Agenda

• Background to Weyerhaeuser
• Biomass that Meets End User Needs
• Torrefaction Value Chain
• Role of Biomass Suppliers
### Weyerhaeuser Background

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded:</td>
<td>1900</td>
</tr>
<tr>
<td>2009 Revenues</td>
<td>$5.5 billion</td>
</tr>
<tr>
<td>Total Assets</td>
<td>$15.3 billion</td>
</tr>
<tr>
<td>Number of employees</td>
<td>14,900</td>
</tr>
<tr>
<td>Technology staff</td>
<td>350 scientists / engineers / economists</td>
</tr>
<tr>
<td>Forestland owned or managed</td>
<td>8.8 million hectares</td>
</tr>
<tr>
<td>Home office</td>
<td>Federal Way, WA</td>
</tr>
<tr>
<td>Operational Experience</td>
<td>Australia, Brazil, Canada, China, France, Indonesia, Ireland, Japan, Malaysia, Mexico, New Zealand, Philippines, Uruguay, USA</td>
</tr>
<tr>
<td>Sales</td>
<td>Worldwide (&gt;60 countries)</td>
</tr>
</tbody>
</table>
Our Vision: Delivering Sustainable Solutions

- Scale Supply
- Fuel Development and Manufacturing Expertise
- Engineering Services
- Forest Asset Management
- Sustainability R&D

Services for Energy Sector
Weyerhaeuser Ownership & Managed Lands

[Map showing Weyerhaeuser Timberlands and China Joint Venture locations]
Our Businesses

Commercial

- Timberlands
  - Wood Products - iLevel
    - Construction
  - Real Estate
    - Consumers
  - Cellulose Fibers
    - Multiple Industries
  - Bioproducts
    - Energy, Chemicals & Materials
  - Biofuels
    - Liquid Fuel Users

Developing
Total Value Chain Results, Customized Solutions

**Land**
- Geography Selection
- Land Use Planning
- Integration of Land Owners

**Selection**
- Species Selection
- Seed Cloning for Maximum Productivity
- Integration of Land Owners

**Silviculture**
- High Yield / Precision Forestry
- Agro-Forestry R&D
- Maximizing value per acre

**Harvest**
- Optimization
- Scale

**Procurement**
- Scale Purchase and Aggregation

**Conversion**
- Lumber / Panel Facilities
- Pulp and Paper
- Biomass Fuels
- Technology Pathways

**Markets & Products**
- N America
- Japan
- S America
- China

**Sustainability Platform**
- Certification / market reputation
- Environmental research & technology
- Social issue risk management
- Public policy / regulatory risk management
- Chain of Custody
- Partnering with NGOs - sustainability research

WEYERHAEUSER | SOLUTIONS  EXPERTISE FOR A SUSTAINABLE PLANET
Biomass that Meets End User Needs

- Bio-Coal is an extension of biomass – new form
- Current biomass supply chains play an important role
- Establish the value to end user
- Economical torrefaction:
  - appropriate scale & location
  - process yield
  - feedstock preparation

Photos: [www.biorefinery.uga.edu](http://www.biorefinery.uga.edu), [www.biomassenergyresearch.ca](http://www.biomassenergyresearch.ca), [www.biocoal.files.wordpress.com](http://www.biocoal.files.wordpress.com)
Dependencies Pace Development

- Economics & ROI
- Value Proposition
- Quality Product & Test Burn Quantities
- Off Take Agreement
- Scale Torrefaction & Densification
- Financing
- Secure Biomass

Economics & ROI → Value Proposition → Quality Product & Test Burn Quantities → Off Take Agreement → Scale Torrefaction & Densification → Financing → Secure Biomass → Economics & ROI

Weyerhaeuser Solutions
Expertise for a Sustainable Planet
Commercialization of torrefaction requires a **total** value chain approach, from feedstock to energy production.

Technical & economic viability can be demonstrated with the right strategic partnerships.

Torrefaction will need to be secured and optimized for the feedstock and energy process requirements.

Feedstock attributes will be an important element in development.
Optimized Feedstock Solutions

- Secure, Long-Term Supply
  - Pulp Wood (in chip form)
  - Location to Wood
  - Location to Customers
- Forest Energy Fiber (from logging harvest)
- Wood Product Manufacturing residues
- Optimized In-Bound and Out-Bound Transportation & Logistics

Industrial Scale Volume

Product Quality

Cost-Effective Delivery
More than Biomass Suppliers

Critical skills to speed the development of torrefaction:
• Feedstock supply, logistics and economic assessment
• Feedstock characterization and preparation tailored to process requirements
• Process design, engineering and construction
• Feedstock and thermo-chemical process R&D
• Large scale operations management
• Facility sites appropriate for torrefaction demonstration and commercial operation
• Techno-economic analysis, modeling and site selection analysis
• Partnering experience
Summary Comments

• Bio-Coal is an extended form of biomass
• Biomass supply, logistics and optimization apply to Bio-Coal
• Value chain partnering is critical for torrefaction commercialization
• Feedstock suppliers have important skills beyond biomass supply