

CLEAN RESOURCES

CLEAN TECHNOLOGY

BIOENERGY - Waste Conversion

FUNDING DETAILS

Advanced Biorefinery Technology Demonstration for Chemicals Production from Waste and Biomass

Within Alberta and around the world, government commitments are driving towards reduced reliance on landfills for waste disposal, and reduction of GHG emissions in the transportation and industrial sectors to mitigate climate change.

As an established leader in Canada's renewable fuel sector and circular economy, Enerkem is meeting these challenges with innovative technologies to produce high value renewable liquid transportation fuels and chemicals. Enerkem's core technology is commercially proven to convert waste materials to synthetic gas, and then to methanol and ethanol. Enerkem now aims to adapt their technology to produce chemicals including dimethyl ether (DME), as well as acetates and acrylates used in the production of plastics, coatings, and resins. This project focuses on technology development at lab-scale and modelling for a full-scale industrial context.



RECIPIENT:
Enerkem Inc.



TOTAL BUDGET:
\$1,174,000



AI FUNDING:
\$508,000



PROJECT DATES:
APR 2019 -
SEP 2021



PROJECT TRL:
Start: 3
End: 5

APPLICATION

The project will help enable the circular economy by combining the Enerkem technology platform with new processes to produce key chemical building blocks. The new processes being developed allow not only the use of waste as feedstock to produce DME, acetates, and acrylates but allows the production of these materials with a lower carbon footprint than existing processes. Acetates and acrylates are materials used in the manufacturing of plastic and fiber products we encounter every day. DME can be used as a fuel, and as a propellant in consumer products such as hair spray. Production of green chemical products from waste is expected to increase Alberta's GDP while diversifying Alberta's economy and reducing GHG emissions.

ALBERTA INNOVATES CLEAN RESOURCES

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PROJECT GOALS

- Complete bench scale development for multiple chemical processes and model their implementation within an Enerkem facility or bio-refinery.
- Optimize the production of ethanol from biomass and waste material to achieve lower capital and operating cost, and to further reduce GHG emissions.
- Based on Enerkem's proven proof of concept, advance development of more sustainable pathways for producing acetic acid and acrylic acid from waste and biomass, rather than oil and gas feedstocks.
- Model scale-up from the laboratory scale to a full industrial context, and accurately predict process capital and operating cost. Favorable economics increase Enerkem's profitability and market reach.
- Model GHG reductions potential. Enerkem currently estimates reductions of at least 400,000 tonnes/year CO₂ equivalent if the technology is commercially deployed at Enerkem's City of Edmonton facility.

BENEFITS TO ALBERTA

- The green, renewable chemical sector represents an unprecedented economic development and leadership opportunity for Alberta. Sector growth will help diversify Alberta's economy while complementing its existing petrochemical sector.
- Availability of green industrial chemicals within Alberta will give a market edge to local companies which manufacture plastics, resins, and coatings, as well as their customers, including Alberta's oil and gas sector.
- Green chemical production will drive GHG reductions through avoidance of landfill gas emissions and by reducing the carbon footprint of inputs used in the manufacturing of coatings, resins, and super adsorbents.
- Increased diversion of waste also reduces leaching of contaminants into land and water associated with disposing of waste in landfills.



2 Patents



10 Project Jobs



50 - 700 Future Jobs



3 New
Products/Services



Indirect Project
GHGs Reduced



400-500 kt/yr Future
GHGs Reduced

CURRENT STATUS

AUG 2021 - Nearing Completion

The project has proved the ability to produce three chemicals using circular syngas with the lowest carbon intensity possible. The developed technology allows Enerkem to manufacture green chemicals including methyl acetate, acetic acid, and acrylic acid in addition to methanol and ethanol. By using a combination of appropriate chemistry, catalysts, and process conditions, a more environmentally friendly route has been developed. A prototype of each process has been built and tested under industrially relevant conditions to support scale-up and life-cycle assessment. These technologies are currently being evaluated for further scale-up and commercial deployment.