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THE FACTS

Research indicates that Canadians want a balanced discussion about energy, the economy and the environment. This pocket book is designed to give you fast, easy access to oil sands facts that will help you get in on the discussion.

Facts are sourced from credible third parties or are developed using CAPP data that is checked against other data sources, including government reports.

GET THE FACTS ON OIL SANDS ON YOUR MOBILE DEVICE!

A mobile version of this fact book is now available as a FREE download to Apple, BlackBerry and Android devices. Downloading is easy. From your mobile device search “oil sands” in the app stores. Get the app, and get in on the oil sands discussion.
DIG DEEPER
We couldn’t cover it all in this little book! So we have provided links to various sources at the end of the book.
Go ahead, dig deeper.

MORE FACTS?
Are you curious about facts that aren’t covered here? Send your questions to publications@capp.ca. We will respond. We will also consider your input when developing future fact books.

UPDATES
The facts provided in this book are current as of July 2014. A regularly updated version is available online at www.oilsandstoday.ca or via the app.

To order printed copies of The Facts on Oil Sands, email publications@capp.ca

WHY DEVELOP THE OIL SANDS?

We will need all forms of energy to meet the world’s growing energy needs. We are going to be using oil for a long time to come — both in Canada and around the world.

As long as we are using oil to power our lives and improve our quality of life, we must develop it in a way that benefits us economically and is environmentally responsible.

Canada has a tremendous resource base combined with a stable, democratic political environment and skilled people that make it the ideal place to develop natural resources.

Canadian oil sands development benefits all Canadians by providing needed energy, stimulating economic growth and generating significant revenues for governments.

Canadians have a long and successful track record in applying innovation to address energy, environmental and social challenges, including oil sands production.
UNIT 1: THE RESOURCE

WHAT ARE OIL SANDS?

Canada has the third largest oil reserves in the world. 97% of these reserves are located in the oil sands.

OIL SANDS

Oil sands are a natural mixture of sand, water, clay, and bitumen.

BITUMEN

Bitumen is oil that is too heavy or thick to flow or be pumped without being diluted or heated. Some bitumen is found within 70 metres (200 ft) from the surface but the majority is deeper underground.

LOCATION

Canada’s oil sands are found in three deposits — the Athabasca, Peace River and Cold Lake deposits in Alberta and Saskatchewan. The oil sands are at the surface near Fort McMurray but deeper underground in the other areas.
MINING METHOD

80% COULD BE DRILLED (IN SITU)
80% of oil sands reserves are too deep to be mined so could be recovered in place, or in situ, by drilling wells. Drilling (in situ) methods create minimal land disturbance and do not require tailings ponds.

Advanced technology is used to inject steam, combustion or other sources of heat into the reservoir to warm the bitumen so it can be pumped to the surface through recovery wells.
REGULATION

Reliable, long-term environmental monitoring based on sound science is in everybody’s best interest. Oil sands operators must adhere to stringent regulations. Approvals from numerous regulatory agencies are required at every phase, from construction and operation to decommissioning and reclamation.

MONITORING

Existing monitoring systems gather valuable data for independent scientific review and inform new monitoring needs as industry grows.

JOSM

JOINT OIL SANDS MONITORING

The Alberta and Canadian governments are working together to implement JOSM, a world-class monitoring program that integrates all environmental components — air quality, water quality and quantity, aquatic ecosystems, terrestrial biodiversity, and habitat.

AEMERA

ALBERTA ENVIRONMENTAL MONITORING, EVALUATION AND REPORTING AGENCY

The Alberta government has created AEMERA, an arm’s length agency, responsible for operating a comprehensive, science-based monitoring system in Alberta.

WBEA

THE WOOD BUFFALO ENVIRONMENTAL ASSOCIATION

WBEA manages programs that include air, land and human exposure monitoring, and operates the most extensive ambient air network in Alberta.

LARP

THE LOWER ATHABASCA REGIONAL PLAN

LARP established new environmental frameworks to protect regional air and surface water quality and increased the amount of land set aside for conservation to more than two million hectares. LARP is the first of seven regional plans to be developed under Alberta’s Land-Use Framework.
The oil sands are a vital energy source for Canada and the world.

UNIT 2: ENERGY

WHY DO WE NEED OIL SANDS?

The oil sands are a vital energy source for Canada and the world.

OUR ENERGY FUTURE

The world relies on an energy mix that includes oil, coal, natural gas, hydro, nuclear, and renewables. All forms of energy production must increase to meet growing global demand. Canada is uniquely positioned to provide an abundance of safe, secure energy.

167 BILLION BARRELS

Canada has 173 billion barrels of oil that can be recovered economically with today’s technology. Of Canada’s 173 billion barrels of oil, 167 billion barrels are located in the oil sands.


TECHNOLOGY

New technology and innovation are critical to developing the oil sands and improving environmental performance.

INVESTMENT

The majority (81%) of world oil reserves are owned or controlled by national governments. Only 19% of total world oil reserves are accessible for private sector investment, 53% of which are found in Canada’s oil sands.

SOURCE: CAPP 2014
Energy Demand

Global Needs
Global demand for energy is expected to increase 33%* by 2035 as economies in both developed and emerging countries continue to grow and standards of living improve.

Source: IEA 2013
*Growth from 2011 to 2035, New Policies Scenario.

Unconventional
All sources of energy, developed responsibly, will be needed to meet growth in global demand. With conventional oil supply declining, the need for unconventional resources, like oil sands, is increasing.

Global Primary Energy Demand

Energy Supply

Fueling North America
Canada’s oil sands are uniquely positioned to contribute to meeting the growth in energy demand. In North America, oil sands production provides secure and reliable supply, reducing reliance on foreign imports and providing economic growth in both Canada and the U.S.

Production
In just over 30 years, Canadian crude oil production has increased by 1.9 million barrels/day due to the growth in supply from oil sands.

Canadian Production: Barrels/day

<table>
<thead>
<tr>
<th>YEAR</th>
<th>1980</th>
<th>2013</th>
<th>2025 F</th>
<th>2030 F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil (incl. oil sands)</td>
<td>1.5 million</td>
<td>3.4 million</td>
<td>5.7 million</td>
<td>6.4 million</td>
</tr>
<tr>
<td>Oil Sands</td>
<td>0.1 million</td>
<td>1.9 million</td>
<td>4.0 million</td>
<td>4.8 million</td>
</tr>
</tbody>
</table>

In 2013, 56% of Canada’s crude oil production was from the oil sands.

*Source: CAPP 2014

5.7 million barrels/day is approximately three times Canada’s current oil consumption.
TRUSTED NEIGHBOURS
Canada is the largest supplier of crude oil and petroleum products to the U.S.

U.S. IMPORTS OF CRUDE OIL & PETROLEUM PRODUCTS BY COUNTRY OF ORIGIN 2013

SECURITY OF SUPPLY
Supplying energy to Canada and beyond generates economic benefits across the country.* For global customers, importing energy from Canada makes sense. Canada is politically stable, infrastructure is robust and environmental standards are high.

*LEARN MORE ABOUT ECONOMIC BENEFITS ON PAGE 25.
MARKETS

Canadian crude oil producers continue to build new markets for their expanding production. New market opportunities include Eastern Canada, the U.S. and growing economies in Asia.

2013 CANADA AND U.S. CRUDE OIL DEMAND BY MARKET REGION

DIVERSIFICATION

Diversifying markets for Canadian oil production is vital to ensure Canada receives full value for its natural resources.

EAST

Eastern Canada currently imports over half of its oil from offshore foreign suppliers.

WEST

The West Coast is a critical outlet for Canadian oil to reach customers in Asian markets.

SOUTH

Even with increased domestic supply, the U.S. will need oil imports to meet its energy demands. As long as the U.S. is importing oil, Canada is the best supplier.
MARKETS & TRANSPORTATION

TRANSPORTATION

Bitumen and crude oil are transported three ways: pipeline, marine transport and rail car.

DILUTED

To flow, the bitumen — which was separated from the sand at the source — is diluted with condensate or upgraded light crude oil. Once mixed with a diluent, the dilbit does not separate, but is a new mixture.

PIPLINES

Today Canada has limited pipeline infrastructure to move crude oil from Western Canada to Eastern Canada, and the U.S.

As a result of strong growth in U.S. and Canadian oil production, crude oil pipeline capacity is expected to become constrained in the next few years, requiring new pipelines and pipeline expansions to provide access to new markets.

A number of pipeline projects are being proposed to connect the growing supply with growing markets in India, China and Eastern Canada.
MARINE TRANSPORT

SAFE FOR 80 YEARS
Oil tankers have been moving safely and regularly along Canada’s West coast since the 1930s.
SOURCE: TRANSPORT CANADA 2012

580 MILLION BARRELS
Each year, approximately 580 million barrels of oil are safely transported along Canada’s East and West coasts via tanker.
SOURCE: TRANSPORT CANADA 2012

500 TANKER VISITS
At present, fewer than 500 oil tankers transit along Canada’s West coast each year. While most West coast oil tankers are U.S.-bound, about 200 call on Port Metro Vancouver. There hasn’t been a tanker issue in the Port of Vancouver for 50 years.
SOURCE: IHS CERA 2013

HIGH STANDARDS
All oil tankers using Port Metro Vancouver are subject to the same international agreements, rules and strict national and port authority standards.
SOURCE: IHS CERA 2013

CLOSER TO ASIA
Asian markets are an 8 to 11 day sail from proposed West coast terminals, two days closer than most of our international competitors.

CROSS SECTION OF A DOUBLE HULLED MARINE VESSEL

DOUBLE HULLED
Large single-hulled crude oil tankers were prohibited in 2010 and can no longer operate in Canadian waters. Double hulled means the bottom and sides of a vessel have two complete layers of watertight hull surface.
SOURCE: TRANSPORT CANADA 2013
Some bitumen from the oil sands is upgraded from heavy to light oil and sent to refineries in Canada and the U.S. to be converted into petroleum products, such as gasoline, diesel and jet fuel.

**1.1 MILLION**

In 2013, approximately 1.1 million barrels/day of Alberta’s bitumen was upgraded in Alberta.

SOURCE: CAPP 2014

**EXPORTS**

In 2013, Canadian crude oil exports averaged just over 2.5 million barrels/day. Growth in exports of Canadian oil creates significant economic benefits, including jobs, for Canadians across the country.

SOURCE: STATISTICS CANADA 2014

**IMPORTS**

Eastern Canada imports 642,000 barrels/day of crude oil from the U.S., Algeria, Iraq, Norway, Saudi Arabia, Kazakhstan, Angola, the U.K., Nigeria and Mexico.

SOURCE: CAPP 2014

Today, rail moves about 280,000 barrels/day, almost 8% of Western Canada’s oil production — a significant increase over past years.

SOURCE: CAPP 2014

**INCREASED CAPACITY**

Rail loading capacity in Western Canada is forecast to be about 965,000 barrels/day by year end 2014.

SOURCE: CAPP 2014
ECONOMIC CONTRIBUTION

$3,865,000,000,000
New oil sands development is expected to contribute over $3.8 trillion dollars to the Canadian economy over the next 25 years — about $155 billion per year.

SOURCE: CERI 2014

$1.5 TRILLION
The oil sands industry will pay an estimated $1.5 trillion in provincial ($302 billion) and federal ($574 billion) taxes and provincial royalties ($590 billion) over the next 25 years.

SOURCE: CERI 2014

NORTH AMERICA
The oil sands has significant economic impact outside Alberta — in the rest of Canada, the U.S. and around the world. Almost every region in Canada has been stimulated by oil sands development through job creation and economic activity.

SOURCE: CERI 2014

Canada’s oil sands industry provides economic benefits to Canada and across North America.
In addition to paying significant royalties and taxes, the oil sands industry is a major employer and creates jobs throughout North America.

**225,000**

Direct employment in Canada as a result of new oil sands investments is expected to grow from 149,000 jobs in 2014 to 225,000 jobs in 2038. When including indirect jobs, employment numbers more than double across Canada in both years.

SOURCE: CERI 2014

The goods, materials and services used to construct and operate oil sands projects, mines and upgraders come from across North America. Many of the components — tires, trucks, gauges, valves, pumps, etc. — are produced in Central and Eastern Canada.

**ALBERTA**

While Alberta receives about 94% of the economic benefits from oil sands, the economic impact across the rest of Canada is significant.

SOURCE: CERI 2011

**OVER 2000 DIRECT SUPPLIERS**

In 2013, over 2000 companies from across Canada had direct business (goods and/or services) with the oil sands.

SOURCE: CAPP 2014

**NUMBER OF COMPANIES THAT HAVE DIRECT BUSINESS WITH THE OIL SANDS — PROVINCES OUTSIDE ALBERTA**

<table>
<thead>
<tr>
<th>Province</th>
<th>Number of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>614</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>191</td>
</tr>
<tr>
<td>Manitoba</td>
<td>60</td>
</tr>
<tr>
<td>Quebec</td>
<td>191</td>
</tr>
<tr>
<td>Ontario</td>
<td>1123</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>26</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>3</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>114</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>41</td>
</tr>
</tbody>
</table>

SOURCE: CAPP 2014

**JOB CREATION**

For every direct job created in Alberta’s oil sands industry, approximately one indirect and one induced job will be created in the rest of Canada.

SOURCE: CERI 2011
INDUSTRY IN ACTION

MODULAR HOMES
Thousands of workers in the oil sands are using Britco manufactured accommodation as their home away from home.

Britco is a modular construction company that is providing jobs and opportunities for people across British Columbia. From a handful of people in Langley in 1977, Britco has grown to approximately 1,000 employees, with 10 modular construction facilities located in Australia, Canada and the United States.

Today, Britco is not only one of the largest modular construction companies in the industry but is also uniquely positioned to meet the needs of its customers anywhere in the world. With a workforce that is highly skilled and multi-faceted, Britco’s work in the oil sands has allowed growth and expansion outside of Canada.

READ MORE: INDUSTRY IN ACTION STORIES: WWW.CAPP.CA/INNOVATION

LOCAL BENEFITS
Most of the oil sands are located in the Athabasca area. Fort McMurray is the largest community in the area which also includes smaller and Aboriginal communities.

GROWTH
The Regional Municipality of Wood Buffalo (including Fort McMurray) is one of the fastest growing communities in North America with average annual population growth of approximately 7.1% from 2000 — 2012.

SOURCE: REGIONAL MUNICIPALITY OF WOOD BUFFALO 2012

LOCAL JOBS
21,115 people were directly employed in oil sands operations jobs in Fort McMurray in March 2011.

SOURCE: REGIONAL MUNICIPALITY OF WOOD BUFFALO.
Alberta’s Aboriginal population is young, growing and several communities are located close to oil sands developments in remote regions of the province. Solid relationships with Aboriginal communities have created mutually beneficial employment and business opportunities.

In 2011 and 2012, oil sands companies contributed more than $20 million to aboriginal communities in the Wood Buffalo and Lac La Biche regions for school and youth programs, celebrations, cultural events, literacy projects and other community programs.

Industry works with potentially affected aboriginal groups to seek ways to mitigate impacts of oil sands development. Aboriginal groups, through consultation and engagement in regulatory processes, and through Canada’s legal system, are afforded multiple levels of due process.
1,550
More than 1,550 consultation meetings were held between First Nations and industry on oil, pipelines, forestry and other resource development projects in 2011 and 2012.
SOURCE: GOVERNMENT OF ALBERTA 2013

$1.8 BILLION
In 2012, Wood Buffalo and Lac La Biche Aboriginal companies performed over $1.8 billion in contract work with oil sands companies.
SOURCE: OSDG 2013

$8 BILLION
Over the past 14 years, Aboriginal companies have earned over $8 billion in revenue through working relationships with the oil sands industry.
SOURCE: OSDG 2013

1,700
There are more than 1,700 Aboriginal employees in permanent operations jobs in the oil sands industry.
SOURCE: OSDG 2011

The Fort McKay Group of Companies LP (FMGOC), which works extensively with oil sands operations through its 6 divisions, brings in more than $150 million in revenue annually. FMGOC is completely owned and controlled by the Fort McKay First Nation.
SOURCE: FORT MCKAY GROUP OF COMPANIES

SYNCRUDE CANADA
Syncrude is one of 13 companies in Canada to be accredited at the Gold Level in the Progressive Aboriginal Relations (PAR) Program of the Canadian Council for Aboriginal Business. PAR measures corporate performance in Aboriginal employment, business development, capacity development and community relations.
READ MORE INDUSTRY IN ACTION STORIES: WWW.CAPP.CA/INNOVATION
U.S. BENEFITS

JOBS
As investment and production of the oil sands ramps up in Canada, the demand for U.S. goods and services will increase, creating hundreds of thousands of highly skilled and well paying U.S. jobs (manufacturing, engineering, construction, etc.).

$BILLIONS
The demand for U.S. goods and services will climb between 2011 and 2035, adding an estimated $5.8 billion to U.S. GDP in 2015, $12.9 billion in 2020, $26.6 billion in 2025 and $42.6 billion in 2035.

SOURCE: CERI 2011

INDUSTRY IN ACTION
The Caterpillar 797 is one of the world’s largest trucks with the capacity to haul up to 400 tonnes per load. As of December 2013, over 260 of these trucks had been purchased for use in Canada’s oil sands, giving an economic boost to at least four U.S. states.

OIL SANDS MINING TRUCK
- Engine made in Indiana
- Cab is fabricated and engine installed in Illinois
- Largest frame component is cast in Louisiana
- Giant Michelin® tires made in South Carolina

Oil is an important part of daily life in Canada, providing energy for transportation, residential and industrial uses.
Canadians consume a lot of energy. We need it to stay warm, do our work and get from place to place.

Crude oil derived from the oil sands is sent to refineries across North America to make gasoline, diesel, aviation fuel and other consumer products.

**FUELS**

**GASOLINE**
Gasoline is the fuel designed for spark-ignition internal combustion engines. It is commonly used in automobiles.

**DIESEL**
Diesel is a fuel designed for engines commonly used in trucks, buses, locomotives and farm and heavy equipment. It contains more energy and power density than gasoline.

**AVIATION FUELS**
Aviation fuels are specialized petroleum-based fuels used to power various types of aircraft.

**PRODUCTS**
Thousands of everyday products get their start from crude oil. Raw materials used to create items including ink, crayons, dishwashing liquids, deodorant, eyeglasses, CDs and DVDs, tires, ammonia, and heart valves are derived from feedstocks from crude oil.

Transportation accounts for 25% of the total energy that Canadians consume — second only in consumption to Canada’s industrial sector. That translates to 200 million litres of gasoline and diesel pumped into fuel tanks across the country on a daily basis just for mobility, without which our modern lifestyle would be impossible.

**ENERGY DEMAND BY SECTOR, 2011**

**ENERGY USE**

**ENERGY DEMAND BY SECTOR, 2011**

14% RESIDENTIAL

25% TRANSPORTATION

13% COMMERCIAL

48% INDUSTRIAL

SOURCE: NEB 2013

**AVGAE OUTPUT FROM A BARREL OF OIL (%), CANADA**

- PROPANE/BUTANE 2.1
- LIGHT FUEL OIL 3.1
- ASPHALT 3.9
- PETRO-CHEMICAL FEEDSTOCKS 4.5
- HEAVY FUEL OIL 5.0
- ALL OTHER PRODUCTS* 5.6
- JET FUEL 5.8
- DIESEL FUEL 27.4
- GASOLINE 42.7

*Includes petro-chemical feedstocks, naphthas, lubricating oils and greases, still gas, and other by-products.

SOURCE: CFA 2013
Since 1990 Canada’s oil sands industry has reduced greenhouse gases (GHG) emissions per barrel by 28%.

GHG EMISSIONS

Canada, with 0.5% of the world’s population, produces about 2% of global CO₂ emissions.

Oil sands account for 8.7% of Canada’s GHG emissions and about 0.13% of global GHG emissions.*

CANADA’S GHG EMISSIONS BY SECTOR 2012

61 MEGATONNES

Oil sands’ total GHG emissions in 2012 were 61 megatonnes.

SOURCE: ENVIRONMENT CANADA 2014

2012 emissions from the U.S. coal fired power generation sector is the equivalent to 25 times the oil sands total GHG emissions (61 megatonnes) in 2012.

*SOURCE: ENVIRONMENT CANADA 2014, WORLD RESOURCES INSTITUTE
Carbon dioxide (CO₂) is a GHG. CO₂ is emitted into the air by burning fossil fuels for electricity generation, industrial uses, transportation and for heat in homes and buildings.

**WELLS-TO-WHEELS**

Measuring GHG emissions from the start of oil production (wells) through to combustion (wheels) is called a wells-to-wheels or life-cycle analysis.

**INTENSITY**

Oil sands crude has similar CO₂ emissions to other heavy oils and is 9% more intensive than the U.S. crude supply average on a wells-to-wheels basis.

SOURCE: IHS CERA 2012

**FULL-CYCLE GHG EMISSIONS OIL SANDS & U.S. REFINED CRUDES**

- WELL-TO-TANK
- REFINED PRODUCT COMBUSTION

![ диаграмма ]

**GHG REDUCTIONS**

**28% BETTER***

GHG emissions associated with every barrel of oil sands crude produced were reduced by 28% between 1990 and 2012.

SOURCE: ENVIRONMENT CANADA 2014

**REGULATED**

The Government of Alberta implemented GHG regulations in 2007 requiring a mandatory 12% reduction in GHG emissions intensity for all large industrial sectors including existing oil sands facilities, or a payment in lieu.

**CCS**

The federal and provincial governments are investing approximately $3 billion to help make Canada a global leader in carbon capture and storage (CCS) technology. Industry and government are cooperating to demonstrate the commercial and technical viability of CCS in Canada.

SOURCE: AESRD 2013

*REFLECTS GAINS IN EFFICIENCY AND A CHANGE IN PRODUCTION MIX.*
AIR QUALITY

24 HOURS/365 DAYS
The Wood Buffalo Environmental Association (WBEA) monitors the air in the oil sands region in and around Fort McMurray 24 hours a day, 365 days a year. WBEA’s air quality monitoring network is one of the most extensive in North America.

Air monitoring information is available in real time at www.wbea.org

IMPROVING OR STATIC
Data collected over the past 10 years at monitoring stations across Alberta indicate air quality is improving in some areas and remaining consistent in others.

SOURCE: WBEA AND CASA

NO DETERIORATION
Based on analysis of average concentrations of common air pollutants, overall air quality has not deteriorated in the Wood Buffalo region even with an increase in industrial activities and population growth.

SOURCE: WBEA AND CASA
0.4 BARRELS
In 2012, drilling (in situ) production required an average 0.4 barrels of fresh water for every barrel of bitumen produced.
SOURCE: CAPP 2013

3.1 BARRELS
In 2012, mining required an average 3.1 barrels of fresh water for every barrel of bitumen produced.
SOURCE: CAPP 2013

80-95%
Oil sands producers recycle 80-95% of water used.
SOURCE: AESRD

187 MILLION m³
Oil sands freshwater use in 2012 was approximately 187 million m³.
SOURCE: CAPP 2013

UNIT 7: WATER
Canada’s oil sands industry recycles water and continues to look for ways to reduce fresh water use.
The Government of Alberta regulates the use of water. Large water users must apply to divert fresh water from its original source. The amount of water allocated is based on sustaining Alberta’s groundwater and surface water.

Each sector applies for water licenses and the government allocates water based on these applications. In 2012, the oil sands industry represented about 8% of total provincial water allocations. But not all of that water was actually used. The oil and gas industry uses less than 1/3 of its total water allocation per year.

### ALBERTA WATER ALLOCATIONS 2012

- **8%** Oil Sands
- **29%** Commercial
- **44%** Irrigation/Agriculture
- **2%** Conventional Oil & Gas
- **11%** Municipal
- **6%** Other

### ATHABASCA RIVER

The Athabasca River is the main source of water for oil sands mining projects.

In 2012, 70% of the fresh water used for oil sands mining was from the Athabasca River (117 million m³). This is 0.6% of average annual river flow and 3% of the lowest weekly winter flow in 2012.

**3% LOWER THAN**

Source: AESRD 2013

### WATER SUPPLY

Northern Alberta, where oil sands operations occur, has more than 86% of Alberta’s water supply.

Source: AESRD 2013

By comparison, the North and South Saskatchewan River basins together account for 13% of Alberta’s water supply and support 88% of the province’s population.
TAILINGS

After the oil sands have been mined, oil is separated from the sand and sent for further processing. “Tailings” are the leftover liquid mixture of mostly sand, some water and clay and residual bitumen.

SETTLING PONDS

Settling or tailings ponds are large engineered dam and dyke systems designed to contain and settle the water, sand, fine clays, silts, residual bitumen and other residual hydrocarbons of the oil sands mining and extraction process.

WATER RECYCLING

Tailings ponds are settling basins that enable process water to be separated and continuously recycled. Oil sands producers recycle 80-95% of water used, reducing use of fresh water from the Athabasca River and other sources.

DYKE WATER MANAGEMENT

Dyke water comes from dyke construction and surface water run-off. For example, ditches around tailings facilities capture this water that is pumped into the tailings ponds.

FLUID TAILINGS

This combination of water and clay has taken decades to consolidate and dry out. New technologies are accelerating the timing of consolidation.

RECLAMATION

The Government of Alberta requires all oil sands operators to have plans in place to convert fine tailings to reclaimable landscapes.

BIRDS

Bitumen can be found on the surface of most tailings ponds. This can pose a threat to waterfowl that land on the pond. Several mechanisms are in place to deter birds from landing, including cannons and radar/laser deterrent systems, like those used at airports.
WATER QUALITY

REGULATED

Alberta Environment and Sustainable Resource Development prohibits the release of any water that does not meet water quality requirements.

ASSESSMENT

In 2010, the Royal Society of Canada (similar to the U.S. National Academy of Sciences) commissioned an Expert Panel of Canadian Scientists to review and assess evidence relating to several perceived environmental impacts of the oil sands, including the impact of the oil sands on regional water supply.

RESULTS

“Current evidence on water quality impacts on the Athabasca River system suggest that oil sands development activities are not a current threat to aquatic ecosystem viability.”

SOURCE: THE ROYAL SOCIETY OF CANADA

Regional water monitoring is currently being enhanced by both the federal and provincial governments. Canada’s oil sands industry supports improved water monitoring.
SUNCOR ENERGY
In February 2013, Suncor implemented an industry-leading process to send tailings water from its oil sands base plant through an existing pipeline to be used as make-up water in its Firebag in situ operations.

Reusing tailings water for make-up water is new not only to Suncor, but also to the entire industry. Through this new innovation, Suncor is reducing the volume of its tailings ponds and eliminating the need for new ponds at its current mine, resulting in a smaller footprint on the environment. Suncor has demonstrated that reusing water from the end of one project’s cycle to another part of its business improves Suncor’s water management practices over a larger geographical area and can help reduce overall regional fresh water use.

Suncor has cleared the technical, regulatory and operational hurdles to allow sharing of recycled tailings between its operations, and proving that a deemed ‘waste product’ can in fact be reused as a valuable resource for other production purposes. Suncor is now further expanding the project by collaborating with industry partners to send its recycled tailings water to other in situ operators to further reduce regional water demand across the industry.

COSIA’S TAILINGS ROADMAP
The Government of Alberta requires all oil sands operators to have plans in place to convert fine tailings to reclaimable landscapes.

COSIA’s Tailings Environmental Priority Area (EPA) is focused on improving the management of oil sands tailings. COSIA and Alberta Innovates — Energy and Environment Solutions (AI-EES) recently released a Tailings Technology Roadmap and Action Plan Project, a collaboration that also involved Alberta Energy, Natural Resources Canada, Alberta Environment & Sustainable Resource Development and the Alberta Energy Resources Conservation Board. This plan provides a comprehensive review of technologies that will help industry identify a suite of actions that will accelerate the development of new and improved commercial tailings treatment technologies.
UNIT 8: LAND

Canada’s oil sands industry is committed to reducing its footprint, reclaiming all land affected by operations and maintaining biodiversity.

**94%**
An Alberta Biodiversity Monitoring Institute (ABMI) report states that the Lower Athabasca region’s living resources are 94% intact. This compares to 54% in Southern Alberta.

SOURCE: AESRD 2013

**0.02%**
0.02% of Canada’s boreal forest has been disturbed by oil sands mining operations over the past 40 years.

SOURCE: AESRD 2013

**90,000 KM²**
In Alberta alone, approximately 90,000 km² (or about 24%) of the boreal forest is protected from development (includes national parks, etc.).

SOURCE: CAPP 2013

**10%**
Since operations began in the 1960s, approximately 10% of the active mining footprint has been or is being reclaimed by industry. Reclaimed land will be certified by government when it can be returned to public use.

SOURCE: AESRD

90,000 km² is about the size of Portugal or South Carolina.
Alberta’s oil sands lie under 142,000 km² of land. Only about 3%, or 4,800 km², of that land could ever be impacted by the mining method of extracting oil sands.

The remaining reserves that underlie 97% of the oil sands surface area are recoverable by drilling (in situ) methods which require very little surface land disturbance)*

*FOR MORE INFORMATION ON HOW OIL SANDS ARE EXTRACTED, SEE PAGES 6 AND 7.

THE SIZE OF ENGLAND?
Some organizations claim the oil sands are destroying an area the size of England (approximately 130,000 km²). In fact, the total mining footprint covers an area about 0.6% the size of England and 10% of that land has been or is being reclaimed. The total area that could be impacted by mining is about 4% the size of England.

* FOR MORE INFORMATION ON HOW OIL SANDS ARE EXTRACTED, SEE PAGES 6 AND 7.
LAND RECLAMATION

LAW
Alberta law requires all lands disturbed by oil sands operations be reclaimed. All companies are required to develop a reclamation plan that spans the life of the project.

CERTIFICATION
Reclamation is an ongoing process during the life of a project. Companies apply for government reclamation certification when vegetation is mature, the landscape is self-sustaining and the land can be returned to the Crown for public use.

PROCESS: IT TAKES TIME
The reclamation process involves monitoring, seeding, fertilizing, tree planting, seed collecting, topsoil salvaging and replacing. It also involves significant landform creation and contouring.

SOURCE: OSDG

It can take up to 80 years for a conifer tree to grow to maturity.

TOPSOIL BARLEY CROP

INDUSTRY IN ACTION

TOPSOIL RECONSTRUCTION
Subsoil takes hundreds of years to turn into topsoil through natural processes such as biodegradation. Imperial Oil has developed a technology to transform subsoil into topsoil in just five years. A field study using humalite, a low grade oxidized (weathered) coal which doesn’t decompose and mimics the portion of natural soil that encourages microbial life and nutrient retention, is underway at two Imperial Oil lease sites.

CARIBOU HABITAT RESTORATION
Two major COSIA initiatives are underway to address legacy linear disturbances and return the boreal forest to high-quality caribou habitat. The Algar Historic Restoration Project (Algar) and the Linear Deactivation Project (LiDea) are both aimed at addressing rehabilitating seismic lines. The two projects involve different approaches and methodologies, with the intent of sharing learnings across the COSIA companies as the projects progress.

SOURCE: OSDG

READ MORE | INDUSTRY IN ACTION STORIES: WWW.CAPPCA/INNOVATION
FIND OUT MORE ABOUT THE OIL SANDS INDUSTRY

Alberta Biodiversity Monitoring Institute (ABMI)
www.abmi.ca

Alberta Chamber of Resources
www.acr.alberta.com

Alberta Energy
www.energy.alberta.ca

Alberta Energy Regulator
www.aer.ca

Alberta Environment and Sustainable Resource Development (AESRD)
www.environment.alberta.ca

IHS (CERA)
www.cera.com

Canadian Fuels Association
www.canadianfuels.ca

Canadian Association of Petroleum Producers (CAPP)
www.capp.ca www.oilsandstoday.ca

Canadian Energy Research Institute (CERI)
www.ceri.ca

Canada’s Oil Sands Innovation Alliance
www.cosia.ca

Centre for Energy
www.centreforenergy.com

Clean Air Strategic Alliance (CASA)
www.casahome.org

International Energy Agency (IEA)
www.iea.org

Oil Sands Community Alliance
www.oilsandsdevelopers.ca

National Energy Board (NEB)
www.neb-one.gc.ca

The Royal Society of Canada
www.rsc.ca

Transport Canada
www.tc.gc.ca

U.S. Energy Information Administration (EIA)
www.eia.doe.gov

Wood Buffalo Environmental Association (WBEA)
www.wbea.org
CANADIAN OIL SANDS PRODUCERS
Canada’s oil sands producers represent 17 companies responsible for more than 90 per cent of the oil sands produced and transported to markets.

THE CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS
The Canadian Association of Petroleum Producers (CAPP) represents companies, large and small, that explore for, develop and produce natural gas and crude oil throughout Canada. CAPP’s member companies produce about 90 per cent of Canada’s natural gas and crude oil. CAPP’s associate members provide a wide range of services that support the upstream crude oil and natural gas industry. Together CAPP’s members and associate members are an important part of a $110-billion-a-year national industry that provides essential energy products.

CAPP’s mission is to enhance the economic sustainability of the Canadian upstream petroleum industry in a safe and environmentally and socially responsible manner, through constructive engagement and communication with governments, the public and stakeholders in the communities in which we operate.
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