

## **Presentation to the Oil Sands Multi-stakeholder Committee**

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### **Mr. Chairman and Members of the Panel:**

The pace of oil sands development has far exceeded expectations. Between 1995 and 2004 oil sands production more than doubled to more than one million barrels per day – 16 years earlier than originally expected. This rapid development has put stress on the social and economic system, as can be seen from the shortage of labour and rising costs. But it also inflicts unnecessary strains on the environment and causes long-term damage.

New mineral leases are being made before there is a process to effectively limit the cumulative impacts of existing operations. The current oil sands rush has led to the allocation of large volumes of water from the Athabasca River for oil sands mining before the scientific studies have shown how much water is needed to maintain a healthy ecosystem. The wastewater from the mining process has created enormous tailings ponds. Where the bitumen is too deep to mine, the roads and pipelines for in situ production are fragmenting the boreal forest and affecting wildlife habitat. Large allocations of groundwater are being made to generate steam for in situ production before we fully understand the rate at which the aquifers are recharged or have an adequate network of monitoring wells across the region.

We are attempting to meet the demands for oil so fast, that new projects are being implemented with current technologies, when somewhat slower progress would allow the assessment of new technologies that could reduce the impacts. For example, new projects for the in situ recovery of bitumen are being allocated large volumes of water to generate steam, when pilot projects using solvents, or a process that burns the bitumen in situ, may be able to reduce or avoid the use of water in the future. Once a project is developed, it will probably operate for 30 to 40 years and it may be difficult to adapt to new technologies.

Alberta Energy recently published a document entitled Alberta's Integrated Energy Vision. One of the six guiding principles is that "Energy development will be undertaken responsibly to ensure that Albertans have a safe and healthy environment in which to live and raise their families. This includes minimizing the environmental footprint and sustaining healthy air and water quality." This is a good principle, but it is not currently being adopted with respect to oil sands development in Alberta. The Pembina Institute is pleased the government has invited Albertans to provide their vision and principles to guide how oil sands development should proceed.



## **A vision for oil sands development**

The Pembina Institute has a vision for oil sands in Alberta:

*Development of the oil sands occurs at a pace and scale that:*

- *respects the capacity of regional ecosystems to be sustained,*
- *addresses global climate change by achieving deep reductions in greenhouse gas emissions,*
- *optimizes economic benefit to the public owners of the resource, and*
- *continuously improves the quality of life of all Albertans today and for future generations.*

A number of principles are needed to achieve this vision. They include:

1. Implementation of regional plans that limit the cumulative impacts of development on air, land and water, and maintain healthy ecosystems. The plans should include a network of protected areas and wildlife corridors within the boreal forest and the management of surface water and groundwater on a watershed basis.
2. Establishment of thresholds that will not be crossed. These should ensure maintenance of certain flows in rivers, groundwater protection, air quality and conservation of wildlife habitat and species.
3. Short-term targets to reduce and offset greenhouse gas emissions, and a requirement that oil sands operations are carbon neutral by 2020.
4. A fair royalty regime so that Albertans are adequately compensated for the development of the oil sands resource.
5. Continuous improvement in the quality of life, which means ensuring not only a sustainable financial contribution from oil sands development but investment in energy efficiency and in the production and distribution of sustainable forms of energy for future generations of Albertans, and recognition of the value of clean air, fresh water and a healthy environment.

Some of my colleagues will elaborate on the above principles at later meetings. As lead author of the Pembina Institute's report "Troubled Waters, Troubling Trends",<sup>1</sup> I would like to highlight the need for regional ecosystems to be sustained, and specifically those relating to the use of water for the extraction of bitumen.

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<sup>1</sup> Griffiths, Mary, Any Taylor and Dan Woynillowicz. 2006. *Troubled Water, Troubling Trends: Technology and Policy Options to Reduce Water Use in Oil and Oil Sands Development in Alberta*, Pembina Institute, <http://www.pembina.org/energy-watch/doc.php?id=613>. Some of the key findings in the Troubled Waters, Troubling Trends report are provided in the Summary Report, attached to this presentation.

## **Bitumen mining impacts on water**

The mining of bitumen has major impacts on water. These include the draining of wetlands, removal of the overburden and dewatering of the basal aquifer (that is, the zone that underlies the bitumen). This affects the drainage over a wide area and will reduce the area of wetlands and eliminate some peatlands, since it takes centuries for peat to develop.

Most of the water for mining operations comes from the Athabasca River, and in 2005 two-thirds of licensed allocations from the Athabasca River and its tributaries were for oil sands mining operations (see Figure 2 in the Pembina Institute's *Troubled Waters, Troubling Trends Summary Report*, which I have given to the panel). The 2005 water allocation was more than twice the volume used annually by the City of Calgary and the demand will further increase (see Figure 3).

The ecological integrity of the Athabasca River depends on adequate flows during the low-flow season in winter. The instream flow needs of the river have not been finalized and the Pembina Institute believes that the proposed government plan could jeopardize the river and its fisheries as it allows industrial withdrawals during low flow periods, even during a "red" alert.<sup>2</sup>

Only 10% of the water withdrawn from the Athabasca River is returned to the river and, after recycling, most of the water and residual sand and bitumen is sent to tailings ponds. The tailings ponds, which already cover over 50 square kilometres, are toxic to birds and fish, as a result of various pollutants found in the bitumen. At a minimum it will take decades before the fine clay particles in the tailings settle out and the water can be reclaimed. As new technologies are developed it may be possible to reduce the volume of water required, but new projects are proceeding before there has been time to greatly improve mining and reclamation processes.

## **In situ operations and water**

Over 90% of the bitumen is too deep to mine and has to be extracted in situ. Both the main processes, cyclical steam stimulation and steam-assisted gravity drainage, use large volumes of water. Despite the recycling of water in most operations, the demand for water is growing rapidly, as can be seen from Figure 4 in the *Troubled Waters Summary Report*. In fact, demand has grown far more rapidly than expected (see Figure 5). By 2004, the volume of water allocated was as great as had been predicted for 2018.

Industry plans suggest that for the next two decades, about one third of the water requirements for in situ operations will be drawn from fresh aquifers.

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<sup>2</sup> Woynillowicz, Dan and Chris Severson-Baker. 2006. *Down to the Last Drop: The Athabasca River and Oil Sands*, Pembina Institute, <http://www.pembina.org/energy-watch/doc.php?id=211>; *Athabasca River at Risk Due to Government Politics*. September 7, 2006, media release, <http://www.pembina.org/energy-watch/media-release.php?id=1279>.

Groundwater levels will fall in some locations as a result of withdrawals and although aquifers are expected to recharge once operations cease, recharge rates may change as a result of activities elsewhere in the watershed or due to climate change. Some fresh water may filter to deeper formations to help fill the void left by the removal of the bitumen or the depressurization of deeper aquifers. At the present time, we do not fully understand the cumulative impacts that water withdrawals, depressurization and voidage will have on shallow groundwater. Moreover, we have insufficient monitoring to provide adequate baseline data and record changes.<sup>3</sup>

Deep saline aquifers are expected to supply about 40% of the water required for in situ operations over the next 20 years, but use of saline water also creates impacts, associated with the disposal of waste from water treatment processes.

Other impacts that have been seen in the Cold Lake area, include the mobilization of naturally occurring arsenic near some well bores, probably due to the high temperatures associated with the cyclical steam stimulation process, and casing failures.

With the rapid pace of development, new in situ projects are being approved before it is known whether the cumulative impacts of existing operations on water can be managed in a sustainable manner.

### **Vision and principles for the sustainable management of water resources**

In addition to the general vision for the development of the oil sands, the Pembina Institute has a vision specifically for the conservation and wise management of water:

*All oil sands projects, whether for mining or in situ production of bitumen are planned and implemented to minimize negative impacts on water and ensure that*

- *fresh groundwater resources are managed in a sustainable manner,*
- *there is no net loss of wetlands, and*
- *aquatic ecosystems remain healthy and viable for the long term.*

The following principles will guide the development of policies to achieve this vision:

1. Measures are based on comprehensive, readily available and up-to-date scientific knowledge and data.
2. There is a full cost accounting approach to water management.
3. Research and implementation of new technologies to reduce water use are encouraged.

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<sup>3</sup> Komex International Ltd. 2005. *Groundwater Monitoring Networks Master Plan Development: Final Report*, Prepared for Alberta Environment. This study drew attention to the lack of monitoring wells in Northern Alberta

4. Where there is insufficient knowledge, the precautionary principle is adopted to ensure that water allocations and other activities do not exceed what is sustainable.
5. The policy framework is adaptable, in order to respond to annual and long-term changes in socio-economic, geographic and climatic conditions.

It is imperative to improve the data available on both fresh groundwater and aquatic ecosystems to determine what water allocations are sustainable. This means expanding the hydrometric network and extending groundwater monitoring, so that it is possible to establish water budgets and ensure that withdrawals do not exceed sustainable recharge rates. As groundwater and surface water are part of the same hydrologic system, they should be managed together on a watershed basis.

The move towards sustainable watershed management will be assisted by policies which:

- Require a staged reduction in water use for oil sands mining.
- Set clear expectations for tailings management and reclamation.
- Avoid the use of fresh groundwater whenever possible.
- Minimize the use of surface water.
- Give priority to the use of saline water, especially water that is produced as a by-product of adjacent operations (e.g., produced water associated with oil, gas or CBM recovery) where it can replace water from other sources.
- Minimize the amount of waste disposal from water treatment processes, which also means restricting the use of saline water as much as possible where it must be treated before use.
- Maximize recycling of used water.
- Evaluate the life-cycle impact of different technologies and implement those that minimize water use and other environmental impacts.

If managed wisely, Alberta's oil sands have the ability to provide revenue for Albertans for several centuries. However, to avoid long-lasting or permanent damage to the environment and to minimize the impacts of oil sands exploitation on the quality of life, a new vision and new principles are needed. The Pembina Institute has spent a lot of time studying the oil sands and we hope that our proposals will help guide the panel's recommendations. Thank you.