Biomass Clusters:

Building upon existing Industry

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Outline

- Introduction
- BIC the catalyst
- Cluster concept
- Building off of strengths
- Clusters in Canada
- The Bioeconomy Model Cluster
- Story of necessity
- Changes driving Clusters
- The Canadian opportunity
- Summary

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Bioindustrial Innovation Canada

Mission

- BIC provides critical strategic investment, advice and services to business developers of clean, green and sustainable technologies. Our expertise in commercialization builds a stronger Canada.

Vision

- To create jobs and economic value sustainably for Canada

Strategic Pillars

- Cluster Builder
- Critical Strategic Investment Fund
- Strong Leader for Commercialization

BIC support comes from;

Agriculture and AgriFood Canada(AAFC)

FedDev, Innovation Science and Economic Development

MRI, Ministry of Rresearch and innovation, Ontario

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CLUSTER CONCEPT
Michael Porter

A cluster is a geographic concentration of related companies, organizations, and institutions in a particular field that can be present in a region, province, or nation. Clusters arise because they raise a company's productivity, which is influenced by local assets and the presence of like firms, and infrastructure that surrounds it.

KEY CONCEPTS

CLUSTERS Increase Productivity and operational **Efficiency**

CLUSTERS stimulate and enable **Innovation**

CLUSTERS facilitate **commercialization** and new business formation

Farm Coop to Biomass Processing to Sugars to chemicals to consumer products – the full value chain

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What are Strength Requirements for a Cluster

- Expertise
- Knowledge
- Policy of Commercialization
- Feed stocks (Biomass)
- Supportive Communities
- Focused on Future

- A key Ingredient for success- Everyone on the same train

Early Hybrid Clusters Across Canada

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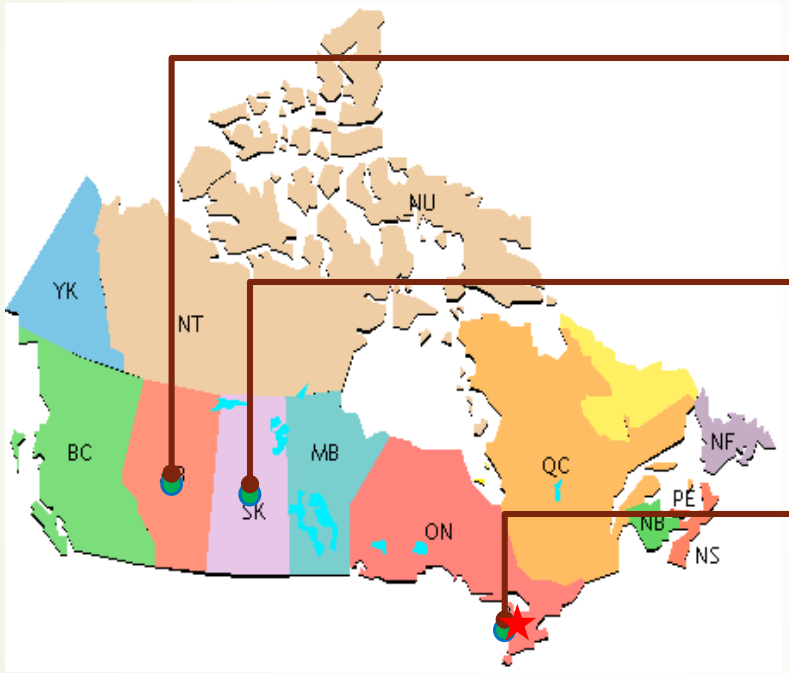
Conversion of existing Industry to the twenty first Century Industries



Drayton Valley
- CO_2 Capture + Conversion
- Forestry Infrastructure
- Agri and Forest Biomass

Saskatoon
- Internationally Renown Agricultural Reputation
- Innovation Place
- Infrastructure
- Agri Biomass

Sarnia-Lambton
- **First BioHybrid Cluster**
- Petrochemical, Energy, Manufacturing Infrastructure
- Close to Markets
- Agri and Forest Biomass

Hybrid - Working with and leveraging existing industry and market infrastructure

Other Bioeconmy Clusters Forming Across the Country – Ontario- Thunder Bay; Port Colborne; Johnstown; Alymer; Alberta – Edmonton, Heartland; Manitoba, Winnipeg (Fibres); NS – Liverpool; others in Quebec and BC with forestry focus.

The Bioeconomy Cluster Model

The Model

- Will vary by location, feedstock, and focus(biochemicals; biomaterials; bioenergy, etc.)
- Will have training for the cluster businesses – College and/or University partners
- Will have access to Innovation and research facilities.
- Will have assistance for site information and development
- Will assist with accessing funding support
- Will have biomass access locally

Tapping the Power of Biomass

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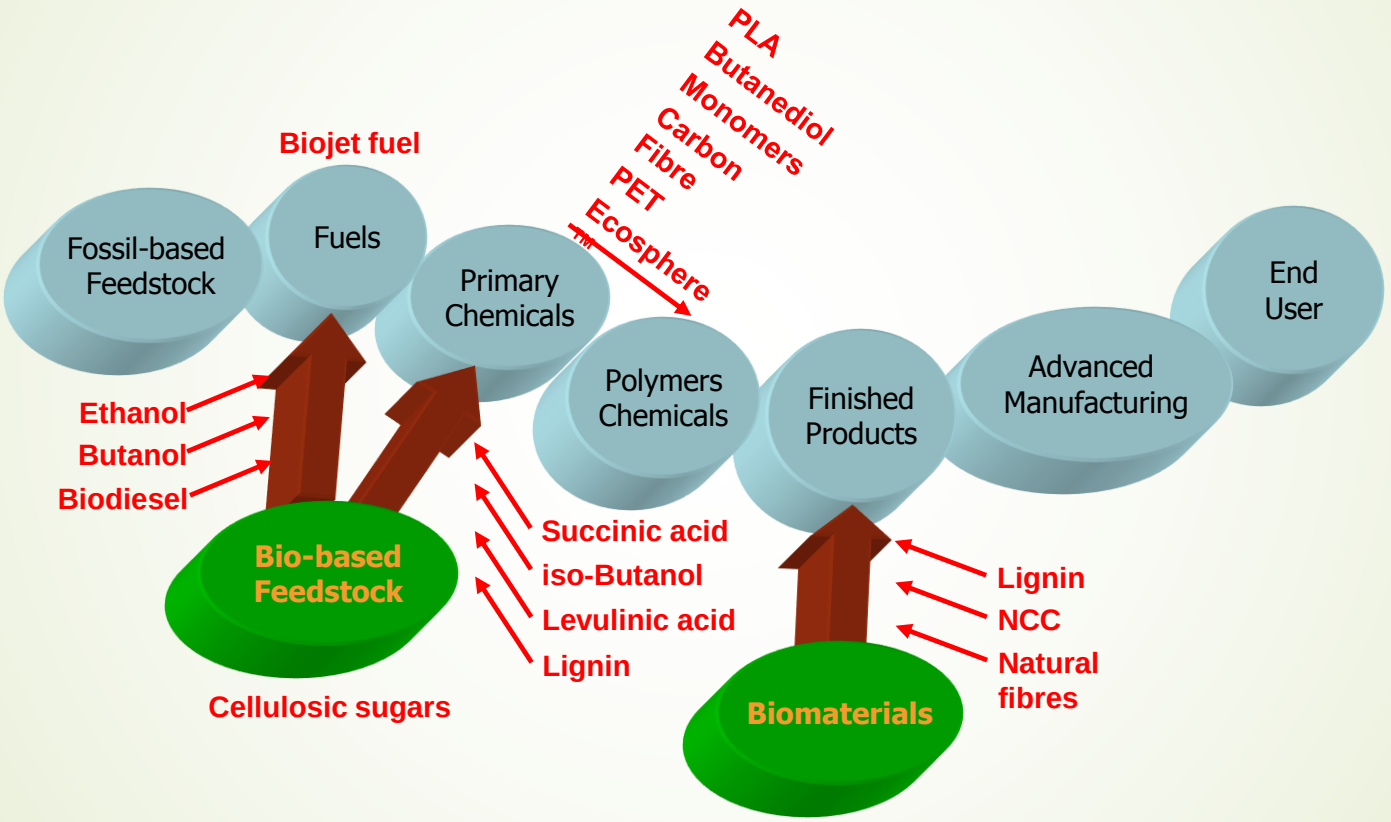
Integrating into the Hybrid Chemistry Value Chain

The key to growing a sustainable Bioeconomy

The Sarnia Model



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SARNIA CLUSTER
Story of Necessity

A Petroleum Cluster since 1860

Lead to growth and prosperity.

However in 1990's it became a diminishing workforce

Hence a series of reviews and consultation lead to the decision to establish a green and sustainable cluster around the existing cluster.

Biobased Chemistry for two reasons:

- Maintain
- Build the Future

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CHANGES DRIVING THE SARNIA CLUSTER

- 1. Changes in the Petroleum and Chemical Industry in North America

  -Restructuring

  -Shale gas

  -Old Facilities and limited expansion

  -Global Focus on Green and Sustainable
- 2.Climate Change and GHG reduction policies
- 3. Consumer demands for Environmentally Sustainable products
- 4. Innovations are leading the way

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Sarnia Hybrid Cluster today

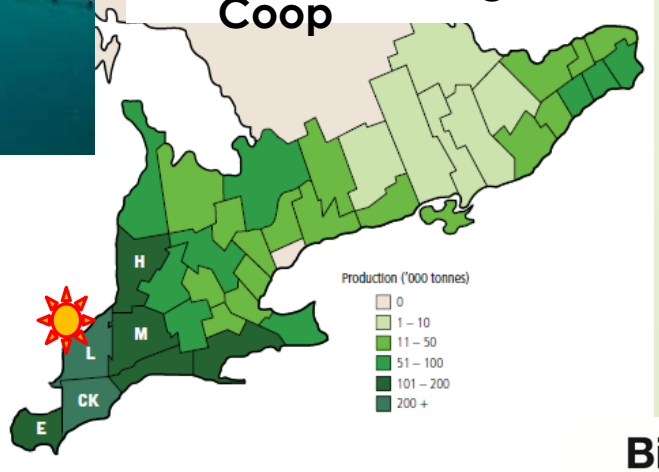
Fossil Based

- Air Products
- BP Energy
- CF Industries
- DuPont
- Ethyl Corporation
- Exxon-Mobil
- Arlanxeco
- NOVA Chemicals
- Pembina
- Praxair
- Royal Dutch Shell
- Styrolution
- Suncor Energy
- TransAlta Energy

Bio/Renewable Based

- BioAmber
- Cargill
- Enbridge
- Greenfield Energy
- Biox
- KmX
- SuncorEthanol
- Woodland Biofuels
- Greencore Technologies
- Ubiquity
- Comet
- Cellulosic Sugar Coop

•80% of Ontario soybeans and corn within 200km



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Companies Are Moving To Locations Of Feedstocks, Large Markets And Capital

Markets are developing where biomass and capital are at:

- North and South America
- SE Asia and Australia
- China
- Europe (forestry and energy)

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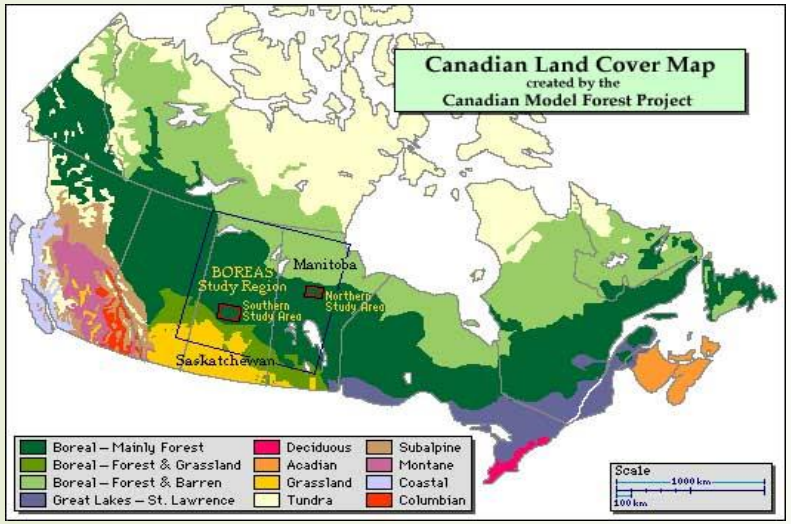
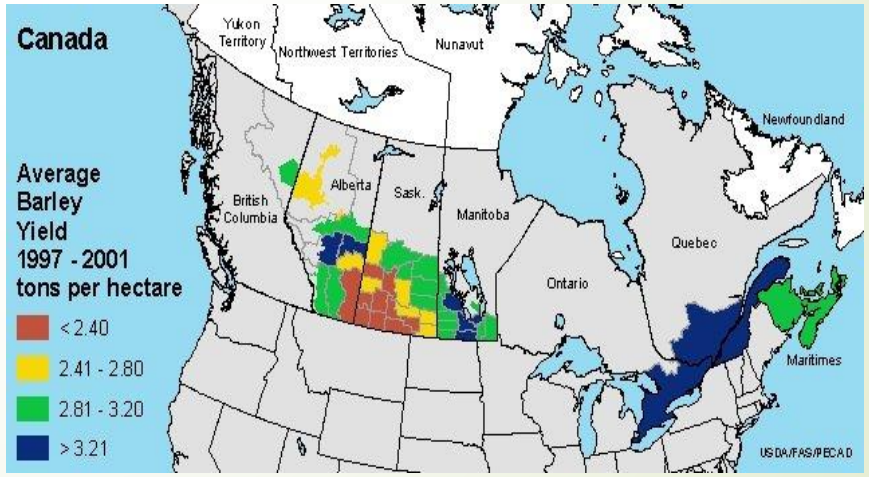
Global Trends Give Canada a Leadership Position

Biomass is the Key Ingredient and Canada has Large amounts of Agricultural and Forestry Biomass

Forestry



Agriculture



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WHY TODAY? CHANGE is a constant in Corn Production-BIOMASS will be part of the future

- 2010 – 165 bushels
- 1985 - 102 bushels
- 1960 – 40 bushels

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International Connectivity – a Key to Growth for Clusters

BIC Partnerships

-Biobased Delta, Netherlands

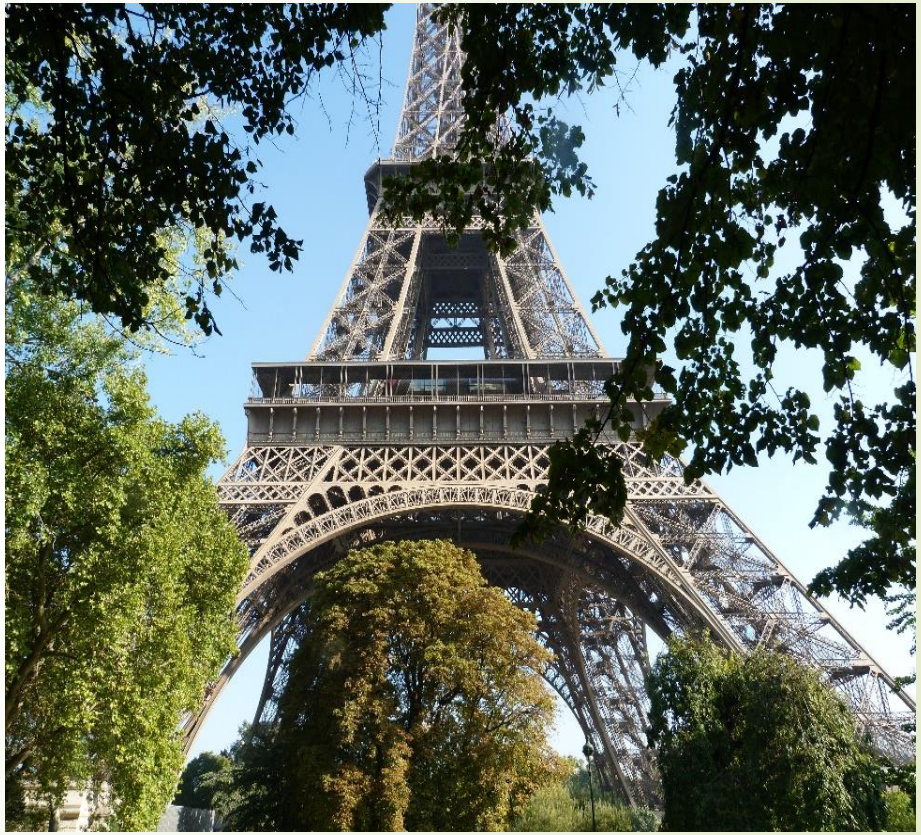
-CLIB 2021, Germany

-Queensland, Australia

-Michigan Biotechnology Institute, United States

-VITO, Belgium

-Others:Malaysia;South Africa;and Argentina



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SUMMARY

- CLUSTERS are key to building a Bioeconomy industry in Canada
- Canada has the key ingredients to be a global leader
- Consumers are going o demand the clean technologies and products when priced right.
- Biomass is the key ingredient to produce biofuels and energy, biobased materials, and Biobased chemicals.
- Hybrid clusters – a partnership of the old and new will be critical to create success.
- The 21st century, one where Canada can take a leadership role.

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Thanks for Listening

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