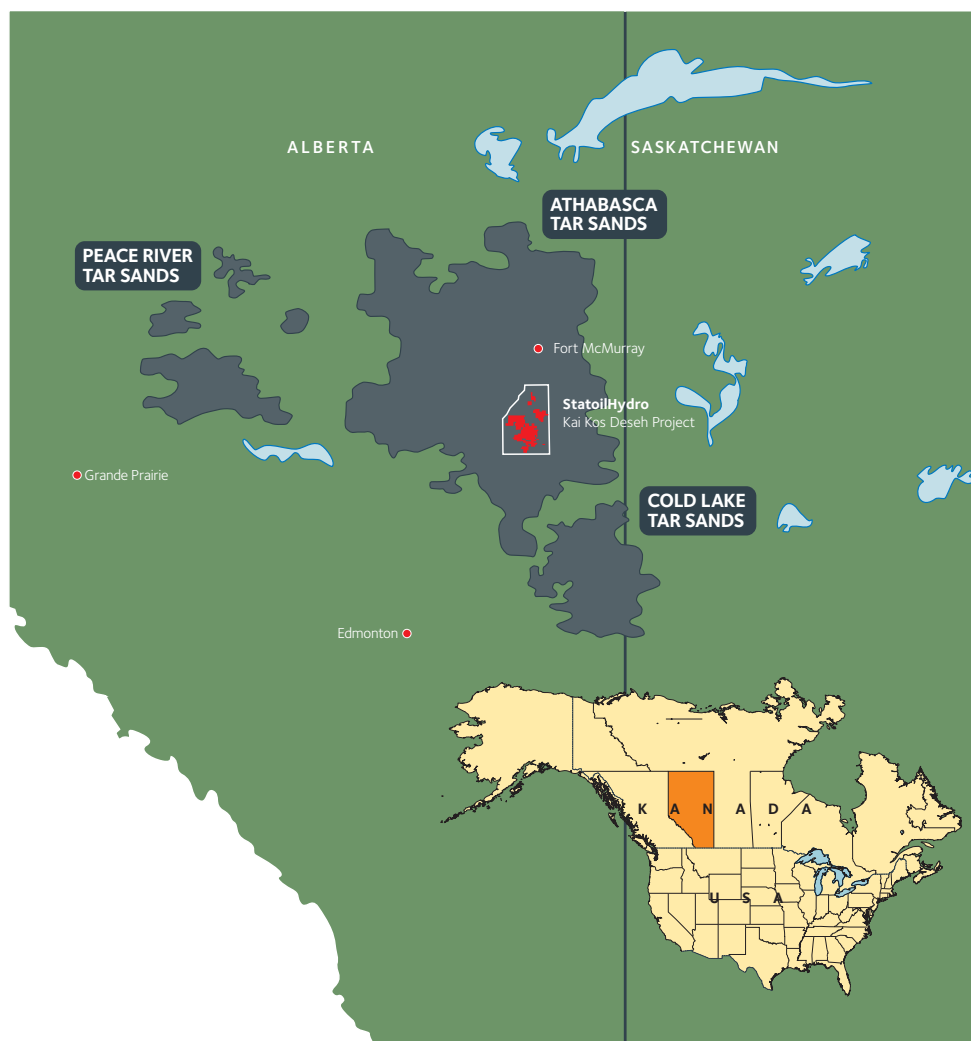
Steam Assisted Gravity Drainage (SAGD) extraction, where the bitumen is 'boiled' out of the ground through injection of hot steam into deeper layers of tar sands is the most common method for extracting bitumen from deep deposits of bitumen. This process leads to the industrialisation of large previously forested areas, the use of significant volumes of water and four times the energy used for open pit mining. There is ongoing research on adding chemicals in the steam to reduce the energy demands, with unknown side effects.



Statoil's tar sands involvement is only linked to deep reserves and the company is planning to use SAGD technology to 'boil' the hydrocarbons out from 300-500 meters below the surface. Statoil figures show similar energy use to the other companies in the area.

Statoil estimates energy use that will result in 60 kg CO₂ per barrel of oil extracted. In addition to 40 kg CO₂ per barrel for upgrading to a synthetic crude oil (SCO) similar to crude oil from the North Sea. This equals up to 100 kg of CO₂ per barrel of SCO, if natural gas is used in the process. The use of coal would result in much greater CO₂ emissions.

On the Norwegian shelf the company emits less than 7.8 kg CO₂ per barrel of oil - and this is still considered problematic for the climate.



Climate and Scale

The green house gas emissions from the tar sands operations in Alberta are already 27 megatons per year, and by 2015 this is expected to increase to 126 megatons. This is more than the emissions of all of Canada's passenger cars and trucks combined. Canadian emissions have increased significantly and the country is today 33.8 percent above their Kyoto commitment. One of the main reasons for this is the rapid tar sands developments.

Statoil's involvement in the tar sands is contributing to a weak Canadian position in global climate negotiations, raising international concerns.

Tar sand extraction in Canada has increased rapidly since 2000. Almost all the world's larger oil companies are now

involved in the tar sands business in Canada, either directly or indirectly by cooperation; Suncor, Syncrude, EnCana, Imperial Oil (Exxon), Japan Canada Oil Sands, Nexen, Chevron, Royal Dutch Shell, ConocoPhillips, Total, Shell Canada, BP, Korea National Oil Corporation and Statoil, in addition to a number of smaller companies. A recent report by Greenpeace shows that many of the tar sands projects are postponed. This is a result of the US oil market showing signs of finally being able to reduce demand in light of the financial crisis, Obama's new climate policies, and generally high costs in Alberta.

Carbon capture and storage (CCS)

The Canadian government, Statoil and other operators in the Canadian tar sands often point to *carbon capture and storage* (CCS) as their solution to the extensive energy use for tar sands extraction and SAGD in particular. However, Statoil has no concrete plans for CCS in Canada.

Statoil has stated that they will look into this, and that CCS is considered for their planned upgrading plant construction (which has now been postponed). Statoil emphasises that the Canadian operations will be *“dependent on a suitable outlet for the CO₂, the existence of an appropriate fiscal and regulatory regime, and availability of adequate infrastructure to transport and store the CO₂.”* None of this exists today.

In november 2008 the *Canadian Broadcasting Channel* (CBC) obtained a ministerial briefing note from a Federal and Albertan government task force, studying the potential for CCS, that judged that *“only a small percentage of CO₂ emitted [from tar sand extraction] is ‘capturable’ since most emissions aren’t pure enough”*.

The document was obtained through the *Freedom of Information Act* and marked *secret*. The document further concluded that *“oil-sands operations are very diverse (both geographically and technically) and only a small portion of the carbon dioxide streams are currently amenable for carbon capture and storage.”*

In-situ (in place) extraction projects using SAGD and other thermal technologies produce large amounts of CO₂, but the emissions are geographically dispersed across large areas, making it extremely challenging and expensive to install capture facilities. WWF-Canada has estimated that only around 10% of tar sands emissions are captureable.

These findings were further proven by the fact that all of Alberta’s largest tar sands producers, including Statoil, recently abandoned their bids for a share of \$2 billion (Canadian) in a provincial government funding program for carbon capture and storage projects. From an original pool of 20 firms selected by the Province of Alberta to be eligible for CCS funding in November 2008, eight of the tar sands companies have chosen not to apply for funding, including Suncor, Syncrude, ConocoPhillips and Statoil. The companies cited high costs and their belief that the money can be better used for capturing greenhouse gases from coal-fired electricity plants, as they represent larger and more concentrated sources of emissions. It is therefore clear that CCS is no *“silver bullet”* for the tar sands related green house gas emissions. Nevertheless, none of the above has so far prevented government officials or industry spokespeople touting CCS as the answer to the tar sands industry’s CO₂ problem.

In addition to all these fundamental challenges come the environmental problems related to industrialisation of large forest areas, use and release of substantial amounts of water and chemicals, the first nations people loosing their hunting grounds, local air pollution and health problems. On top of that, questions have been raised on the economic viability of the projects, in spite of few environmental regulations and very generous Canadian conditions.

Greenpeace believes Statoil should withdraw from Canadian tar sands extraction now and focus their innovative resources on more sustainable projects.