BIOCLEANTECH

FORUM

Pulp Mills as Basis for BioCleantech Development:

Challenges, Lessons, New Directions

Presented by

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Presentation Overview

- Challenges and Imbalances – changing markets, industry structures, policies
- Lessons from dead pulp mills -- repurposing / community adjustment assignments
- New Directions – how do we get to a new, sustainable industry structure?

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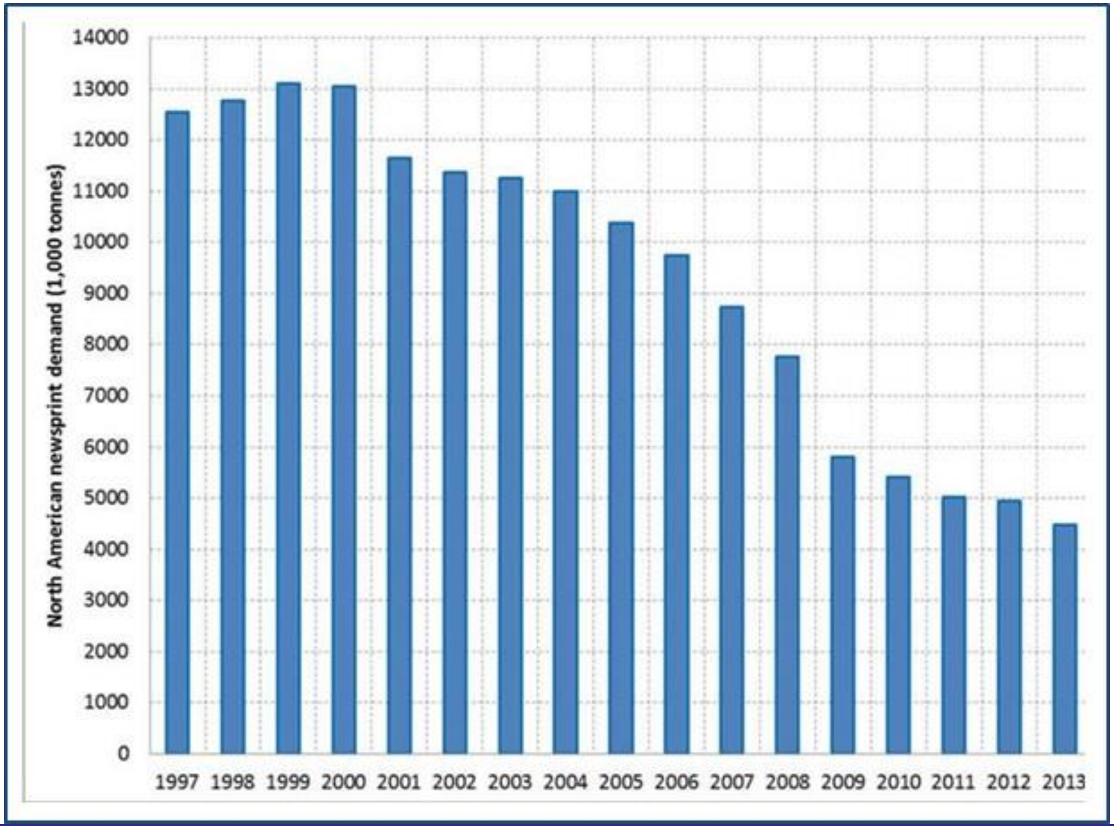
Changes and Imbalances - Markets

- Dramatic declines in newsprint demand – from >13 million tonnes to <4.5 million tonnes – 66% decline in thirteen years
- 20 newsprint mills closed, plus several hundred sawmills
- Production of other paper grades also down – 35-40%



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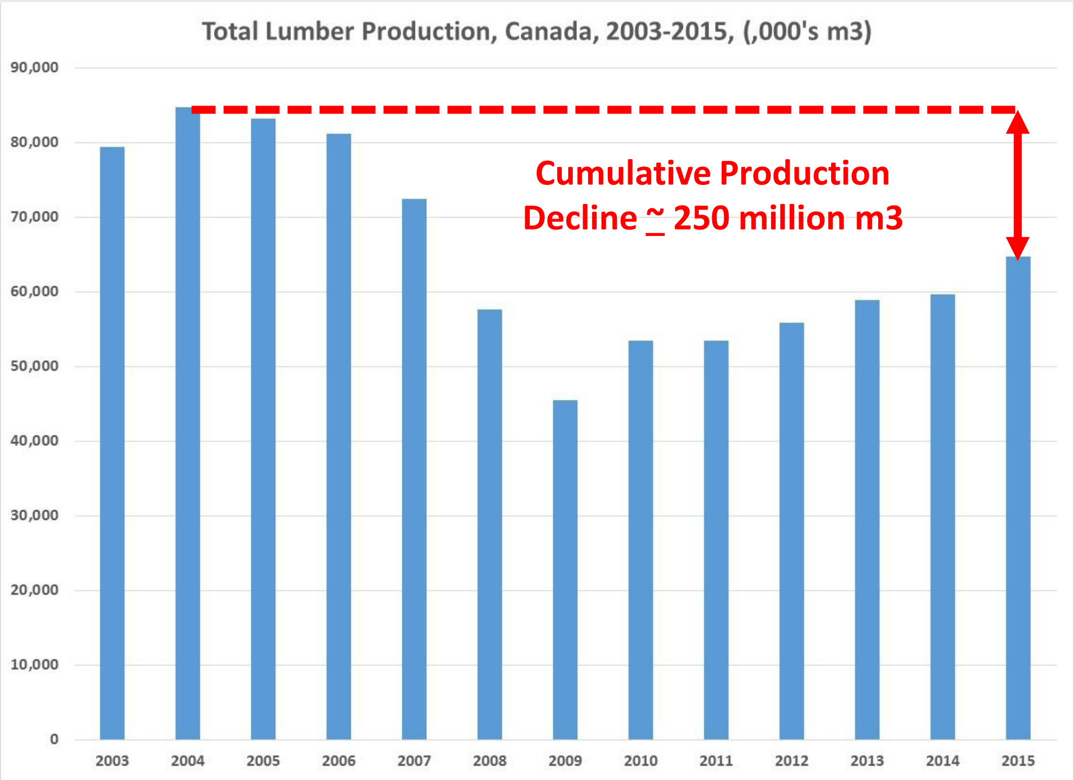
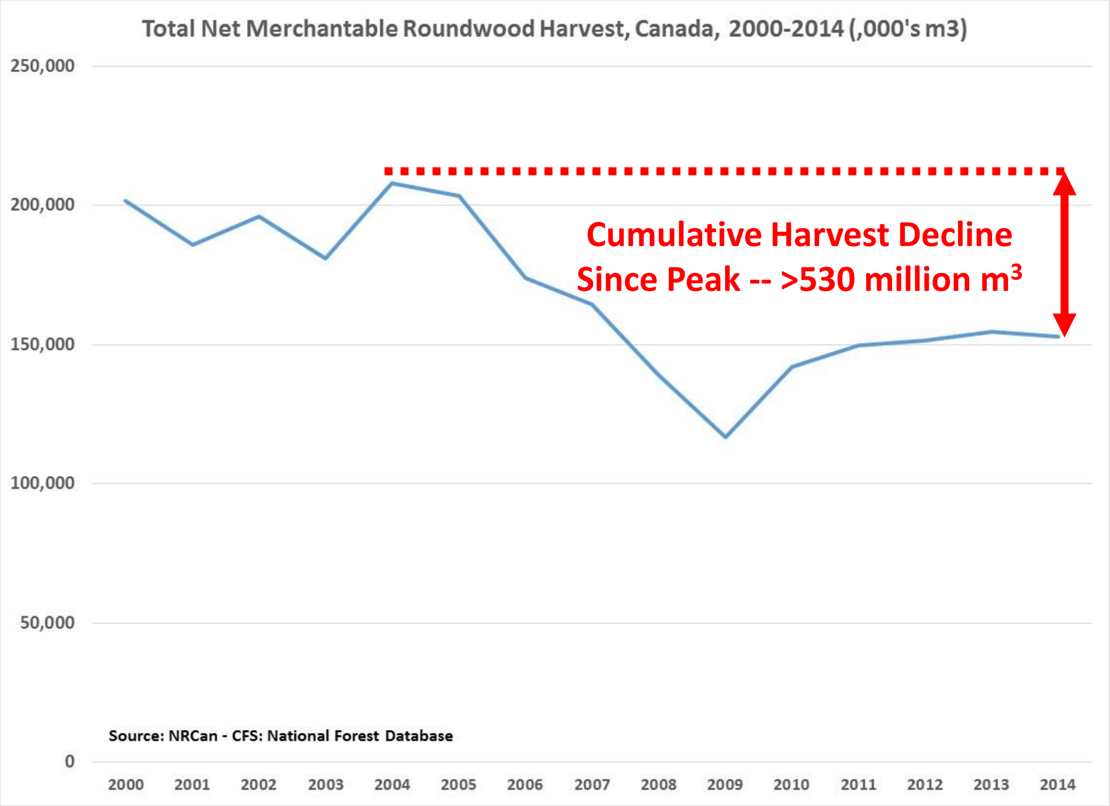
Changes and Imbalances - Markets

- Lumber production also significantly down
- Panel production picture almost identical
- Almost 100,000 jobs lost in entire sector
- New SLA disagreement with US in play
- Market diversification a key topic – *again*!



Source: Cansim Table – 303-0064

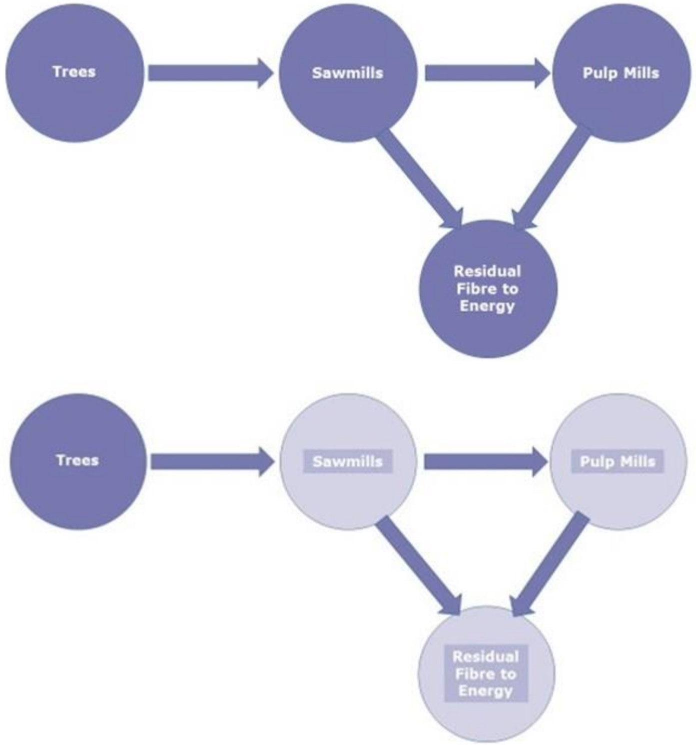
Changes and Imbalances - Markets



- **Net result --significantly decline in harvest activity**
- **Reduced harvest volumes *do not include* potential biomass supplies from 'harvest residues**
- **Country is 'awash' in underutilised forest biomass – potentially > 1 billion m^3**

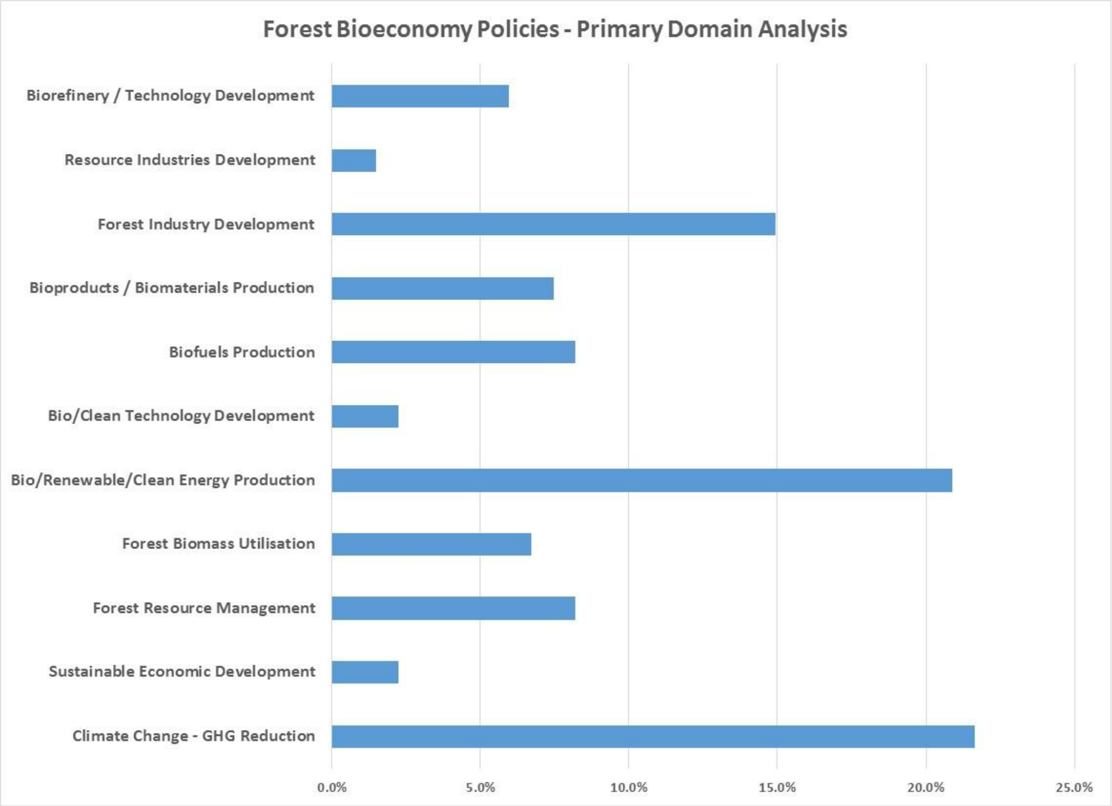
Challenges and Imbalances - Structure

- Changes in markets disrupting traditional symbiotic relationship between wood products / sawmills segment and pulp and paper segments
- Without a new ‘symbiotic relationship’, ability to achieve complete resource utilisation challenging



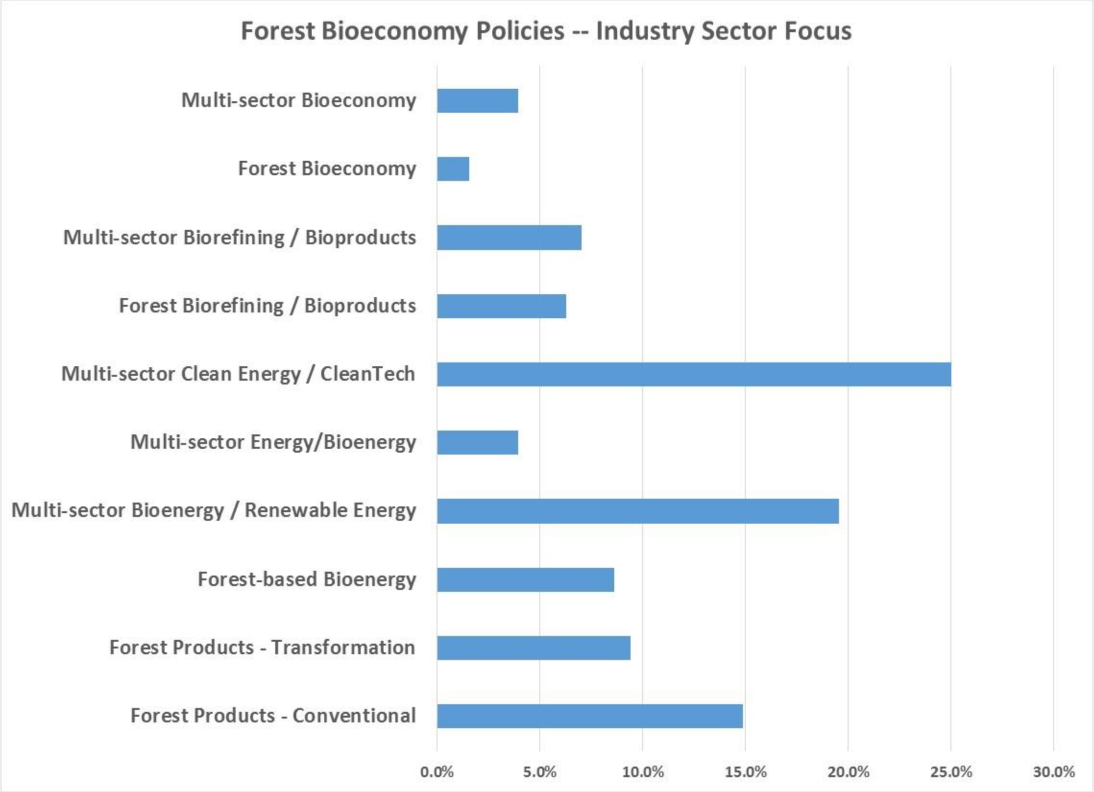
Changes and Imbalances - Policy

- More than 130 policies, programs, legislation identified related to *forest bioeconomy* development in Canada – direct and indirect – during 2000 - 2015 period
- Policy domain focus has shifted towards wider 'bio', 'clean tech' focus in more recent years of the period
- New 'symbiotic relationship' need not really addressed



Changes and Imbalances - Policy

- Sector focus analysis similarly reflects shift towards multi-sector, 'bioeconomy' focus
- More pronounced when policies segmented by period – 2000-2005, 2006-2010, 2011-2015
- Key policy 'gap' remains – modification of tenure / allocation policies to facilitate new entrants / ventures



Lessons From Mill Closures

Lessons from Mill Closures

- Retention, preservation of infrastructure important – requires multi-stakeholder collaboration
- Understand limits of installed technologies – conversion potential, scale suitability, site capacity to support multiple processing operations
- Mill closure has changed industry structure / fibre flows at local / regional level
  - Previously available feedstock flows likely disrupted – higher cost

Lessons from Mill Closures

- Avoid unintended consequences – environmental regulations can impact redevelopment potential
  - Maintaining ‘active industrial site’ status critical
- Policy environment – particularly related to fibre control – may constrain new entrants
  - Legacy tenure holders may be able to exclude new entrants

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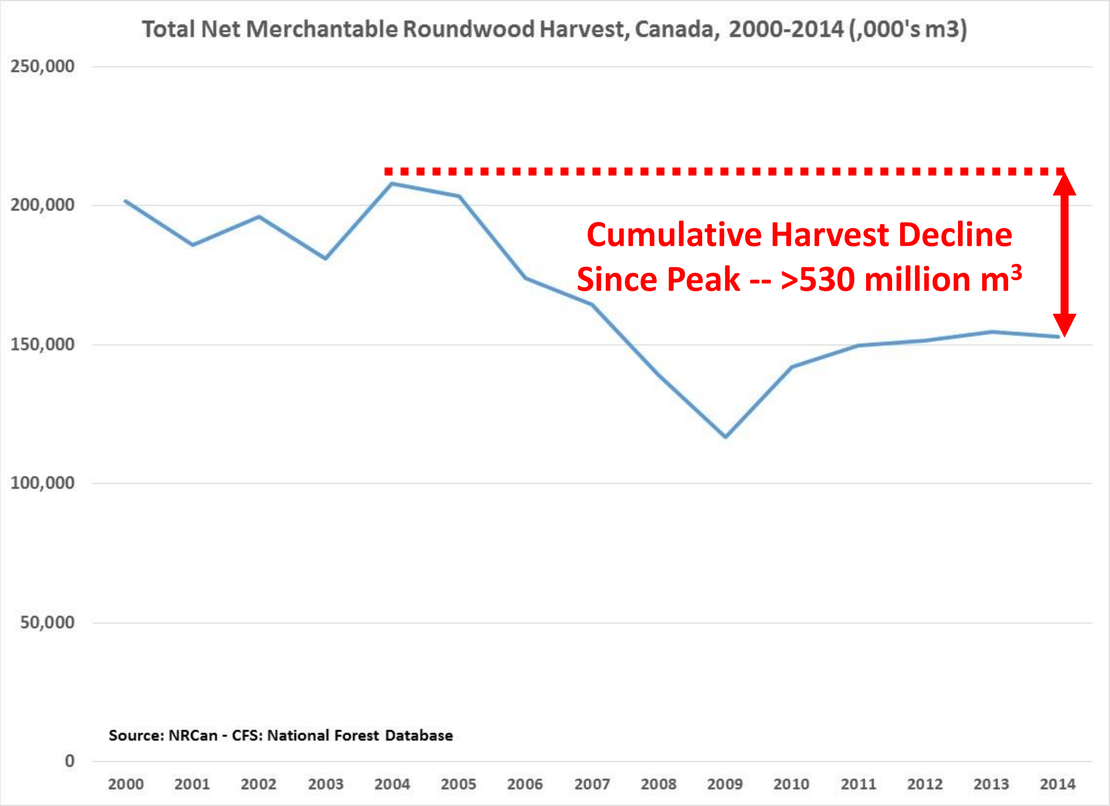
Opportunities – New Approaches



- Harvest decline and mill closures mean that in many areas of the country, forest biorefining must be viewed as 'greenfield'
- Limited or no sources of residual feedstocks – and certainly not zero cost
- Fibre flows between component elements critical to viability

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Opportunities – New Thinking

Oil

- Chemicals, rubber, plastics – 4% volume // 42% value
- Liquid transportation fuels – 70% volume // 43% value
- Bunker fuels, asphalt – 26% volume // 15% value

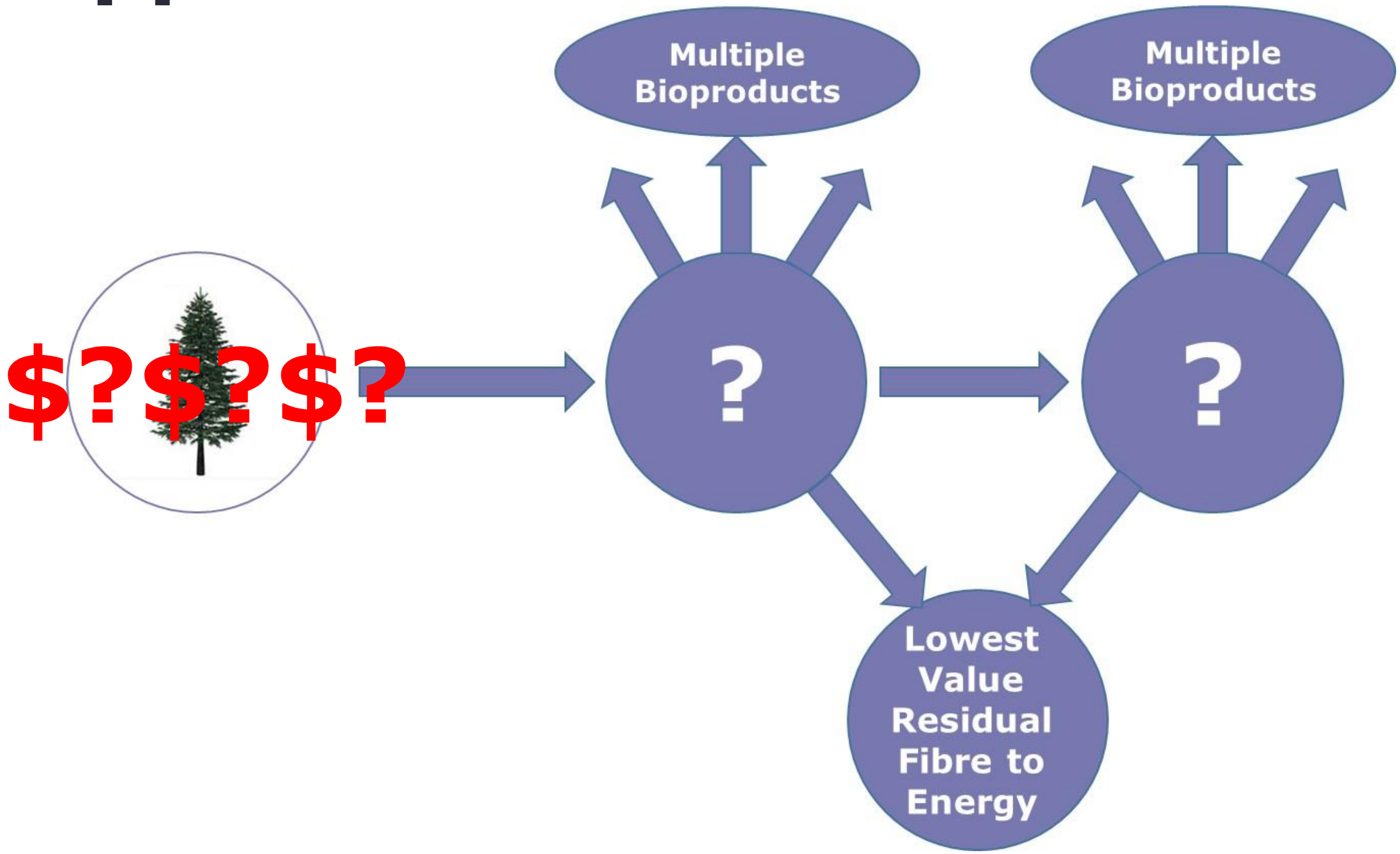
Source: Browne, T., FP Innovations

Trees ???

- Hemicelluloses to chemicals – 2.5% volume // 6% value
- Lignin / Materials– 2.5% volume // 3% value
- Cellulose to dissolving pulp – 37% volume // 76% value
- Black liquor, other solids to heat / power – 53% volume // 15% value

Source: Browne, T., FP Innovations

Opportunities – New Structure



Final Thoughts – Moving Forward

- Consultation with / buy-in of ***all*** stakeholders essential
  - Do not assume community wants new industrial activity – our experience shows otherwise
- Validate raw material supply chain assumptions
  - ‘Robust’ may not be accurate – demographics, work force migration have changed – harvest capacity may be diminished

Final Thoughts – Moving Forward

- Government support essential, but challenging –
  - Alignment with financial / investment programs
  - Fibre allocation changes may be needed
    - Potential for perception of disadvantage to incumbents
- Strategic framework needed – define priorities that will be given public funding support

Thank You

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DISCUSSION – QUESTIONS?

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