

Woody Biomass Definitions of Terms

A community-scaled integrated utilization strategy provides an ecologically appropriate, economically viable, and socially responsible approach to using woody biomass. A dispersed network of community-scaled facilities of either small-scale energy facilities or interrelated wood products businesses plays a localized role in restoring forest conditions and fostering community economies. Collectively, these interrelated facilities provide the most practical and efficient approach to address ecological restoration at the landscape level while sustaining the sense of place and heritage of rural communities.

WHAT IS WOODY BIOMASS?

Woody biomass, as defined in a 2003 Memorandum of Understanding between the Secretaries of the U.S. Departments of Agriculture, Energy, and Interior includes:

“The trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment that are the by-products of restoration and hazardous fuel reduction treatments.”¹

Woody biomass is generally composed of smaller-diameter trees and stems that are often no more than 8” to 12” in diameter. This size of material is generally considered non-merchantable relative to the locally available conventional markets for wood products like sawtimber for dimensional lumber.

The removal of woody biomass, by definition, is not the primary objective of federal forest management activities. Woody biomass is often a by-product of hazardous fuels reduction or ecological restoration activities that are undertaken to restore the ecological integrity of forested ecosystems. Examples of ecologically-based forest management objectives include the reduction of forest fuels, accelerating the development of old forest characteristics and structure and enhancing wildlife habitat.

¹ Norton, G., S. Abraham and A. Veneman. Memorandum of Understanding on Policy Principles for Woody Biomass Utilization for Restoration and Fuel Treatments on Forests, Woodlands, and Rangelands. June 18, 2003.

WHAT DOES WOODY BIOMASS UTILIZATION MEAN?

Woody biomass utilization is defined in the 2003 Memorandum of Understanding between the Secretaries of the U.S. Departments of Agriculture, Energy, and Interior as:

“The harvest, sale, offer, trade, or utilization of woody biomass to produce the full range of bio-based products and bio-energy, including timber, engineered lumber, paper and pulp, furniture and value-added commodities, and bio-energy and/or bio-based products such as plastics, ethanol, and diesel.”¹

The variability in species-related properties and size characteristics of woody biomass, allows for a wide range of options for using it to create other products. The woody biomass sector can be loosely defined as a compilation of wood products businesses (including those generating energy) that use woody biomass of all sizes and quality characteristics. Some examples of uses for woody biomass include the creation of wood products and energy.

WOOD PRODUCTS

Value-added wood products: Products like wood flooring and moulding, roundwood products like fencing and posts and poles, and finished goods like windows and cabinetry can all be created from woody biomass. Generally, value-added products are manufactured from trees or stems that are larger than 4” in diameter. The creation of these products is considered to add value because in the past, woody biomass has not been used to make conventional wood products and was traditionally deemed to have little or no commercial value.

Composites: Smaller pieces of wood fiber can be reformulated, often using resin or glue to hold them together, into solid wood substitutes like oriented-strand board (OSB), particleboard, or composite decking. In general, most of these manufacturing processes require considerable amounts of investment capital and large quantities of raw material making them impractical for smaller, rural-based enterprises to pursue.

RENEWABLE ENERGY

Energy production: Woody biomass can be used to generate several forms of energy, including electricity, thermal energy (heat), combined heat and power (CHP), or liquid bio-fuels (cellulosic ethanol, bio-oil, biodiesel).

Electricity can be produced by burning woody biomass to heat water and create steam. The steam then drives a turbine to produce electricity. The term **hog fuel** is often used in the context of producing electricity from woody biomass. Hog fuel is a proven forest products industry use of tree bark and limbs to generate on-site electricity or thermal energy to reduce energy costs.

Thermal energy, or heat, can also be produced from woody biomass. Burning hog fuel, forest slash, or wood chips in a wood-fired boiler for use in either **space heat** (the use of thermal energy to heat an enclosed space or building) or **process heat** (the use of thermal energy to provide heat for a step in an industrial process, such as drying lumber). Woody biomass can also be manufactured into **densified wood products** like wood pellets, bricks and logs, that are then burned in industrial boilers or specifically-designed residential stoves. Wood pellets are generally made from trees smaller than 4" in diameter, limbs and the residual sawdust and peelings generated from other wood processing activities.

Liquid bio-fuels including cellulosic ethanol, bio-oil, or biodiesel can be produced from woody biomass. Emerging wood-to-ethanol technology converts woody biomass through a biochemical or thermochemical process into sugars, which are then fermented to produce ethanol. Cellulosic ethanol can be used as a replacement of or in combination with, traditional gasoline.

The current energy markets for electricity and the lack of technology that currently exists for creating liquid bio-fuels from wood make the generation of thermal energy the most economically and energy efficient conversion of woody biomass. From a carbon perspective, wood fuel can be used to displace the use of heating oil, natural gas, or propane in heating public facilities in rural communities.

Often, **community-scaled thermal energy applications** that produce heat for community schools and public buildings only require woody biomass from 100-200 acres of forest restoration

treatments per year.² This small amount of material eliminates the threat of competition for locally-derived woody biomass among communities. **Locally-derived fuel** can be defined as woody biomass sourced from forest restoration treatments within 50 miles of the facility or produced as the byproduct of manufacturing processes at a local integrated wood products facility.

WHAT ARE INTEGRATED WOOD PRODUCTS FACILITIES?

Traditionally, wood products have been manufactured at larger, stand-alone facilities in which only one product or class of products is made; for example, a stand-alone facility might produce dimensional lumber but not flooring, posts and poles, or composites.

Smaller trees are more expensive to remove from the forest and do not yield the same volume of products as larger diameter trees. For these reasons, integrated wood products facilities offer the most cost-effective means to utilize woody biomass.

An **integrated wood products facility** typically sorts woody biomass for its highest-value use and then manufactures a suite of different products. For example, an integrated facility might manufacture flooring from the largest portion of the tree, posts and poles from the "top" of the tree, and use any remaining portion of the tree along with sawdust residuals to produce thermal energy. This integrated approach, often referred to as **full utilization**, can result in a higher yield per tree than typical stand-alone facilities thus distributing the additional costs over more products.

WHAT IS AN APPROPRIATE SCALE FOR THESE FACILITIES?

Integrated wood products facilities and/or stand-alone energy generation facilities are most applicable when they are **appropriately-scaled** as defined through a collaborative approach evidenced by broad stakeholder involvement, analysis, and agreement on a range of issues including sustainable supply, ecological impact, and community benefit. If facilities are scaled appropriately, these businesses can avoid the historical "boom and bust" of the conventional wood products industry, and instead serve as tools to improve the economics of ecologically and socially driven forest management.

² Calculated based on the energy needs of several community-scaled projects in central Oregon. On average, these facilities would utilize the energy equivalent of 1000 tons of woody biomass annually. Typical restoration treatments remove between 5 – 10 tons per acre. Therefore, 1000 tons / 5 tons per acre = 200 acres.

For most rural places, a **community-scaled** approach is the most appropriate. This scale is also defined through a collaborative process and can be thought of as a sub-scale of appropriately-scaled facilities. Community-scaled facilities are designed to adapt to changes in volume and type of material being supplied, to accommodate limitations in transportation distances and inefficiencies, and for integrated wood products facilities, to efficiently produce a variety of products to reflect these variations over time. These characteristics enable community-scaled facilities to adjust to ecological and economic changes over time, building resiliency into the local economy. Community-scaled approaches can also consider unique ownership, investment, and management structures.

Financially, both value-added wood products businesses and energy facilities need a consistent supply of raw materials to attract investors and/or financing options. Consistent supply does not necessarily equate to a large quantity of supply. If a business is community-scaled, relatively low amounts of volume can be supplied over a longer period of time, giving rural businesses longevity.

BENEFITS OF COMMUNITY-SCALED WOODY BIOMASS UTILIZATION

A community-scaled integrated utilization strategy can lead to the most practical, efficient and applicable approach to restoring forested ecosystems, fostering local economies, and sustaining rural communities.

Place-based solutions can **build capacity** simultaneously in multiple communities by increasing:

- Human capital through education and skills training, social and cultural capital through fostering a collaborative spirit among residents,
- Physical capital through providing support to improve community infrastructure,
- Financial capital by pursuing grants and/or loans to leverage private investment for business development, educational needs and skills training.

Some of the benefits of a community-scaled, integrated woody biomass utilization approach include:

Economic benefit and equity:

- Improved economics of and accelerated implementation of critical forest restoration and community wildfire protection activities.
- Reduced economies of scale and raw material needs allowing for adaptive forest management.

- Maximizing the value of woody biomass by sorting for its highest-value use and co-locating users of by-product residuals.
- Distribution of economic benefits to rural forest-based communities and the nation through local ownership, increased entrepreneurial activity, and/or community benefit criteria in federal grant and contracting work.
- Local retention of tax base and profits.

Social support for woody biomass utilization through collaboratively identified common ground among local leaders and interest groups from different sectors and backgrounds.

Environmental benefits to communities and the nation through:

- Reduced fossil fuel consumption and carbon emissions from heating public facilities,
- Contributions to accelerated forest restoration through removal of biomass materials,
- Reduced carbon emissions and smoke pollution from wildfire.

WHO WE ARE

The Rural Voices for Conservation Coalition is comprised of western rural and local, regional, and national organizations that have joined together to promote balanced conservation-based approaches to the ecological and economic problems facing the West. We are committed to finding and promoting solutions through collaborative, place-based work that recognizes the inextricable link between the long-term health of the land and well being of rural communities. We come from California, Oregon, Washington, Idaho, New Mexico, Montana, Arizona and Colorado.

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