



 **CRIBE** centre for research & innovation  
in the bio-economy



By: Lorne Morrow RPF  
Sept 15, 2010



## 2008: Creation of C.R.I.B.E.

- Ont govt. recognized need for support and change for the forest sector.
- Recognition to move to the forefront of the commercialization of chemicals, fuels and fibres that can be produced from forest biomass.
- 2008 Budget, \$25 million over four years to create a provincial bio-economy research and innovation centre to be located in Thunder Bay.



## General Description of CRIBE

- \$ 25 Million investment over 4 years
- Additional federal funding of \$10 million through FPInnovations
- Commercialization of research and innovation
- New products, processes, jobs and businesses
- Small lean organization facilitating collaboration
- Close coordination with other research organizations (FPInnovations, BRI, Bio-auto council etc.)





# Timing and Budget

5 year horizon with \$ 25 million investment.

## Nominal Distribution of Funds:

- Bio-refinery pilot: \$ 8 million
- Other projects: \$ 14.5 million
- Admin costs over period: \$ 2.5 million





# Funding Principles

- The Province of Ontario is the principle funding partner for CRIBE.
- CRIBE funding can only be applied to eligible expenditures incurred by for-profit companies, publically funded research centres, universities and colleges that are located in the Province of Ontario.
- CRIBE funding can be in the form of grants, loans (including interest-free or interest-bearing, and with outcome-linked conditions for repayment), or a combination of the two.
- A grant or loan to any one company can **range from \$150,000 to \$1 million**. In exceptional cases projects valued above or below these amounts may be considered.
- **CRIBE will invest up to 50% of the total project costs**. Participants are expected to contribute at least 25% of the project value as cash with the remaining matching contribution as eligible in-kind (see appendix for eligible in-kind contributions).



## Scope of Project

- CRIBE investments are expected to commercialize forest biomass material and create wealth.
  - This could include incorporating existing market-ready bio-based materials, chemicals, fuels or processes into Ontario-made products, concepts or processes. Commercialization must be illustrated through product sales or buyer commitment at the end of the project.
- Commercialization is expected before March 31, 2013.
- Projects involving only proof of concept research will not be funded.
- Projects that do not involve the use of forest biomass will not be funded.



# Strategies

1. **Commercialization of Innovative Bio-mass Related Research:** *CRIBE will support the commercialization of research and development findings and transfer these technologies to industries in Canada and worldwide.*
2. **Incorporate the present Industry base in the Future:** *CRIBE will develop the forest-based bio-economy in a way that transforms the existing forest economy*
3. **Diversification of Biomass uses:** *CRIBE supported initiatives will transform forest bio-mass into higher value-added uses.*
4. **Nurture New Business:** *The true measure of CRIBE's success will be its ability to attract new investment to Northern Ontario.*



# Potential Project Target Areas

Research Dev & Implementation Projects	Collaborative demonstration and pilot projects	Developing new clients for products and a culture of innovation
<ol style="list-style-type: none"><li>1. Building Solutions</li><li>2. Next generation pulp and paper solutions</li><li>3. Novel bio-materials</li><li>4. Forest bio-fibre initiatives (inventory handling &amp; processing)</li><li>5. Value chain maximization</li></ol>	<ol style="list-style-type: none"><li>1. Bio-Refinery Initiative</li><li>2. Lignin Demonstration Plant</li><li>3. Small energy systems(remote communities)</li><li>4. New Building systems</li><li>5. Value added merchandizing sites</li></ol>	<ol style="list-style-type: none"><li>1. Develop cross-sector links (petro-chemical, bio-auto)</li><li>2. Develop knowledge hubs</li><li>3. Technical assistance to foster continuous improvement in mills and woodlands</li></ol>

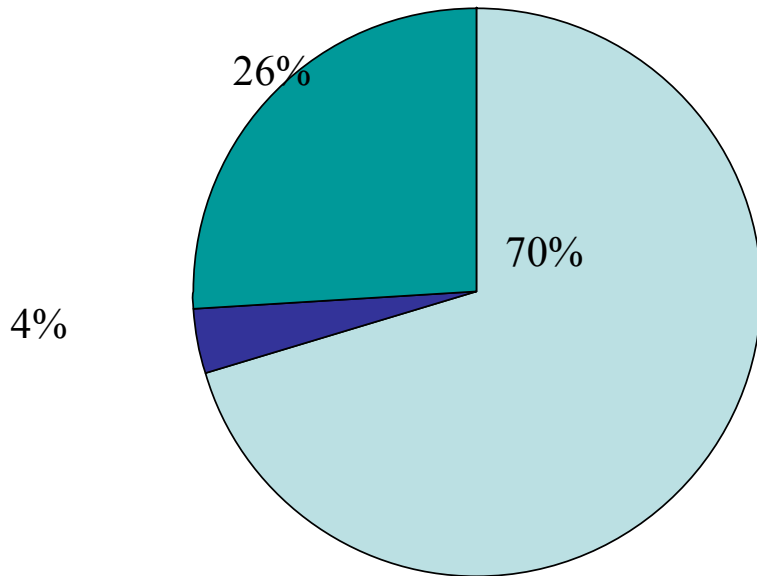


## Results Expected

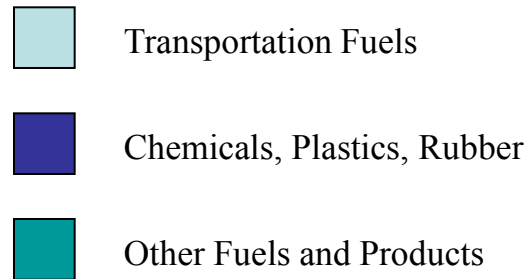
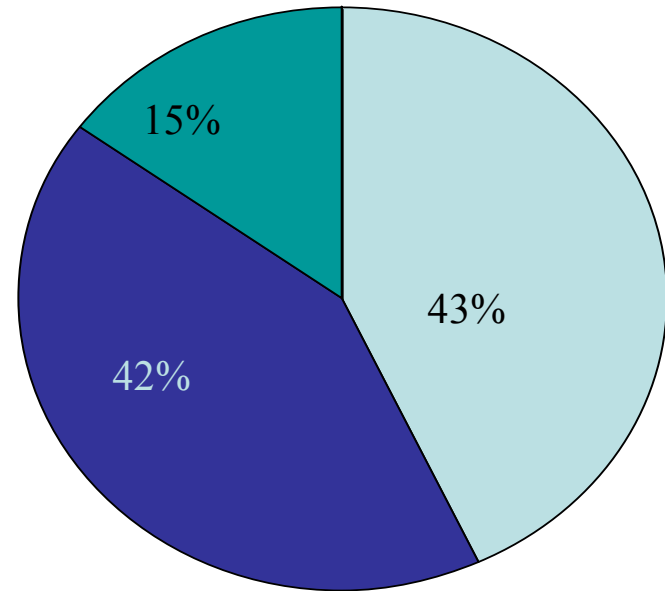
- Creating new jobs and new skills in the workforce of northern communities;
- Creating new businesses in the North;
- Expanding and diversify the product mix currently produced by the traditional forest products sector from the forests;
- Support the creation of novel materials such as bio-chemicals and composites.
- Enabling the shift of manufacturing toward green products.
- Supporting the sustainable use of the forests and forest biomass of Northern Ontario.

# A Lesson from Petroleum Refineries

Petroleum End-uses



Revenues



Source: T. Werpy,  
2009 BioWorld Conference

# Biomass – Comes in many forms throughout the World





# Ontario's Competitive Advantage

## Past:

1. Captive feedstock (large tenured forest licences)
2. Abundant low cost fibre
3. High quality fibre (black spruce)
4. Low energy prices
5. Skilled labour
6. Tariffs and competition
7. Exchange rates



# Ontario's Current Competitive Situation

## Positives:

1. Existing facilities and excess capacity
2. Skilled labour forces
3. Certified sustainable feedstock supply

## Negatives

1. Abundant, sustainable fibre, but **no longer low cost**
2. Ever increasing energy pricing: especially electrical
3. Increased forest regulation: endangered species....
4. Transportation costs
5. Significant amounts of new off-shore competitive capacity



# Strategic Options

- Biomass is bulky, wet and distributed
- Petroleum is cheap, dense and comes out of a pipe
- Petroleum has scale advantage
- To compete, we will need:
  - High value-added products that can compete on both price and performance
  - Shared logistics, infrastructure
  - Integrate value-added products and energy
- The petroleum example is critical
  - 4% of feed makes 42% of revenues

T. Browne FPInnovations

# Chemicals with new bio-properties

- Identify novel products based on unique biomass properties
- Strategic approach
  - Cost less critical if new functionalities available?
  - Exact molecular replicate?
- New capital infrastructure?
- **Is this our 4%?**



# FPAC: Future Bio-pathways study

- *"Integrated mill- one that produces wood, pulp/paper as well as bio-energy and bio-materials – **provides 5 times as many jobs as a stand-alone bio-operation....**"*
- *" it places traditional products, especially lumber and pulp, at the heart of new green business model..."*

## Benefits of Integration with an existing facility:

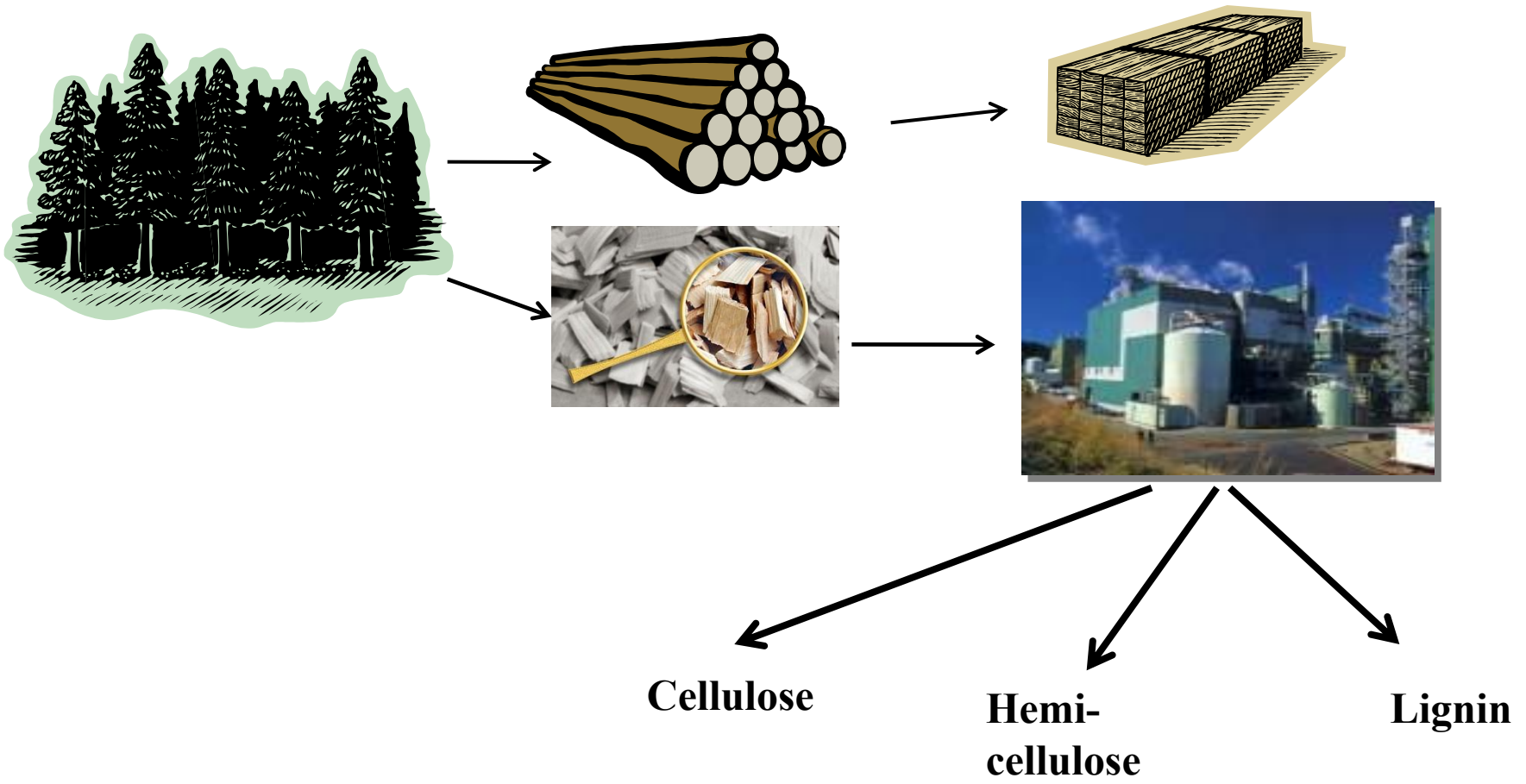
- Shared forestry and feedstock flow: Many years of expertise
- Forestry plans and infrastructure: complicated and expensive
- Dilution of existing infrastructure costs
- Many mills have surplus capacity and equipment

# What is a Bio-refinery?

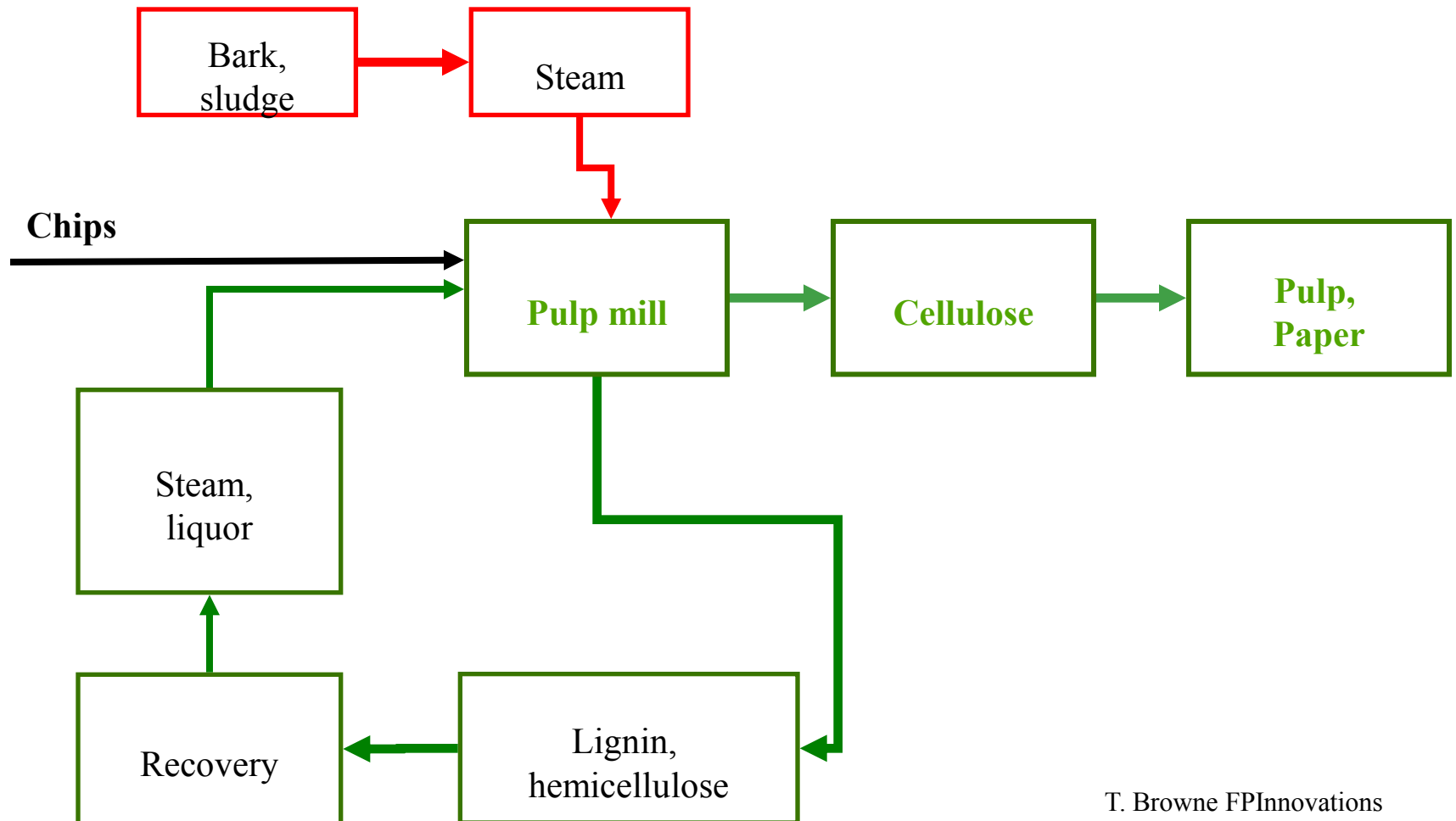
- An integrated set of processes
- Multiple products, a single site
  - Novel, value-added products
  - Commodity grades
  - Fuels, chemicals, others
- Raw material:
  - Renewable, biomass-based
  - Forestry or agricultural residues
  - Dedicated plantation crops
  - Urban residues



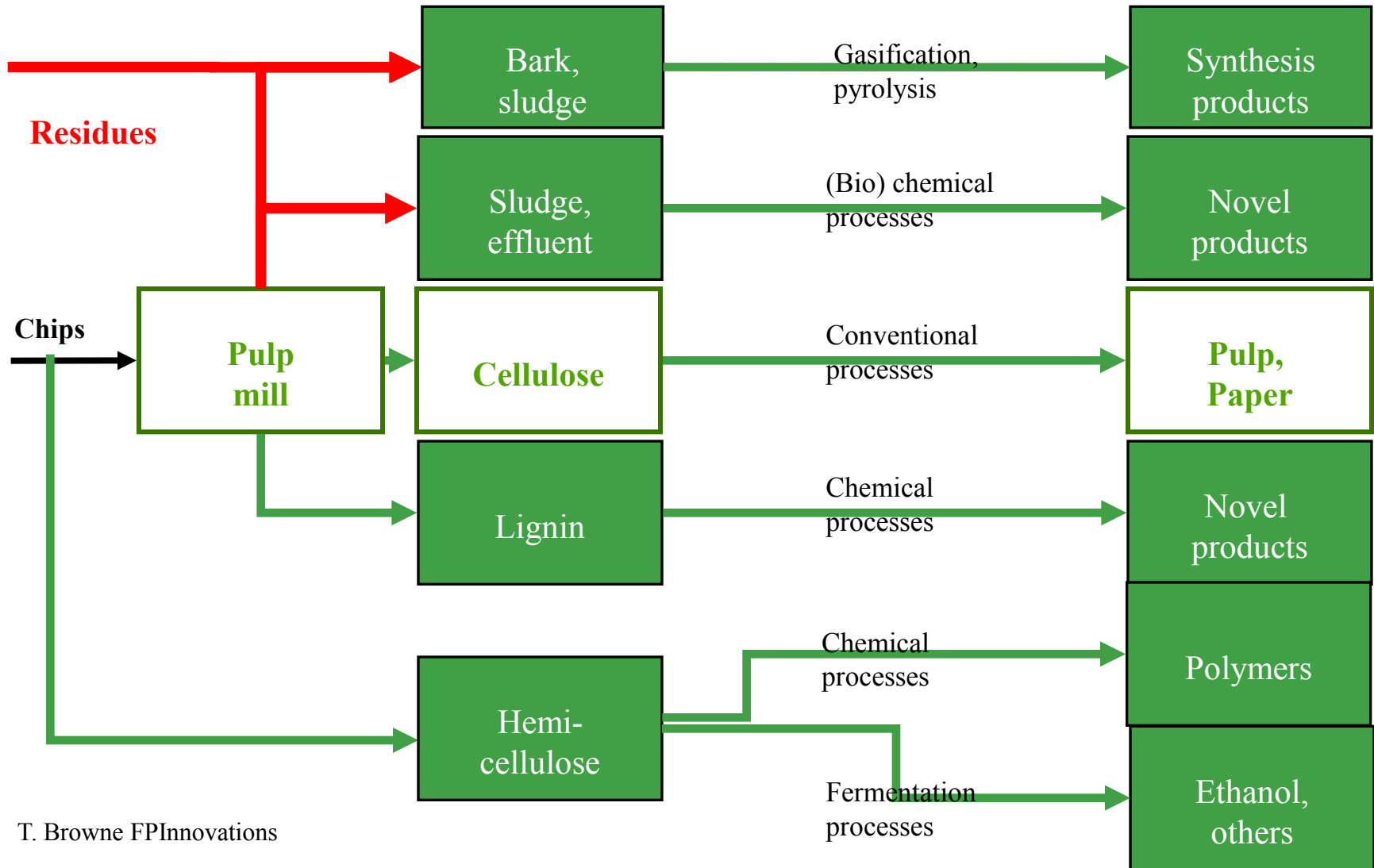
# Components of Wood:



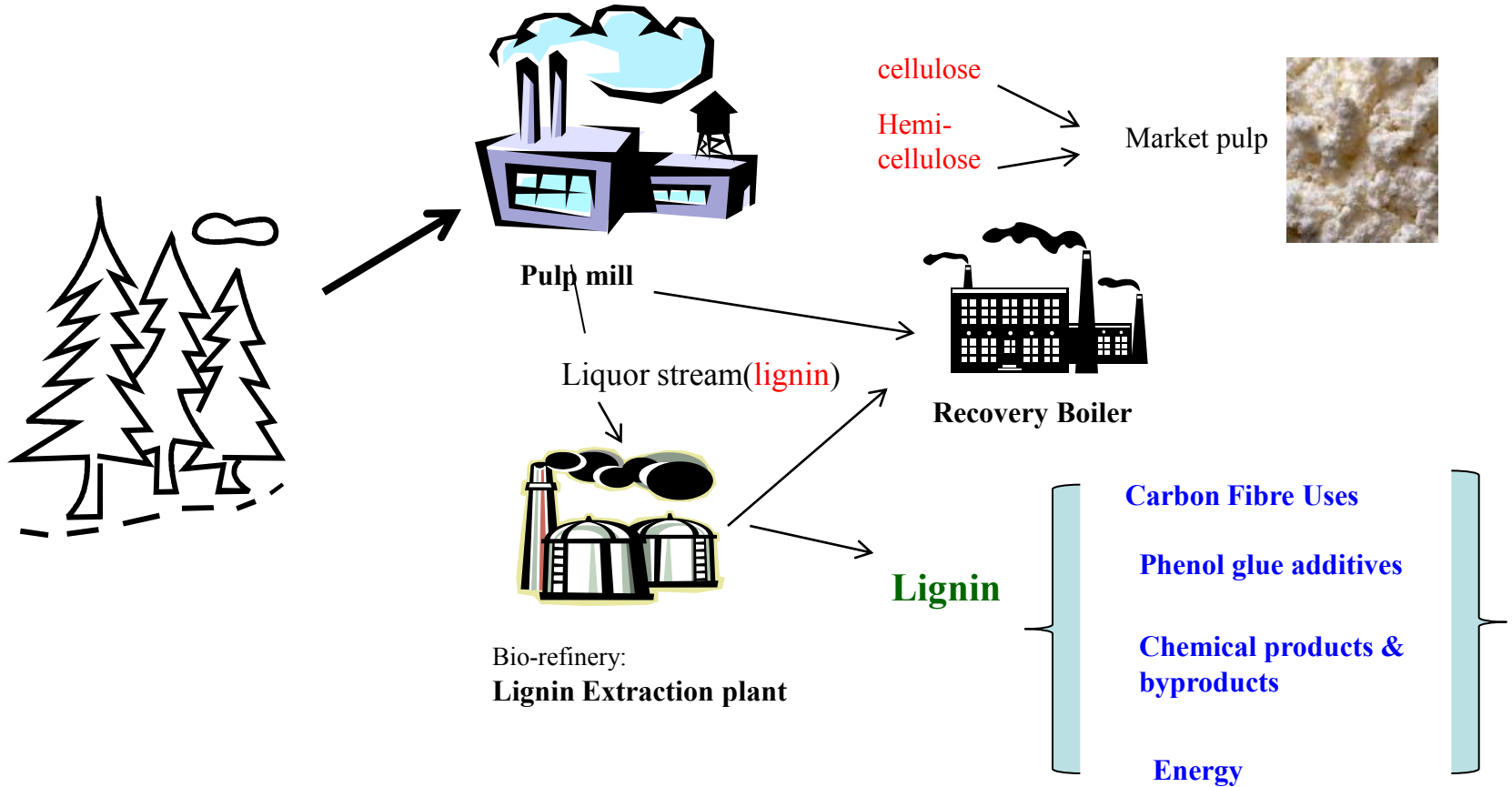
# Pulp mill material flows



# Potential pathways to new products



# Lignin Bio-Refinery Initiative: Thunder Bay





# Bio-Refinery Initiative: Thunder Bay mill

## Step 1: Lignin evaluation plant (100 kg/d)

- To build a world-class liquor and lignin evaluation centre
- To coordinate the activities with broader Canadian R&D in the area
  - FPInnovations, Lakehead, NSERC and NRC networks, UWO Sarnia, etc.

## Step 2: Commercial Lignin plant (50 t/d):

- To build a pilot commercial lignin plant
- To identify value-added uses for the lignin

## Novel technologies

- To evaluate and implement other novel technologies for the forest sector

## Other potential project areas

1. Platform chemistries
2. Combined heat and power for remote communities
3. Wood merchandizing yards
4. Bio-energy projects:
  - torrefied wood??
  - Syngas
  - Fuels
  - Pellet enhancement



# Strategic Conclusions

1. Competing in commodities will be very challenging
  - If the 4% is essential to petrochemicals, it is even more essential to forestry
  - Where is our 4% stream?
2. Combined Heat and Power:
  - Difficult without policy changes: EU 20/20/20
  - Lack of infrastructure
  - Lower North American pricing of gas and power
3. Selective strategic investment to capture that 4%:  
Each mill site will be unique and different
4. Scale of forestry installations:
  - Driven by feedstock costs
  - Implies smaller, distributed plants
  - Tradeoff: economies of scale for feedstock costs

# Summary

- CRIBE structure and governance now in place
- “Open for Business”
- Practical “hands on” Board
- Northern Ontario forests provide clear strategic advantages
- Opportunities for synergies across Ontario
- New products, processes, jobs and businesses





## Web site

[www.cribe.ca](http://www.cribe.ca)



- Investment criteria and investment funding process can be accessed from site.

Submit project funding requests to:

[projects@cribe.ca](mailto:projects@cribe.ca)

Information about CRIBE:

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