

IN SITU OIL SANDS INVESTMENTS ARE CREATING ALBERTA'S ENERGY FUTURE

Three ERA-funded in situ technologies developed and deployed in Alberta are making a major impact on the energy industry's environmental performance and economic output. These innovations, some decades in the making, are drastically cutting water use and GHG emissions, while improving operational costs.

Experts from Imperial Oil, ConocoPhillips, and MEG Energy—were joined by the Canadian Heavy Oil Association (CHOA) on November 18, 2020 to share insights related to project development and execution. They also discussed the business case and market potential of these technologies and the need for the industry to continue innovating how it works together.

Over 400 people registered for ERA's free, Lessons Learned Workshop focused on how in situ investments are transforming Alberta's oil sands.

"The big thing with innovation is you can't be afraid to take risks. You need to tap into the larger ecosystem to get the best ideas, and you need champions to move these ideas forward," said Cheryl Trudell, Vice President, Upstream Research, Imperial Oil.

SET SOLID PERFORMANCE METRICS AND MILESTONES

Trudell spoke to Imperial's commercial application of its breakthrough Cyclic Solvent Process (CSP), a successful \$100 million, multi-year pilot project at its Cold Lake facility in Alberta. The process is estimated to eliminate the amount of energy needed to generate steam in extracting bitumen, reducing emissions intensity by about 80 per cent compared to previous approaches.

Imperial benefitted by doing a lot of work planning the project and setting solid performance metrics. They had a strong structure in place from the start. They knew what they needed to learn, had milestones determined, leading to no



MEG Energy's eMVAPEX project, pictured above, was one of three ERA-funded in situ technology solutions featured at ERA's Lessons Learned Workshop on November 18, 2020.

major surprises along the way. ERA committed \$10 million to the project.

"When you spend \$100 million on a pilot project, you want good data to make a definitive decision on the technology. From the beginning, we wanted to know that when we were done, we can put our hand on heart and say, 'yes this technology worked,'" said Trudell.

HARNESS THE POWER OF PEOPLE IN THE PROCESS

Beyond technology, the event highlighted the need to enable and understand people; the people generating ideas, the people advancing them, the people putting them into an operational setting, and the people at the end of the value chain—the customer.

"Innovation can start and stop with people. To really create the transformational change the world expects, we need to unlock new ways of

working, we need new skills and culture, we need a complete solutions approach. The world is demanding we do more, and they are demanding it on an exponential timeframe. We need to innovate the process and speed up the pace of change," said Carrie Fanai, CHOA Board Member and Program Lead, Bitumen Value Chain Optimization, Suncor.

GOVERNMENT FUNDING CRITICAL TO GETTING PROJECTS OFF THE GROUND

The importance of government support to enable technology was a key part of the discussion. ERA committed \$2.5 million to ConocoPhillips' Non-condensable Gas Co-injection for Thief Zones. The \$10 million project has since seen a 25 per cent reduction of steam to oil ratio, saved over five million barrels of steam, and avoided 90 thousand tonnes of emissions.

"Without funding, we would have postponed the project and not seen the GHG reductions we have

seen so far. When we applied, it was a tough time for the industry, but we were able to get support and now it's not a technology we are just piloting, it's one we are commercializing and rolling out. It's a real success story," Julian Ortiz, Manager, Technology Project Integration, ConocoPhillips.

COMMERCIALIZATION DECISIONS DEPEND ON MARKET CONDITIONS AND PRODUCTION GROWTH

Lessons Learned panelists spoke to how market conditions play a key role in timing commercialization. MEG Energy is in the later stages of piloting its eMVAPEX project, which is on the cusp of commercialization. They received \$10 million in funding from ERA's Oil Sands Innovation Challenge for the \$105 million project. While results are not finalized, MEG is expected to reduce GHG emissions intensity by over 40 per cent compared to traditional in situ methods.

"This project has successfully achieved most of its stated goals. We are continuing to acquire data to learn what we can, so that we have as much confidence in the process as we can before making more decisions around the timing of commercialization. There are a few things that have to happen there; including attractive market conditions and a growth in production," said Kyle Thacker, Reservoir Engineering Lead, MEG Energy.

ERA's Lessons Learned Workshops are a way to share insights from experts with those who can benefit from knowledge translation. The goal is to accelerate technology adoption. A video of the event is available on eralberta.ca/workshops.

"Transitioning to a clean energy future is complex. It requires de-risking and scaling-up promising technologies. The adoption of new, in situ technologies take us another step toward creating the low-emissions future the world is seeking," said Steve MacDonald, ERA CEO.

COMMITTED TO ACTION

- ▶ ERA is a key partner in addressing Alberta's climate and economic priorities. We fund and de-risk late-stage technologies to reduce GHG emissions and help grow and create competitive industries in Alberta.

CONVENING RESOURCES FOR COLLABORATION

- ▶ The Government of Alberta provides grants to ERA. For more than 10 years, ERA has been investing revenues from the carbon price paid by Large Final Emitters (LFEs) to accelerate the development and adoption of innovative and clean technology solutions.
- ▶ We work with industry, government, and technology developers to make Alberta a hub for innovative ideas that reduce GHG emissions and improve economic competitiveness.
- ▶ We convene resources and facilitate strategic partnerships with industry, government, business, academia, and other funders to foster a suite of policy, regulatory, program and business innovation tools that will help address barriers to commercialization.
- ▶ With our stakeholders, we developed a Technology Roadmap that guides investment decisions and informs our portfolio mix.

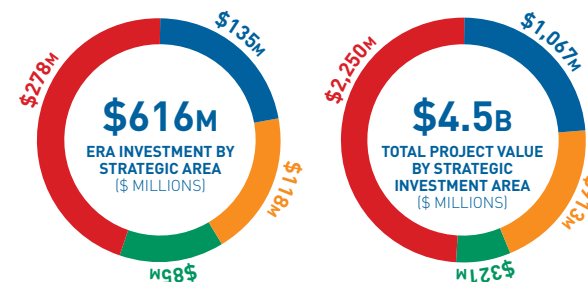
FUNDING OPPORTUNITY	WHAT'S IT ABOUT?	ERA FUNDING	HIGHLIGHTS
GRAND CHALLENGE	Technologies to transform CO ₂ from waste to value	\$31M	2 projects awarded \$5M each in the final round
METHANE CHALLENGE	New methane detection and reduction technologies	\$26M	11 projects funded worth \$66M in total project value
OIL SANDS INNOVATION	Late-stage, GHG-reducing technologies to help Alberta's oil sands industry remain competitive	\$61M	8 projects funded worth \$666M in total project value
INDUSTRIAL EFFICIENCY CHALLENGE	Technologies to increase efficiencies for LFE industrial facilities	\$59M	9 projects funded worth \$235M in total project value
BEST CHALLENGE	GHG-reducing technologies in biotechnology, electricity, and sustainable transportation	\$76M	13 projects funded worth \$282M in total project value
NATURAL GAS CHALLENGE	Unlocking innovation across Alberta's natural gas value chain	\$58M	20 projects funded worth \$155M in total project value
FOOD, FARMING, AND FORESTRY CHALLENGE	Accelerating innovation for sustainable growth	\$40M	Invited 38 projects to submit Full Project Proposals. Funding decision expected in Spring 2021
PARTNERSHIP INTAKE PROGRAM	Evaluating promising GHG-reducing projects referred to ERA by Trusted Partners	\$59M	17 projects funded to date worth over \$1.3B in total project value
SHOVEL-READY CHALLENGE	Support for companies ready to implement leading-edge technologies in applications for both greenfield and brownfield operations	\$150M*	Expression of Interest submission process closed Dec. 22, 2020
ENERGY SAVINGS FOR BUSINESS	Support for small- and medium-scale industrial and commercial businesses for cost-saving and emissions reducing projects	\$55M*	Applications open February 1, 2021. Up to \$250,000 available per project.

*This program is funded in part by the Government of Canada's [Low Carbon Economy Fund](#).

INVESTING IN A DIVERSE PORTFOLIO

186 Projects

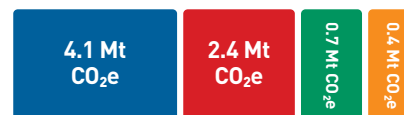
- ▶ **Cleaner Oil & Gas** (71 Projects)
- ▶ **Low Emitting Electricity Supply & Demand** (25 Projects)
- ▶ **Food, Fibre, & Bioindustries*** (46 Projects)
- ▶ **Low Carbon Industrial Processes & Products** (44 Projects)



*In 2012, ERA provided funding for three adaptation projects in consultation with Alberta Environment and Parks.

CUMULATIVE PROJECT EMISSION REDUCTIONS

7.6 Mt CO₂e Total by 2020



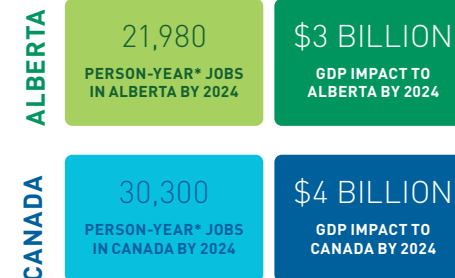
35 Mt CO₂e Total by 2030



Note: We have estimated emission reductions for all projects with approved funding commitments and executed funding agreements and assumed the projects will continue successfully and as planned. Should circumstances change for these projects, emission reduction estimates may change materially.

LEVERAGING FUNDING AND CREATING JOBS

Technology is the engine of environmental and economic opportunity. For every ERA dollar we commit to advancing new technologies, over \$6 has been invested by funding partners.



*A person-year is equal to one-year of employment for one individual. Please note: economic impact is reported on a calendar year basis, not fiscal year.