Forestry Management Carbon Developments

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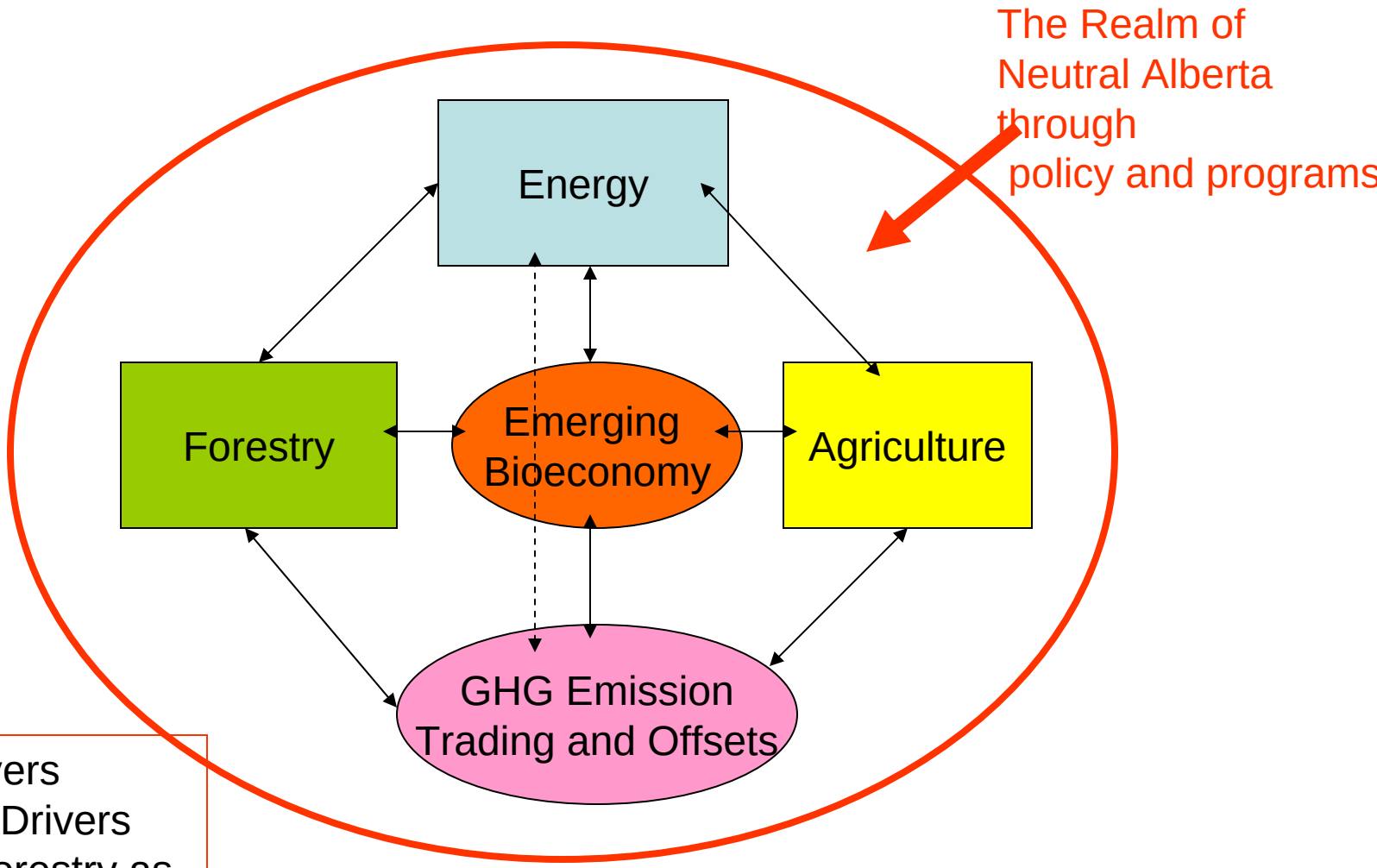
Working TowardsCarbon Neutral



Policy Drivers
Economic Drivers
Enabling forestry as
a carbon player

Key Policy Instruments

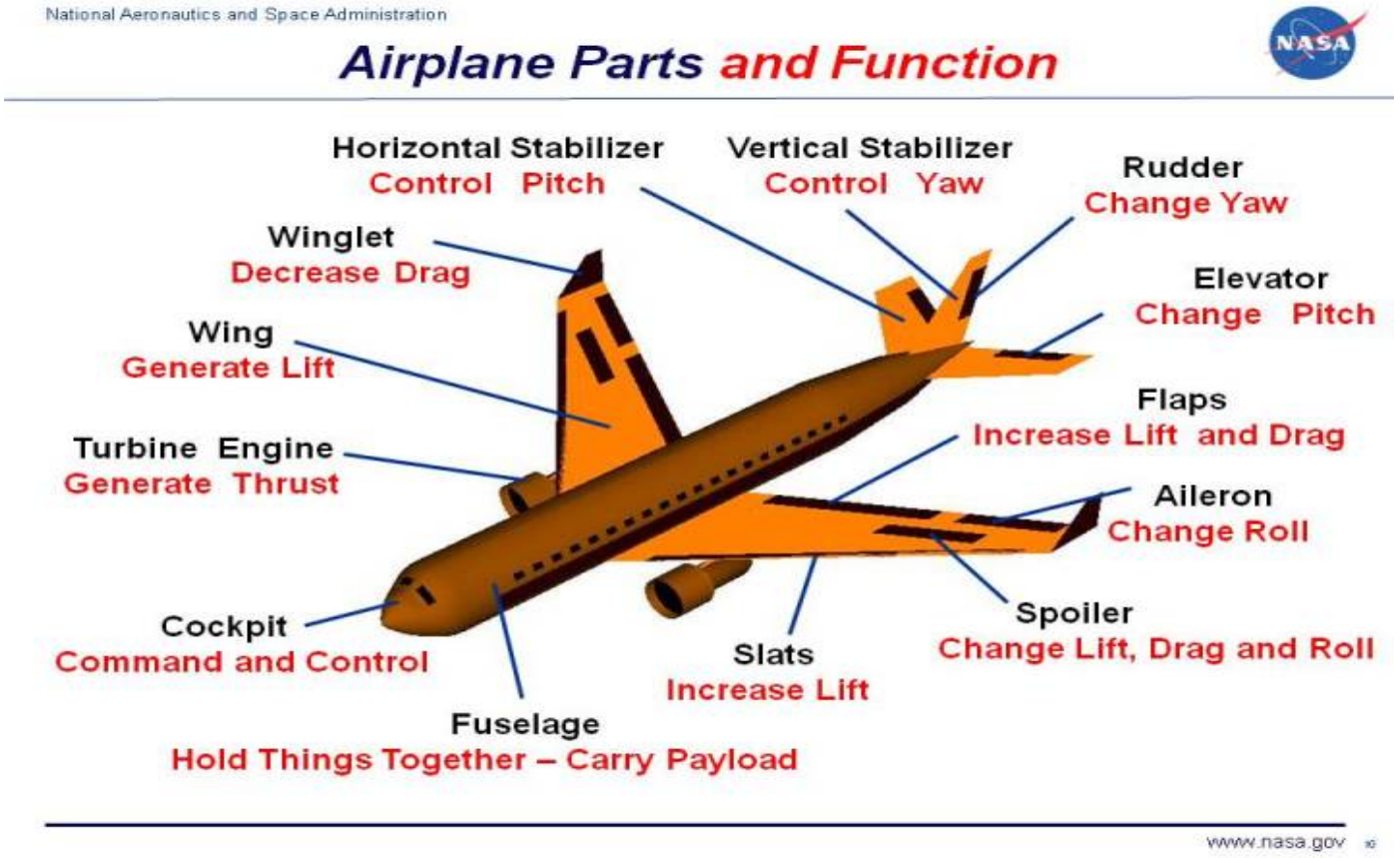
The key public policy instruments that should be used to develop the bioeconomy sector are the following:

- **Carbon pricing – either directly through a Carbon Tax or indirectly through a Cap-and-Trade System. Also potential Carbon Tariff for internationally traded goods.**
- **Renewable Portfolio (or Fuel) Standards**
- **Feed-in Tariffs and/or Producer Incentives**
- **Cost subsidies – both capital (fixed) and variable**
- **Research, Development & Deployment subsidies**

In choosing the right policy mix, it is important to understand the relative competitiveness of the alternative forms of renewable energy.

Courtesy Don Roberts CIBC FPAC

- So what are the key policy and strategy drivers for Forestry and Carbon at Present?



Policy Drivers Forest Industry Competitiveness Committee Strategies:

- **Strategy 1** – Rationalizing the Planning and Management System
- **Strategy 2** – Bringing Tenure into Alignment
- **Strategy 3** – Managing Strategic Costs
- **Strategy 4** – Addressing Infrastructure Needs
- **Strategy 5** – Capitalizing on Alberta's Energy and Bio-economy Interests
- **Strategy 6** – Diversifying Products and Markets
- **Strategy 7** – Enhancing Communications and Branding

Policy Drivers Carbon Ownership

- One of priority actions arising from FISC implementation.
- Policy is intended to be a “toe into the door”
- Full bulletin is available at http://www.srd.alberta.ca/ManagingPrograms/ForestManagement/ForestBusiness/documents/ForestBiofibreCarbonSequestionBenefitsApr2010.pdf
- Harvested trees or its parts are owned by the tenure holder
- Forest management activities through approved quantification protocol forest management plan.
- Land based biodiversity offsets are only sanctioned under approved legislated regional plans under ALSA. “REDD” like carbon offset trading and ownership not decided yet
- Further bulletins will be forthcoming and in support of new forestry protocols are determined

Policy and Process for Forest Management Agreement Renewal (2005)

- Bio-industry activities viewed favorably counting towards renewal
- Renewed FMA provide for third party access to harvest debris should company not have plans to utilize
- Prefer FMA tenure holder and bio-industry form business arrangement
- Future change -Anticipates additional ecological services rights being awarded to FMA tenure holders subject to appropriate protocols etc etc

Climate Change Strategy – Responsibility / leadership / action (2008) – Alignment

- Make efforts to further remove barriers and consider incentives for expanding the use of renewable and alternative energy sources.
- The 4 key initiatives with the strategy are
  - Energy conservation and efficiency (forestry manufacturing, harvesting and transportation)
  - Carbon capture and storage- Life cycle of wood in buildings
  - Greening energy production- forest industry role in renewable energy
  - Adaptation- Forest Management Plans are good vehicle for enabling

2009 Provincial Energy Strategy

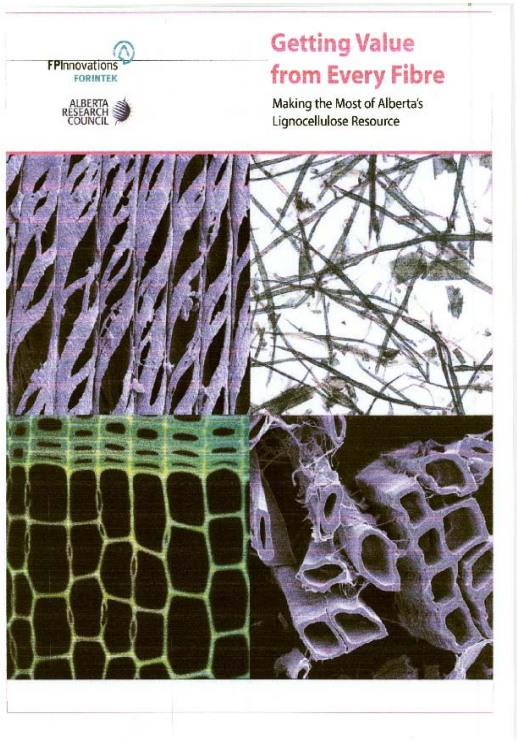
- Renewable energy is a clear fit with forestry
- Manage GHG and use of renewable energy to enhance collaboration
- Promote community based micro generation-good fit for forestry (Will upcoming Alternate Energy Strategy set targets?)
- Nine Point Plan program updates-
  - Bioenergy Producer Credit Program is extended for five years until 2016
  - Implement renewable fuel standard in April 1 2011
  - Biorefining Commercialization and Market Development Program- extended to April1 2011 refer to Phase 2 guidelines

http://www.energy.alberta.ca/BioEnergy/pdfs/Phase2_BCMDP_Guidelines.pdf

Softwood Lumber Agreement

- Requires Canada to notify on any new programs and policies
- Following provisions of SLA closely-low risk
- Severely restricts ways and means to assist forest industry in these troubled economic times
- Programs must be broad and general (including carbon credits) and not specifically targeting forest industry

Policy Drivers
Fiber Road Map



Integrated Technologies and Infrastructure

Bio-refining- Key is adopt the right combination of technologies
Market Intelligence- invest in a intelligence gathering system
Transforming Alberta's Education System- to have a culture of innovation start early- eg access to supernet

Targeted Research & Development

Work should focus on:

- **Advancing the technology** of bio-refining;
- **Aligning wood quality with product attributes** demanded by markets;
- Breakthrough **manufacturing technologies**;
- Advancing **wood products technologies**;
- Creating "**next generation" recovery** that works towards "zero waste";

What Drives The Economics of Carbon Bio-Energy/Products?

In Alberta having a competitive bioeconomy is a key driver towards achieving carbon neutral

Five key variables shape the economics of investing in competitive bioeconomy:

1. The price of fossil fuels (the main substitute)

2.The price of carbon

3. The conversion technology

4. The cost of the feedstock (50%-80% of the variable cost)

5. Public Policy

At present, all five of these variables are in a state of flux worldwide – and this discourages private investment.

However, the long-term fundamentals are positive for Alberta if we are mindful of these variables.

Courtesy Don Roberts CIBC FPAC

Biomass to Biosomething in Alberta

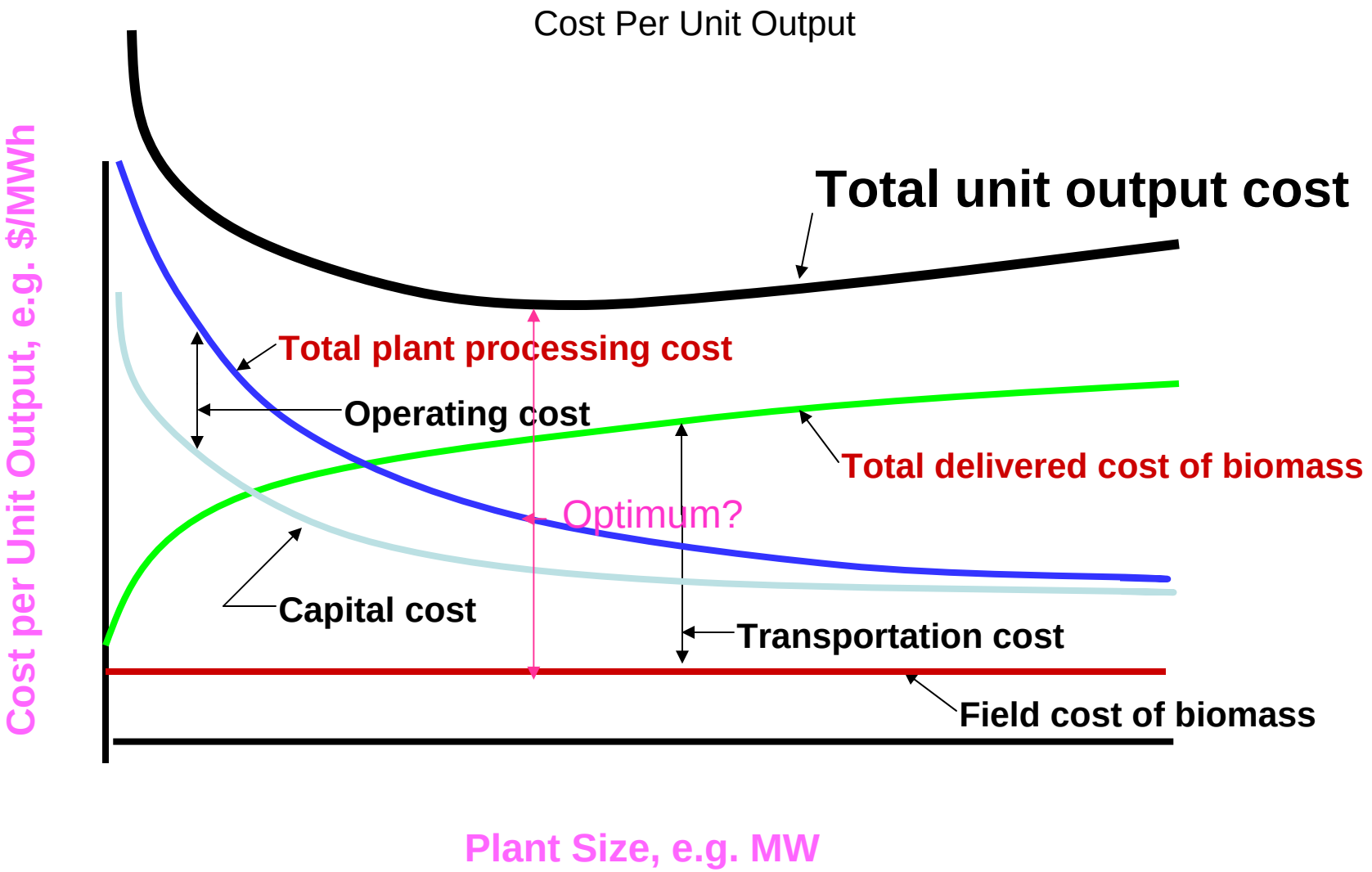
Harvesting

Chipping

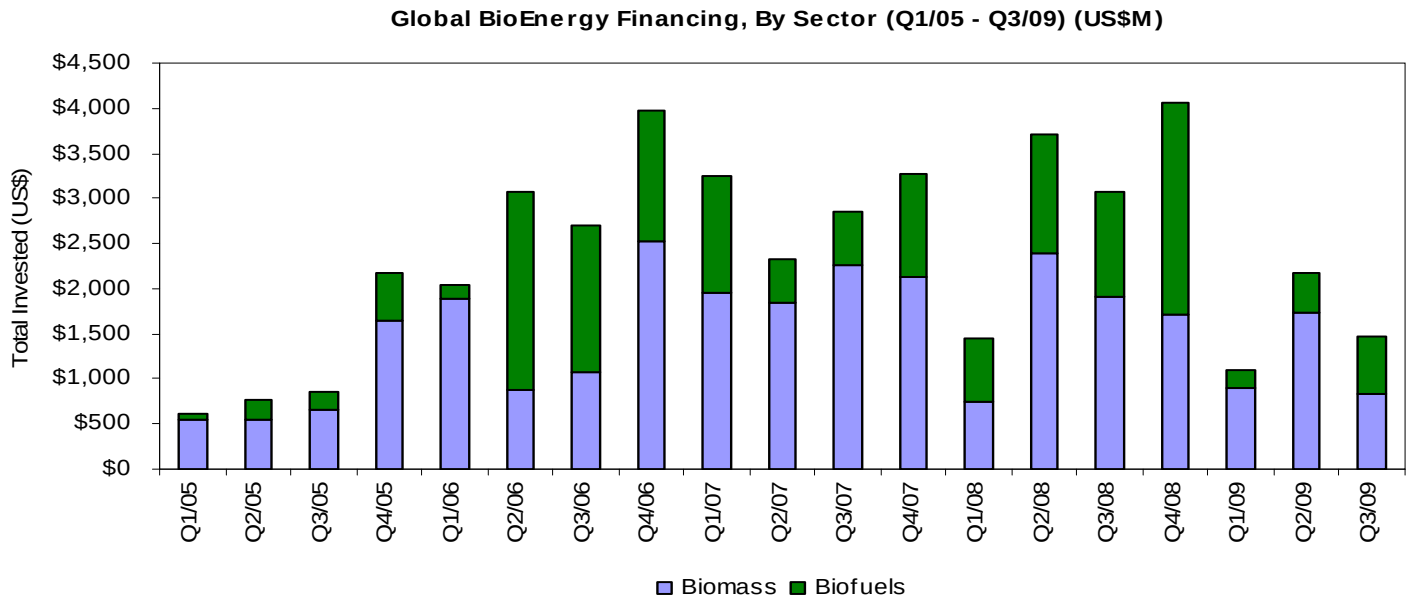
Transportation

BioPlant

Is it feasible in Alberta?



Global Bio-Energy Financing

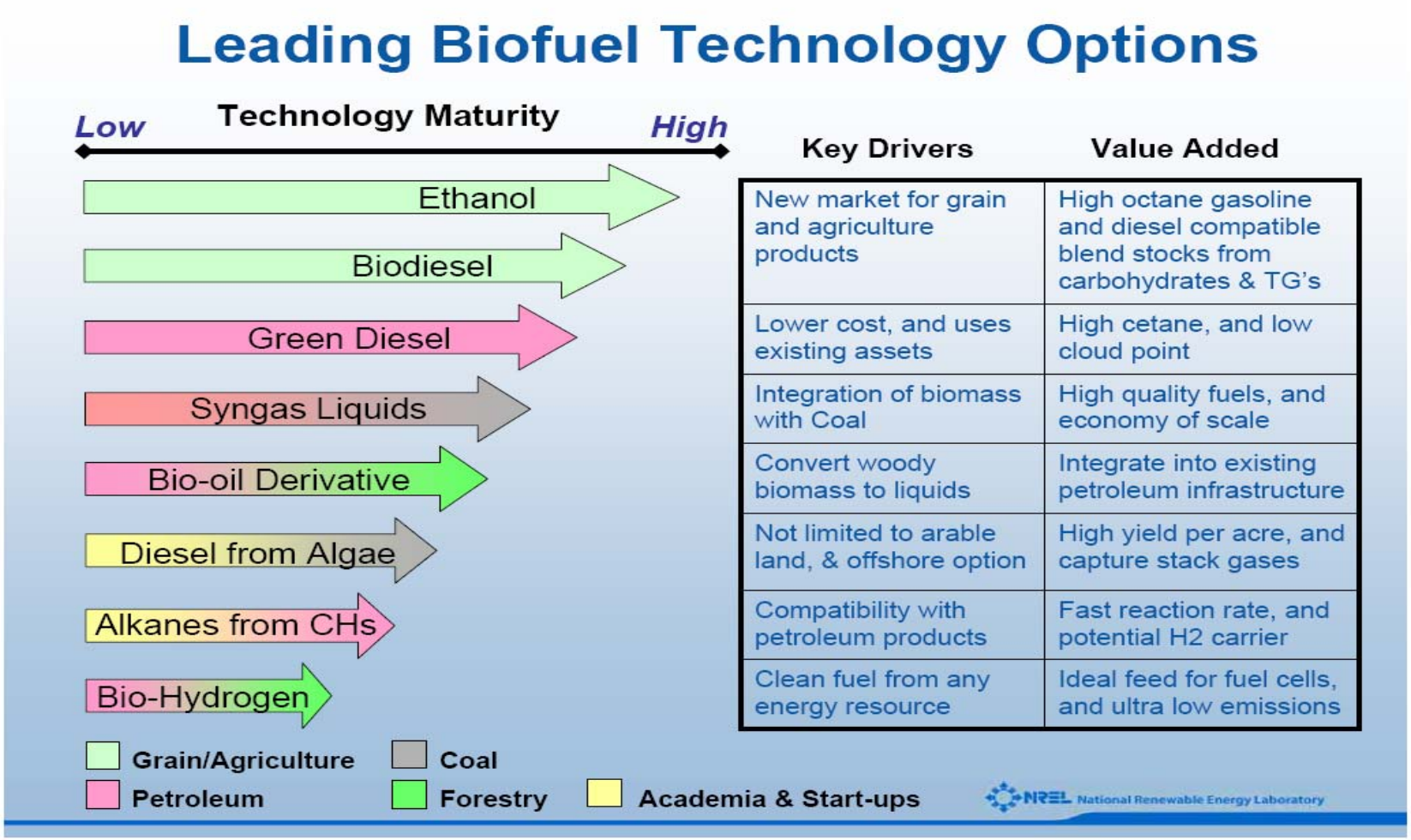


Source: New Energy Finance, CIBC World Markets Inc.

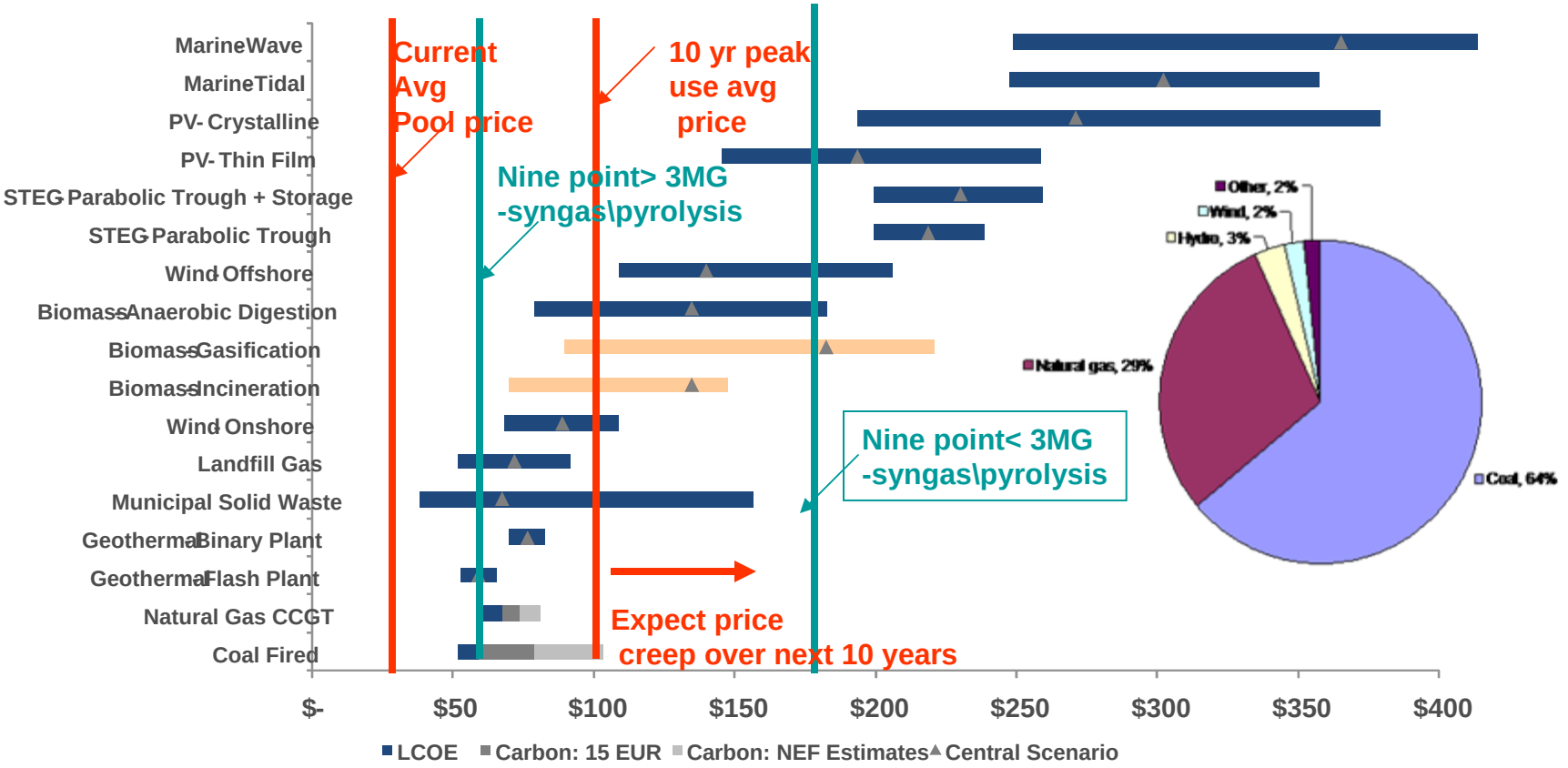
- **Bio-energy can be split into two types: biofuels (i.e., liquids) and biomass (solids and gases). In 2008, the split was roughly 45/55.**
- **The economic crisis has had a major impact on the level of investment in the global bioenergy sector. After exceeding $12 billion in 2008, it fell by ~75% from Q4/08 to Q1/09. Now starting to recover**
- **Going forward, we expect the proportion of the investment made in the biomass segment will increase.**

Courtesy Don Roberts CIBC FPAC

Technology is evolving



Levelised Cost of Electrical Energy Q2 2009 ($CAN/mWh, by Type of Energy)



Wide range in costs within a given technology, which mainly reflects location (quality & cost of inputs) and scale.

As of now, Bioenergy is not the lowest cost source of renewable electricity (but it is better than solar, marine, and some Off-shore wind)

Renewable costs are volatile, but generally on a downward trend due to changes in technology and improving scale. Fossil fuel cost are generally rising due to scarcity and carbon charges.

Economic Realities 1

- US Biofuel subsidy programs
  - US forest sector already received more than $8 billion
  - Strong potential exists for a further $ 20.7 billion in subsidies
  - Programs reward “business as usual” activities
  - Some States like Biowa and California have complementary programs

	Past Payments	Confirmed Programs	Proposed Programs
AFMC:	$ 8-9 billion		
BCAP:	$ 0.3 billion	$ 1.1 billion	
CBPC:		$ 12 billion (net)	
REPC:			$ 7.6 billion
Total:	**$ 8.3-9.3 B**	**$ 13.1 B**	**$7.6 B**

AFMC Alternative Fuels Mixture Credit –expired
BCAP Biomass Crop Assistance Program-paused
CBPC Cellulosic Biofuels Producer Credit- active
REPC Renewable Electricity Production Credit -active

Mark Boyland
Canadian Forest Service | NRCan

Economic Reality 2

- Subsidies other provinces

Q4 2008

Energy Output	FOB Mill CDN$ $/GJ	$/Kwh	$/liter	$/odt
Low Pressure Steam	**0**			
Syngas for lime kiln	**7.5**			
Heat to district heating	**0**			
Power to grid		**0.05**		
Ethanol			**0.65**	
FT Diesel			**0.50**	

Normalized

Energy	FOB Mill CDN$ $/GJ	$/Kwh	$/liter	$/odt
Low Pressure Steam	**0**			
Syngas for lime kiln	**6**			
Heat to district heating	**0**			
Power to grid		**0.05**		
Ethanol			**0.65**	
FT Diesel			**0.50**	

Power to grid set to $0.139/kwh for Ontario only. BC and Quebec set to $0.5/kwh

Economic Reality 3

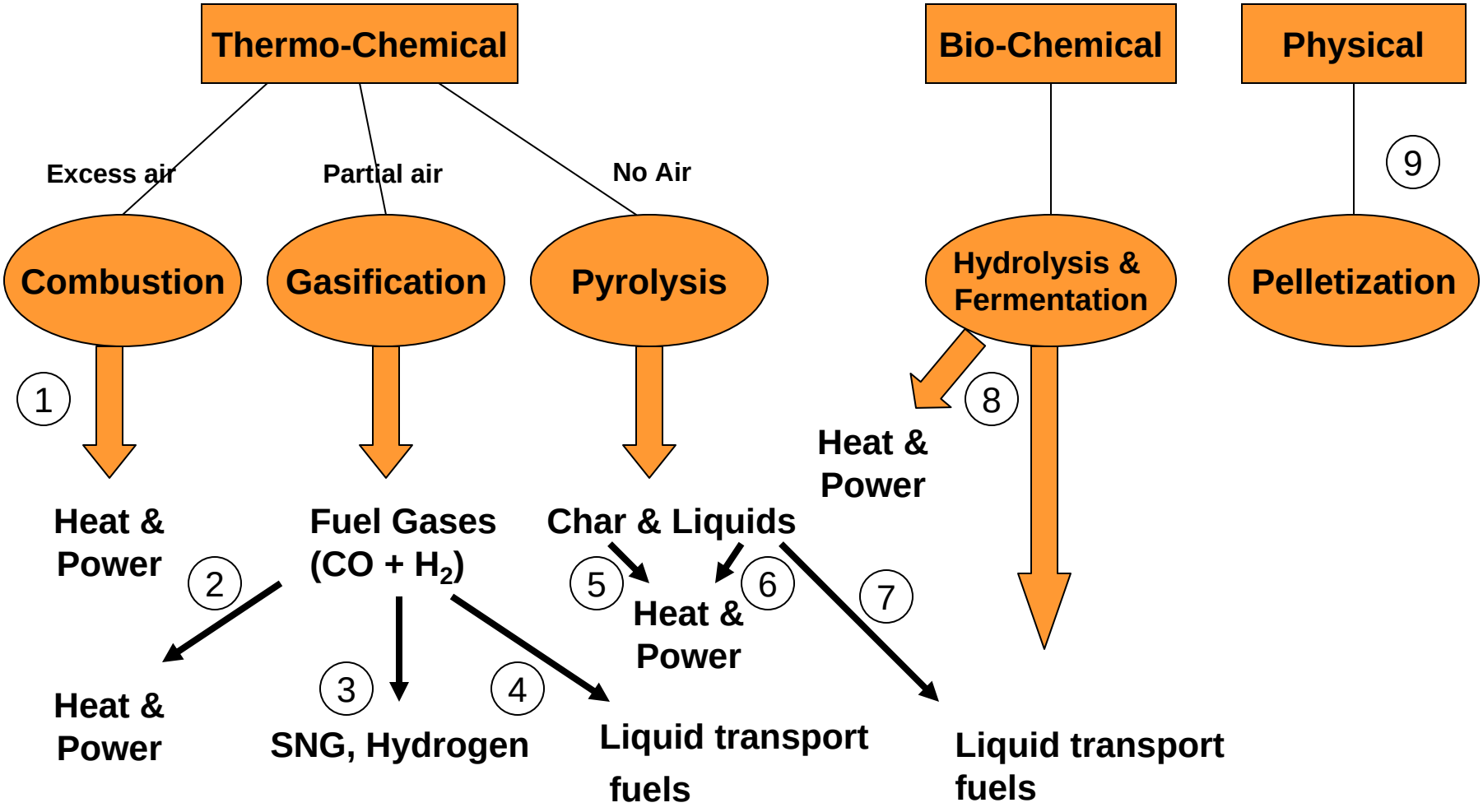
- Alberta Nine Point Program

Bioenergy Product: Liquid Biofuels	**Production for first 150 million litres per year**	**Production in excess of 150 million litres per year**
Second generation ethanol	$0.14 per litre	$0.09 per litre
First generation, grain-based ethanol	$0.10 per litre	$0.06 per litre
Biodiesel and bio oil	$0.13 per litre	$0.09 per litre
Bioenergy Product: Electricity	**Production from capacity less than 3 megawatts**	**Production from capacity greater than 3 megawatts**
Electricity production from biogas, synthetic gas or gasification of biomass	$0.06 per kilowatt hour kWh	$0.017 per kWh
Electricity production from combustion of biomass	$0.02 per kWh	$0.02 per kWh

Central to all bio-energy strategies is a competitive price for delivered biomass……. True regardless of where you live.

Courtesy Don Roberts

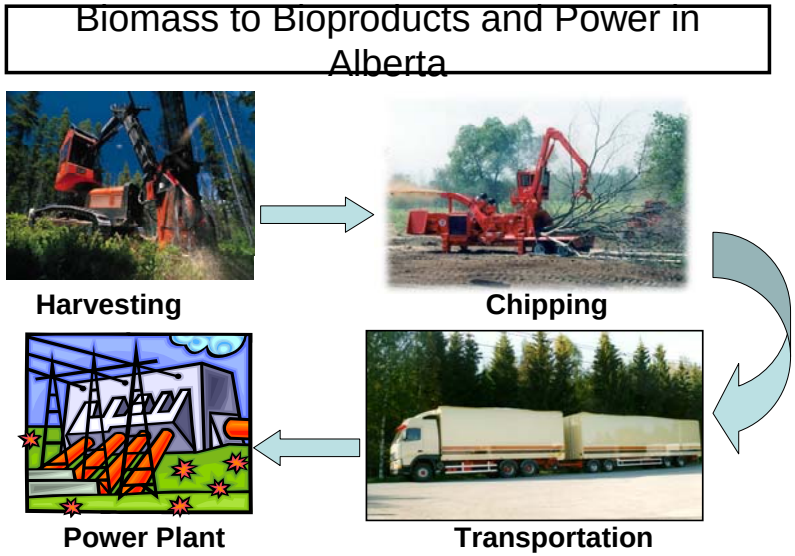
Bio Pathways



Courtesy FPInnovtion and Forest Products Association

Enabling forestry as a carbon player

- Activities underway are intended to
  - gain efficiencies leading to greater biomass recruitment, energy efficiencies and reduced costs
  - Increase income streams by enabling carbon market opportunities as well as bioenergy and renewable fuel income streams (maybe maybe)



Enabling forest industry as a carbon player

- **Continue biomass quantification**
  - Work continues with Bios Mapping that involves FPInnovation and several forest companies.
  - Work with NRCAN on fiber quality and quantity to improve characteristics and to improve conversion avoidance
  - Grinding trials underway to calibrate logging residual estimates
  - Department has completed a high level assessment of logging residue availability http://www.srd.alberta.ca/ManagingPrograms/ForestManagement/ForestBusiness/documents/ForestIndustryCompetitiveness-AlbertaBiomassOpportunitiesMarch2010.pdf
  - There is a need to develop comprehensive integrated biomass inventory that includes agriculture, forestry and landfill biomass sources. Communities requesting regional summaries for their use

Enabling forestry as a carbon player

- **Improve access and efficiencies for utilization of forest harvest residue and improve harvesting efficiency**
  - BMP training of logging contractors WOLF
  - Innovation in collection and transportation of residues FPInnovation
  - Ground rules and planning guidelines for logging residues and soil nutrient and biodiversity conservation
  - Understand cost structure of biomass recruitment-benchmark study MNP
- **Improve transportation efficiencies**
  - SmartDRIVER for logging and product truck drivers as well as logging contractors-FPInnovation WOLF Regional Colleges
  - Super King B and Chip Van supersizing-Transportation is putting in place a highway system to allow larger trucks-FPInnovation involved in trials
  - Bridge strengthening and road widening costing studies underway
  - Increase inter-model rail sites in Alberta- CN Finance and enterprise, Transportation, SRD, ARD

Enabling forestry as a carbon player

- **Afforestation**- need to move the stalled protocol forward great opportunity for Agro-forestry in Alberta
  - Alberta Woodlot Association promotion of private land forestry and working with Finance to get farm tax policy expanded to include forestry. Woodlot owners already playing in spot market carbon trading
  - Weberville Community Woodlot Demonstration
- **Manage risks that impact our natural forest carbon capital-**
  - Healthy Pine Forest Strategy
  - Firesmart
  - ILM

Enabling forestry as a carbon player

- Improved or Enhanced Forest Management
  - Most of AAC gains from re-established managed plantations are already factored into approved forest management plans required to be prepared by tenure holder as part of their legislated tenure requirements
  - What is left on the table needs discussion
  - Will be monitoring Forest Carbon Project and any resultant strategies, as well as other jurisdictions with interest
  - Significant obstacles: additionality, permanence, leakage, inter-jurisdictional policy conflict,
  - Certainly need to continue working on adaptation strategy aspects and keep the door open for future opportunities

Enabling forestry as a carbon player

- **Improving efficiencies of forest manufacturing facilities**
  - Promoting energy self sufficiency and improved productivity for all major forest industry facilities FPInnovation mill and energy studies
  - Working with facilities under 100000 tonne emitters to establish emission baselines
  - Most of industry in the 30000 to 50000 tonne emitters based on first baseline approximation
  - Working with industry to maximize opportunities under Nine Point Plan

Enabling forestry as a carbon player

- **Forest carbon storage**
  - At this point SRD policy is on conservation through BMP on disturbance and reclamation – accelerated reclamation or avoided conversion aspects are still future considerations
  - Wood first campaign to promote increased wood use in non-residential construction, promote the life cycle analysis of wood for carbon footprint and sequestration
  - Athena life cycle work at U of C. will give us quantifiable data on various materials used in buildings.
- **Biomass conversion**
  - In mill conversion-Working with Biosolutions, FPInnovation, FPAC on potential biofuel and bioenergy conversion strategies-these will use waste streams and emissions for conversion to renewable fuels and energy. Venture capital lacking.
  - In block conversion of residues to bio-char, bio-oil, FPinnovations- needs a lot of time and money.
  - Other jurisdictions may breakthrough first
  - Governments with lots of research bucks and incentive grant opportunities will share the rewards of first engagers and patent rights to transformative technologies

New Activites

- Upcoming Projects FPinnovations, Incremental Forest Technologies, etc (subject to firming monies)
  - FPInnovation 1 While primary focus of the first project is providing Alberta's forest industry the opportunity to strategically engage the carbon economy –protocol components will also be addressed and developed concurrently
  - FPInnovation 2 develops a framework for quantification of GHG impacts from of new forest products on the forest enterprise (woodlands and processing) as well downstream processes.
  - FPInnovation 3 brings together the concepts in FPI 1 with a number of MPB strategies for the West Central region.
- Further Biopathways
  - work in Alberta TBD
  - Industry Biopathways Phase 2

- coordinate policy
- Accelerate protocol development
- Define ownership
- Complete inventories
- promote energy self sufficiency
- Accelerate R&D
- Beware excessive market exuberance