Integrated Biomass Energy Campus:
Creating value from woody biomass in Northeast Oregon

Dylan Kruse
Sustainable Northwest
Portland, Oregon

Special thanks to Nils Christoffersen:
Wallowa Resources, Enterprise, Oregon
Before we begin

• Energy is just one piece of the puzzle
• Jobs....jobs....jobs
• Oh, and infrastructure
• Bigger picture, broader whole
• The “New Forest Economy”
• Resonance and replicability
• You can do it too...and here’s how
A few stark realities...
Timber Harvest in Wallowa County:
Average Annual Harvest by Decade (mbf) - Projection for 2010-2019
Haypen 3 stewardship contract

Biomass – (1.0”-4.9”)
23% of cut trees per acre.

Pulp fiber – (5.0”-6.9”)
33% of cut trees per acre.
Wallowa Fire Zone - Wildfire Occurrence 1955-2007
Acres Burnt and Total Cost of Suppression

Average Annual Fire Suppression Cost
1986-2007: $6.7 million per year

731,541 acres burnt since 1955; 680,705 acres (93%) have burnt since 1986.

$144 million spent in suppression since 1970; $140 million (97%) spent since 1986
Draft Blue Mountain National Forests Management Plan

• >60% of the 3 national forests in eastern Oregon are at risk of catastrophic wildfire (Dec 2009)

• Impact to watershed function, endangered species recovery, recreational opportunities, and jobs.

• 1.5 million acres targeted in USFS Eastside Restoration Strategy. Only treating 30-50,000 acres per year.

• Restoration and biomass utilization = win-win.
Exploration of Opportunities
Figure 12-7. Cost of biomass electricity as a function of biomass fuel cost

- $0.28/kWh in Hawaii
- $0.073/kWh in NE Oregon
Approx. 85,000 GT for 5 MW

Figure 7-5. Forest biomass supply curves for potential conversion sites in Baker, Union and Wallowa Counties.
Table ES-1. Biomass supply quantity and weighted average biomass cost delivered to potential plant sites in Baker, Union and Wallowa Counties

<table>
<thead>
<tr>
<th>Supply type</th>
<th>Quantity (GT/year)</th>
<th>Average cost ($/GT delivered)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baker County</td>
</tr>
<tr>
<td><strong>Biomass ethanol</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural residue</td>
<td>80,009</td>
<td>35.24</td>
</tr>
<tr>
<td>Forest biomass</td>
<td>425,934</td>
<td>48.66</td>
</tr>
<tr>
<td>Mill chips</td>
<td>308,794</td>
<td>25.39</td>
</tr>
<tr>
<td>Veneer cores</td>
<td>1,458</td>
<td>12.46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>816,195</td>
<td>38.47</td>
</tr>
<tr>
<td><strong>Biomass power</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest biomass</td>
<td>425,934</td>
<td>48.66</td>
</tr>
<tr>
<td>Mill chips</td>
<td>308,794</td>
<td>25.39</td>
</tr>
<tr>
<td>Veneer cores</td>
<td>1,458</td>
<td>12.46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>736,186</td>
<td>38.22</td>
</tr>
</tbody>
</table>
NE Oregon Biomass Assessment

Table 3-3. Estimates of annual biomass generation from overstocked land$^{30}$

<table>
<thead>
<tr>
<th>Biomass source</th>
<th>Total overstocked area (acres)</th>
<th>Annual treated area (acres)</th>
<th>Total biomass generated (GT)</th>
<th>Annual biomass generation over a 20-year time frame (GT/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber harvest on economically viable forest land</td>
<td>16,100</td>
<td>850</td>
<td>176,316</td>
<td>8,816</td>
</tr>
<tr>
<td>Thinning overstocked forest land (assumes 10 GT/year yield)</td>
<td>234,900</td>
<td>11,745</td>
<td>2,349,000</td>
<td>117,450</td>
</tr>
<tr>
<td>Total</td>
<td>251,000</td>
<td>12,595</td>
<td>2,525,316</td>
<td>126,266</td>
</tr>
</tbody>
</table>

Blue Mountains Assessment – Across 3 Counties

251,000 overstocked acres on USFS in commercial management zone. Timber harvesting on 16,100 acres of this area could result in a positive net value – producing an average of 9,000 GT per year over 20 years. Limited funding and markets to support thinning on remaining overstocked land (234,900 acres).
“Typical” forest supply chain
The solution...

Integrated Biomass Energy Campus!

“IBEC”
Integrated campus supply chain

Long saw logs directly to mill

Integrated Campus
45 miles

Short Saw & Pulp
60%

Firewood/
Densified

Residuals

15%

25%

Post & pole

15%

Everything else to Campus
Integrated Biomass Utilization

- Short saw log
- Debarker
- Post and Pole
- Whole Log Chipper
- Firewood
- Kraft chips
- Heat logs
- Local biomass boilers
- Combined Heat and Power
Integrated Biomass Energy Campus
Restoration, Utilization, and Wealth Retention

Fuel reduction project → Byproduct and log removal → Restored condition

- Firewood
- Densified fire logs
- Post and pole

And fuel to Enterprise School District
Benefit 1: Reduced in-woods harvesting and trucking costs, and lesser site impacts

• Reduced harvest cost per acre, due to simplified and reduced in-the-woods sorting and processing

• Higher recovery rate in volume of small log and biomass materials, and less breakage

• Smaller landings result in less site disturbance
Benefit 2: Integrated and diversified merchandising and marketing

• Reduced raw material cost for Campus businesses

• Operational advantages to inventory, labor sharing, and market adaptation

• Operational synergies for marketing and delivery
Benefit 3: Economic Diversity, Stability, and Predictability

• Local ownership and control

• Circulating payroll and revenue dollars

• Job creation, both on site and in the woods

• Utilization of the human and infrastructure capital, and continuation of Wallowa County’s forest products heritage.
Benefit 4: Increased forest health and restoration

• Increase in acres treated for hazardous fuel reduction

• Reduced cost to tax payers associated with forest restoration

• Improved air quality, and reduced cost of weed control
Benefit 5: Additional supply to regional mills and forest products customers

• Increased tons per acre removed

• Improved harvest economics
Photo courtesy of Marcus Kauffman
Photo courtesy of Marcus Kauffman
County-Scale Impacts

- **Employment**
  - 25-30 jobs on-site, 18 in the woods (>1% of the workforce)

- **Catalyst to forest management**
  - Markets for 100,000 - 130,000 tons of woody biomass
  - Support management costs for 10,000 to 20,000 acres
  - $3,000,000+ in delivered log / biomass payments to landowners

- **Biomass energy benefits**
  - 1 MW of electricity / 5 million BTU’s of heat
  - Offset of 1 metric ton of carbon
  - Retain ~$500,000 in energy payments in local economy
It takes a village

• Passionate, and knowledgeable management

• Public-private partnerships
  • Low-cost working capital - NMTC
  • County government support

• Non-profit partnerships
  • Technical assistance
  • Maintaining the triple-bottom line
  • Equity stake
Questions?

• Nils Christoffersen, Wallowa Resources
  • nils@wallowaresources.org; (541) 426-8053

• Dylan Kruse, Sustainable Northwest
  • dkruse@sustainablenorthwest.org; (503) 221-6911

• Or visit Integrated Biomass Resources:
  • http://www.integratedbiomass.com/
Monthly Boiler Revenue and Costs

Fuel Cost - $3564 (at $18/ton)
Maintenance - $350
Labor - $1350
Electricity Sales/Value - $5040
Thermal Sales - $5000

Net Revenue - $4776

Assumes limited thermal markets: potential to increase thermal sales value and net revenue with additional thermal users.