



Natural Resources
Canada

Ressources naturelles
Canada

Canada-Task 33 Update

Gasification in Canada

Travis Robinson

CanmetENERGY-Ottawa

October 2023



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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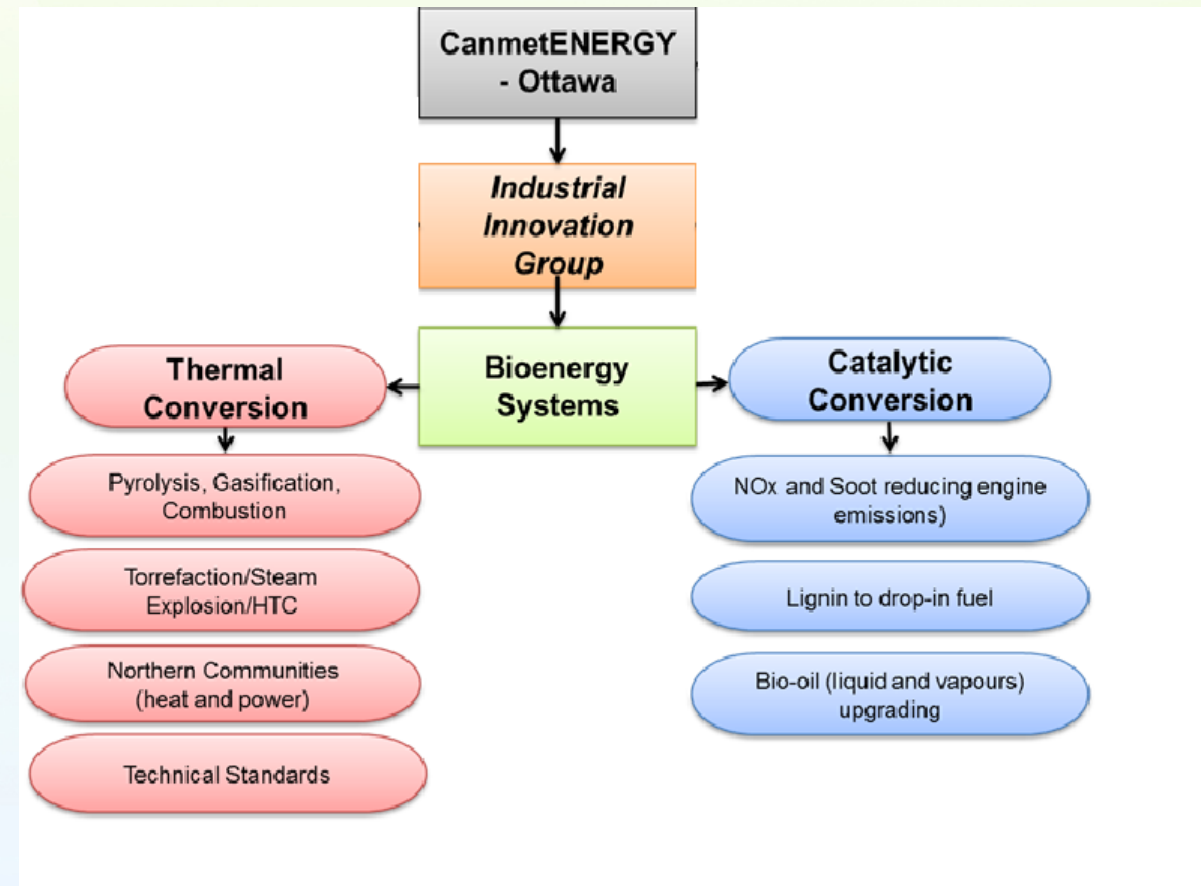
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CanmetENERGY-Bioenergy

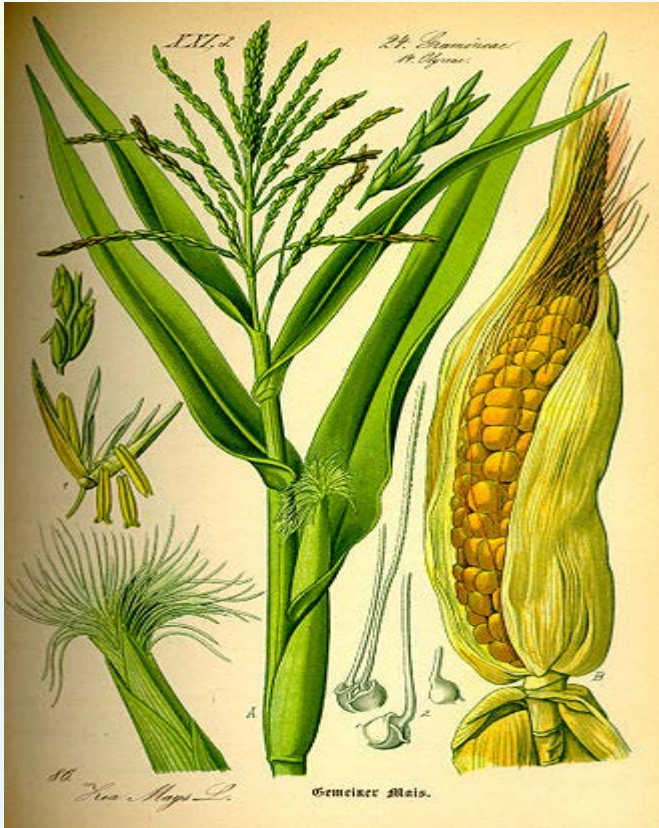
- Biomass Gasification research taking place under PERD funded *Gaseous Biofuels for Industrial Decarbonization (new 5 year cycle)*
- Experimental trials 2023-2027
 - Carbonized feed
 - High impact feed (roadside, agriculture, SRF)



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CanmetENERGY-Bioenergy



- CanmetENERGY, Natural Research Council, and the University of Alberta exploring liquefaction as a pre-treatment for gasification
- Corn stover
- Fast pyrolysis, HTL
- Spray testing, rheometric properties, TGA
- FT hydrocarbons for SAF
- Work on-going recently published *Thermal Decomposition Model of Biocrudes at High Heating Rates for Spray Combustion and Gasification* at the American Flame Research Council's 2023 Industrial Combustion Symposium

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National Research Council (NRC)

- Recent work included downdraft gasification coupled to a spark ignition engine
- Exploring hydrothermal gasification of bio-liquids HTL and fast pyrolysis oils and slurries



Hydrothermal conversion facility NRC-Ottawa

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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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ENERKEM



- Edmonton facility (operating) 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
 - Slated to include 90 MW electrolyser
- 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

- Venture is driven by a 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 pellets instead of bitumen residue



Sturgeon Refinery Redwater, Alberta

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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
- Numerous projects in development US and Canada



Kiln located at Chat Technology's Thorold Ontario site