Limits to Growth: Wood Pellet Production in the U.S.

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Fact: Bioenergy projects use real wood.

- Bioenergy projects primarily target mill and forest residues, debris and other byproducts.
- Some projects also target low value trees from forest thinnings or pulpwood material as a feedstock.
- Bioenergy project developers typically prefer waste materials with few or no markets than compete with an existing industry in the marketplace.

Bark residues at lumber mill  Scrap pallets: urban waste  Logging residues

Photo sources: [http://www.rainierwoodrecyclers.com/woodrecycle.htm](http://www.rainierwoodrecyclers.com/woodrecycle.htm), USDA, Natural Resources Conservation Service
Bioenergy Projects: Screen for Success

• Technology
  – Does the project rely on proven or unproven technology?

• Status
  – Is the project under construction or operating?
  – Is the project on hold or is the plant shut down?
  – Has the project received/secured/signed two or more of:
    • Financing
    • Air quality permits
    • EPC contracts (Engineering, Procurement & Construction)
    • Power purchase agreements for electricity facilities
    • Interconnection agreements for electricity facilities
    • Wood supply agreements
    • Location
Bioenergy Demand: US Case Study

- Projects: 459 → Expected: 296 (64%)
- Wood demand: 128.6 MM → Expected: 78.5 MM (61%)

Source: Forisk Consulting, as of July 2013
Relative Growth of Bioenergy Since 2010

Source: Forisk Consulting, July 2013
Lessons Learned: why do projects fail?

U.S. Bioenergy Plant Progress; July 2010 - July 2013

Source: Forisk Consulting, as of July 2013
Projected Wood Demand: U.S.

Source: Forisk Consulting, Ince & Nepal 2012
Export Demand Drives Wood Pellet Project Growth in the U.S. South

- Wood pellet plants rely on known, proven technologies.
  - This facilitates the financing and development of new projects.
- Pellet projects require lower levels of capital investment relative to liquid fuel and large scale electricity projects.
  - Pellet projects require $150 million or less while the others require hundreds of millions of dollars.
- Project developers and investors are responding to actual demand from actual customers (in Europe).
  - The pellet projects announced as of July 2013, 58% (31 of 55) focus on the export markets.
  - For the South, export oriented projects account for 93% of the total.

<table>
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<tr>
<th>Region</th>
<th>Domestic</th>
<th>Export</th>
<th>Total</th>
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<tr>
<td>North</td>
<td>14</td>
<td>4</td>
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</tr>
<tr>
<td>South</td>
<td>2</td>
<td>27</td>
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<tr>
<td>West</td>
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Pellet Projects Face Practical Limits to Growth in the U.S. South
Pellet update: North and West

• 45 pellet plants in the North account for 55% of US domestic pellet production capacity

• 26 pellet plants in the West account for 25% of US domestic pellet capacity

• Recent announcements:
  – Cate Street Capital planning 3 export torrefied pellet facilities
    • East Millinocket, ME (275,000 ton)
    • Millinocket, ME (100,000 ton)
    • Eastport, ME (250,000 ton)
  – Chip Energy in Goodfield, IL had a groundbreaking ceremony for a recycled biomass pellet plant; the plant may be operational by October 2013
About Forisk Consulting

• Forisk provides management consulting and educational services to senior management and investors in the forest products, wood bioenergy and timberland investing sectors.

• Founded in 2004.

• Current research includes:
  – Timber Market Analysis and Forecasting
  – Timberland Ownership and Investment Vehicles
  – Wood Bioenergy
    • *Wood for Bioenergy: Historical Context and a Practical Path Forward*
      – Book published by the Forest History Society in 2012