Growing Sustainable Bio-economy Clusters

Biomass as a key ingredient

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Outline

• Introduction
• Change
• Cluster Development – Sarnia model
• Bioindustrial Innovation Canada
• Facilities in cluster
• Opportunities and partnerships
• Summary
World Population Growth

[Graph showing world population growth over time with a map indicating population density.]
R&D And Therefore Innovation Occurs In Cycles

Bioeconomy
Demands of Major Megatrends Will Drive Future Innovation

Context for Development

Energy Security

Food & Nutrition Security

Global Climate Change

Sustainability

Limited Land

Limited Water

Agricultural & Forest Production

Food

Fiber

Feed

Renewables
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)
“The ability to learn faster than the competition is often the only sustainable competitive advantage a company (or country) can have.”

Arie de Geus
CHANGE is a constant in Corn Production-BIOMASS will be part of the future

- 2010 – 165 bushels
- 1985 - 102 bushels
- 1960 – 40 bushels
Global Trends Give Canada a Leadership Position

Biomass is the Key Ingredient and Canada has Large amounts of Agricultural and Forestry Biomass
Early Hybrid Clusters Across Canada

Converging Fossil and Bio-Based Industries

Drayton Valley
- CO2 Capture + Conversion
- Forestry and oil/gas
- 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

Working with and leveraging existing industry and market infrastructure
What is needed to Build a Hybrid Cluster

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

A key ingredient for success - Everyone on the same train
The Cluster Concept Sarnia, 2002

• WHY? Changes in the Petroleum and Chemical Industry in North America
  Restructuring
  Shale gas
  Old Facilities and no expansion
  Global Focus on Green
The Community of Sarnia Lambton Coalesced Around a Strategy

• A Strategy: Hybrid Chemistry

• A Vision: World Leading Hybrid Chemistry Cluster
  - Create a sustainable and green future through partnerships to develop the cluster
  - build on your strengths

The Community seen a new Future
Bioindustrial Innovation Canada Mission: Create jobs, economic value sustainably for Canada

How we do it

Commercialize bio-based and sustainable chemistry technologies through networking and investment

Catalyze the establishment of networked hybrid clusters in Canada

VALUE DRIVEN (high quality jobs, economic wealth and environmental sustainability)

FOCUSED ON DELIVERING COMMERCIALIZATION

Identifying Opportunities

Obtaining Results

Creating More Opportunities

Repeating the Success

Bioindustrial Innovation Canada
A Sustainable Chemistry Alliance
**Integrating into the Hybrid Chemistry Value Chain**

The key to growing a sustainable bioeconomy

- **Fossil-based Feedstock**
  - Ethanol
  - Butanol
  - Biodiesel

- **Bio-based Feedstock**
  - Cellulosic sugars

- **Fuels**
  - Biojet fuel
  - Ethanol
  - Butanol
  - Biodiesel

- **Primary Chemicals**
  - Succinic acid
  - Red Butanol
  - Levulinic acid
  - Lignin

- **Polymers Chemicals**

- **Finished Products**

- **Advanced Manufacturing**
  - PLA
  - Butanediol
  - Monomers
  - Carbon Fibre
  - PET
  - Ecosphere™

- **Biomaterials**
  - Lignin
  - NCC
  - Natural fibres

- **End User**
The Opportunities: Pilot facilities and Industrial Brownfield Sites

There are three companies in the accelerator today—Woodland Biofuels; GreenCore Technologies; and KmX.

The Two BioIndustrial Parks are attracting tenants.
Creating Success

- BIC manages a fund through SCA that functions as a catalyst to change the Valley of Death to the Valley of Hope.

- To date, invested 5.3 million dollars in 14 companies, which translated into these companies raising 144 million in that round.

- Three companies have completed IPO’s for a total of 205 million

- Not all are winners

- Over the last 5 years we have seen job creation of 335 direct jobs; 1588 indirect jobs and 783 construction jobs
Opportunities to Build New Industries in Partnership with existing

• Bio-refinery processes for biomass utilization and value add technology platforms
• Marketing of bio-products from food and biomass processing
• Biomass production and engineering:
  - Novel biomass production systems
  - Crop, livestock and forest residues
  - Newer bio-fibre products
  - Microbial and algae derived biomass
Sarnia Hybrid Cluster today

**Fossil Based**
- Air Products
- BP Energy
- CF Industries
- DuPont
- Ethyl Corporation
- Exxon-Mobil
- LANXESS
- NOVA Chemicals
- Ontario Power Generation
- Pembina
- Praxair
- Royal Dutch Shell
- Styrolution
- Suncor Energy
- TransAlta Energy

**Bio/Renewable Based**
- BioAmber
- Cargill
- Enbridge
- Greenfield Ethanol
- Methes Energy
- KmX
- Solutions4CO2
- Suncor Ethanol
- Woodland Biofuels
- Greencore Technologies
- Plantform

-80% of Ontario soybeans and corn within 200km
International Connectivity – a Key to Growth

BIC Partnerships (MOU’s)

- Biobased Delta (Netherlands)
  - Queensland Australia
  - Michigan Biotechnology Institute (United States)
  - Others: Malaysia; South Africa; and Argentina
Connectivity and Partners to Share Success

A Sample of our Connectivity through Established Relationships

Canadian Industry

Public Sector and Not for Profit

International
Summary

We are in a world of CHANGE, rapid Change, which provides us with a tremendous opportunity as a nation and Community to be global leaders

The Opportunities:
1. An opportunity to demonstrate global leadership in bio-based and sustainable industry with Sarnia as model to build from.
2. An opportunity to integrate the fossil based, non-fossil and biogenetic industries by encouraging hybrid development
3. An opportunity to create a national sustainability strategy to add value to regional and Canadian natural resources
4. An opportunity to create international partnerships to make a better world
Thanks for Listening

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