A CATALYST FOR CLEAN TECHNOLOGIES IN THE OIL SANDS SINCE 2012

Video: What is COSIA?

cosia®
CANADA'S OIL SANDS INNOVATION ALLIANCE

WHAT ARE THE OIL SANDS?

- Mixture of sand, water, clay and bitumen.
- Bitumen is a heavy complex hydrocarbon.
- Contain relatively high levels of sulphur, nitrogen.
- Bitumen not a major source of heavy metals; enriched (compared to crustal abundance) in vanadium, nickel, molybdenum and rhenium.
- Almost solid at room temperature – cannot be extracted using conventional drilling techniques.

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OUR MEMBERS

Canadian Natural

cenovus ENERGY

ConocoPhillips Canada

Imperial

SUNCOR

Syncrude

Teck

DID YOU KNOW

Our members represent 90%
of Canada's oil sands production?

UNIQUE INNOVATION MODEL

COSIA is an alliance of oil sands producers focused on accelerating the pace of improvement in environmental performance in Canada's oil sands.

- COSIA brings together leading thinkers from around the world to:
  - significantly reduce greenhouse gas emissions
  - improve how we use and manage water
  - minimize land disturbances
  - reclaim land faster
- It's about sharing expertise, resources, technologies and even intellectual property to go farther, faster in environmental performance.
- It's called open collaboration and it's a unique made-in-Canada way of advancing game-changing technology solutions.

WHAT PROGRESS HAVE WE MADE

$1.6B

TECHNOLOGY DEVELOPMENT COSTS

1,075

CONTRIBUTED TECHNOLOGIES

233

ACTIVE PROJECTS

$531M

COST OF ACTIVE PROJECTS

*Cumulative from 2012-2020.

WHAT WE HAVE ACHIEVED

We're well on our way!

From 2009 to 2018, Canadian oil sands companies **reduced GHG intensity per barrel by 20%** (IHS Markit)

An additional **16-23%** reduction is expected in the next decade (IHS Markit)

Since 2012, COSIA members have

- **Reduced freshwater use intensity by 46%** at oil sands in situ operations
- **Reduced net water use by 25%** at oil sands mining operations

Our members are leading experts at land management.

- Reclaiming land disturbed by oil sands operations faster
- Developing and sharing best practices around the world.

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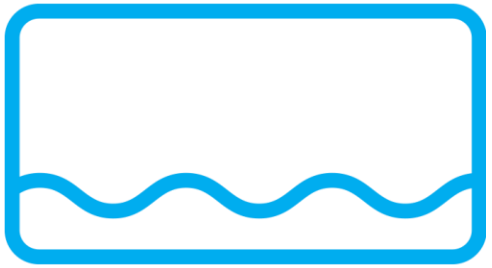
OUR PRIORITY AREAS

We've identified four priority areas where innovation can have the biggest impact:

Greenhouse Gases



Water

Land

Tailings

GREENHOUSE GASES

We are committed to a low carbon future through exploring and/or advancing technology in numerous areas, including:

1. Carbon Capture, Utilization and Storage (CCUS) e.g. Molten Carbonate Fuel Cells
2. Natural Gas Decarbonisation (removing carbon from methane)
3. Energy Efficient Design
4. Fugitive Emissions Measurement and Management
5. Reinventing the extraction process

Carbon Capture Utilization and Storage (CCUS)

CCUS is one of today's most promising technologies to significantly reduce global CO_2 emissions from large industrial sources.

- The oil sands industry has been a pioneer on this front and is leading technology development.
- Canadian Natural has advanced several initiatives and now has the fifth largest CCUS capacity in the world.
- Since 2015, the company's Quest facility has captured and safely stored **5 million tonnes of CO_2** underground – at a lower cost than anticipated.

✓ **That's equivalent to taking 1.25 million cars off the road for one year.**

XPRIZE CARBON | nrg | cosia

NRG COSIA Carbon XPrize

Learn more at transformingthefuture.ca

Watch the video

Natural Gas Decarbonization

Natural Gas Decarbonization (NGD) technologies capture CO_2 from the natural gas stream either before or after it is burned for extraction or processing operations.

The carbon is removed through thermal, electrical or mechanical means.

The ideal NGD technology for the oil sands will:

- **Remove** the carbon using the least amount of energy possible while exploring options to safely store or re-use the carbon in a manner that does not contribute to emissions.

- **Transform** carbon into a form that is sequestration ready, or a saleable product (e.g. carbon-rich or carbon black by-product).

H2nanO - SolarPass™

H2nanO has created a new passive, sunlight-activated approach to treat hard-to-degrade organic contaminants and volatile emissions.

Called *SolarPass™* the innovative process could be used to reduce fugitive emissions from tailings ponds.

Water Return

- Eliminates initial aquatic impacts in one day
- Accelerates remediation of oil sands process-affected water

Emissions and Odour Control

- Reduces odours from water and fugitive emissions by intercepting, containing and transforming volatile compounds before they leave the water.

EXAMPLES OF INNOVATION OPPORTUNITIES

Greenhouse Gases (GHG)

- Natural gas decarbonization
- Post-combustion capture of CO2
- Optimal CO2 transportation system design

Tailings

- Solutions to modify clay properties that result in improved geotechnical performance.
- Technologies / solutions to improve deposit performance.
- Scalable and cost-effective tailings dewatering and consolidation.

Land

- Zero land disturbance exploration.

Water

- (Mining) Low-energy water treatment technologies to treat trace amounts of dissolved organics in oil sands process water (OSPW).
- (Insitu) Water treatment technologies to remove specific dissolved solids from produced water.
- (Insitu) Robust online analyzers.

SUBMITTING AN IDEA OR POTENTIAL SOLUTION: ETAP

We want to hear about ideas and potential innovations from academia, research centres, innovation hubs, who could help us continue to improve the environmental performance of Canada's oil sands industry!

- Further information, technical details and requirements are outlined in the **innovation opportunities** and **challenge documents** on the COSIA website.
- Ideas and potential solutions can be submitted through COSIA's Environmental Technology Assessment Portal **(E-TAP)** on our website **cosia.ca**
- Submissions will be viewed by all COSIA members. If even just one COSIA member is interested in the idea, commercial discussions will begin.


COSIA CHALLENGE

Mobilizing the world's minds and resources to improve environmental performance.

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Natural Gas Decarbonization

SOLUTION DESCRIPTION:

Technologies that will partially or completely remove the carbon content of natural gas

CHALLENGE SPONSOR:

COSIA's **GHG EPA** is sponsoring this challenge.

Our aspiration is to **produce our oil with lower greenhouse gas emissions than other sources of oil.**

CREATED: October 8, 2014

All projects are evaluated and actioned as they are received.

COSIA has four Environmental Priority Areas (EPAs): Water, Land, Tailings, and Greenhouse Gases (GHGs).

For more information on this COSIA Challenge please visit **www.cosia.ca**

Follow us on social media!

COSIA_ca

Canada's Oil Sands Innovation Alliance (COSIA)

Canada's Oil Sands Innovation Alliance – COSIA

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