West Fraser Bio-Conversions

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West Fraser

2012 Pacific Rim Summit on

Industrial Biotechnology and Bioenergy

October 10-12th, Vancouver, BC, Canada

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About West Fraser

An integrated solid forest products company primarily focused on wood products

- Founded in 1955 in Quesnel
- Core business is producing lumber, plywood, laminated veneer lumber (LVL), MDF, pulp and newsprint
- 7,000 employees in more than 35 operations in Western Canada and across the Southern United States
- North America's largest lumber producer, Canada's largest plywood and 3rd largest market pulp producer

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Sustainable Resource

- Managed forests key to business
- Saw logs provide highest value
- Pulp logs are included in the harvest

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Primary Conversion

- Lumber mills convert high value timber to construction grade solid wood products. Sawdust, shavings, wood chips and bark are byproducts that provide significant value

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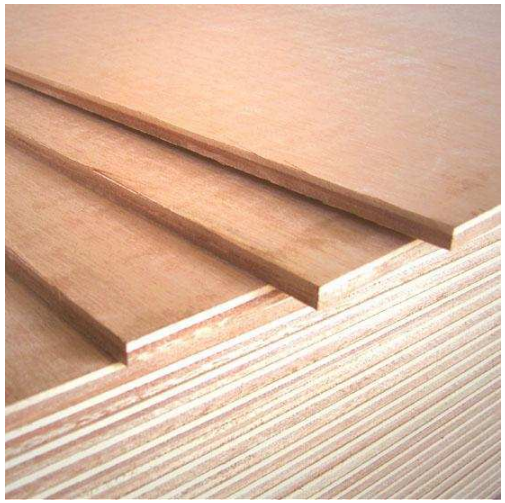
Engineered Wood (LVL, Plywood)



- Peelers (high quality saw logs) are used to produce engineered wood products
- These products are composites of wood and resins

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Engineered Wood (MDF)

- Sawdust is used to produce medium density fibre board.
- These composites of wood and resin can be used to produce a variety of products from moldings, to cabinets and furniture

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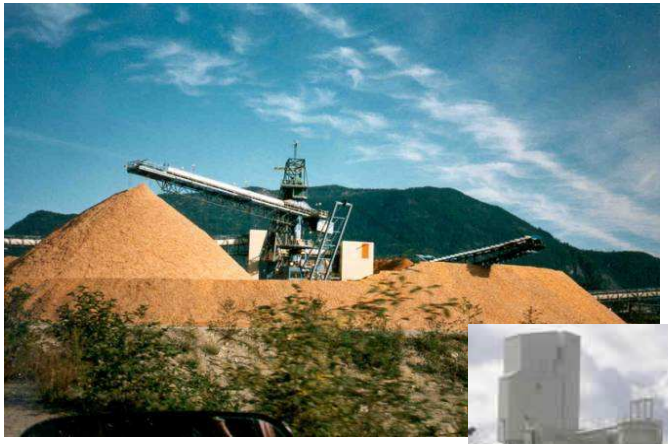
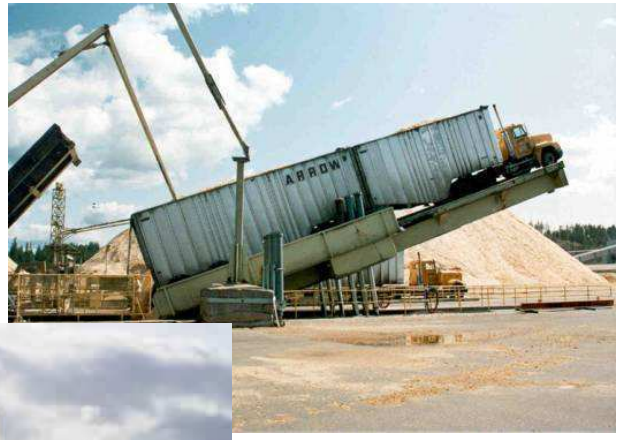
Kraft Pulpmill





- Residual chips from the lumber mills are converted to pulp in our Kraft pulp mills using chemicals
- Pulp liquors contain all non-cellulose components of the biomass

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Biomass Fuel Conversion

- Beehive burner for waste disposal all our lumber mills used them most have been converted to thermal heat systems
- Two remain in operation, two are on standby

- Thermal Oil Units burn biomass to displace natural gas used for lumber drying

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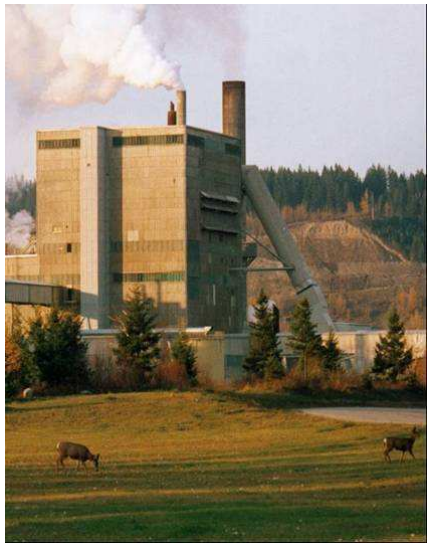
Traditional Power Generation



- Pulp mill Power boiler and Steam Turbine

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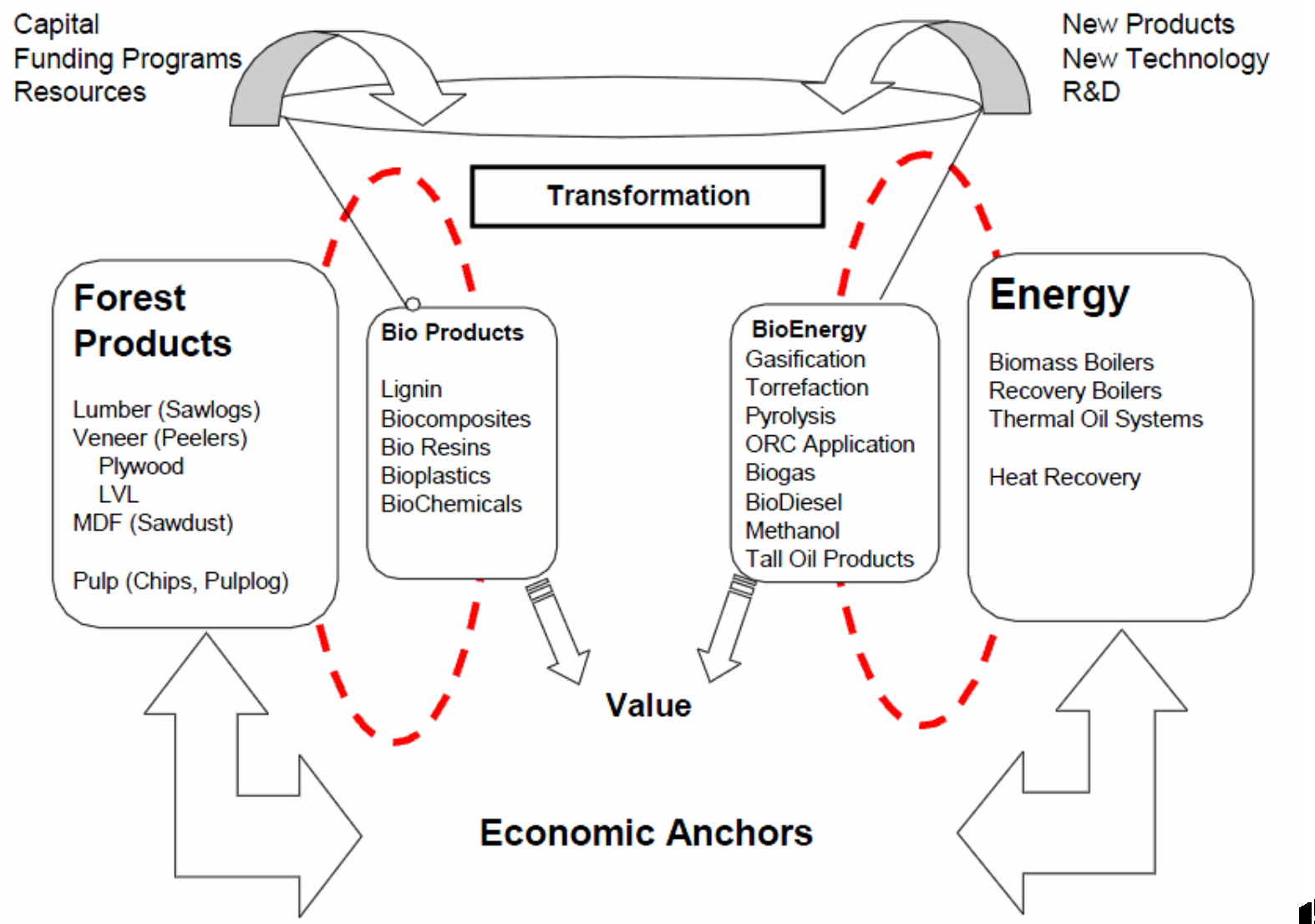
BIO Initiatives



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Key Requirements of Bio Initiatives

- **Meet business objectives**
  - Economically competitive return
  - Be sustainable without subsidy
  - Compliment our environmental sustainability requirements
- **Synergy with operations**
- **Be commercial or near commercial stage of development**
- **Market for outputs**
- **Availability of Inputs**
- **Simple to use**

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Current Initiatives

- **Energy is a focus**
  - 10 MW Biomass plants at Chetwynd and Fraser Lake
  - 5.3 MW Biogas Plant at Slave Lake Pulp
  - Tall Oil used for green Energy at Cariboo Pulp
  - Green Transformation funds used to reduce steam and generate more electricity in steam turbines at Cariboo Pulp and Hinton Pulp

- **Effluent treatment Biomass used for land application**

- **Research**
  - Bio-refinery conversions at Hinton with Ecole Polytechnique et al
  - Bio-composites at AITF
  - Composting Olds college
  - MDF quality improvements AITF

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Turboden ORC Unit

- New Biomass energy systems being applied at lumber mills to eliminate use of Beehive burner

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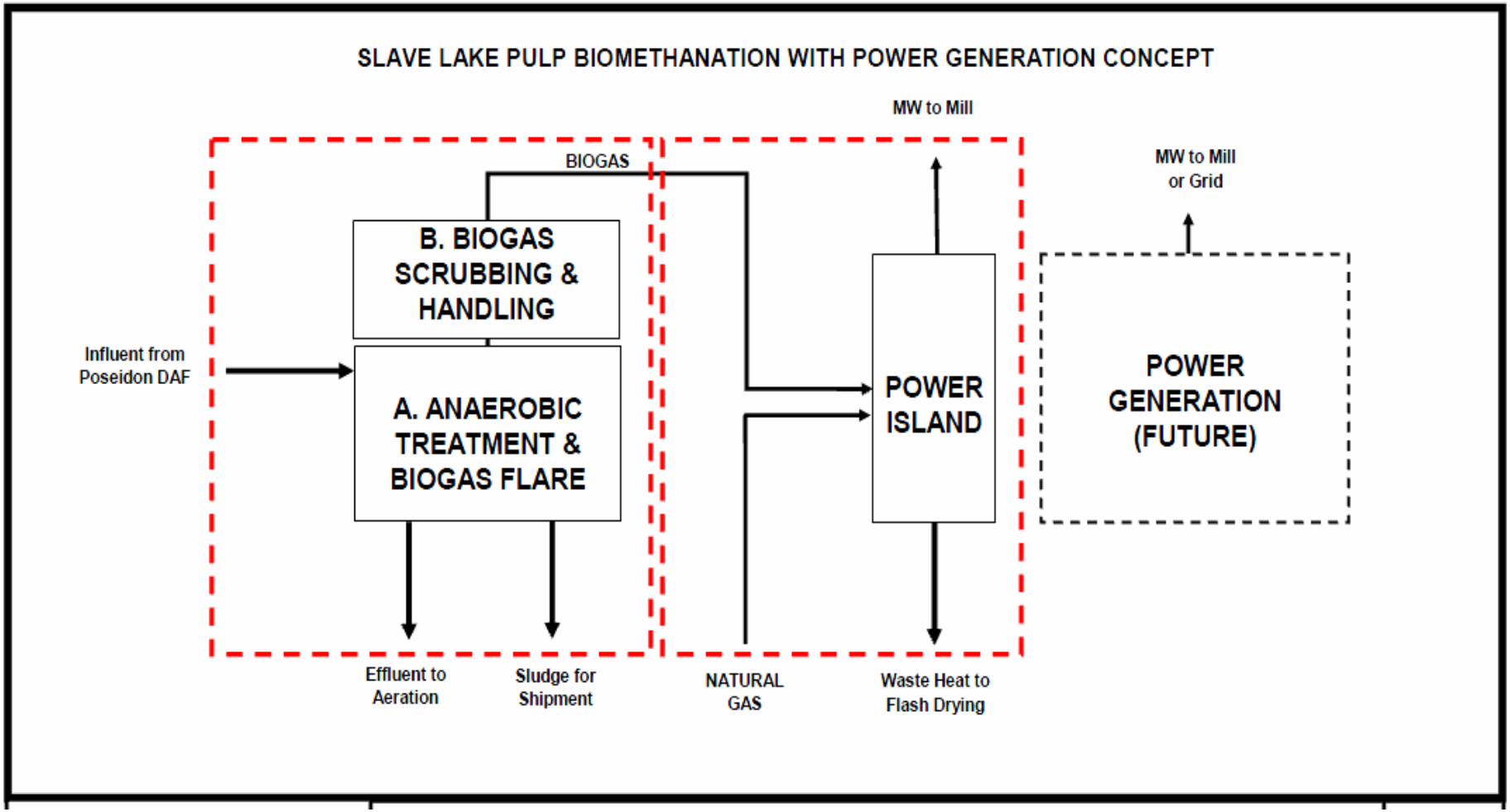
Anaerobic Effluent Treatment



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Biowaste for Soil Enhancement

- Disposal of effluent biomass costly as difficult to dry to a combustible moisture content
- Land application or composting two viable alternatives

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Future Opportunities

Pulp Liquor refining

- Liquor is a complicated soup of inorganic and organics
- Tall oil can be removed from liquor. It is currently burned but can be refined to produce other products
- Lignin can be used in resins
- West Fraser has market for resin used in Engineered wood products

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Bark and residuals

- Most economic use of bark is combustion to produce energy
- Roadside residuals not economic for producing electricity
- Opportunity is to develop high value uses of bark

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