## The Opportunities and Cost Investment

Given that the analysis shown here does not include potential revenue from using stored $CO_2$ to enhance oil recovery, or cost reductions from the technological advances that will occur over the next 15 years, costs could be even lower than suggested.

Becoming carbon neutral by 2020 is both reasonable and achievable, particularly given the imperative for action to prevent dangerous climate change and the ability of the energy sector to demonstrate leadership in tackling this challenge.

Oil sands developers can push forward at the current unsustainable pace and become one of Canada's biggest polluters, or they can demonstrate innovation and genuine leadership, showing Canada and the world how to reduce GHG pollution while society transitions away from fossil fuels towards sustainable energy.

## On the path to carbon neutral, oil sands companies need to

- establish a leadership role in the oil sands sector and set a target of becoming carbon neutral by 2020
- evaluate and apply the best approaches to becoming carbon neutral for their type of operations
- evaluate all possible GHG pollution reduction options through on-site energy efficiency and fuel switching measures
- support immediate action on developing a domestic carbon offset trading system
- implement carbon capture and storage technologies and invest in GHG pollution offsets that go beyond business-as-usual practices.

PHOTO: ABLESTOCK IMAGES

***Oil sands companies have an opportunity to lead a legacy of carbon neutral development. Development Canadians can be proud of.***

## Want more information?

*For more information including the detailed analysis for the costs to become carbon neutral, download our full report Carbon Neutral 2020: A Leadership Opportunity in Canada's Oil Sands. It is available from* ***www.oilsandswatch.org****. At our website you will also find photos, videos and other information on oil sands.*

the PEMBINA institute
Sustainable Energy Solutions

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# Carbon Neutral OIL SANDS by 2020

FACT SHEET

LEADING THE WAY TO MORE RESPONSIBLE OIL SANDS DEVELOPMENT

CANADA'S OIL SANDS INDUSTRY:

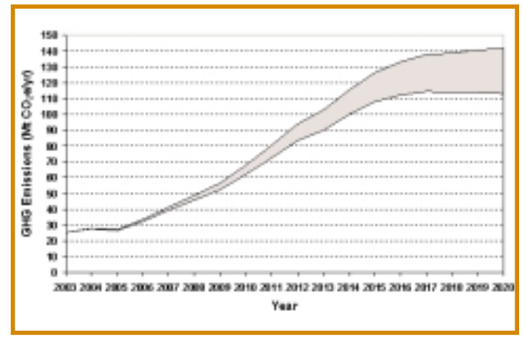
# Environmental Laggard or Innovative Leader?

*Even the best case scenario anticipates 108 megatonnes of GHG pollution will be released into the atmosphere from oil sands operations by 2015.* ▼

***For a few dollars per barrel, using existing technology, oil sands operations can become carbon neutral by 2020.***

An unprecedented oil sands rush is underway in Canada. Between 1995 and 2004 Canadian oil sands production more than doubled to 1.1 million barrels per day – 16 years ahead of the anticipated schedule. As a result, the magnitude of the risks and opportunities for Canadian oil producers is also unprecedented.

One serious risk of oil sands production is greenhouse gas (GHG) production. The science of climate change leaves little doubt that GHG pollution must be reduced immediately if we are to avoid drastic worldwide climate change impacts. Oil sands development could contribute up to 47% of the projected business-as-usual growth in Canada's total emissions between 2003 and 2010, making it the single largest contributor to GHG pollution growth.[1]




If measures are not taken to curb emissions growth, the oil sands industry may have the lion's share of the responsibility for undermining Canada's international obligation to reduce its GHG pollution. Current development is taking Canada in the opposite direction it needs to be headed, increasing societal risks by letting emissions soar unchecked.

Given the world class scale of the oil sands resource, Canada's international reputation will depend on how we manage the environmental impacts, especially GHG pollution, associated with oil sands development.

1 *For projected emissions (low and high projections) associated with each oil sands project, and the associated assumptions and caveats for the projections, see "The Climate Implications of Canada's Oil Sands Development: Backgrounder" at http://www.pembina.org/publications_item.asp?id=213.*

## Oil Sands Industry Must Reduce its Pollution

*While it is imperative that other sectors and individuals do their part to reduce GHG pollution, there is good reason for oil sands companies to be taking a leadership role:*

- *Oil sands operations are the single fastest growing contributor of GHG pollution in Canada.*
- *Oil sands development is growing at a rapid pace and production is expected to reach five million barrels of oil per day by 2030, up from 1.1 million per day in 2004.*
- *Companies operating in the oil sands had an average annual increase in income of 42% between 1999 and mid-2006, for a total increase of 440%. They can afford to invest in innovative solutions to reduce environmental impacts.*
- *Given the relative proximity of operations, there is opportunity for industry collaboration.*
- *The technology to achieve carbon neutrality already exists and costs could be as low as a few dollars per barrel of oil.*

# Oil Sands Companies Can Be Carbon Neutral by 2020 for as Little as a Few Dollars per Barrel

▲ *Oil sands upgrader plant and related facilities.* PHOTO: CHRIS EVANS

***Accomplishing such a target would demonstrate to the world that Canada's oil sands industry is responsibly managing its GHG pollution.***

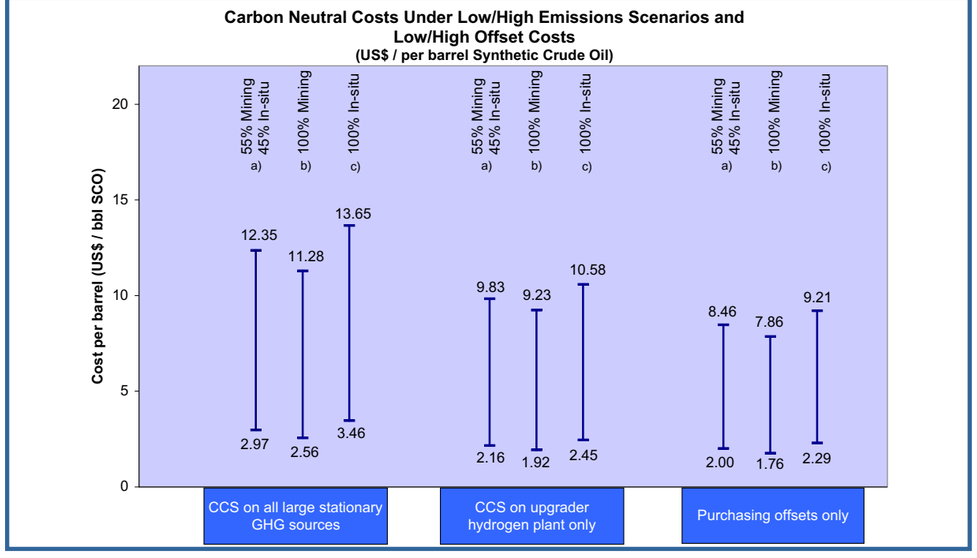
The technology to achieve carbon neutrality already exists and the costs to oil sands companies could potentially be as little as $2.50 US per barrel (bbl). Comparatively, it costs up to $1.75 US per bbl to remove lead from gasoline, and a little less than this to reduce sulphur in diesel to current levels. Further, some oil sands projects are estimated to be economic with oil prices at $30-$35 US per bbl (the average price at the beginning of September 2006 was $70 US per bbl).

## The Path to Carbon Neutral

The costs for an average oil sands operation to become carbon neutral will ultimately depend on how that neutrality is achieved. Although there are numerous options for becoming carbon neutral, for example fuel switching and energy efficiency, only a combination of carbon capture and storage, and acquiring pollution offsets (carbon credits) is considered here. Mining operations, in-situ operations, and operations that use both types of resource extraction are also examined. All examples include initial refining of the bitumen, or "upgrading". Carbon neutral costs under low and high emissions scenarios and low and high offset markets are presented.

The following example is summarized from the Pembina Institute report, ***Carbon Neutral 2020: A Leadership Opportunity in Canada's Oil Sands***, which includes detailed assumptions, references and calculations. The detailed report can be downloaded from **www.oilsandswatch.org**.

## Carbon Neutral: What Does it Cost?




▲ *The mining operations strip away boreal forest and mine up to 100 metres into the earth.* PHOTO: CHRIS EVANS

## Sources of Greenhouse Gas Pollution

Oil sands operations generate GHG emissions from different sources. The operations themselves can be divided into three categories:

- Mining and extraction: In 2004, 65% of oil sands production was from mining operations.
- In-situ production: In 2004, 35% of oil sands production was from in situ operations.
- Upgrading: In 2004, 61% of oil sands production was upgraded to synthetic crude oil.

This example does not consider the GHG emissions from either transporting the oil via pipeline to the refinery nor the refining operations that produce gasoline, diesel, jet fuel and other end user products.

▲ *GHG pollution must be reduced immediately if we are to avoid drastic worldwide climate change impacts.* PHOTO: DAVID DODGE, THE PEMBINA INSTITUTE

## Carbon Capture and Storage Opportunities

An alternative to reducing the generation of GHG emissions is to capture and store $CO_2$ pollution. Different capture technologies are available, all with benefits and disadvantages depending on the specific application. Costs for capture are generally dictated by the industrial application; specifically, the higher the $CO_2$ purity the lower the cost. Once $CO_2$ is captured and compressed it is transported by pipe to an underground reservoir. Geological storage of $CO_2$ can occur in a variety of formations, including depleted oil/gas/bitumen reservoirs, coal seams, deep saline aquifers, and salt caverns. Storing $CO_2$ in large depleted oil and gas reservoirs would carry a lower cost, while storage in shallow, small reservoirs would carry a higher cost. Issues around long-term (permanent) retention, and potential health effects due to leakage, for example, must be addressed.

**BOTTOM LINE: $34-$100 US/tonne $CO_2$**
(including capture, transport, and storage)

## The Greenhouse Gas Market and Offset Prices

Purchasing GHG offsets is one way to help meet the goal of becoming carbon neutral. It is important to stress, however, that,

i) fuel switching and energy efficiency options should be considered first, and

ii) any offsets purchased must meet the highest environmental standards.

**BOTTOM LINE: $22-$66 US/tonne $CO_2$**
during the 2020 timeframe