Canada's Industrial Bioeconomy
Seizing the Opportunity



Scaling Up 2019 Conference

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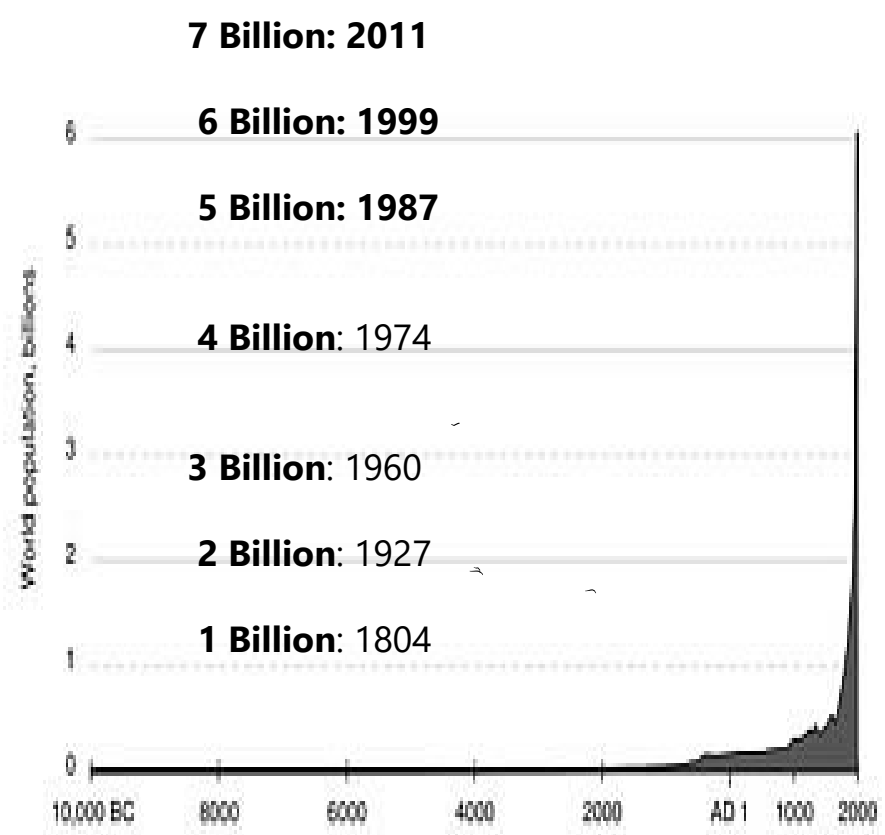
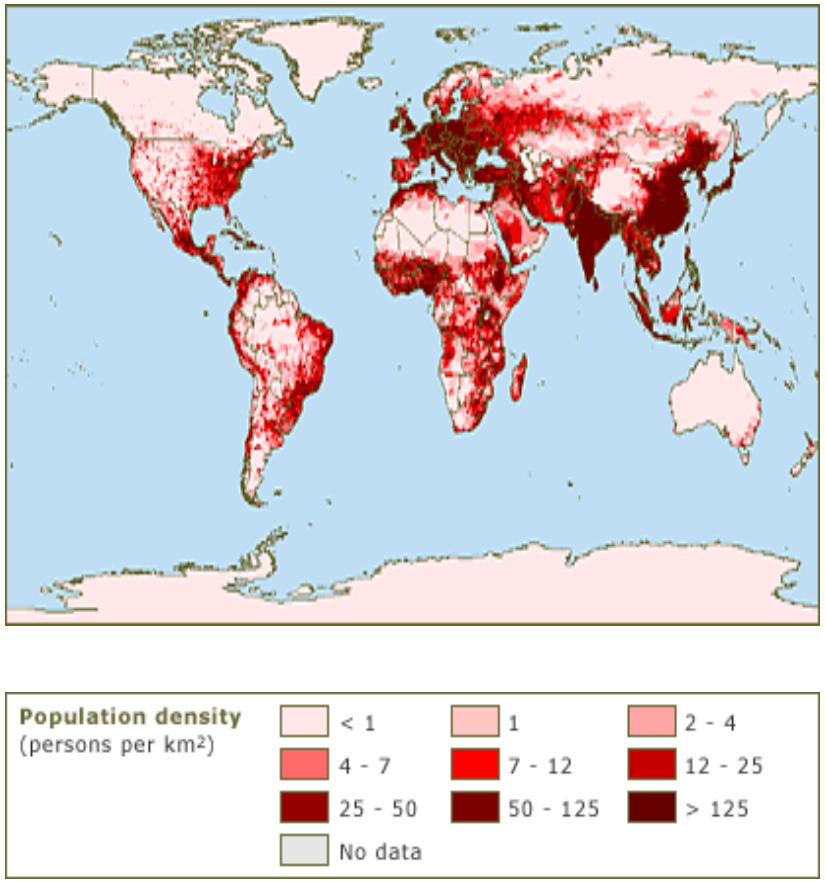
BioDesign

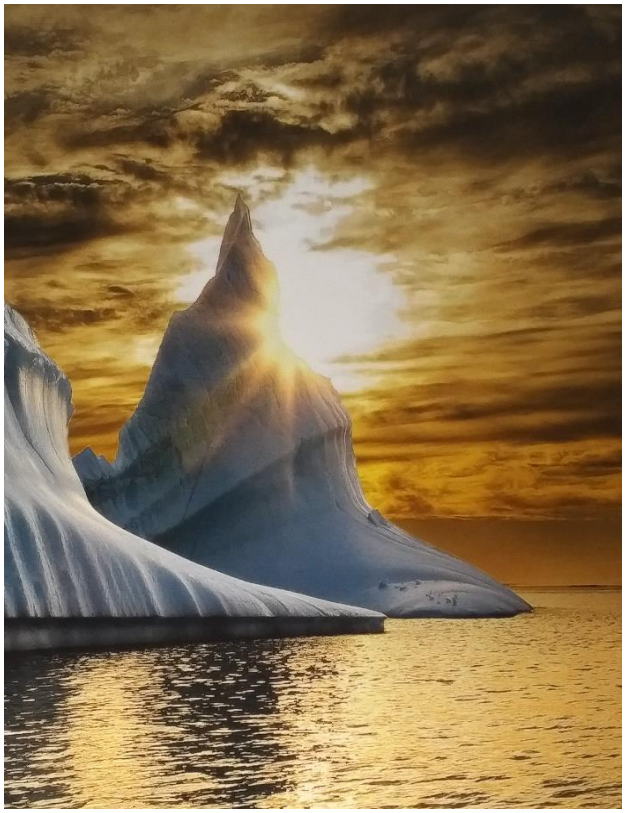
Why Are We on a Critical Path?
World Population: At 7.7 Billion and growing





Why Are We on a Critical Path?
Climate Change: We are now feeling the impacts

- **Ice caps melting and ocean levels rising**
- **Ocean acidification and warming**
- **More severe weather events**
- **Permafrost thawing in North**
- **Longer crop growing season by 2 – 3 weeks in Canada over last 40 years**



The science is well documented

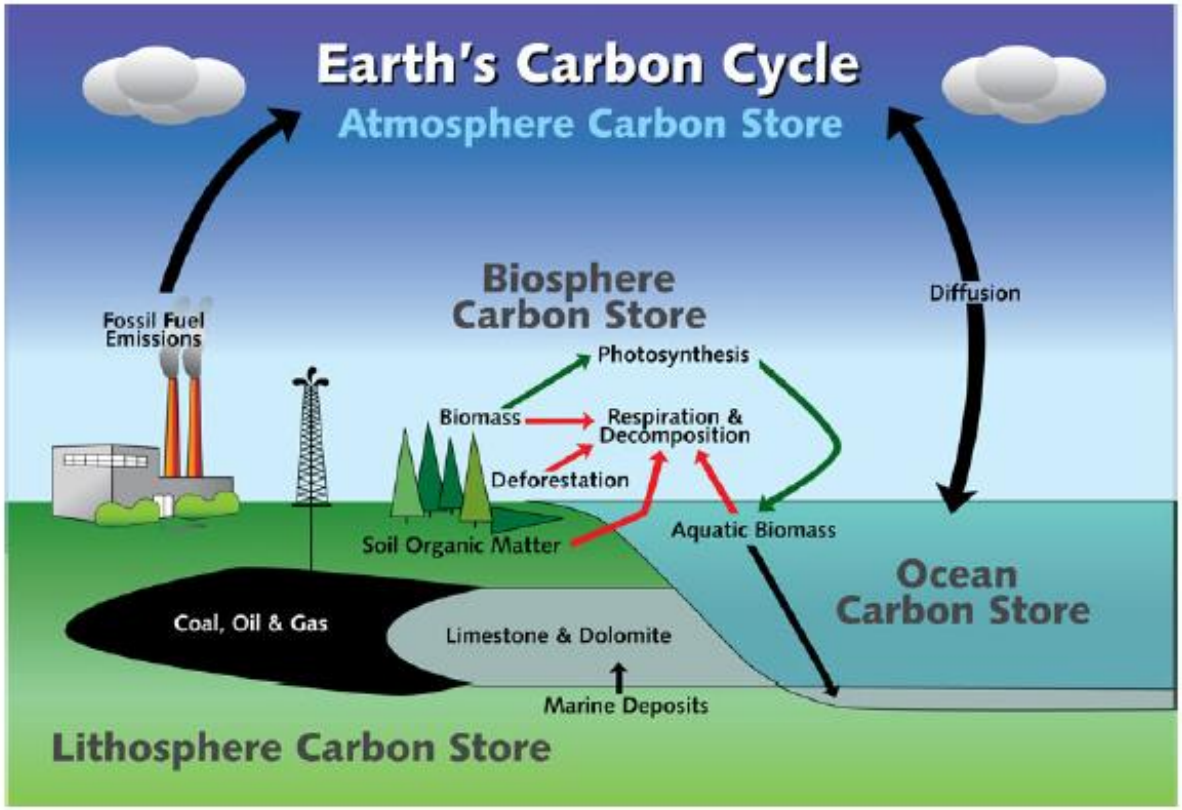
How Must We Respond?
Transition to a low carbon economy

Burning fossil fuels creates GHG emissions from lithospheric sources

Photosynthesis is nature's process for energy capture and carbon sequestration

Creating a low carbon economy requires innovation:

- **develop lower fossil fuel emission options**
- **create lower GHG process technologies**
- **focus on Earth's Carbon Cycle and Biosphere Carbon Store**



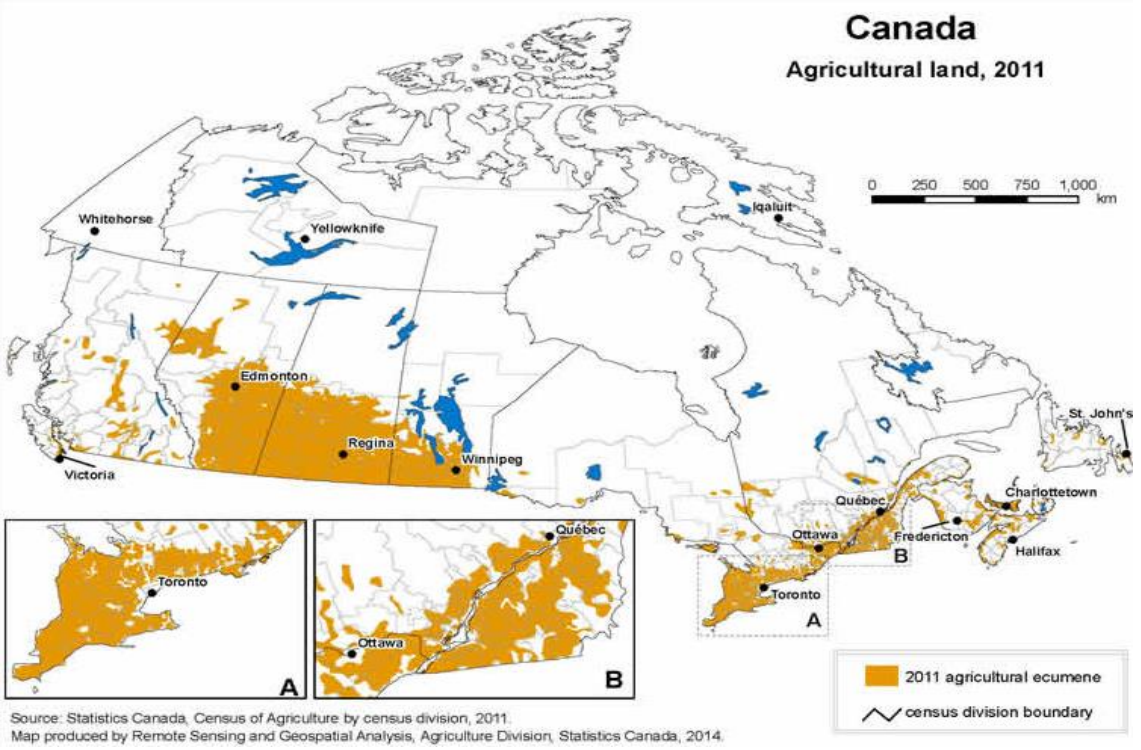
How Must We Respond?
Use available biomass from Canada's agriculture

Leveraging Agri-Processing:

- **Agricultural residues from cereal grain production**
- **Oil from industrial oilseeds**
- **Purpose-grown crops such as miscanthus, switchgrass and algae**

Emerging Bioproduct Clusters:

- **Brassica crops grow well in the Prairies (canola, carinata)**
- **80% of Canada's corn and soybeans grow within 200 km of the Sarnia-Lambton Hybrid Chemistry Cluster**
- **Quebec has a strong agricultural cluster near Varennes**
- **Western Canada plant protein 28 M hectares of farmland supporting 60 MMT of high-protein crops**



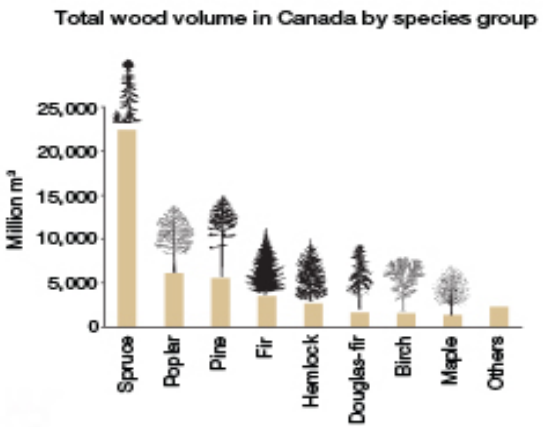
Great source of sustainable, high-quality feedstock

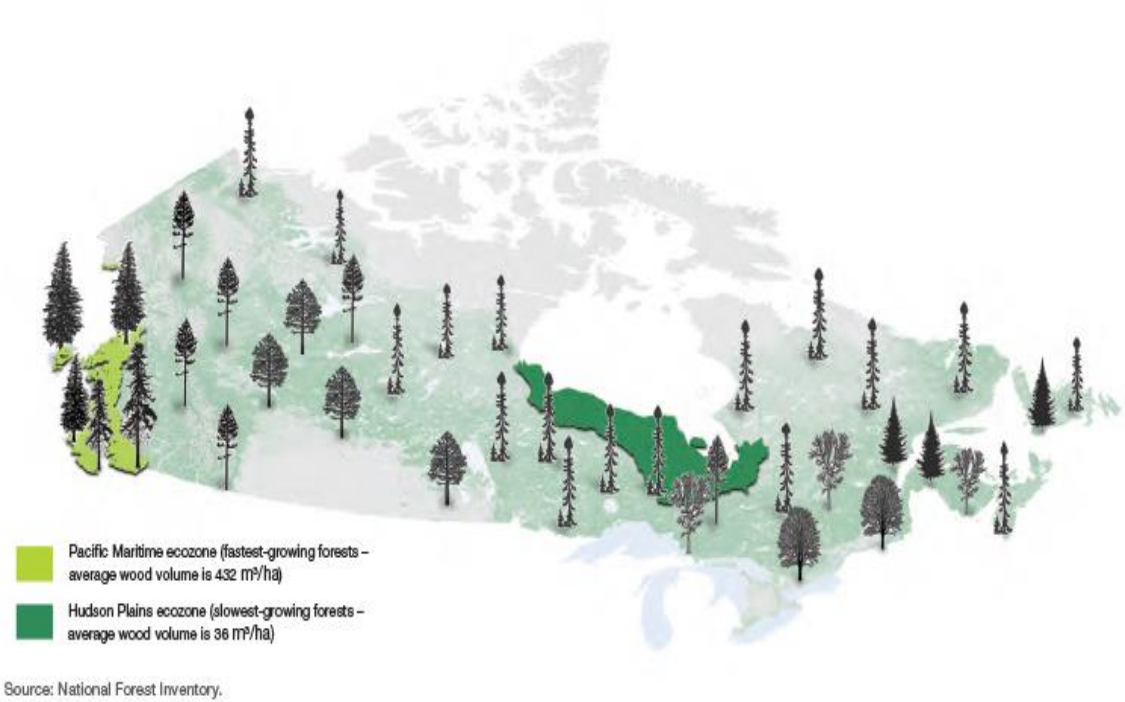
How Must We Respond?
Manage Canada's forests – 347 million hectares

Where does wood grow in Canada?

Canada's forests contain 47 billion m^3 of wood from different species, mostly spruce

Most forests are relatively slow growing, but some are highly productive





Source: National Forest Inventory.

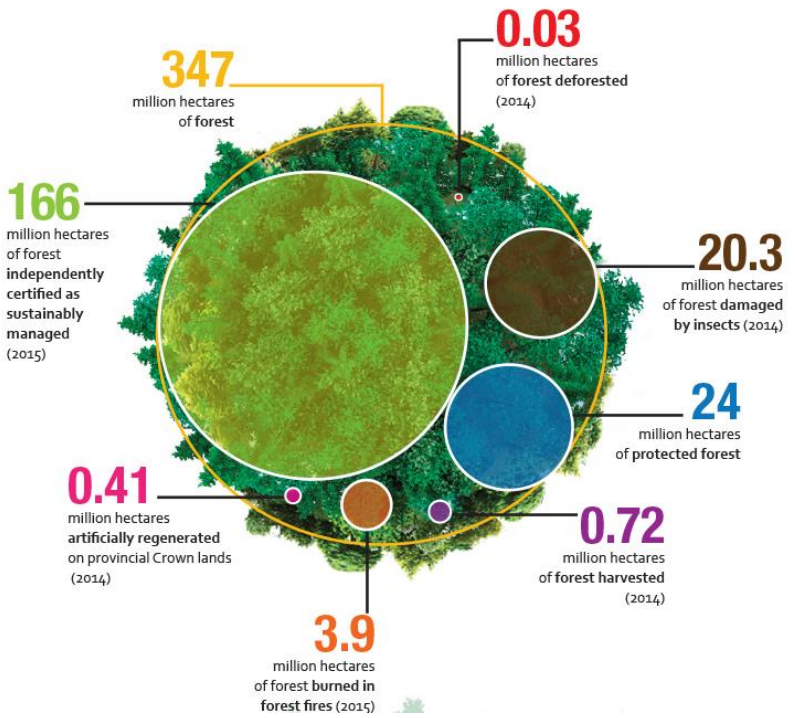
How Must We Respond?
Leverage infrastructure & sustainable supply chains

Existing Infrastructure:

- **Lumber and forestry products companies with existing supply chains**
- **Pulp and paper facilities providing a base for the development of biorefineries and clusters**

Emerging Bioproduct Industry Clusters:

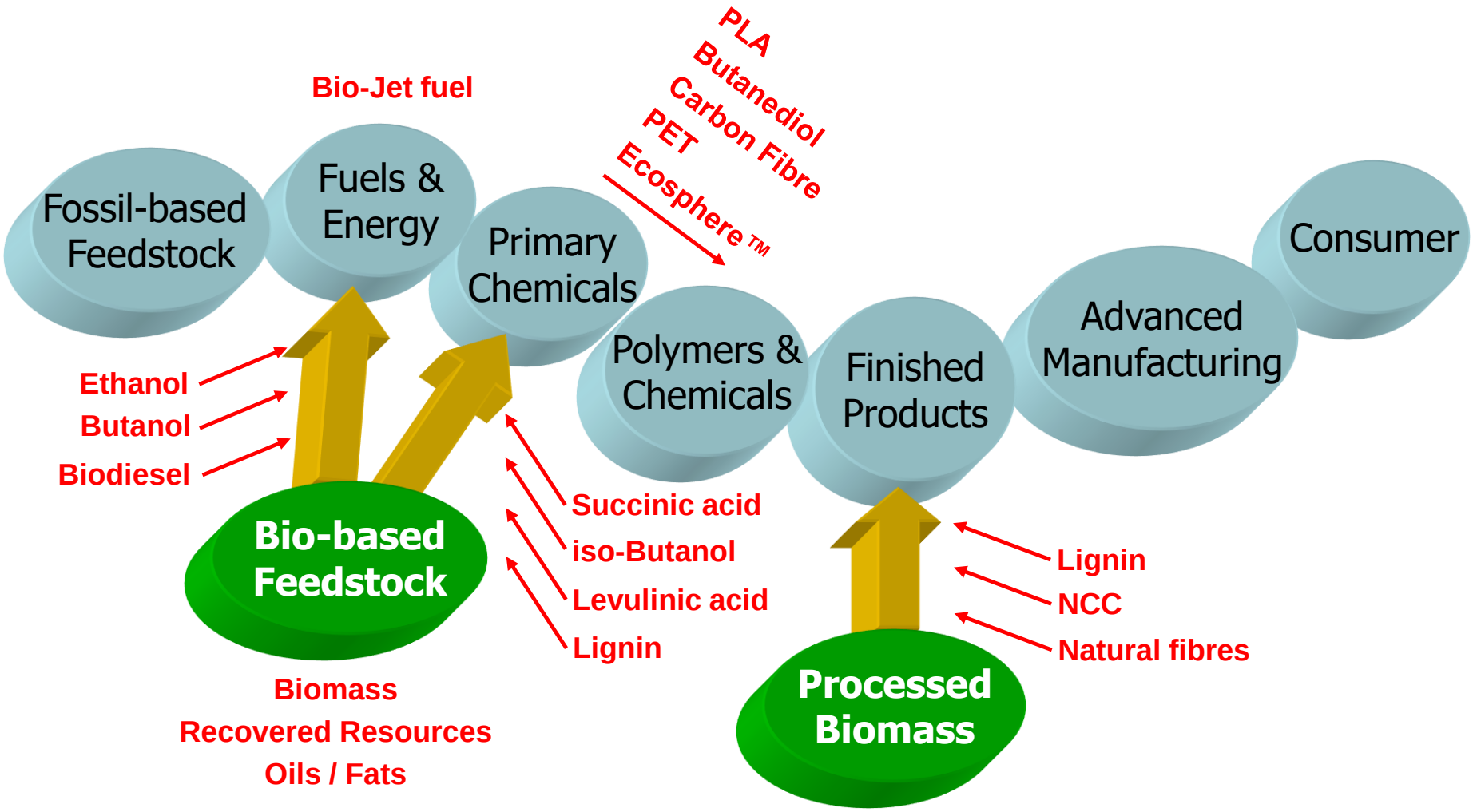
- **British Columbia – Prince George**
- **Alberta – Drayton Valley, Hinton**
- **Northern Ontario – Thunder Bay**
- **Eastern Ontario – Leeds & Grenville / Maitland**
- **Quebec – La Tuque, Trois Riviéres / Bécancour**
- **Atlantic Canada – Nova Scotia, New Brunswick**



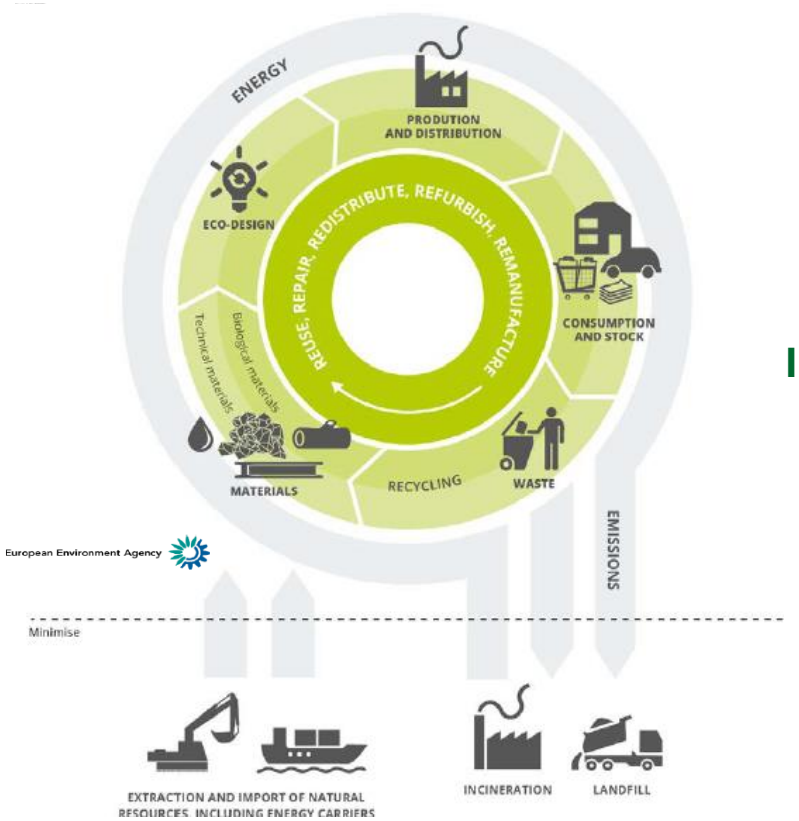
Canada's Forests – 50% Sustainably Certified

How Must We Respond?

Integrate into the hybrid chemistry value chain



How Must We Respond?
Integrate into the Circular Economy



Circular Economy:

- Key strategies include circular supply chains, eco-design, reuse, recovery, and recycling of resources
- In Europe, the bioeconomy and circular economy are being combined to address the issues of climate change and resource consumption

Integration of the Bioeconomy:

- Strategic advantage for Canada as we have 10% of the world's forests (50% certified sustainable) and significant availability to agricultural materials.
- Use bio-based, non-biodegradable materials where there is a benefit over fossil alternatives and can be effectively recycled at end of life
- Use bio-based, biodegradable materials where risk of dispersion into the ecosystem is high (e.g. lubricants and disposable products)

These answers are not possible without *COMMERCIAL ADOPTION* of bioprocesses, bioproducts, and the recycling and reuse of existing materials

What is the BioDesign?

The BioDesign consortium concept formed in 2017 around a collective mission to build and support highly-innovative Canadian firms who seek to commercialize new bio-based products and sustainable biomass-to-bioproducts technologies

Bioindustrial Innovation Canada is a not-for profit business accelerator providing critical investment, advise and services to early stage companies with clean, green and sustainable technologies

FPInnovations is a not-for-profit R&D private organization that specializes in the creation of solutions that accelerate the growth of the Canadian forest sector and its affiliated industries to enhances their global competitiveness

Forest Products Association of Canada (FPAC) is a trade association which represents Canada's wood, pulp and paper producers both nationally and internationally in government, trade, and environmental affairs

BIOTECanada is dedicated to the sustainable commercial development of biotechnology. This involves the introduction of new products and processes to improve health, agriculture, the environment, and industrial operations

Industry Consultations Across Canada

Participation:

- 10 sessions
- 7 provinces
- Additional industry survey
- > 400 participants
- 146 companies
- 62 industry associations

View from Industry:

"The priorities were chosen because they are shared across the bioeconomy and were validated at both the in-person consultation sessions and through the industry survey"

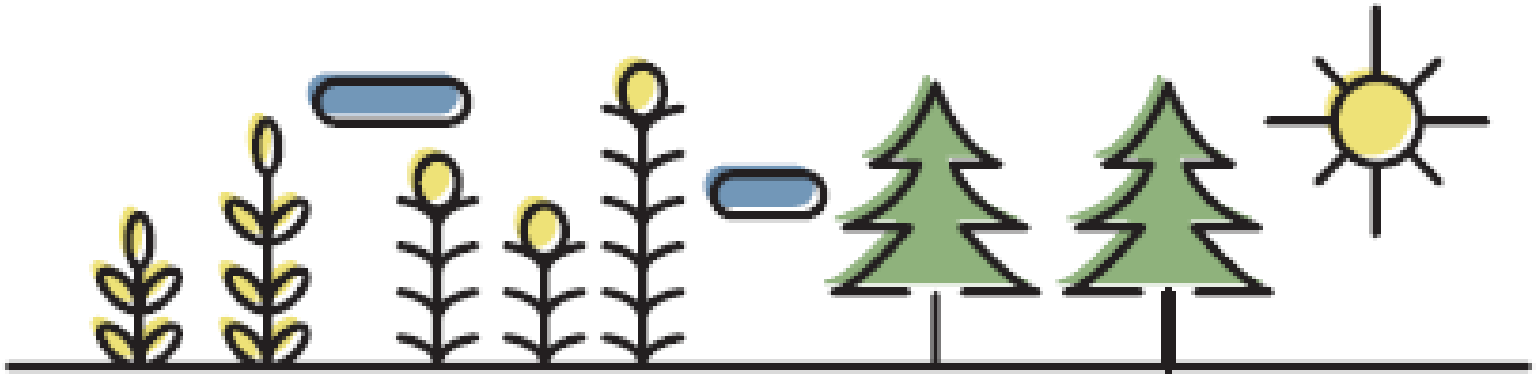
What Did We Hear?
Priorities for success in Canada

Create a business climate that supports scaling up Canadian companies in the bioeconomy and makes Canada a priority for investment

Establish committed and patient innovation policy and financing

Develop innovation clusters and ecosystems which are key to success and for the inclusion of rural and northern communities

Build anchor companies in Canada which includes decision-making and supplier development within subsidiaries of multinational corporations



Canada's Industrial Bioeconomy Strategy
Seizing the opportunity for all Canadians

A Shared Vision for Canada

- Promote the highest valorization of Canadian biomass and residuals
- Promote the objectives of a reduced and sustainable carbon footprint through best management practices
- Create pan-Canadian collaboration to leverage regional strengths and opportunities
- Integrate Canada's bioeconomy into the global circular economy

A Shared Commitment from government, academia and industry to:

- Align on the "Four Key Priority Areas"
- Take action to deliver on the recommendations

A Call to Action requires us to:

- Establish strong communication channels within Canada
- Gain support from industry and government to foster business-led collaboration between multiple organizations, including: SMEs, academic and research institutions, large corporations, and incubators/accelerators to accelerate commercialization in the bioeconomy - BioDesign
- Create economic benefits while delivering low carbon solutions for Canadians

Transformation Requires Building New Commercial Relationships

The bioeconomy is a key component of the success of circular economy activities in Canada, specifically the deployment of biomass that can be sustainably managed and replenished. The transformation requires building new commercial relationships, redesigning and reinventing products and packaging, developing technologies, making investments, and changing production methods

The current models of production, distribution and disposal need a radical transformation to enable a smarter, more productive cycle of productivity to emerge – one that will reveal both the economic and environmental benefits currently being overlooked. Unilever believes that the CELC* can kickstart the critical mass of support needed across businesses, government and civil society to allow this economic transformation to occur.

JOHN D. COYNE
VICE-PRESIDENT & GENERAL COUNSEL
UNILEVER CANADA
CO-CHAIR.
CIRCULAR ECONOMY LEADERSHIP COALITION

*The Circular Economy Leadership Coalition (CELC) is an initiative of Smart Prosperity

The answers to climate change, food security, and population growth are not possible without *COMMERCIAL ADOPTION* of bioprocesses, bioproducts, and the recycling and reuse of existing materials

The industrial bioeconomy is an integral part of the solution and needed for an economically viable circular economy in Canada

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