Demonstration of an Integrated Biorefinery

Old Town’s Bioenergy Business

E2Tech/MPPA Forum ~ February 27, 2014
“Reinventing Maine’s Pulp, Paper & Forest Products Industries”
Configured for Alternative/Renewable Energy Development
- UM’s FBRI Technology Research Center
- OTFF’s Piloting, Analytical and Technical Services

Biomass Boiler Operations with 16 MW Turbine
Integrated into ISO-NE Markets ~ FERC QF Status
Additional Generating Capacity > 9.5 MW Gas Turbine
Participation in REC Market (Renewable Energy Credits)

- 200,000 tonne capacity market pulp mill ~ northern bleached hardwood Kraft (NBHK)
- Pre-extraction & acid recovery IP and technology
- Production of high-quality fiber products, while simultaneously producing feedstock for a biorefinery
– Create an environment of “continuous improvement” focused on efficient and economically viable operations given the “high cost of wood” in the Northeast
– Development and demonstration of a technically and economically viable biofuels process that converts “wood to jet fuel” (biofuels)
– Pursue opportunities for growth that create value and diversity of its manufacturing model in Old Town
– Operate a green, efficient energy platform reducing greenhouse gas emissions and carbon footprint
– Create a “center of excellence” for developing technologies and intellectual property in the area of bio-energy

**Vision ~ Old Town & Patriarch**

**Goal**
Long Term Viability and Sustainable Jobs

– Fiber Security
– Low cost position
– Innovation/Technology Development
– Energy Independence

**Vision**
Creating value through utilization of the existing infrastructure
OTFF Sustainability

- **Safety Culture**
- Environmental Stewardship (Conservation & Sustainability)
- Sustainability & Green Initiatives provide strong future growth
- Proximity to raw materials
- Second generation feed stock ~ renewable resource
- Established infrastructure supported by an ongoing business
- Pulp from northern mixed hardwoods
- Chain of custody certification
- Traceability
- Strategic partnerships

![FSC Certified](image)

**SUSTAINABLE FORESTRY INITIATIVE**

*Good for you. Good for our forests.*

[www.sfiprogram.org](http://www.sfiprogram.org)
Technology Pathways

• Pre-extraction of Hemicellulose (C5) and Acid Recovery
  - Impact on pulp quality
  - Acid recovery purity and markets
  - Complex process and capital intensive

• C5 Rich Sugars Fermented to Bio-Butanol -> upgrading to bio-jet
  - Inefficient fermentation (water balance)
  - Butanol an intermediate ~ conversion technologies not proven at scale
  - High Capex and Opex ~ $24 per gallon and 36 cent sugar

• C6 Rich Sugars with Algal Fermentation with hydrocarbon upgrade to bio-jet
  - Solazyme ~ fermentation only ~ 3rd parties to condition and upgrade
  - Opportunity for by-product development
  - Economic viability ~ $16 per gallon at 30 cent sugars; Capex at $100 per gallon
  - Wood to Jet Fuel ~ technically feasible but not economical
  - Could pilot end product with Logos or Solazyme plus POS & EPO

• 2nd Generation Clean Sugars ~ OTFF’s “Core Value”
  - Performance ~ comparable to corn dextrose
  - Low sugar cost ~ with biomass, 10-15 cent range commercially viable
  - Capex ~ re-purposed pulp mill < $4 range as benchmark
  - Plastics, Chemicals and Carbon Fibers ~ scale and feedstock costs
Relative Value

- Carbon Fibers: OTFF commercial sugar plant as feedstock $0.10/# Feedstock 10x $1.00/# Chemicals 5x $5.00/#
  Carbon Fiber
- Fuel Comparison: $0.03 Biomass 5x
  $0.15 Sugars 3x Fuels (~$3/Gal)
- Pulp Comparison: $0.06 Wood 4x $0.24
  Pulp (~$500 ADST)
- Biomass BTU Value: $0.03 Biomass 3x
  $0.10 Wood Pellets (~$200/ton)
• **The Ethanol Platform**, is the first step in mitigating scale-up risk for cellulosic feedstock production.

• **Old Town has proven technology** for producing clean cellulosic sugars from wood for conversion to bio-fuels, bio-plastics, bio-chemicals and potentially carbon fibers.

• **The steps to commercialization** over the next several years:
  • a **logical pathway** that demonstrates the technology, incorporating a model that maximizes profitability, manages debt and capital;
  • a **continuation of technology development** to higher value conversion technologies and products; and
  • a **commercial deployment strategy** that includes the “viability of bolt-on technology”, licensing and re-purposed pulp mills.

*Long term viability in a volatile pulping industry*...
Ethanol Platform

Ethanol

BioJet
- BioJet
- Naptha
- Kerosene

BioPET
- Soft Drink Bottles/Caps
- Water Bottles/Caps
- Recycled Plastics

Bio chemicals
- Ethyl Halides
- Ethyl Esters
- Diethyl Ether
- Ethyl Amines

Antiseptic

Solvent

Medical Ethanol

Further Upgrading

Ethanol Biofuel
### Gasoline/Ethanol Consumption in New England

<table>
<thead>
<tr>
<th>State</th>
<th>Gasoline</th>
<th>Ethanol</th>
<th>OTFF Volume</th>
<th>Percentage of Ethanol Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine</td>
<td>669,816,000</td>
<td>66,981,600</td>
<td></td>
<td>19.40%</td>
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<tr>
<td>Connecticut</td>
<td>1,456,098,000</td>
<td>145,609,800</td>
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<td>Massachusetts</td>
<td>2,768,472,000</td>
<td>276,847,200</td>
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<td>New Hampshire</td>
<td>699,258,000</td>
<td>69,925,800</td>
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<tr>
<td>Rhode Island</td>
<td>371,364,000</td>
<td>37,136,400</td>
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<tr>
<td>Vermont</td>
<td>319,494,000</td>
<td>31,949,400</td>
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<tr>
<td>New England</td>
<td>6,284,502,000</td>
<td>628,450,200</td>
<td>13,000,000</td>
<td>2.07%</td>
</tr>
</tbody>
</table>

Data from 2011 U.S. Energy Information Administration. Ethanol Market is calculated on a 10% blending basis to motor gasoline.
FOOD VS. FUEL

FOOD OR FUEL?

Nearly a billion people will go hungry tonight, yet this year the U.S. will turn nearly 5 billion bushels of corn into ethanol. That’s enough food to feed 412 million people for an entire year.

8 BUSHELS OF CORN = 21.6 GALLONS OF ETHANOL FUEL

OR

ENOUGH FOOD TO FEED A PERSON FOR A WHOLE YEAR

Competitive Advantage

Food

Fuel

Certified Women's Business Enterprise

OLDTOWN FUEL & FIBER

A Lynn Tilton Company
Biofuels use a small amount of biomass today

- Potential to become local and global

Biomass yield depends highly on local sun, soil, and water

- Losers: Purpose-grown energy crops and algae bioreactors
- Winners: Agricultural and forest waste
- Wildcards: low-capex and offshore algae

Conclusion:
Biomass cultivation technologies and opportunities are highly local
• **Capacity**
  - 50 MM Ton/year US
  - 12 MM Ton/year Canada

• Repurposing 10% of this capacity would correspond to 12.4 Billion # sugar/year
• Technology Center with unmatched capability
  • Industrial manufacturing environment
  • Operating pilot plant
  • Experienced Industry professionals
• Demonstrable expertise (2012)
  • Made 20 tons of wood derived clean lignocellulosic sugar
  • Sold for a variety of fermentation applications
• Poised as outsourced technology partner to other businesses
  • Lab & Pilot scale cellulosic feedstock development
  • Manufacturing experience perspective in development work
  • Engineering Services for limited project scopes
  • Innovative and Creative follow through to meet customer goals
  • Extensive piloting equipment & capability
  • Validation of customers’ theoretical ideas/concepts
  • Cellulosic sugar and acid analytical lab capabilities
  • Capable of supplying cellulosic sugars for customer processes