BRITISH COLUMBIA

FPInnovations

Clean-Tech Innovation Strategy for the B.C. Forest Sector

2016–2024

"One of the keys to having a globally competitive forest sector is the commitment to innovation, whether it's new harvesting techniques, looking to break the barriers on tall wood buildings, or commericalizing new wood products. British Columbia's forest sector leads the way."

Honorable Steve Thomson,
Minister of Forests, Lands and
Natural Resource Operations

"The forest industry contributes to a low-carbon future through its sustainable forest practices and the production of green building materials. We are uniquely positioned to further that contribution through development of high-value, wood-based alternatives to an incredible variety of products, from construction materials and auto parts, to cosmetics and chemicals. Clean-tech, bioenergy and nanotechnology innovation are transforming the forest sector."

James Gorman, Vice President, Corporate and
Government Relations, West Fraser

Innovation Leadership with Forest Sector Partners

- Ministry of Forests, Lands and Natural Resource Operations
- Ministry of Technology, Innovation and Citizens' Services
- FPInnovations' industry members
- Natural Resources Canada
- Western Economic Diversification Canada
- Coast Forest Products Association
- Council of Forest Industries
- University of British Columbia

Extended Partners

Colleges and universities

Indigenous communities

Canadian Wood Fibre Centre

Resource industry associations

Wood WORKS! BC

Forestry Innovation Investment Ltd.

BC Wood

Canada Wood Group

Ministry of Environment

Ministry of Transportation and Infastructure

Canadian Wood Council

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About FPInnovations

FPInnovations is a not-for-profit world-leader that specializes in the creation of scientific solutions in support of the Canadian forest sector's global competitiveness and responds to the priority needs of its industry members and government partners. It is ideally positioned to perform research, innovate, and deliver state-of-the-art solutions for every area of the sector's value chain, from forest operations to consumer and industrial products. FPInnovations' staff numbers more than 525. Its R&D laboratories are located in Vancouver, Québec City, and Montréal and it has technology transfer offices across Canada. For more information about FPInnovations, visit: www.fpinnovations.ca.

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Ministry of Forests, Lands and Natural Resource Operations' Priorities and Principles:

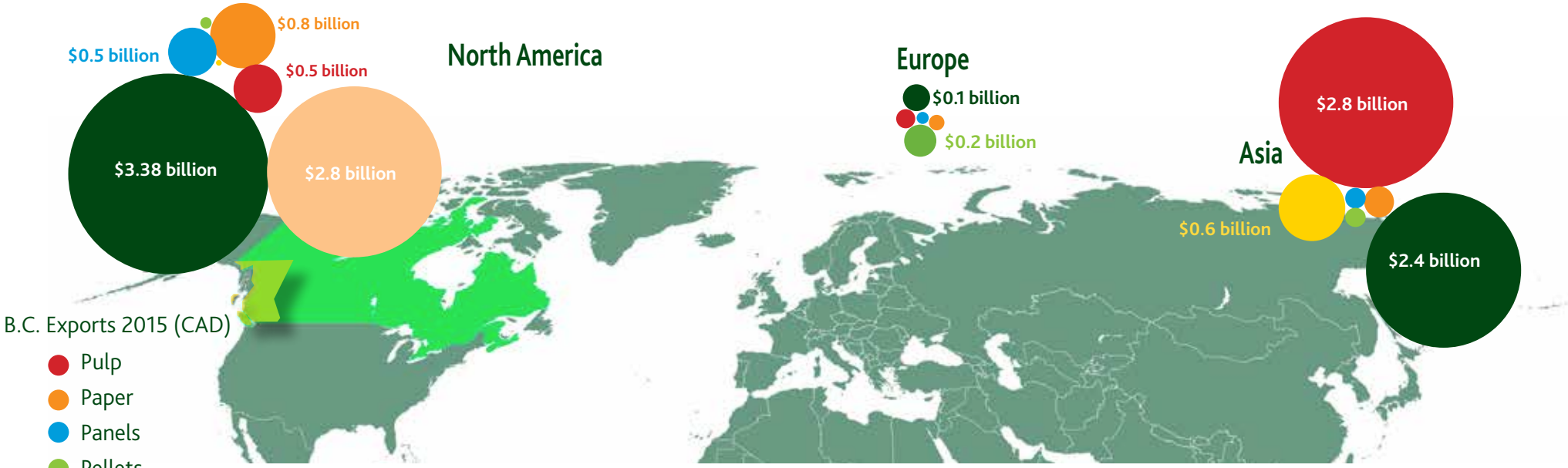
Clean-Tech Development, Adoption, and Sector Innovation

A committed effort to adapt, adopt and develop technologies and innovations will help the B.C. forest sector benefit from the new competitive realities in the global clean-tech and natural resource-based bio-economy.

One strategic action highlighted in *Strong Past, Bright Future: A Competitiveness Agenda for British Columbia's Forest Sector* is support for this FPInnovations strategy with the goal of maintaining a diverse, globally competitive industry.

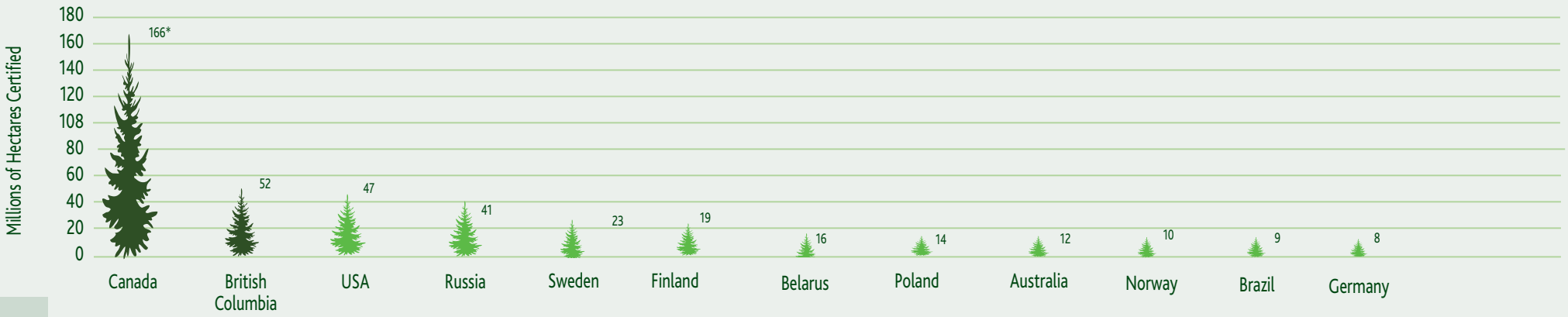
A Strong Past	B.C.'s forest sector advantages have supported the provincial natural resource economy since the formation of the province.
2016	Traditional advantages alone will not ensure the long-term success of the B.C. forest sector in the 21st century.
A Bright Future	A committed effort to remain adaptive and enhance flexibility to develop cutting-edge innovations and benefit from the global clean-tech and natural-resource-based bio-economy.

B.C.'s Forest Sector is Global



Source: FPInnovations

British Columbia: Forest Certification in the Global Context



*Source: www.certificationcanada.org as of December 31, 2015. *Double counting of areas certified to more than one standard has been removed from this figure.

A Competitive Forest Sector Supports Communities Across B.C.

B.C.'s forest sector delivers well-paying jobs, many of them in communities, and contributes taxes for important services for British Columbians.

JOBS

65,500 direct jobs (2015)

COMMUNITIES

More than 140
communities in B.C. depend on the forest sector

GDP

$8.8 billion of GDP,
$5.4 billion direct (2015)

TAXES

$1.7 billion of total tax revenue (2015)

TRANSPORTATION

20% of all rail traffic in B.C. (2014)

20% of shipments through Metro Vancouver (2015)

EXPORTS

$12.9 billion - 38.1% of Canada's total forest sector exports (2015)

B.C. is one of the world's largest exporters of softwood lumber products, and a significant global producer of pulp, paper, and bioenergy

MANUFACTURING

20% of all B.C. manufacturing
Lumber sales $8.6 billion

Pulp and paper $4.5 billion (2015)

*Source: StatsCan, Port Metro Vancouver, Ministry of Forests, Lands and Natural Resource Operations

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Clean-Tech Innovation Strategy for the B.C. Forest Sector

Ultimate Goal:

Innovation driving commercialization to enhance the forest resource and product value.

Innovation - a key component to competitiveness

A sound, fully supported strategy and related research and development commercialization program is key to get the highest value from B.C.'s forest resources

Research and development projects guided by our partnership with the commercial sector and provincial and federal governments

THEME 1

Innovation - a key component for:

Enhanced Economic Viability

Enhanced Economic Viability

GOAL:

Demonstrate the viability of new products and clean technologies to enhance the value chain and advance the B.C. forest sector.

OUTCOMES:

- Increase value from forest fibre
- Diversify customer and product base
- Increase margins for core products

Innovation Driving Commercialization to Enhance the Forest Resource and Product Value

Implement Advanced Processing Technologies

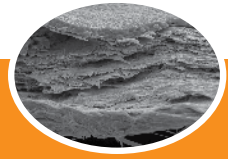
Harvesting, wood products, pulp & bioproducts

- Steep slope harvesting (access to full allowable annual cut)
- Increased utilization from the landbase (increased value per cubic metre from cutblocks)

Develop Innovative Products from B.C. Forests

Generating new returns from B.C.'s diverse species (new revenue)

- New biomaterial applications - cellulose filaments, lignin (new markets)
- Extractives from B.C. tree species



Adopt Wood Building Systems

Position B.C. as a global leader in the design, engineering, and supply of large wood structures and components

- Hybrid systems and tall wood buildings (grow the market for wood)
- Modern timber bridges

Enhance Future Transport

Targeting efficient collection, distribution, and delivery of forest feedstocks and products

- Greenhouse-gas–efficient truck configurations for B.C. (reduce unit cost and emissions)
- Effective movement of biomass, logs, chips, lumber, pulp

THEME 2

Innovation - a key component for:

Environmental Sustainability

Environmental Sustainability

Innovation Driving Commercialization to Enhance the Forest Resource and Product Value

Position B.C. as a clean technology leader in developing processes, tools, and technologies to identify and support carbon value, sustainable resource development, and environmental monitoring.

GOAL:

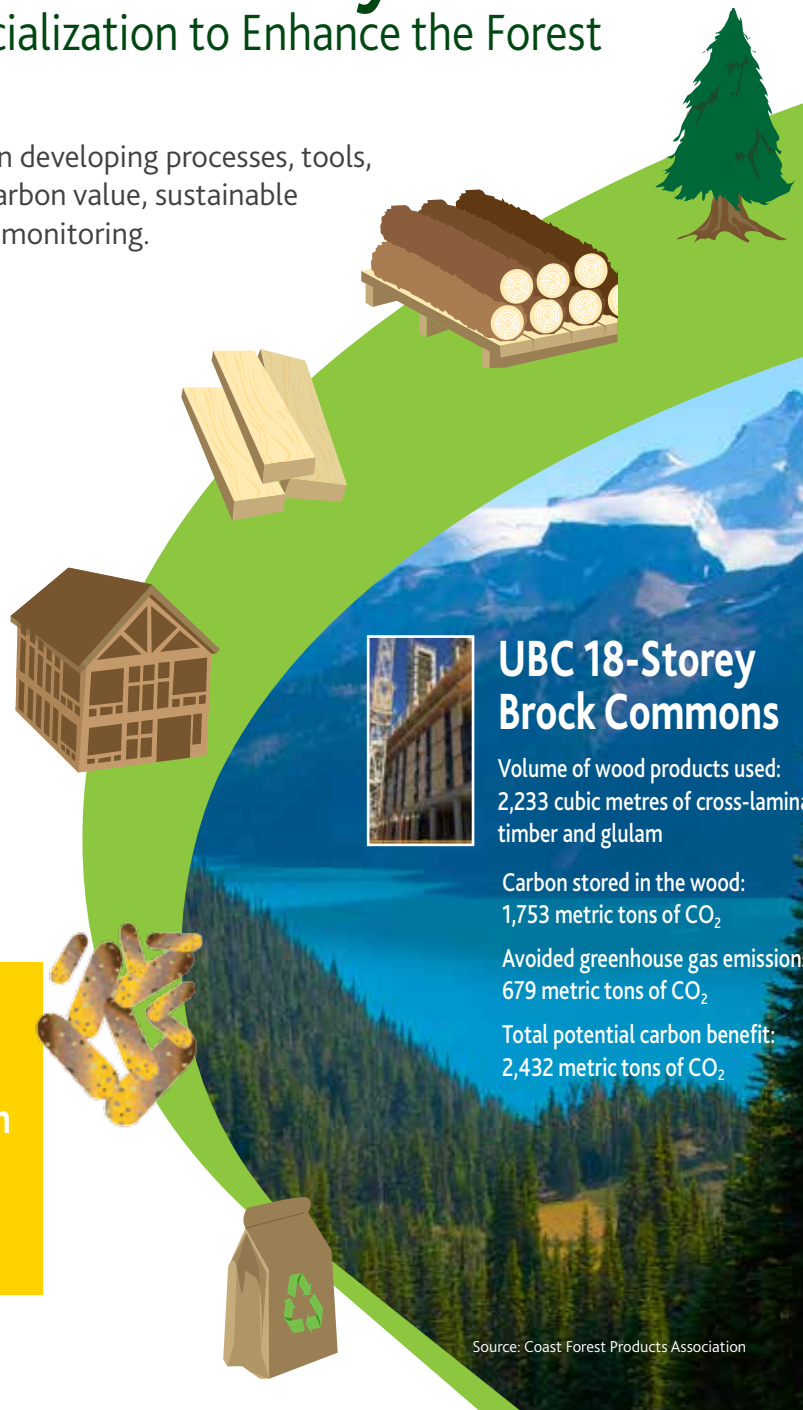
Capture the value of carbon and maintain sustainable resource leadership.

OUTCOMES:

- Balance resource values on the land-base – water, wildlife, timber, tourism, non-timber products, minerals, energy
- Maintain public acceptance to resource development
- Prepare for and mitigate impacts of climate change

"In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre, or energy from the forest, will generate the largest sustained mitigation benefit."

Intergovernmental Panel on Climate Change 2007 Fourth Assessment Report, Mitigation.



UBC 18-Storey Brock Commons

Volume of wood products used: 2,233 cubic metres of cross-laminated timber and glulam

Carbon stored in the wood: 1,753 metric tons of CO_2

Avoided greenhouse gas emissions: 679 metric tons of CO_2

Total potential carbon benefit: 2,432 metric tons of CO_2

Source: Coast Forest Products Association

Position B.C. to be a Leader in Capturing Carbon Value → **Proactively Manage Wildfire/Water for Climate Change** → **Develop Tools & Technologies for World-Class** → **Enhance Clean-Tech Collaboration on the Land Base**

THEME 3

Innovation - a key component for:

Aboriginal and Community Technical Support

Aboriginal and Community Technical Support

Innovation Driving Commercialization to Enhance the Forest Resource and Product Value

Strengthen capacity in Aboriginal communities to play an active role in B.C.'s new forest bio-economy.

Develop clean technologies and forest sector innovation programs to support value-added opportunities for small and medium enterprise industrial clusters.

GOAL:

Resilient and prosperous forest-based communities, in partnership with First Nations.

OUTCOMES:

- Increase value from forest fibre
- Manage long-term stability in community infrastructure
- Enhance and diversify rural GDP and jobs

Strengthen Capacity

- Rapid market response for B.C.'s value-added manufacturers
- Building capacity within Aboriginal communities

Develop and Support Clean Technologies

- Develop clean technologies to support value-added opportunities
- Product and business development

Build Business-to-Business Relationships

- Broker for win-win
- Match resource development strategies with existing infrastructure

GOAL:

Establish an effective governance structure that drives innovation.

Governance Structure

Guiding Principles

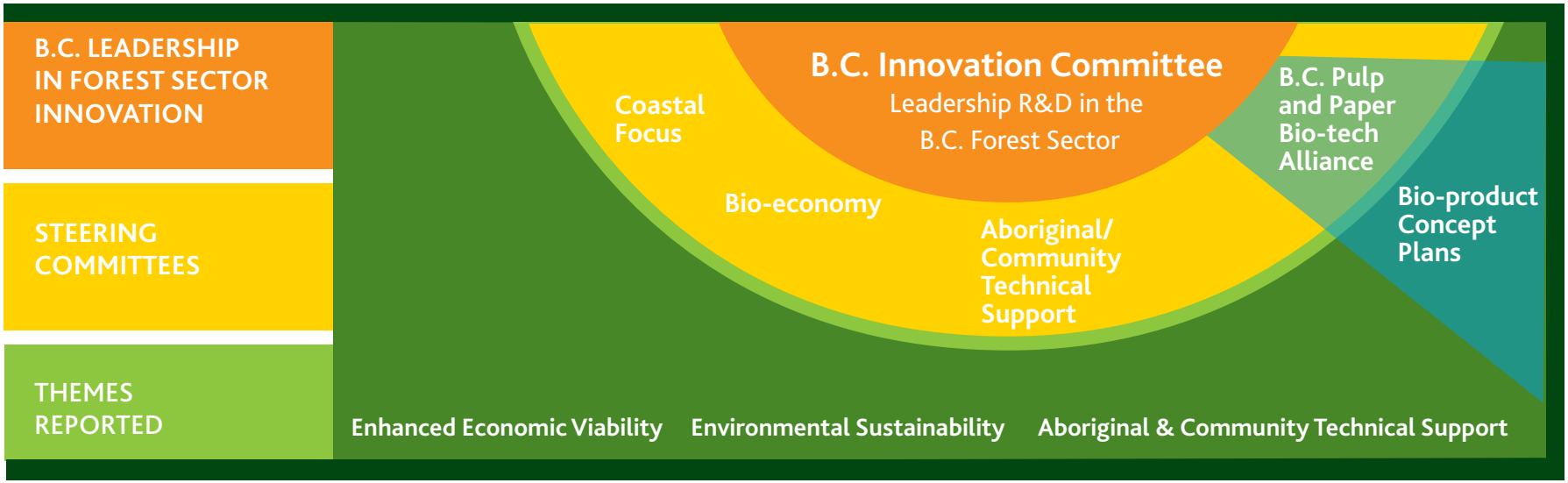
Accelerating innovation and enabling partnerships among industry, government and academia

- Developing solutions to enhance competitiveness and sustainability

Maximize value and uptake, ensuring non-duplication and building competencies/partnerships as necessary

- Guide change and link partners
- Trusted innovation partner to industry's core business models
- Objective evaluator to federal/provincial public policy interests
- Partnerships with forest industry, the Province of British Columbia, universities, federal government, Aboriginal and rural communities, and others

Common, pro-active, strategic approach (value propositions and stage-gates)



ISSUES-BASED WORKING GROUPS

Forest & Fibre	Forest Sector Carbon	Steep Slopes	Biomass Ash
Transportation	Architects and Engineers	Salt-laden Hog Fuel	Modern Timber Bridges

Performance Metrics

FPInnovations Targets*

THEME 1 — Enhanced Economic Viability

10% fibre recovery improvement
$3/m³ margin efficiencies

every 4 years
5 new products
3 new systems/technologies

THEME 2 — Environmental Sustainability

10% greenhouse gas emissions reduction for resource equipment

10% increase of carbon stocks in wood products used in the built environment

THEME 3 — Aboriginal and Community Technical Support

every 2 years
40 communities engaged
15 businesses created/maintained

*FPInnovations' Cleantech Innovation Strategy metrics are intended to link with actions and outcomes in the Ministry of Forests, Lands and Natural Resource Operations' Competitiveness Agenda and the Ministry of Technology, Innovation and Citizens' Services' #BCTech Strategy

FPInnovations' Strategic Action Plan

VISION

A world where products from sustainable forests contribute to every aspect of daily life

FPINNOVATIONS IMPACTS:

52 technological advances implemented in **150+** facilities in the past four years. Provided **$500M** in margin improvements for FPInnovations' members. Typical return on investment is **3:1**.

Research and Innovation Priorities

- Sustainable fibre supply
- Innovative manufacturing processes and products accelerating transformation
- Environmental sustainability and social licence

Maximizing Impact

- Open-access innovations
- Leverage data; best practice
- Global reach; adopt and adapt
- National-scale cross-sector priorities; critical mass regional delivery
- Customized solutions; localized needs

Strategic Priorities

- Culture of innovation excellence, competitiveness, and sustainability
- Shaping the future; fast-tracking innovation and partnerships

Ref: Strategic Action Plan

"I believe there are things we must do now and over the longer term to realize a brighter future: a future built on innovation and adapting to changing times by finding greener ways to extract and develop our natural resources and get them to market, a future built on investing in clean technology and green infrastructure, making greater use of renewable sources of energy, and ensuring that the economic and environmental benefits of energy efficiency are fully realized."

Hon. Jim Carr (Minister of Natural Resources)

"We do cutting-edge research; we have world-class partners and unique facilities, as well as the best team in place comprising an award-winning staff–all of which have allowed us to build a track record that has defined our success to date."

Pierre Lapointe (President and CEO, FPInnovations)

"Innovation is the process through which economic or social value is extracted from knowledge through generation, development, and implementation of ideas to produce new or improved products, services, processes, strategies, or capabilities."

Conference Board of Canada

"There is not an organization or enterprise in British Columbia that is not in the technology business, and their ability and need to adopt new technologies is only going to increase."

Greg D'Avignon, B.C. Business Council