

REPURPOSING AGRICULTURAL WASTE TO CREATE SUSTAINABLE, HIGH-VALUE PRODUCTS

While studying in the brewmaster program at Olds College in 2015, Alex Villeneuve noticed an overlooked opportunity: spent barley, a byproduct of the brewing process, was being routinely discarded in significant quantities.

Villeneuve began cultivating mushrooms in Ziplock bags using this waste as a growing medium. What started as an experiment soon demonstrated considerable success. Over time, he refined his process, founded Ceres Solutions, and developed a plan to transform spent barley into high-value, high-demand products.

“When I saw all this high-quality grain just being shovelled into bins and taken off to the landfill, it seemed like we were leaving a lot of value on the table,” Villeneuve said. “There’s still a lot of proteins and sugars and minerals in that grain, and it seemed like a shame to just be throwing it away.”

With a \$460,000 investment from ERA in 2021, Ceres piloted a system to repurpose these byproducts into a substrate for growing specialty mushrooms. They found that the longer the mushroom roots used the spent grain, the higher the protein content became, allowing them to transform the enriched byproduct into high-quality cattle feed, providing a sustainable alternative for local ranchers.

“It’s very similar to high-quality silage. It really lends itself well to either replacing the silage or a lower-quality forage in a diet,” said Villeneuve. “The protein is quite good, and since it’s a byproduct of our farm that runs 365 days a year, we’re going to have a consistent high-quality output every year.”

Ceres’ system was first commercially demonstrated upon project completion in 2024. Ceres was able to supply the Alberta market with high-quality, affordable specialty mushrooms and add value to local biomass byproducts. This production offsets mushrooms that would otherwise be imported from BC, Ontario, China, or Korea.

Ceres is now the largest grower of specialty mushrooms in the Canadian prairies and the company intends to expand its operations by exploring new value-added products while scaling its substrate-processing technology for international exports. Currently, Ceres produces 4,000 pounds of gourmet mushrooms each week but aims to increase production to over 10,000 pounds.

“We’re going to keep looking at ways to take the things that aren’t being used efficiently and create another stream of value for the company and for the region,” Villeneuve said.

TACKLING METHANE EMISSIONS THROUGH PARTNERSHIPS, STRATEGIC INVESTMENT

Methane is a potent greenhouse gas, trapping heat 28 times more effectively than carbon dioxide, making emissions reduction crucial. Alberta is a global leader in tackling this challenge, slashing methane emissions from the oil and gas sector by 52 per cent since 2014.

Supported by a \$1.4 million investment from ERA, a partnership between the University of Calgary and Canadian Natural Resources Limited (CNRL) demonstrates how innovation, collaboration, and strategic funding can keep the province’s momentum in this critical space.

Launched at the University of Calgary, PoMELO (Portable Methane Leak Observatory) is a vehicle-mounted detection system designed to identify methane leaks directly at their source. By integrating advanced sensor technology and mobile capabilities, PoMELO is a cost-effective solution for easily accessing areas prone to emissions. The ERA-funded project was officially completed in 2024.

“Partnerships with industry have proved critical to evolving this technology and its potential for the future,” said Thomas Barchyn, Project Manager, University of Calgary. “The U of C is deeply science-focused, so we need practical feedback and experience. Achieving impact requires understanding real problems to reduce emissions in Alberta – that doesn’t come from papers, it comes from the field.”

In Alberta, oil and gas facilities in remote areas make traditional methods costly and inefficient. Being mobile, PoMELO can easily access sites, allowing for quick, efficient, and cost-effective emissions mitigation. Mounted on a pickup truck, PoMELO detects emissions using laser spectrometers, wind instruments, and GPS, along with machine learning for data analysis.

Unlike costly handheld optical gas cameras that require close access, PoMELO allows for immediate assessments that deliver real-time data processing, enabling operators to locate leaks quickly and promptly make repairs. Since the data is processed in real time, operators can immediately locate leaks, enabling them to quickly repair them to comply with Alberta’s environmental regulations. To date, PoMELO has been deployed at over 1,500 sites.

“In the case of PoMELO, we are doing it all; we are using science to reduce emissions, building a pool of highly qualified personnel, advancing science into places it’s never been before, creating commercial opportunities, and solidifying Alberta’s role as a global leader,” said Barchyn. “With the help of ERA, I think it will be part of the birth of a new methane detection industry.”



WITH SUPPORT FROM ERA, CERES SOLUTIONS’ TECHNOLOGY WAS COMMERCIALY DEMONSTRATED IN 2024.

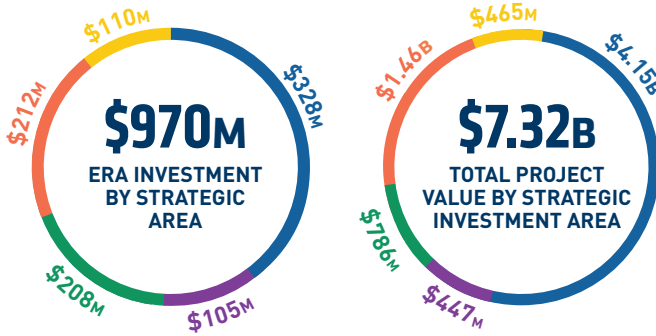


MOUNTED ON STANDARD SERVICE TRUCKS, POMELO HAS BEEN DEPLOYED AT 1,500 WELL SITES IN ALBERTA.

INVESTMENT IN TECHNOLOGY INNOVATION

306 Projects*

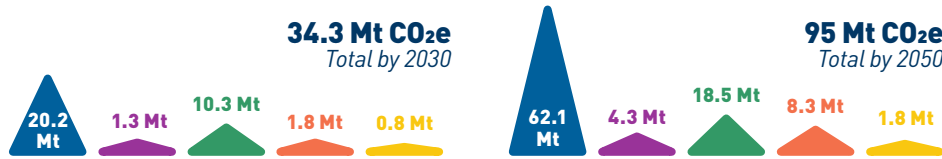
- ▶ **EMERGING ENERGY** (60 Projects)
- ▶ **CIRCULAR ECONOMY** (35 Projects)
- ▶ **IMPROVED EFFICIENCY** (86 Projects)
- ▶ **INDUSTRIAL DECARBONIZATION** (55 Projects)
- ▶ **CARBON MANAGEMENT** (67 Projects)



*In 2012, ERA provided \$7 million in funding for three adaptation projects worth \$7 million in consultation with Alberta Environment and Parks.

6.5:1 LEVERAGED FUNDING FROM PUBLIC AND PRIVATE INVESTORS

CUMULATIVE PROJECT EMISSION REDUCTIONS



Note: GHG claims are subject to the disclaimer provided below. 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.

INVESTMENT IN COMMERCIAL ADOPTION

ENERGY SAVINGS FOR BUSINESS PROGRAM

PROJECTS 2138
 INVESTED \$47 MILLION
 JOBS CREATED 1,279
 AB GDP CONTRIBUTION \$166.6 MILLION
 EMISSIONS REDUCED 3.7Mt OF LIFETIME EMISSIONS

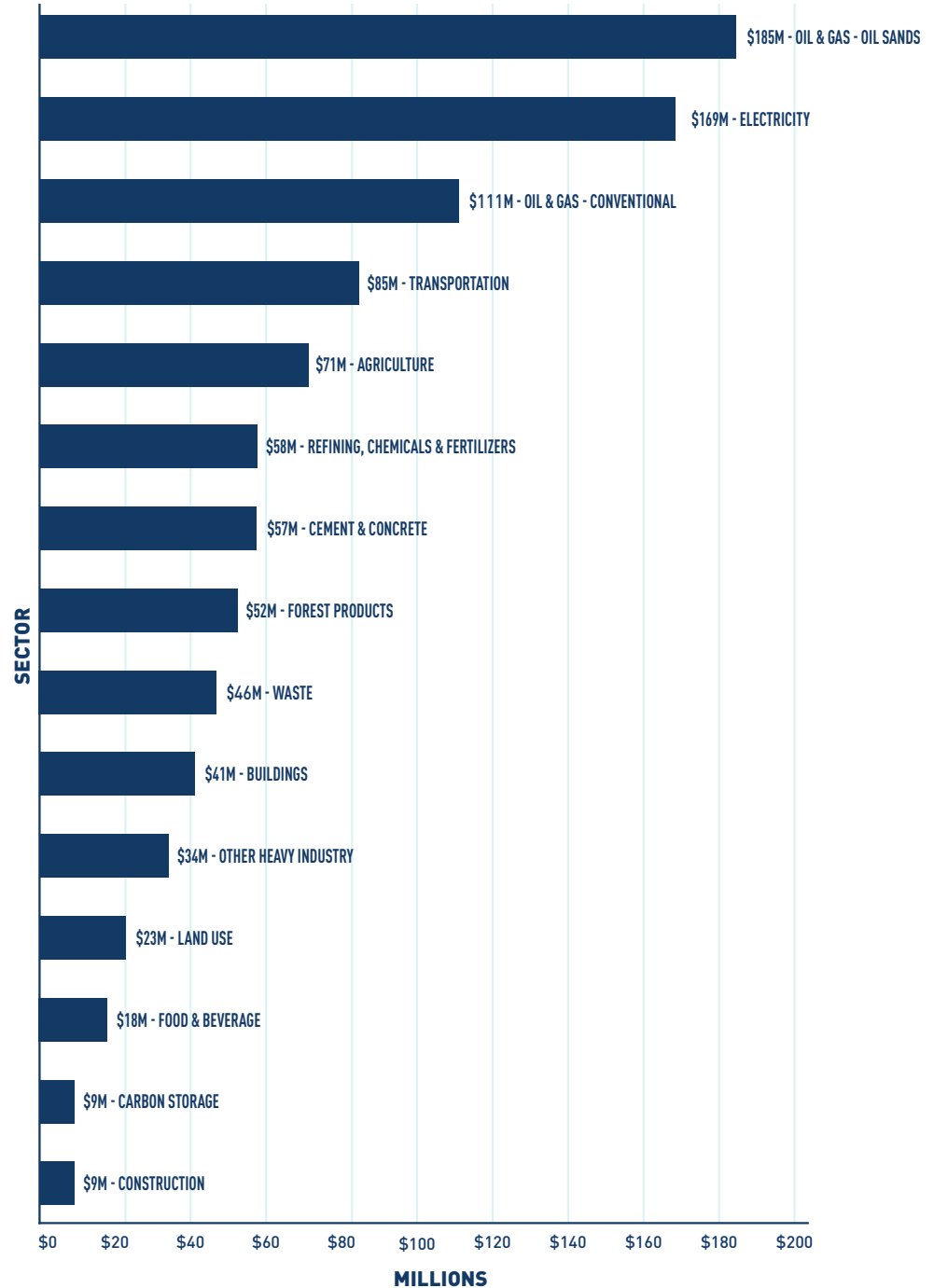
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ALL PROJECTS



**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.

FUNDING BY SECTOR



Disclaimer: ERA presents consolidated portfolio information and forecasted information that relies on proponent assumptions and scenario analysis. Project and operating data used to prepare assumptions that are used in the methodology to calculate GHG emissions are determined by the project recipient and reviewed for reasonableness by ERA. While ERA makes every effort to ensure claims related to emissions performance are accurate, it does not audit underlying information or verify all source data and is not responsible or liable for any environmental claims, environmental performance metrics, or any representations, statements, or claims regarding emissions or emissions reductions contained in this Stewardship Report, or any assumptions or methodologies underlying any such claims.