

US INDUSTRIAL PELLETT ASSOCIATION

Sustainable Wood Pellet Supply from the US Southeast

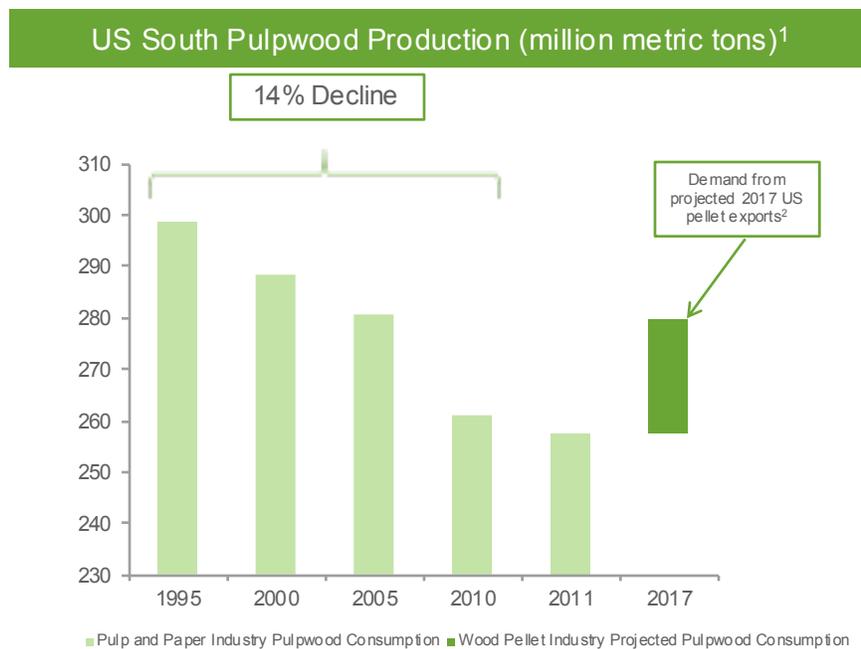
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Oak Ridge National Laboratories
Bioenergy in the Southeastern United States



U.S. Industrial Pellet Association

HARVEST OF PULPWOOD HAS DECLINED SIGNIFICANTLY SINCE 1995 LEAVING SIGNIFICANT EXCESS SUSTAINABLE SUPPLY



¹ US Forest Service

² Estimate assuming constant 2010 pulp and paper consumption + demand from RISI projected pellet exports in 2017

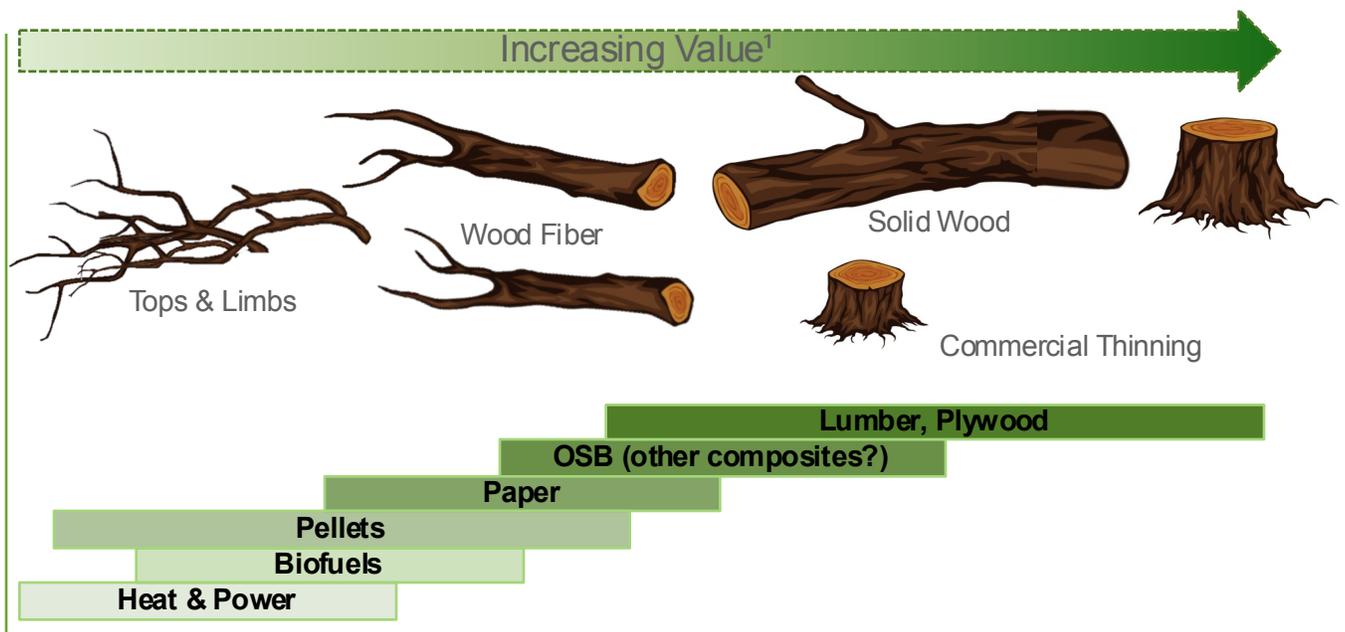
³ Hawkins Wright

Assumptions: Projections assume 28 cubic feet/ton green wood, 2 tons green wood per 1 ton pellets.

CASCADING IN PRACTICE: FIBER FOR BIOENERGY UNUSABLE BY SOLID WOOD MARKETS



SAW TIMBER IS PRIMARY LANDOWNER VALUE PROPOSITION



¹ Graphic: Plum Creek

² Munsell, J. F. and Fox, T. R. 2010. An analysis of the feasibility for increasing woody biomass production from pine plantations in the southern United States. *Biomass and Bioenergy* 34: 1631 – 1642.

TYPICAL WOOD PELLET FIBER FEEDSTOCK – LOW GRADE BYPRODUCTS OF SAWTIMBER HARVESTS

US pellet producers' feedstock consists entirely of byproducts of harvests for saw timber, some of which are in whole tree form and mill residues.



Tops and limbs: Parts of the tree that cannot be refined into lumber.



Low grade round wood (whole trees): The whole trees that US producers use are either commercial thinnings or are being harvested in the course of normal timber harvests but do not meet sawtimber specification (knotted, diseased, rotten, malformed).



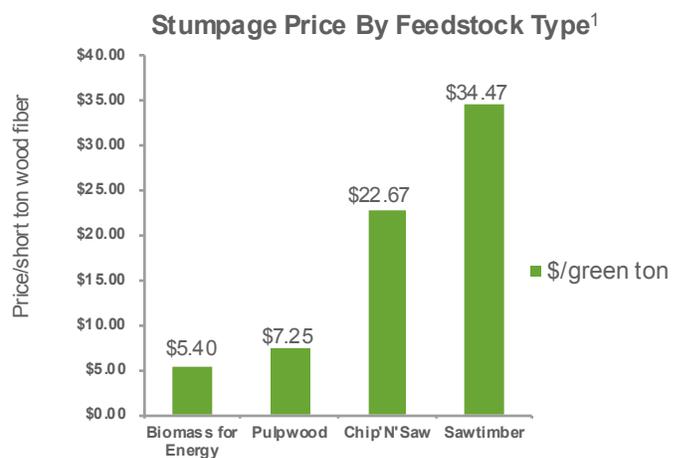
"In-woods" chips: Chips made by suppliers in the forest out of low grade wood and waste materials that are left over after a primary harvest.



Mill waste and residues: Wood chips and sawdust from other types of mills, primarily sawmills.

ECONOMICS OF FIBER PROCUREMENT

- Landowners need revenue to maintain forestland. Timber is typically grown on 15-30 year rotations. Costs over a 30 year rotation include:
 - Property taxes: \$400-500 per acre¹
 - Management fees including:
 - Reforestation costs
 - Stand improvement
 - Road maintenance
 - Property line maintenance (fencing, etc)
 - General administrative and accounting costs
 - Certification:
 - SFI: \$30-54 per acre
 - FSC: \$18,000 total
- Landowners grow trees for saw timber. Based on net present value of timber assets, landowners either:
 - Harvest and change land use (or divest)
 - Harvest and re forest
 - Delay
- Higher NPV of timberland due to pellet industry demand provides incentive to maintain forests and not convert to agriculture.



¹ Assumes timberland value of \$ 1600/acre and varying property tax rates depending upon county.

² Munsell, J. F. and Fox, T. R. 2010. An analysis of the feasibility for increasing woody biomass production from pine plantations in the southern United States. Biomass and Bioenergy 34: 1631 – 1642

³ USFS TPO Data and Forest2Market

SOUTHEAST US IS HOME TO HIGHLY PRODUCTIVE FORESTS; FOREST MANAGEMENT DELIVERS INCREASING FOREST VOLUMES AND CARBON STOCKS



3 weeks post harvest



1 year post harvest



6 years post harvest



7 10 years post harvest

STRONG MARKETS FOR WOOD HELP TO MAINTAIN AND INCREASE FOREST VOLUMES AND IMPROVE FOREST HEALTH IN THE US

- **>750 million acres** of forest area (>304 million hectares)
- Total US forest area is within ~1% of what it was 100 years ago.¹
- During the last 60 years, **forest inventories have grown by more than 50%** in the US.²
- US forest carbon stocks: **+31%** since 1990, during a period of **intensive forest products industry activity**.³

¹Bratkovich, S., Bowyer, J., Bratkovich, J., Fernholz, K., Stal, S., & Frank, M. (March 2011). Forests of the United States, Understanding Trends and Challenges. Doyetal Partners Inc., p.7

²USDA Forest Service. (2009). US Forest Resource Facts and Historical Trends. USDA Forest Service, p.17.

³US Environmental Protection Agency. (2012). Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2010. Washington, DC: US Environmental Protection Agency, Section 2, p.14.

US REGULATIONS PROVIDE STRONG FRAMEWORK FOR SUSTAINABLE FORESTRY

- Strong legal framework which promotes transparency and legality of supply while also protecting environmental services and values during silvicultural operations.
 - The Clean Water Act (CWA)
 - The Endangered Species Act (ESA)
 - The Lacey Act
- State developed and implemented Best Management Practices (BMPs) ensure that harvest operations do not impair water quality and that sensitive habitats are protected.

