Yale Forest Forum

BEF Opportunities for Working Forests and Climate Mitigation
ENVIVA’S OPERATIONAL FOOTPRINT – OVERVIEW

PLANTS: Ten U.S. pellet production facilities with a total annual production capacity of 6.2 million metric tons

- Ahoskie, NC (AHO)
- Amory, MS (AMO)
- Cottondale, FL (COT)
- Greenwood, SC (GRE)
- Hamlet, NC (HAM)
- Lucedale, MS (LUC)
- Northampton, NC (NOR)
- Sampson, NC (SAM)
- Southampton, VA (SOU)
- Waycross, GA (WAY)

PORTS: Six deep-water marine export terminals

- Port of Chesapeake, VA (CHE)
- Port of Mobile, AL (MOB)
- Port of Panama City, FL (PAN)
- Port of Pascagoula, MS (PAS)
- Port of Savannah, GA (SAV)
- Port of Wilmington, NC (WIL)
THE BUSINESS OF WOOD PELLETS

Forest: It all begins with wood sourced from the U.S. Southeast, one of the world’s most dynamic areas of forest growth and sustainable management. These working forests provide one-fifth of the wood used worldwide each year.

Receiving: The low-value wood we buy comes primarily from family forest owners who manage their land in a manner that adheres to our strict sustainability standards. Sourced wood is transported to our facilities for processing to create a higher-value end-product in the form of an energy-dense pellet.

Sizing: The low-value wood is handled in a manner to uniformly size chips for the dryer as well as to provide bark as a fuel source for the drying process.

Drying: The chips enter an industrial dryer that reduces the natural moisture content of the wood. The dry fiber is then sent to hammermills to reduce and refine the fiber for pelletizing.

Pelletizing: Refined dry fiber is then sent through the pellet presses where the material is compressed and naturally bonds to form energy-dense pellets that are safe and efficient for storage, transportation, and end use. No chemicals are used throughout the manufacturing process.

Port Facilities: Our deep-water ports are strategically located to receive pellets from multiple facilities to minimize transportation and are stored to accumulate necessary volumes for bulk shipments.

Shipping: Bulk shipping via cargo ship greatly enhances transportation efficiencies to distribute pellets worldwide. Before and after their voyage, pellets are inspected for quality to meet customer specifications and to ensure that our renewable wood pellets serve as a reliable source of energy that directly replaces fossil fuel.
Displace Coal
Bioenergy is part of an all-in strategy to reduce carbon emissions and limit dependence on fossil fuels. Wood pellets directly replace coal, providing customers around the world with a renewable fuel source that improves the environmental profile of energy generation.

Grow More Trees
Key to keeping forests as forests is strong demand for forest products. We create a market for sustainable low-value wood that encourages good forest stewardship and creates incentives for forest landowners to replant and keep their land as forest.

Fight Climate Change
The world cannot afford to delay taking decisive climate action. The Intergovernmental Panel on Climate Change has mapped out numerous pathways toward a sustainable future, and they all rely on wood bioenergy.
The International Renewable Energy Agency specifies that biomass in energy generation needs to increase from 3% in 2018 to 18% in 2050 in order to reach net zero in 2050.

The International Energy Agency’s “Net-Zero Emissions by 2050 Scenario” shows output of bioenergy rising to 100 exajoules (EJ) in 2050 from less than 40EJ in 2020, enough to meet almost 20% of the world’s total energy needs.

EU Commission’s taxonomy recognizes bioenergy used for power and heat as making a substantial contribution to climate mitigation, alongside solar and wind.

All 27 EU member states agreed to raising EU’s 2030 GHG emission reduction target from 40% to 55%, as compared to 1990 levels, and RED II calls for renewables to account for at least 32% of EU’s gross consumption by 2030.

European Climate Law sets legally binding target of net zero by 2050.
THE U.S. SOUTHEAST IS ONE OF THE WORLD’S LARGEST FOREST REGIONS

1.1 million KM² of forested land which is 300x the forested land of the Netherlands.

Forested land area in the Southeast U.S. > Total land size of Germany, Spain and Italy COMBINED. Southeast U.S. forested land = Forested land in Sweden, France, Finland, Spain, Norway and Germany COMBINED.
WHAT IS "GOOD" BIOMASS?

- Good biomass is made from low-value wood that is a by-product of a planned traditional timber harvest or a sawmill operation.
  - These by-products can be delivered directly from the forest, as tops, limbs, thinnings, and/or low-value smaller trees, or they can be delivered as secondary residues, like sawdust and shavings from industrial processing.
- Good biomass is not made from larger, high-value trees that instead could be used for longer-lived products.
- Good biomass comes from a region where forest carbon stocks are stable or increasing.
- Good biomass comes from harvest practices that safeguard biodiversity.
- Good biomass comes from a forest that is returned to forest after harvest, and not from land that will be converted to agriculture or development.

https://www.envivabiomass.com/the-forest-biomass-promise/
Timber Harvest Product Merchandizing

Higher-value markets, such as sawtimber, drive landowner harvest and planting decisions.

The average price for high-value sawtimber is up to 9 times as much as the lower-value pulp wood used by the biomass industry.

End products with permanent carbon storage, such as mass timber, telephone poles, furniture, etc. are valued highest by the marketplace.

Lower-value markets, such as biomass, benefit landowners by clearing away wood and by-products that are not of quality required for sawtimber markets, making replanting easier.

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<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>HIGH</th>
<th>LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oak Sawtimber</td>
<td>$47.30</td>
<td>$12.84</td>
</tr>
<tr>
<td>Pine Pole Logs</td>
<td>$46.89</td>
<td>$5.10</td>
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<tr>
<td>Mixed HW Sawtimber</td>
<td>$29.50</td>
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<tr>
<td>Pine Plywood Logs</td>
<td>$27.65</td>
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<tr>
<td>Pine Sawtimber</td>
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<tr>
<td>Pine Chip-n-Saw</td>
<td>$18.76</td>
<td>$5.10</td>
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</tbody>
</table>

1. Stumpage prices from TimberMart-South

*Products purchased by Enviva.
Wood Pellets Accounted for 2.7% of Wood Removals in the U.S. South in 2017

Source: Forest2Market, Historical Perspective on the Relationship between Demand and Forest Productivity in the US South, 2017
In working forests, strong demand for forest products leads to investment in forests and increasing carbon stocks. A decline in demand for forest products will lead to less forest growth, not more.

- Demand for all wood products—including biomass—drives growth in a market-driven environment like the U.S. Southeast.

- Forest landowners are incentivized to protect and grow the natural resource where there are strong, long-term markets available.*

*Source: Forest2Market, Historical Perspective on the Relationship between Demand and Forest Productivity in the US South, 2017
Sustainable wood biomass is a unique solution because, done properly, it displaces coal, grows more trees, and fights climate change at scale.

Through 2019, wood pellets supplied by Enviva have effectively displaced 14 million metric tons ("MT") of coal and will be on track to displace another 86 million MT of coal by 2044.
BIOGENIC CARBON CYCLE INSTEAD OF ONE-WAY TRIP FOSSIL FUELS

1. When electricity is made by burning fossil fuel, it releases carbon which has been locked underground for millions of years.

2. Adding to CO₂ levels in the atmosphere and leading to climate change.

3. Biomass absorbs carbon dioxide as it grows.

4. When it burns it simply releases the same CO₂ it has absorbed during its lifetime.

5. The basic cycle of growth, combustion and regrowth is carbon neutral.

6. There are carbon emissions from steps in the chain, such as planting, harvesting, processing and transportation. However, these emissions are far lower than burning conventional fossil fuels.
ENVIVA’S RESPONSIBLE SOURCING POLICY

SUSTAINABLE FORESTRY STANDARDS

ENVIVA WILL ONLY SOURCE PRIMARY MATERIALS FROM A SUPPLIER WHEN:

- The forest source will be replanted or regrown as forests and will not be converted to non-forest uses
- Water quality in a harvest area is protected through adherence with forestry Best Management Practices (BMPs)
- High Conservation Values (HCVs) are not threatened by harvest activities

PLEDGES IN CONSERVATION LEADERSHIP

WE PLEDGE TO COLLABORATE WITH STAKEHOLDERS TO HELP:

- Keep the amount of forestland stable or increasing at regional scales;
- Conserve wetland forest ecosystems, peatland forests, and high-carbon tropical forests;
- Address the conversion of forest types that provide high-quality habitat for at-risk species; and
- Restore critical, threatened, or declining forest types

www.envivabiomass.com/sustainability/responsible-sourcing/responsible-sourcing-policy/
Enviva’s Forest Management Groups have certified over 70,000 acres (28,000 hectares) of private forest land in the U.S. Southeast to ATFS and FSC standards.

Enviva’s Third-Party Forest Certification Standards

Forest certification ensures an internationally-accepted standard for sustainable forestry and encourages better forest management. The audits that accompany these standards provide assurance to customers, regulators, and environmental stakeholders.
THE ENVIVA FOREST CONSERVATION FUND

• A $5 million, 10-year program
• Conserving working forests and sensitive bottomland ecosystems in VA and NC
• Partnership with the U.S. Endowment for Forestry and Communities
• Annual matching-fund grants to nonprofit conservation organizations
Enviva reports quarterly T&T updates and provides tract-level data on its sourcing on its website.

A leading-edge sustainable sourcing program that provides, transparent, public data and allows stakeholders to track the source of our wood to its origin in the forest.

With Track & Trace, we can tailor our sourcing practices to the specific need of our operations and provide an unprecedented level of transparency, going above and beyond any other pellet producer or southern forest products company.

**Where does Enviva source its wood?**

- Over 1,400 working forest harvests
- In more than 100 counties
- In 7 Southern states

_The forests in the U.S. Southeast continue to grow and thrive_
**Scope 1**
- direct emissions from assets owned and controlled by Enviva
  - 6% of total emissions

**Scope 2**
- indirect emissions from heat, steam or electricity purchased by Enviva
  - 41% of total emissions

**Scope 3**
- indirect emissions in Enviva’s upstream or downstream value chain
  - 53% of total emissions

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**Transparency and Reporting**
- Track and report annually on all emissions
- Commit to disclose climate-relevant data and risks through CDP (formerly the Carbon Disclosure Project) by the end of 2022

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**For Scope 1 Emissions**
- Immediately work to minimize the emissions from fossil fuels used directly in our operations
- Offset 100% of our residual emissions through investments in projects that result in real, additional, and third-party verified net-carbon reductions
- Focus on forest offsets in partnership with Finite Carbon and others

**For Scope 2 Emissions**
- Source 100% of energy for our operations from renewable sources by 2030, with interim target of at least 50% by 2025
- Maximize use of on-site renewable energy generation at our facilities, as well as develop new off-site renewable energy resources physically located in our operating regions where possible

**For Scope 3 Emissions**
- Proactively engage with partners and other key stakeholders to adopt clean-energy solutions, including trucking, rail, and shipping logistics
- Take steps to accelerate and advocate for the development of new solutions and to work with stakeholders to bring those solutions to market

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**The Partnership and Our Sponsor Commit to the Goal and Plan to Become “Net-Zero” in Our Operations by 2030**
This tree is large enough in diameter to make a pine sawlog classification, but these 3 points of sweep or crook would make it a pulpwood tree in the US. Sawmill will not saw a crooked tree because inherently the lumber when dried will be crooked as well because the grain of the wood determines the straightness of the lumber it will produce.

This tree is large enough to make a sawlog classification and is straight indicating a straighter, more uniform wood grain. Once it is sawn into lumber and dried the lumber will be straight and useful.