



Natural Resources
Canada

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Canada-Task 33 Update

Gasification in Canada

Travis Robinson

CanmetENERGY-Ottawa

June 2024



Canada 

CanmetENERGY-Ottawa

- Natural Resources Canada (NRCan)
- Wide array of research
 - CCUS
 - Built Environment
 - Metallurgical coke
 - Bio-energy
- Various pilot and bench research facilities
- CFD modelling and systems analysis



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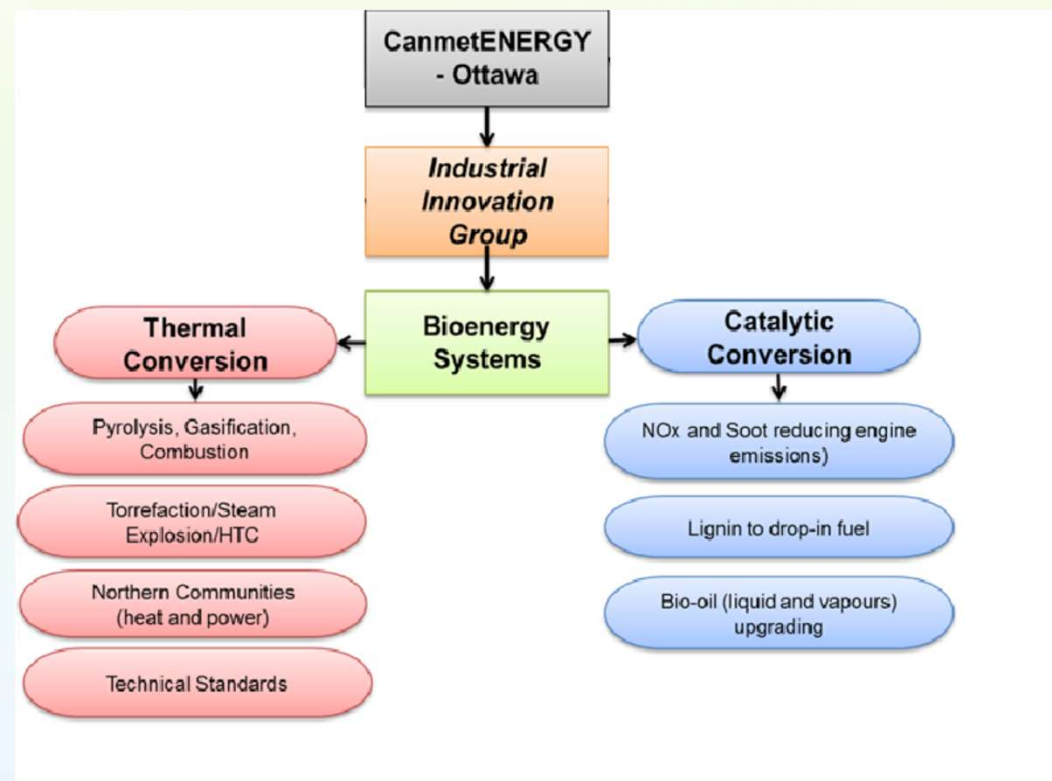
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CanmetENERGY-Bioenergy

- Biomass Gasification research taking place under PERD funded *Gaseous Biofuels for Industrial Decarbonization (new 5 year cycle)*
- Experimental trials 2023-2027
 - Carbonized feed
 - High impact feed (roadside, agriculture, SRF)



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National Research Council (NRC)

- 40 kWth downdraft gasification-spark ignition engine gen-set
- Focused on hydrothermal gasification of bio-liquids HTL and fast pyrolysis oils and slurries
- Also have a group working on syngas fermentation



Hydrothermal conversion facility NRC-Ottawa



University of British Columbia (UBC)



- The Bioenergy Research Development Facility at UBC has operated a Nexterra gasifier since 2012
- 6 MW thermal for campus district heating
- UBC is commissioning a steam-oxy pilot system for advanced fuels research under the direction of Xiaotao (Tony) Bi

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Nexterra

- Nexterra supplied construction and demolition wood fired 10 MW^{el} gasification systems in UK continue to operate successfully in environmentally friendly manner (<https://www.graviscapital.com/news/case-study-birmingham-bio-power-limited>) and are in a rare group of gasification systems built in UK that are still operating and collecting Renewable obligation credits ([Renewables & CHP \(ofgem.gov.uk\)](https://www.ofgem.gov.uk/renewables-and-chp)).
- Nexterra Management has completed Management Buy Out process and the Corporation is operating under the Ownership of former and current Nexterra employees
- Solution for converting organic solid waste into the clean renewable syngas that could be further converted into renewable methane, methanol or hydrogen. Seeking a strategic partner to build a technology demonstration plant.

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ENERKEM



- Edmonton facility (closed recently) 38 million L/a methanol
 - first-ever waste-to-biofuel facility to sell its ethanol under the U.S. Renewable Fuel Standard
- VARENNES facility (under construction)
 - Investment greater than 1 billion announced 2020
 - Commissioning 2025
 - 200 K tonnes waste to 125 million L of renewable fuels annually
 - Work on the foundation is on-going
- Tarragona (with Repsol)
 - 220 million L/a Methanol from 400 tonnes of waste
 - joint venture Ecoplanta Molecular Recycling Solutions
 - Awaiting final investment decision

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Hydrogen Naturally

- Team with experience in gasification of bitumen heavy bottoms at the Sturgeon refinery
- CO₂ from gasification at the Sturgeon refinery has been undergoing sequestration since 2021
- Recreate this success using wood residues instead of vacuum bottoms
- Active in design, financing, and ensuring that government policy recognizes the carbon removal benefits of “their process”



Sturgeon Refinery Redwater, Alberta



Char Technologies

- Fired rotary kiln technology
- Produce biocarbon for AD gas clean up (SulfaCHAR™)
- Interest in using biochar for steelmaking
 - C\$6.6M Strategic Investment by ArcelorMittal and Annual Biocarbon Purchase Agreement announced earlier this year
- Thorold, ON facility under construction
 - 11.3 million invested
 - 20000 GJ/a RNG (kiln gas)
 - 2000 tonnes biochar
 - Start-up 2024
- Recently announced a 500 tonne production run of pelletized carbon



Kiln located at Chat Technology's Thorold Ontario site

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Highbury

- Founded by Dr. Paul Watkinson of UBC
- 2008 to present
- Proprietary dual bed gasifier
- 0.4 tonne/day facility located at UBC
- Medium BTU gas suitable for fuel replacement or upgrading
- Recently awarded some grants
 - study of Highbury gasifier providing renewable fuel gas (RFG) to replace natural gas in a lime kiln.
 - F.E.E.D. study for conversion of Highbury RFG into liquids using FT and internal hydrogen generation.



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