

Overview of Biorefinery Facilities in Canada - Pilot, Demo and Commercial (last reviewed Nov 2013)

Country – Facility Name	Biomass Feedstock	Bioproducts	Description (e.g.technology, capacity, status)	Classification	Website
Canada					
Lignol Innovations Ltd – pilot-scale biorefinery (Burnaby, BC)	Wood, straw, energy crops	Cellulosic ethanol, lignin, specialty cellulose, acetic acid, lignin, furfural, sugars	Organosolv-based fractionation, hydrolysis, enzymatic saccharification, fermentation, lignin recovery and drying. 1 t/d feedstock pilot plant since 2009. Working on scale-up to 400 t/d.	C6 & C5 sugars and lignin biorefinery for bioethanol, chemicals and biomaterials from lignocellulosic crops or residues	www.lignol.ca/info@lignol.ca
Bio-economy Technology Centre – pilot plant located at Resolute Forest Products pulp and paper mill (Thunder Bay, ON)	Wood chips from a sustainably managed forest certified under Forest Stewardship Council	574,000 tonnes per year of market pulp, newsprint, commercial printing papers; 43MW cogeneration plant; 10 kg/hr lignin sold for product development (e.g. industrial resins, carbon fibre)	Traditional Kraft mill production with new 10 kg/hr lignin pilot scale production facility. The lignin is separated from the black liquor using an acidification process.	3 platform (pulp & paper, lignin, electricity&heat) biorefinery using wood chips for pulp & paper, lignin and bioenergy	www.resolutefp.com Pilot plant: http://www.cribe.ca/projects/content/projects/article/fpinnovations-lignin-pilot-plant
Enerkem - pilot facility (Sherbrooke, QC)	Over 25 different types of feedstocks	Small quantities of syngas, methanol, acetates and second-generation ethanol	Biomass gasification, catalytic conversion of syngas	Syngas biorefinery using a variety of biomass feedstock for biochemicals and biofuels	www.enerkem.com
GreenField Ethanol Inc. cellulosic ethanol pilot facility (Chatham, ON)	Low to high lignin cellulosic feedstocks (residues and purpose grown crops)	Cellulose and hemicellulose sugar monomers, cellulosic ethanol, acetic acid, distillers grain, CO ₂ , lignin used for process energy	Percolation/hot water/steam explosion pretreatment equipped with proprietary Modified Extruder Technology followed by hydrolysis, fermentation of C5 and C6 sugar monomers, and the production of acetic acid	4-platform (C6&C5 sugar, distillers grains, acetic acid, heat) biorefinery using agriculture and forest residues for bioethanol, chemicals, value added products and bioenergy	www.greenfieldethanol.com

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Enerkem - demo facility (Westbury, QC)	wood waste from used utility poles	Cellulosic ethanol, methanol	Biomass gasification, catalytic conversion of syngas Production capacity: 5 million litres per year	Syngas biorefinery using wood waste and other residues for biofuels and biochemicals	www.enerkem.com
Domtar commercial Kraft pulp and paper mill with new demo facility - CelluForce joint venture between Domtar and FPInnovations (Windsor, QC)	Wood chips from sustainably managed forest certified under Forest Stewardship Council and Sustainable Forestry Initiative	Uncoated freesheet papers; Bleached hardwood market pulp; Bioenergy; nanocrystalline cellulose (NCC) for product development	Traditional Kraft pulp and paper production with new patented acid hydrolysis demo plant producing 1 t/d nanocrystalline cellulose (NCC); A portion of the mill's Kraft pulp is converted into NCC. The NCC plant includes acid recovery and anaerobic treatment of effluent that produces biogas.	3 platform (pulp & paper, nanocrystalline cellulose, electricity&heat) biorefinery using wood chips for pulp & paper, nanocrystalline cellulose and bioenergy	www.domtar.com Demo plant: www.celluforce.com
Highmark Renewables (Vegreville, AB)	Wheat grain, cattle manure, slaughtering waste	Ethanol, DDGS used as animal feed, fertilizer, electricity and heat (used internally)	Conventional biochemical conversion process to produce ethanol integrated with an anaerobic digester next to a cattle feedlot	Biogas and C6 sugars biorefinery for bioethanol, animal feed, fertilizer, electricity and heat from organic residues and starch crops	www.highmark.ca
Ensyn -commercial facility (Renfrew, ON)	Wood residues from flooring plant and sawmill	Food flavouring, polymer resins and bioenergy used internally	Fast pyrolysis using Rapid Thermal Processing (RTP) technology; pyrolysis oil fractionation	Pyrolytic liquid biorefinery for resins, food flavouring, and heat from wood residues	ww.ensyn.com
Permolex International - commercial facility (Red Deer, AB)	Wheat (grain)	Ethanol, flour and gluten food ingredients, DDGS sold for animal feed, CO ₂	Integrated flour mill, gluten plant and ethanol production facility; grain fractionation; conventional grain ethanol plant	C6 sugar biorefinery for bioethanol, animal feed, and food ingredients from starch crops	www.permolex.com

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GreenField Ethanol Inc.- commercial facility (Chatham, ON)	Corn (grain)	Ethanol, corn oil, DDGS sold for animal feed, CO ₂ sold for industrial uses; 2013: use of CO ₂ and heat by adjacent greenhouse	Conventional biochemical conversion process to produce ethanol (197 million litres per year) and DDGS (132,000 tonnes per year); High speed centrifuge extraction produces 3,500 tonnes per year of corn oil.	C6 sugar biorefinery for bioethanol and 2 animal feed products from starch crops	www.greenfieldethanol.com
Alberta Pacific Forest Industries - commercial pulp mill with new methanol purification system (Boyle, AB)	Wood (aspen, poplar) from sustainably managed forest certified under Forest Stewardship Council	650,000 tons of bleached Kraft pulp per year; 50 MW cogeneration plant selling power to the grid; 4,000 tons per year of biomethanol used internally or sold as solvent, antifreeze, fuel, or for formaldehyde production.	Traditional Kraft pulp production with new 4,000 t/yr bio-methanol extraction & purification commercial demo unit. The unit, a 2 stage distillation proprietary technology, was developed by A.H. Lundberg Systems Ltd. It converts steam stripper off gas, a by-product stream from the chemical recovery area of the Kraft pulping process, into high purity methanol.	3 platform (pulp, stripper off gas, electricity&heat) biorefinery using wood chips for Kraft pulp, electricity and biomethanol	www.alpac.ca Methanol production: http://www.alpac.ca/content/files/BioMethanolNewsRelease.pdf
Enerkem Alberta Biofuels waste-to-biofuels facility - Commercial under construction (Alberta, QC)	Sorted municipal solid waste	Cellulosic ethanol, biomethanol	Biomass gasification, catalytic conversion of syngas Capacity: 38 million litres per year Subsidiary of Enerkem Inc.	Syngas biorefinery using municipal solid waste for biofuels and biochemicals	www.enerkem.com
Vanerco waste-to-biofuels facility - Commercial under development (Varenes, QC)	Sorted industrial, commercial and institutional waste	Cellulosic ethanol, biomethanol	Biomass gasification, catalytic conversion of syngas Capacity: 38 million litres per year 50/50 joint venture between Enerkem and GreenField	Syngas biorefinery using industrial, commercial and institutional waste for biofuels and biochemicals	www.enerkem.com