

# Drilling DEEPER

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FACT SHEET



ENVIRONMENTAL MANAGEMENT • LAND • AIR EMISSIONS • WATER • CLIMATE CHANGE

## The In Situ Oil Sands Report Card

### First-ever report card on deep oil sands Most projects score below the grade

*Some in situ environmental impacts as serious as mining*

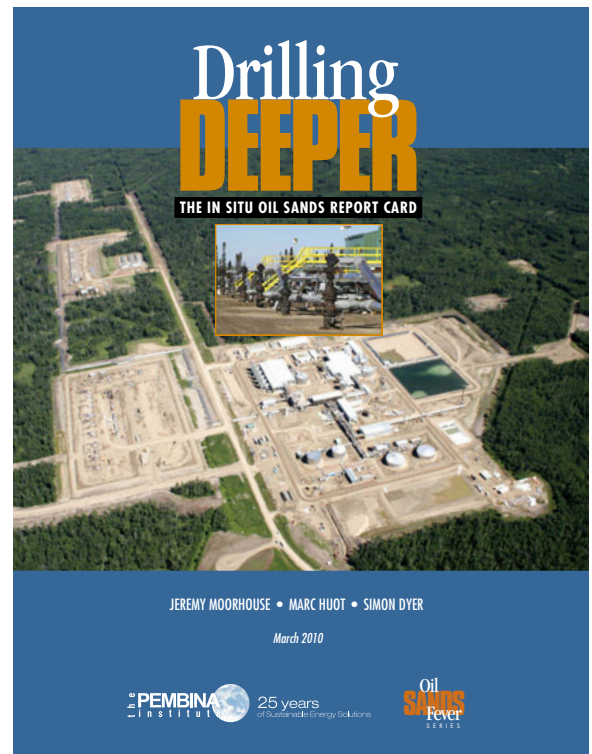
About one-fifth of Alberta is available for an environmentally intense form of oil sands development known as in situ, or “in place,” extraction. The in situ process involves drilling several wells into the oil sands deposit, and then heating the oil sands underground using high-temperature steam so the bitumen can flow to a well and be pumped to the surface.

Mining is currently the predominant means of producing crude from Alberta’s oil sands, but in situ techniques could allow access to the 80% of Alberta’s oil sands resources that are too deep to mine. Unfortunately, there is limited information about the environmental impacts and performance of in situ oil sands development.

*Drilling Deeper* provides a **first-of-its-kind analysis** of the environmental performance of in situ oil sands by **comparing nine operational facilities** from all three oil sands areas: Athabasca, Peace River and Cold Lake. The analysis follows the same report-card style methodology as *Under-Mining the Environment*, the Pembina Institute’s 2008 report that evaluated and compared the environmental performance of 10 existing and proposed oil sands mines.

In this new report, the Pembina Institute compared in situ projects on **17 environmental indicators** grouped in five categories: general environmental management, land, air emissions, water and climate change.

The highest-scoring projects in the survey were Suncor’s Firebag, with 60%, and Cenovus’s Foster Creek, with 57%. Canadian Natural’s Primrose/Wolf Lake project received the lowest score of 25%.



*In the first-ever assessment of environmental performance for deep oil sands development, Canadian in situ oil sands projects received marks ranging from 25% to 60%. Five of the nine projects surveyed scored less than 50%, and the average score was only 44%. These results demonstrate there is substantial room for improvement across the sector.*



# Room for Improvement

With the highest-ranked project scoring only 60% and a nine-project average grade of 44%, it is clear there is significant room to increase the environmental performance of in situ oil sands operations.

Many operations demonstrate leadership in some areas of project-specific environmental performance, and most companies have an environmental policy that commits to continuous improvement.

Suncor Firebag, Suncor MacKay River, Cenovus Foster Creek and Imperial Oil Cold Lake were **above average** in overall environmental performance.

- Each project was a commercial-scale operation performing near expected technical performance.
- All four operations incorporate cogeneration into their facilities, reducing air and greenhouse emission intensities.
- The companies perform relatively well on environmental management.

Canadian Natural Primrose/Wolf Lake, Husky Tucker, Shell Peace River, JACOS Hangingstone and Cenovus Christina Lake all **scored below the average** environmental performance.

- Three of the projects were demonstration or pilot projects, which operate less efficiently and typically do not incorporate water recycling and sulphur recovery technologies.
- The other two projects were commercial facilities performing below their expected technical performance, resulting in increased emissions, water use and waste disposal rates.

Additionally, **companies are lagging** in the following key areas:

- Very few in situ operators have established absolute reduction targets for air emissions, water use and greenhouse gas emissions that go beyond regulated requirements. No project received full points on these indicators.
- Aside from a modest commitment from Suncor, no company invested in biodiversity offsets to compensate for the terrestrial impacts associated the development of its facility.
- Only two companies (Imperial Oil and Shell) have third-party accredited environmental management systems.
- Only three companies (Suncor, Cenovus and Shell) financially support the Alberta Biodiversity Monitoring Institute and its province-wide biodiversity monitoring program.

In Situ Project	Total Score
Suncor Firebag	60%
Cenovus Foster Creek	57%
Imperial Oil Cold Lake	55%
Suncor MacKay River	53%
<b>AVERAGE SCORE</b>	<b>44%</b>
Shell Peace River (DEMONSTRATION)	38%
Cenovus Christina Lake (PILOT)	37%
Husky Tucker (START-UP)	35%
JACOS Hangingstone (DEMONSTRATION)	34%
Canadian Natural Primrose/Wolf Lake	25%

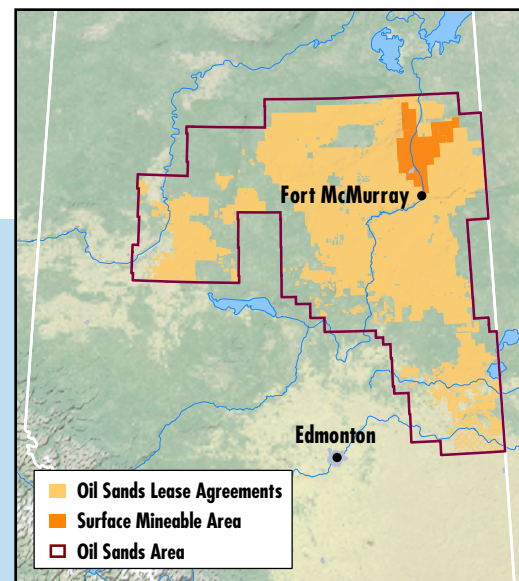
## Report Card Highlights

- Scores ranging from **25% to 60%** show that for in situ oil sands development the regulatory bar is set too low to protect the environment.
- Applying **industry best practices** could dramatically reduce the environmental impacts of in situ oil sands development and bring marks up to 85%.
- In situ is not necessarily a low-impact form of oil sands development. Preliminary indicators suggest that some impacts, such as **greenhouse gas** and **SO<sub>2</sub> emissions**, are higher for in situ than for mining.
- The cumulative impacts of in situ oil sands development are not being considered, despite the fact that **80,000 km<sup>2</sup>** of Alberta's boreal forest (an area the size of Scotland) has been leased for development.
- Environmental performance data is not sufficiently accessible or comparable. Without **publicly available** and **accessible data**, the job of properly assessing the environmental impacts of in situ oil sands development becomes much more difficult.

## Why in situ matters

Oil sands underlie 140,200 km<sup>2</sup> of land in northern Alberta. An area larger than Scotland has already been leased for in situ oil sands development.

In situ oil sands projects could eventually affect as much as one-fifth of the province's landscape.



# The In Situ Oil Sands Report Card

PROJECT	General Environmental Management (out of 3)	Land (out of 5)	Air Emissions (out of 3)	Water (out of 4)	Climate Change (out of 2)	Overall Score
Suncor Firebag	1.5	3	1.75	3	1	60%
Cenovus Foster Creek	2	2.75	2	2	1	57%
Imperial Oil Cold Lake	2.5	2*	1.25	2.5	0.5	55%
Suncor MacKay River	1.5	2.5	1.75	2.5	0.75	53%
<b>Average</b>	<b>1.83</b>	<b>2.36</b>	<b>1.06</b>	<b>1.56</b>	<b>0.50</b>	<b>44%</b>
Shell Peace River (demonstration)	3	3*	0	0	0	38%
Cenovus Christina Lake (pilot)	2	2	1.5	0	0.75	37%
Husky Tucker (start-up)	2	3	0	1	0	35%
JACOS Hangingstone (demonstration)	0.5	2*	0.5	2	0.5	34%
Canadian Natural Primrose/Wolf Lake	1.5	1	0.75	1	0	25%

Summary of project scores (\*Imperial Oil Cold Lake, Shell Peace River and JACOS Hangingstone were scored out of four on the land indicators because they were not scored on land use intensity.)

## The Pembina Institute compared in situ oil sands operations on 17 environmental indicators

GENERAL ENVIRONMENTAL MANAGEMENT	
<ul style="list-style-type: none"> <li>commitment to continuous improvement</li> <li>regulatory compliance</li> </ul>	<ul style="list-style-type: none"> <li>third-party validated environmental management systems</li> <li>transparent public reporting</li> </ul>
LAND	
<ul style="list-style-type: none"> <li>disturbance footprint</li> <li>monitoring of impacts on biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>strategies to offset terrestrial impacts</li> <li>support for establishing protected areas</li> </ul>
AIR EMISSIONS	
<ul style="list-style-type: none"> <li>nitrogen oxides emissions</li> <li>sulphur dioxide emissions</li> </ul>	<ul style="list-style-type: none"> <li>air emissions reduction targets</li> </ul>
WATER	
<ul style="list-style-type: none"> <li>total water use</li> <li>freshwater use</li> </ul>	<ul style="list-style-type: none"> <li>liquid waste production</li> <li>water use reduction targets</li> </ul>
CLIMATE CHANGE	
<ul style="list-style-type: none"> <li>greenhouse gas emissions</li> </ul>	<ul style="list-style-type: none"> <li>voluntary greenhouse gas reduction targets</li> </ul>

## Mining vs. In Situ

### Dispelling the myth of low-impact oil sands development

*Drilling Deeper* compares the surveyed in situ projects to an “average” mining project in terms of land use, air and greenhouse gas emissions, and water use.

On average, in situ projects have **higher greenhouse gas and sulphur dioxide emission intensities** than mining. This means that in situ projects contribute more to climate change and acid deposition per barrel of bitumen produced than oil sands mining. Some in situ projects also have higher **total water use** intensities than the average for mining.

When the **land disturbance and fragmentation** effects associated with natural gas production are considered, the influence on wildlife habitat of in situ operations can reach levels that are equal to and sometimes greater than mining.

### GHG Intensity

In situ project range:	64–533 (kg/bbl)
In situ project average:	91 (kg/bbl)
Mining project average:	36 (kg/bbl)

# SUMMARY OF RECOMMENDATIONS

## Government and industry both have clear roles to play in improving the environmental performance of in situ oil sands operations.

### GOVERNMENT

- **Mandate environmental stewardship.**
  - Make compensatory offsets to mitigate the terrestrial impacts of in situ oil sands development mandatory.
  - Develop conservation offset policies as recommended by the proposed wetland policy for Alberta and by *Responsible Actions: A Plan for Alberta's Oil Sands*.
  - Integrate mandatory financial support for the Alberta Biodiversity Monitoring Institute into existing and future approvals.
  - Make third-party accreditation of environmental management systems mandatory for in situ projects.
- **Create a competitive atmosphere for innovation.** In situ operators have very little incentive to improve environmental performance. Government must consider how to harness the innovative capacity of the oil sands industry to address environmental issues.
- **Halt new project approvals** until environmental management systems are complete.
- **Acknowledge the cumulative impacts of in situ development.** Government must take the lead in establishing regional environmental thresholds and completing land use planning.

### INDUSTRY

Industry needs to incorporate best practices and lead improvements. As a standard business model, industry should adopt current best practices and continuously improve once best practices have been adopted.

Simply meeting industry best practices could significantly increase the scores of several companies.

Five of nine projects received a failing grade, but there are many steps in situ oil sands operations could take today to improve their environmental performance.

The analysis shows that while the average score of all projects was low, simply incorporating best practices — the best elements of each oil sands project — would result in a score of 85% in this assessment.

### What would best practices mean for the environment?

If all the in situ oil sands projects in this survey incorporated best practices already in use, annual environmental savings would be equivalent to

- the average water use of almost 100,000 Canadians
- the sulphur dioxide emissions of Metropolitan Vancouver
- the greenhouse gas emissions of nearly 750,000 cars



▲ *Regional management plans that account for the cumulative impacts of oil sands development while protecting Alberta's ecosystems should be completed before new projects are approved.*

PHOTO: DAVID DODGE, THE PEMBINA INSTITUTE

### MORE DATA NEEDED

*Current project-specific environmental impact data is hard to access and difficult to compare. To allow fair evaluation of the environmental performance of in situ projects, data collection must be improved and results made publicly available. Transparency and accountability are needed in environmental data reporting.*

### Want More Information?

For more information and a complete list of recommendations, download the full report, *Drilling Deeper: The In Situ Oil Sands Report Card*, from our website, [www.oilsandswatch.org](http://www.oilsandswatch.org). You will also find photos, videos and other information and reports about the oil sands.

This report was prepared by Jeremy Moorhouse, Marc Huot and Simon Dyer of the Pembina Institute.

[www.oilsandswatch.org](http://www.oilsandswatch.org)