CAPP CANADA'S OIL & NATURAL GAS PRODUCERS

CANADA'S Oil Sands

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The future of Canada's oil sands industry is changing –

and we are excited about it. Like the entrepreneurs who established our industry and helped fuel our world over the past 100 years, we share Canadian values and have built our industry focused on solutions and continuous improvement.

We are going to be using oil for a long time to come – both in Canada and around the world. Canada has a tremendous resource base combined with a stable political environment and skilled people that make it the ideal place to develop our natural resources responsibly.

We know we have an impact on the planet. Just as we are committed to growing our businesses, we are equally committed to improving our environmental performance. We collaborate on our biggest environmental challenges, and develop technologies that lessen our impact on air, land and water, and provide benefits for our country.

We know that our innovation and technological advances will help Canada achieve its global environmental commitments and move towards a cleaner energy future. We know it, because we are working on tomorrow's energy, today.

So, when it comes to helping the globe meet the need for increasing demands for energy – all forms of energy – we believe the world needs more Canada.

ENERGY

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.

165 BILLION BARRELS

Canada has 168 billion barrels of oil that can be recovered economically with today's technology. Of Canada's 168 billion barrels of oil, 165 billion barrels are located in the oil sands.

Source: AER, 2019 and BP Statistical Review, 2019

Canada has the third-largest oil reserves in the world.

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, 52% of which are found in Canada's oil sands.

Source: CAPP, 2019

ENERGY

Energy Demand

GLOBAL NEEDS

Global demand for energy is expected to increase 27%* by 2040 as economies in both developed and emerging countries continue to grow and standards of living improve.

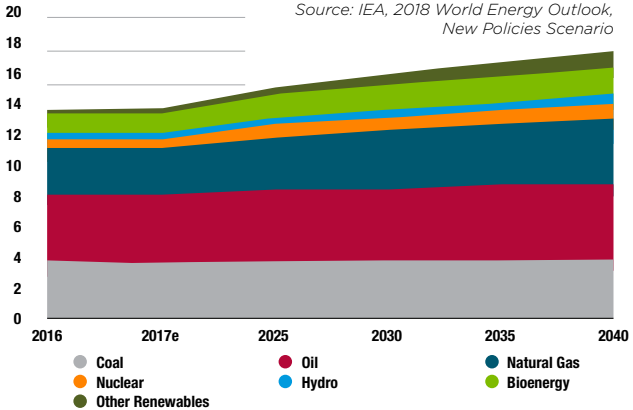
Source: IEA, 2018 World Energy Outlook, New Policies Scenario.

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, such as oil sands, is increasing.

GLOBAL PRIMARY ENERGY DEMAND

Billion tonnes oil equivalent



Source: IEA, 2018 World Energy Outlook, New Policies Scenario

Energy Supply

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, reliable and environmental standards are high.

FUELLING CANADA

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

Over the last 35 years, Canadian crude oil production has increased by 3.2 million barrels per day mainly due to the growth in supply from the oil sands.

CANADIAN OIL PRODUCTION

BARRELS PER DAY

	1983	2018	2025 F	2035 F
Crude Oil (incl. oil sands)	1.4 million	4.6 million	5.5 million	5.9 million
Oil Sands	0.2 million	2.9 million	3.6 million	4.3 million

In 2018 about 63% of Canada's crude oil production was from the oil sands.

Source: CAPP, 2019

USES

Oil is an important part of daily life in Canada, providing energy for transportation, residential and industrial uses.



Energy Use

Canadians consume a lot of energy. We need it to stay warm, do our work and get from place to place.

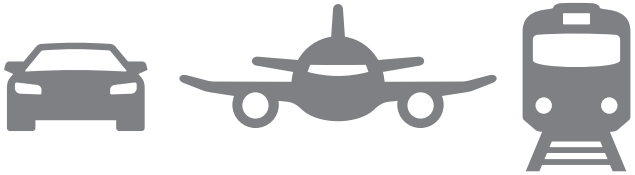
Oil derived from the oil sands is sent to refineries across North America to make gasoline, diesel, aviation fuel and other consumer products.

FUELS

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

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

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.



USES

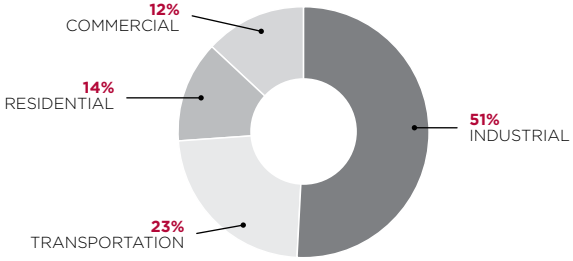
Energy Use

CANADIAN CONSUMPTION

Transportation accounts for 23% of the total energy that Canadians consume — second only in consumption to Canada's industrial sector. That translates to 207 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, 2017

Source: NEB, 2017



PRODUCTS

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

AVERAGE OUTPUT FROM A BARREL OF OIL (%), CANADA

Source: Canadian Fuels Association, 2017

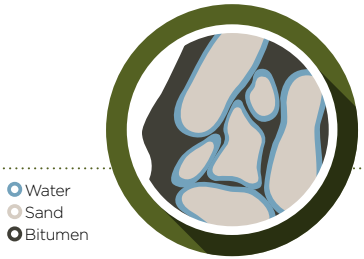


GASOLINE	35.6
DIESEL FUEL	25.9
ALL OTHER PRODUCTS*	14.0
LIGHT FUEL OIL	7.2
HEAVY FUEL OIL	6.8
JET FUEL	3.9
ASPHALT	3.9
PROPANE/BUTANE	2.6

*INCLUDES PETRO-CHEMICAL FEEDSTOCKS, NAPHTHA, LUBRICATING OILS AND GREASES, STILL GAS, AND OTHER BY PRODUCTS.

THE RESOURCE

Canada has the third largest oil reserves in the world, 98% of these reserves are located in the oil sands.



OIL SANDS

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

BITUMEN

Bitumen is oil that is too heavy or thick to flow on its own. It must be diluted, 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 other areas.



THE RESOURCE

Recovering the Oil

Oil sands are recovered using two main methods: drilling (in situ) and mining. The method used depends on how deep the reserves are deposited.

IN SITU METHOD

Of all oil sands reserves, 80% are too deep to be mined. These reserves are recovered in place, or "in situ," by drilling wells. Drilling methods create minimal land disturbance and do not require tailings ponds.

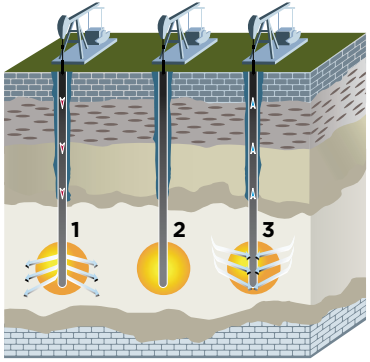
Advanced technology is used to inject steam, combustion or other sources of heat into the reservoir to warm the bitumen so it can be pumped to the surface through recovery wells.

80

80% of oil sands could be recovered through drilling.

20% of oil sands could be recovered through mining.

CYCLIC STEAM STIMULATION DRILLING (IN SITU) METHOD

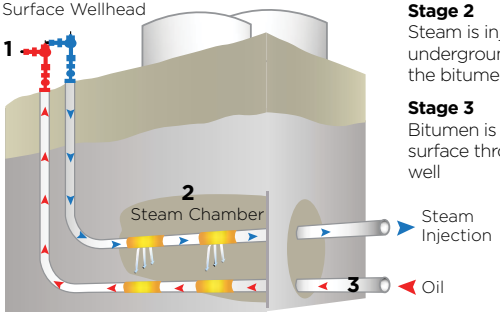


Stage 1
Steam injected into the reservoir

Stage 2
Steam heats the viscous oil

Stage 3
Heated oil and condensed steam pumped to the surface

STEAM ASSISTED GRAVITY DRAINAGE DRILLING (IN SITU) METHOD



Stage 1
Horizontal wells are drilled based on the location of bitumen deposits

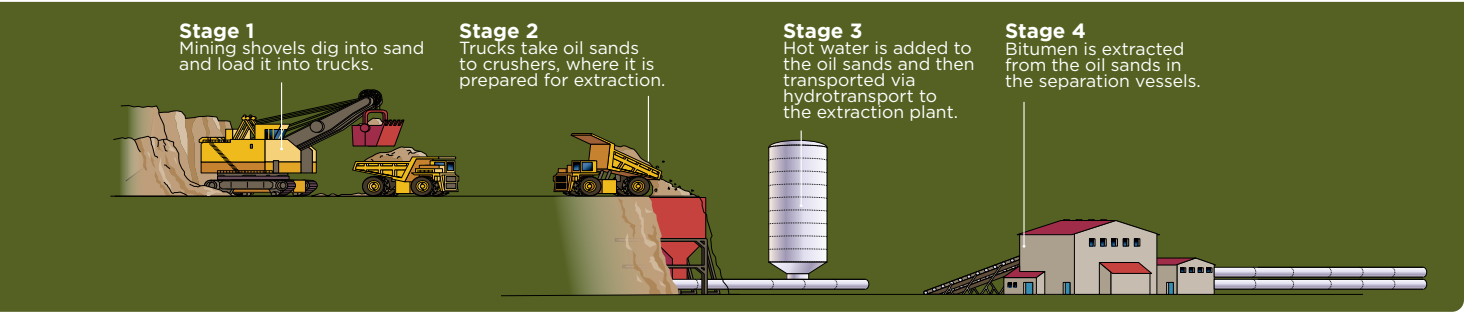
Stage 2
Steam is injected underground to liquefy the bitumen

Stage 3
Bitumen is pumped to the surface through a recovery well

THE RESOURCE

Recovering the Oil

MINING METHOD



Of the oil sands reserves, 20% are close enough to the surface to be mined using large shovels and trucks.

20

20% of oil sands could be recovered through mining.

80% of oil sands could be recovered through drilling.

UPGRADING AND REFINING

Once recovered, bitumen from the oil sands can be 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.

1.2 MILLION

In 2018, about 1.2 million barrels per day or 40% of the total bitumen produced in Canada was upgraded in Canada.

Source: AER, 2018

TRANSPORTATION

Canadian crude oil producers continue to build new markets for their expanding production.

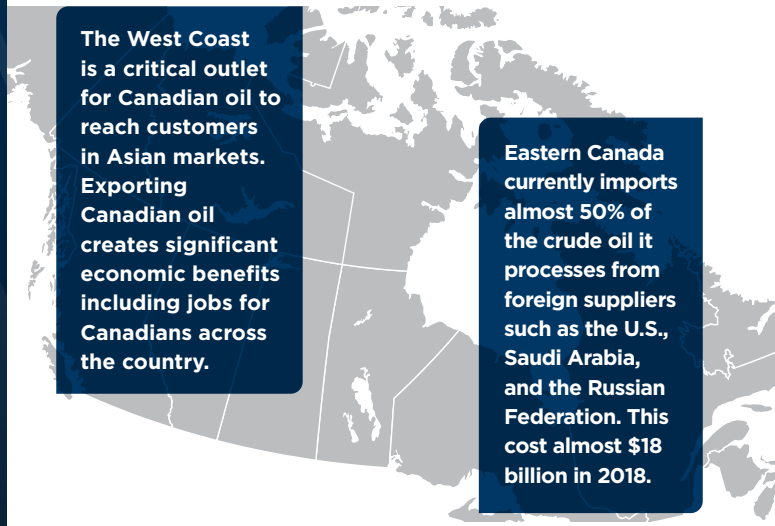


Markets

Today essentially all of Canada's oil exports go to one customer — the United States. Access to multiple customers beyond the United States is crucial to strengthen Canada's energy future.

DIVERSIFICATION

Without better access to tidewater and domestic markets Canada receives fewer economic benefits from oil sands development.



The West Coast is a critical outlet for Canadian oil to reach customers in Asian markets. Exporting Canadian oil creates significant economic benefits including jobs for Canadians across the country.

Eastern Canada currently imports almost 50% of the crude oil it processes from foreign suppliers such as the U.S., Saudi Arabia, and the Russian Federation. This cost almost $18 billion in 2018.

TRANSPORTATION

Pipelines

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



Source: CAPP, 2018

Canada needs more pipelines in all directions to move our growing oil supply to more customers.

Today, Canada has limited pipeline infrastructure to move oil from Western Canada to Eastern Canada and beyond to global customers.

A number of pipeline projects are proposed to connect the growing supply with growing markets in India, China, and to continue supporting the U.S.



DILUTED

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

TRANSPORTATION

Marine Transport

SAFE FOR 80 YEARS

Oil tankers have been moving safely and regularly along Canada's West Coast since the 1930s.

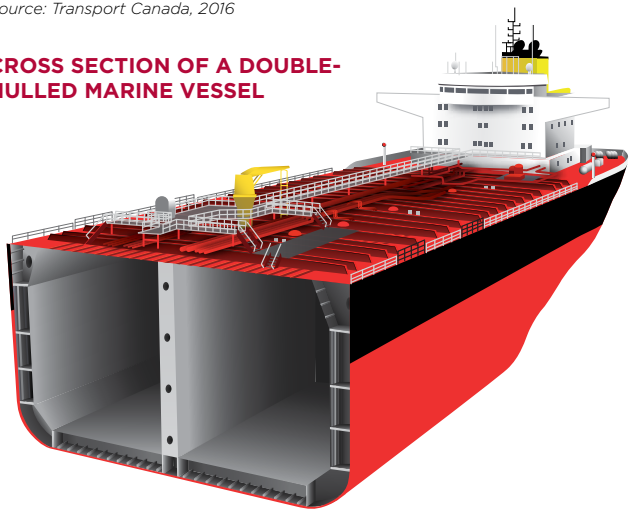
Source: Transport Canada, 2016

DOUBLE-HULLED

Large single-hulled 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 water-tight hull surface.

Source: Transport Canada, 2016

CROSS SECTION OF A DOUBLE-HULLED MARINE VESSEL



580 MILLION BARRELS

Each year, about 580 million barrels of oil are safely transported along Canada's East and West Coasts via tanker.

Source: Transport Canada, 2016

2%

Oil tankers currently represent about 2% of total ship traffic visiting Port Metro Vancouver.

Source: Clear Seas, 2017

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: Clear Seas, 2017

CLOSER TO ASIA

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

TRANSPORTATION

Rail Transport

Without new pipelines, every new barrel of oil will need to move by rail. In 2018, about 233,000 barrels per day of western Canadian crude oil – or about 5% of Western Canada's supply – were moved by rail.

Source: CAPP, 2019

Rail loading capacity in Western Canada is currently about 1,000,000 barrels per day.

Source: CAPP, 2019



ECONOMY

Canada's oil sands industry provides economic benefits across Canada.

ECONOMY

Economic Contribution

$1.0 TRILLION

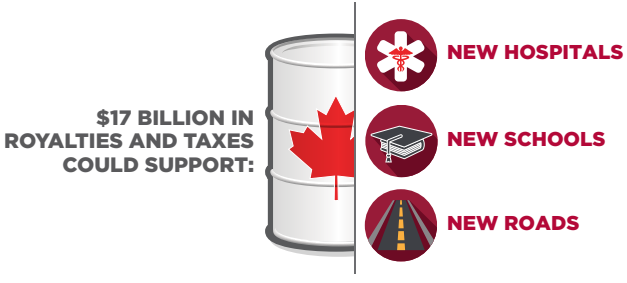
Oil sands development is expected to contribute over $1.0 trillion to the Canadian economy from 2019 - 2029

Source: CERI, 2019

$17 BILLION

Over the next 10 years the oil sands industry is expected to pay an estimated 17 billion in provincial and federal taxes - including royalties. Governments use this economic contribution to help pay for things Canadians value and want such as healthcare, education and public infrastructure.

Source: CERI, 2019



Jobs



In addition to paying significant royalties and taxes, the oil sands industry is a major employer and creates jobs across Canada.

205,000 JOBS

In 2017, the oil sands supported and created almost 205,000 direct and indirect jobs across Canada.

Source: Prism Economics and CAPP 2017



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 B.C., Ontario and Quebec.

JOB CREATION

For every direct job created in the oil sands industry, 2.5 indirect jobs will be created in the rest of Canada.

Source: CERI, 2017

ECONOMY

Canadian Benefits

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

Source: CAPP, 2019



"We developed specialty gloves for the oil sands. The company is an example of B.C. people making a difference."

Martin and Michele Moore
Watson Gloves
Vancouver, B.C.

"The oil sands are tremendous for Ontario. We've been selling equipment to the oil sands for a decade now. It's bringing business and new job opportunities to us."

Don Berggren, President
Berg Chilling Systems Inc.
Toronto, Ontario

"The economic impact of supplying goods and services to the oil sands on our region is phenomenal. The oil sands are good for Prevost, good for Quebec and all of Canada."

Gaétan Bolduc, President and CEO
Prevost Coach Manufacturer
Sainte-Claire, Quebec

2,200 DIRECT SUPPLIERS

In 2016 – 2017, more than 2,200 companies from across Canada had direct business (goods and/or services) with the oil sands.

Source: CAPP member data aggregated by CAPP, 2019

ECONOMY

Canadian Benefits



B.C.

$600 MILLION

$600 million was spent by oil sands producers on procurement in British Columbia between 2016 and 2017.

Source: CAPP, 2019



ONTARIO

$1.9 BILLION

About $1.9 billion was spent by oil sands producers on procurement in Ontario between 2016 and 2017.

Source: CAPP, 2019



QUEBEC

$300 MILLION

About $300 million was spent by oil sands producers on goods and services in Quebec between 2016 and 2017.

Source: CAPP, 2019

Indigenous Communities

Canada's oil sands industry continues to build positive and mutually beneficial relationships with Indigenous communities where we work.

CONSULTATION

Industry works with potentially affected Indigenous groups to seek ways to mitigate impacts of oil sands development. Indigenous groups, through consultation and engagement in regulatory processes, and through Canada's legal system, are afforded multiple levels of due process.

COMMUNITY

In 2015 and 2016, total funding for community investment in the oil sands was $48.6 million, which includes contributions such as sponsorship for community activities, in-kind investments and contributions to community infrastructure.

Source: CAPP, 2018

ALMOST 400 COMPANIES

In 2015 and 2016, 399 Indigenous companies from across Alberta had direct business (goods and/or services) valued at $3.33 billion with oil sands operators. These companies represent 65 communities across Alberta.

Source: CAPP, 2018

ECONOMY

Indigenous Communities

INDIGENOUS SUPPLIERS IN ALBERTA ON THE RISE 2013 - 2016

COMMUNITIES

2015-16 **65**

+11

since 2013

COMPANIES

2015-16 **399**

+72

since 2013



INDUSTRY IN ACTION

The Fort McKay Group of Companies LP (FMGOC), which works extensively with oil sands operations through its six 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

IMPERIAL: ENGAGING INDIGENOUS BUSINESSES

Finding solutions to engage, create and sustain opportunities for the Indigenous business community is a fundamental goal at Imperial. At the company's existing operations, it has local and Indigenous suppliers providing a wide variety of services including charter aviation, janitorial, construction, security, road maintenance, scaffolding, environmental services and well servicing.

The company also offers local and Indigenous suppliers information and training on its procurement process and requirements and offers in-depth debriefs to unsuccessful local and Indigenous vendors to help them succeed in the future.

Since 2009, Imperial has spent in excess of $1.5 billion with Indigenous suppliers, spending $329 million with more than 100 different Indigenous suppliers in 2015 alone.

ENVIRONMENT

Canada's oil sands producers are committed to developing solutions for a cleaner energy future.



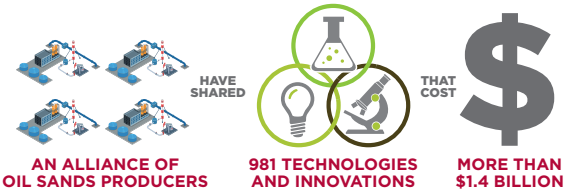
ACCELERATING PERFORMANCE

As Canada's oil sands industry works to help meet global energy demand, at the same time we are accelerating environmental performance.

CANADA'S OIL SANDS INNOVATION ALLIANCE (COSIA)

COSIA is an alliance of oil sands producers focused on accelerating the pace of environmental performance in Canada's oil sands through collaborative action and innovation.

COSIA brings together thought leaders from industry, government and academia to improve measurement, accountability and environmental performance in four priority areas; tailings, water, land and greenhouse gases.



To date, COSIA's member companies have shared 981 distinct technologies and innovations that cost more than $1.4 billion to develop.

www.cosia.ca

cosia

ENVIRONMENT

Protection Spending

$3.7 BILLION

Canadian businesses reported spending $8.4 billion on environmental protection in 2016. $3.7 billion was spent by the oil and natural gas industry. Almost 40 per cent this money was spent on capital investment projects; investments designed to improve long-term pollution prevention, abatement and control.

Source: Statistics Canada, 2016

ENVIRONMENTAL SPENDING BY INDUSTRY

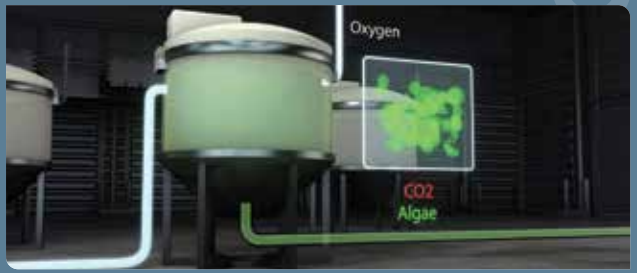
Source: Statistics Canada, 2016



Oil & Gas Extraction	44%
Mining	10%
Primary Metals	10%
Electric Power	7%
Paper Manufacturing	6%
Chemical Manufacturing	5%
Food	4%
Petroleum & Coal Products	4%
Other Manufacturing	2%
Transportation Equipment	2%
Wood Product Manufacturing	1%
Natural Gas Distribution	1%
Other	3%

INDUSTRY IN ACTION

THE ALGAE PROJECT



Oil sands companies are investigating using algae (microscopic plants) to reduce greenhouse gas emissions while producing valuable products. An assessment for a pilot-scale biorefinery was initiated in 2013 by Canadian Natural Resources Limited (Canadian Natural), the National Research Council of Canada (NRC) and Pond Technologies, a Canadian algae technology company. Building upon these learnings, the NRC, Pond Technologies, and St Marys Cement began testing this technology in 2016 at a pilot-scale biorefinery, located at St Marys Cement Plant in Ontario.

The pilot project captures carbon dioxide from the cement plant operations by placing this gas into a large photobioreactor (tank) with algae and LED lights to promote photosynthesis. The mature algae can be pressed to release bio-oil that can be used for biofuels and biomaterials— and, at an oil sands operation, blended into heavy oil or synthetic crude oil. The leftover algal biomass may be used to feed livestock or as a soil amendment for land reclamation.

ENVIRONMENT

Regulating and Monitoring

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.

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

JOSM

JOINT OIL SANDS MONITORING

Launched in 2012, the Alberta and Canadian governments are working together to implement JOSM, a world-class monitoring program that integrates all environmental components.

WBEA

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.

WBEA reports continuous ambient air quality data, in real time, directly to their website.

LARP

THE LOWER ATHABASCA REGIONAL PLAN

LARP established new environmental frameworks to safeguard regional air and surface water quality and increase the amount of land set aside for conservation to more than two million hectares.

Through the Land-use Framework process and the Lower Athabasca Regional Plan (LARP), the Government of Alberta has committed to setting cumulative environmental limits to inform oil sands development.

The total conserved land through LARP is three times the size of Banff National Park.



ENVIRONMENT

Air

GHG EMISSIONS

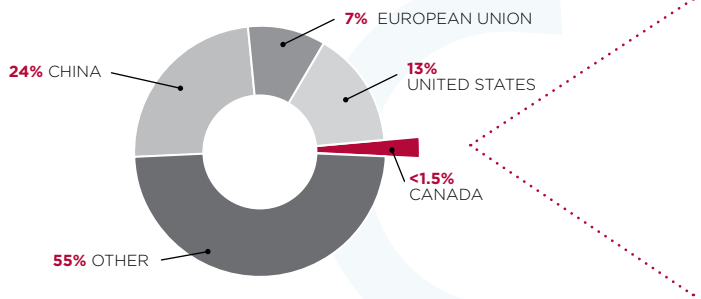
Oil sands account for 10% of Canada's GHG emissions or about 0.15% of global GHG emissions.

Carbon dioxide (CO_2) is a GHG. CO_2 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

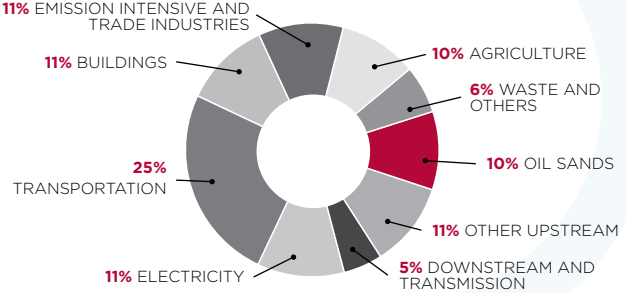
Measuring GHG emissions from the start of oil production (wells) through to combustion (wheels) is called a wells-to-wheels or life cycle analysis.

GLOBAL GHG EMISSIONS 2014



Source: World Resources Institute, 2017

CANADA'S GHG EMISSIONS BY SECTOR 2016



Source: Environment and Climate Change Canada, 2018

Canada, with less than 1% of the world's population, produces less than 1.5% of global CO_2 equivalent emissions.

ENVIRONMENT

Air Quality

24 | 7 | 365

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 **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

Air quality in Fort McMurray is better than many North American cities – including Toronto, Edmonton and Seattle – benchmarked by the Clean Air Strategic Alliance (CASA).

INDUSTRY IN ACTION

COSIA IN SPACE



COSIA is literally going out of this world to achieve its vision of accelerating the pace of environmental performance in Canada's oil sands. Through COSIA, oil sands operators will investigate the use of satellite technology to measure greenhouse gas (GHG) emissions from tailings ponds and mine faces.

Imperial Oil is leading the joint industry project with Canadian Natural, Shell and Suncor to work with GHGSat (a global emissions monitoring company based in Quebec) to investigate the use of satellite technology to provide more accurate and frequent measurements of GHG emissions.

The satellite named "Claire" launched on June 22, 2016 and is orbitting above Alberta's oil sands mining operations once every two weeks and conduct concentration measurements and transmit them back to Earth.

www.cosia.ca

ENVIRONMENT

Water

Canada's oil sands industry recycles water and continues to look for ways to reduce fresh water use.

0.20 BARRELS

In 2018, drilling (in situ) production required an average of 0.20 barrels of fresh water for every barrel of oil equivalent produced.

Source: AER, 2019

2.6 BARRELS

In 2018, mining required an average of 2.6 barrels of fresh water for every barrel of oil equivalent produced.

Source: AER, 2019

75 - 86%

Oil sands producers recycle 75 - 86% of water used. In 2018, recycled water represented 75% of the total water used for mining and 86% of the total water used for in situ. In situ projects also use alternative water sources, such as saline groundwater or oil sands process-affected water from neighbouring mines.

Source: AER, 2019

263 MILLION M^3

Oil sands fresh water use in 2018 was about 263 million m^3. That is 0.18% of all the fresh water available in Alberta.

Source: AER, 2019

Water Use

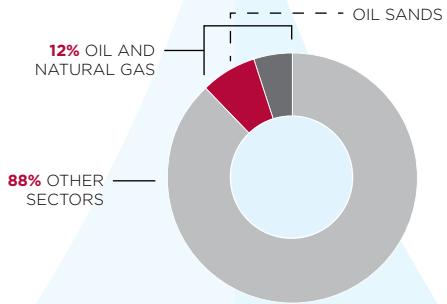
REGULATED

The Alberta Energy Regulator oversees the industry's 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 licences and the government allocates water based on these applications. In 2018, the oil and natural gas industry represented almost 12% of total provincial water allocations. Of this, approximately 68% was for oil sands development. But not all of that water was actually used. The oil and natural gas industry used about 27% of its total water allocation in 2018.

ALBERTA WATER ALLOCATIONS 2018

Source: AER, 2019



ENVIRONMENT

Water Use and Availability

ATHABASCA RIVER

The Lower Athabasca River was the source of 63% of the fresh water used for oil sands mining in 2018. The remaining 37% came from surface runoff or shallow groundwater sources.

Source: AER, 2019

LESS THAN 3%

In 2018, 156 million m^3 of water was withdrawn from the Lower Athabasca River for oil sands mining. During the lowest weekly winter flow of 2018, oil sands mining withdrawals represented just 2.6% of the river flow.

Source: AER, 2019

MANAGED

The Surface Water Quantity Management Framework for the Lower Athabasca River establishes weekly management triggers and water withdrawal limits. Triggers and limits reflect seasonal variability and become more restrictive in times of low flow. A series of adaptive management triggers direct when a management response is required.

WATER SUPPLY

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

Source: Alberta Environment and Parks, 2015

Water Quality

MONITORED

The Governments of Canada and Alberta execute a comprehensive environmental monitoring program in the oil sands region, including water monitoring for quality, quantity and aquatic ecosystem health.



MANAGED

A Surface Water Quality Management Framework was developed as part of the Lower Athabasca Regional Plan (LARP). The framework includes ambient surface water quality triggers and limits. Triggers are intended to give advance notice of less favourable trends, while limits are established as the upper boundaries that must not be crossed. A management response is required if quality triggers or limits are exceeded.

ENVIRONMENT

Tailings Ponds

TAILINGS

Tailings are a mixture of water, sand, clay and residual bitumen, and are the by-product of the hot water treatment process used to separate the oil from the sand and clay. Tailings are stored in large engineered dam and dyke systems called tailings ponds, designed to settle out the solid particles from the water.

WATER RECYCLING

Water is continuously recycled from the tailings ponds back into the extraction process, reducing new withdrawals of fresh water from the Athabasca River and other sources.

FLUID TAILINGS

Although sand separates quickly from the tailings, smaller particles of clay and silt remain in suspension and form fluid tailings that take up to 30 years to separate. New technologies are accelerating the settling process.

RECLAMATION

To ensure fluid tailings volumes are managed appropriately, the Government of Alberta released the Tailings Management Framework which will ensure fluid tailings are in a ready-to-reclaim state within 10 years of the end-of-mine life.

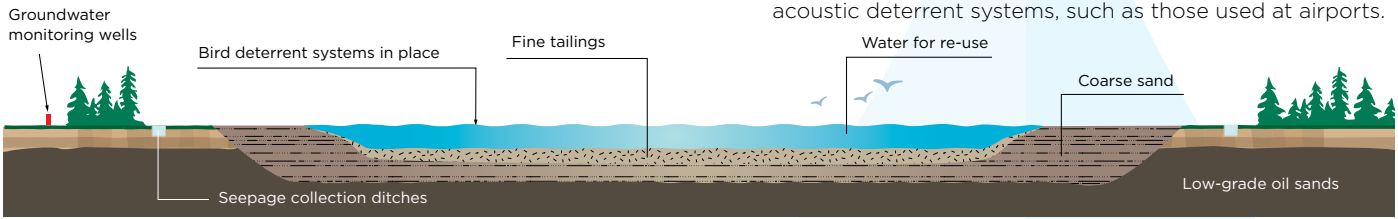
$1.2 billion has been invested in tailings-reduction technology by oil sands operators.

WATER QUALITY

All tailings ponds are constructed with containment dykes and groundwater monitoring facilities to capture run-off and minimize seepage.

BIRDS

Residual bitumen can be found at the surface of most tailings ponds, posing a threat to birds and waterfowl that land on ponds. Several mechanisms are in place to deter birds, including propane cannons and radar/laser-activated acoustic deterrent systems, such as those used at airports.



INDUSTRY IN ACTION

RIFLE TUBE TECHNOLOGY



Through COSIA, oil sands companies are looking at ways to increase energy efficiency while reducing boiler blowdown and water use in SAGD operations.

Rifle Tube Technology involves using a “rifled” or “ribbed” tube instead of the smooth tubes currently used in boilers and heat exchangers that produce steam for SAGD. The internal ribbing of rifle tubes introduce centrifugal force in the tubes helping to turn water into steam more uniformly, which means less energy, fewer emissions, and less water use.

Devon Energy completed a 10-month demonstration pilot at their Jackfish in situ facility and will use the results to conduct additional tests to further advance the technology in early 2018.

www.cosia.ca

INDUSTRY IN ACTION

NIKANOTEE FEN



In 2013, Suncor Energy, with the help of joint industry project partners Imperial Oil Limited and Shell Canada, completed construction of a three-hectare fen, named the Nikanotee Fen (pronounced Nee-ga-no-tee; the Cree word for “future”). This achievement established Suncor as one of the first companies in the world to complete reconstruction of this type of wetland in co-operation with a number of university researchers and consultants from across the continent.

Research being conducted in the Nikanotee Fen will enhance understanding of how to re-establish wetlands on reclaimed land. Wetlands form a large part of the local ecosystem, and they naturally capture and store carbon. These peat-forming plant communities also provide a very specific habitat for wildlife and plant species, many of which are of cultural significance to Indigenous communities.

ENVIRONMENT

Land

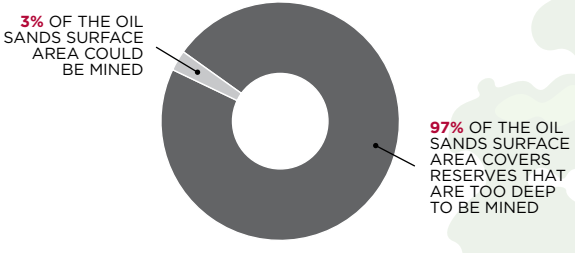
LAND IMPACTS

Alberta's oil sands lie under 142,000 km^2 of land. Only about 3%, or 4,800 km^2, 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.

OIL SANDS LAND USE

Source: AER





*For more information on how oil sands are extracted, see pages 12 - 15.

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: Alberta Environment and Parks

0.03%

0.03% of Canada's boreal forest has been disturbed by oil sands mining operations over the past 40 years.

Source: Alberta Environment and Parks

11%

Since operations began in the 1960s, about 11% 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: Oil Sands Portal, 2016

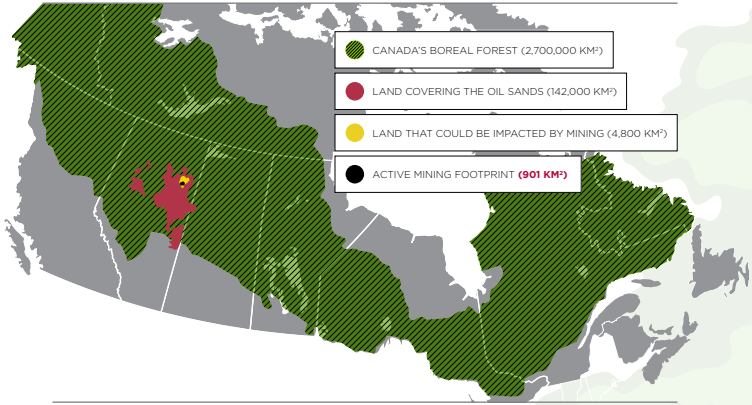
90,000 KM^2

In Alberta alone, about 90,000 km^2 (or about 24%) of the boreal forest is protected from development (includes national parks, etc.).

Source: CAPP, 2015

ENVIRONMENT

Land Reclamation



HOW BIG IS 901 KM²?

Area (KM²)	City Proper	Greater Metropolitan
Calgary, Alberta	848	5,107
Hamilton, Ontario	1,117	1,371
Madrid, Spain	605	4,609

THE SIZE OF ENGLAND?

Some organizations claim the oil sands are destroying an area the size of England (about 130,000 km²). In fact, the total mining footprint covers an area about 0.6% the size of England and 11% 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.

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: CAPP

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

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.

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.

To order printed copies of *Canada's Oil Sands*, email publications@capp.ca.

UPDATES

The facts provided in this book are current as of November 2019.

A regularly updated version is available online at: **www.canadasoilsands.ca**.

Discover the oil sands with social media:

@OilGasCanada **OilGasCanada** **@OilGasCanada**

FIND OUT MORE

About the Oil Sands Industry

ALBERTA BIODIVERSITY MONITORING INSTITUTE (ABMI)
abmi.ca

ALBERTA CHAMBER OF RESOURCES
acr-alberta.com

ALBERTA ENERGY
energy.alberta.ca

ALBERTA ENERGY REGULATOR
aer.ca

ALBERTA ENVIRONMENT AND NATURAL RESOURCES
alberta.ca/environment-natural-resources.aspx

CANADA'S OIL SANDS INNOVATION ALLIANCE
cosia.ca

CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS (CAPP)
capp.ca and canadasoilsands.ca

CANADIAN ENERGY RESEARCH INSTITUTE (CERI)
ceri.ca

CANADIAN ENERGY REGULATOR (CER)
cer-rec.gc.ca

FIND OUT MORE

About the Oil Sands Industry

CANADIAN FUELS ASSOCIATION
canadianfuels.ca

CLEAN AIR STRATEGIC ALLIANCE (CASA)
casahome.org

IHS MARKIT
cera.com

INTERNATIONAL ENERGY AGENCY (IEA)
iea.org

OIL SANDS COMMUNITY ALLIANCE
oscaalberta.ca

THE ROYAL SOCIETY OF CANADA
rsc.ca

TRANSPORT CANADA
tc.gc.ca

U.S. ENERGY INFORMATION ADMINISTRATION (EIA)
eia.gov

WOOD BUFFALO ENVIRONMENTAL ASSOCIATION (WBEA)
wbea.org

THE CANADIAN ASSOCIATION OF PETROLEUM PRODUCERS

capp.ca

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 80 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 $109-billion-a-year national industry that provides essential energy products.

CAPP's mission, on behalf of the Canadian upstream oil and natural gas industry, is to advocate for and enable economic competitiveness and safe, environmentally and socially responsible performance. Competitiveness, in North America and globally, is necessary so as to attract the capital necessary to grow production and expand markets to deliver value to the Canadian public and to our investors. Public confidence, from governments, Aboriginal Peoples, the public, stakeholders and the communities in which we operate, will be determined by our collective performance and the effectiveness of our communications and outreach.

CAPP

CANADA'S OIL & NATURAL GAS PRODUCERS

CANADASOILSANDS.CA

Scan to view a digital version of this fact book.

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