Wood Processing Residues

FACT SHEET 5.1

INTRODUCTION

What remains after timber arrives at a mill for processing is commonly referred to as primary and secondary wood processing residue or waste. This residue is prepared for utilization because generally it is clean, uniform, on-site, and low in moisture content. Examples include bark, sawdust, and black liquor. According to a recent USDA Forest Service report, about 84 million tons of wood processing residues were generated in 2002, about 98 percent of which was recoverable[1]. Wood processing residue can be used directly to produce heat and electricity, or indirectly to produce bio-based products such as char or pellets. About 70 percent of recoverable wood processing residue is used in the manufacturing of other products such as particleboard, nonstructural panels, and animal bedding[1].

To date, the forest products industry in the United States has been very successful in its effort to use these materials to fuel the mill's primary manufacturing or other bio-based production processes. It consumes the remaining 30 percent of recoverable wood processing residue for energy production of some sort, with many mills producing significantly more energy than they consume[1]. A typical sawmill, for example, creates enough waste to exceed its own energy requirement by 10 to 30 percent[2]. This excess energy is then available for sale to local power grids at competitive prices. This fact sheet describes the various wood processing residues that are generally available and can be used for bioenergy or bioproducts. Also provided are descriptions of the products and energy these residues are used to create.

WOOD PROCESSING RESIDUES

Wood processing residues, as compared to logging residues, consist of black liquor, sawdust and bark.

source: US Department of Energy

Image 1. Black Liquor

Black Liquor. Black liquor is a recycled by-product formed during the pulping of wood in the paper making industry. More specifically, it is the substance that remains after cellulose fibers have been removed to form paper fibers (*Image 1*). It consists of lignin, water, and other chemicals used in the extraction process. It is an important liquid fuel in the pulp and paper industry. Black liquor is recovered and recycled via combustion or gasification in on-site boilers or gasifiers. The results of these processes are heat energy, carbon dioxide, and recoverable chemicals. The steam that is generated during the black liquor recovery process contributes significantly to the energy needs of pulp and paper mills. Recovered chemicals are recycled into white liquor, which is the original slurry of chemicals used in the pulping process, reducing the pulping process's chemical needs by almost 90 percent.

Ashton, S.; P. Cassidy. 2007. Wood Processing Residues. Pages 165–168.
In: Hubbard, W.; L. Biles; C. Mayfield; S. Ashton (Eds.). 2007. Sustainable Forestry for Bioenergy and Bio-based Products: Trainers Curriculum Notebook. Athens, GA: Southern Forest Research Partnership, Inc.

source: Corbis Corporation

Image 2. Sawdust Pile

source: Corbis Corporation

Image 3. Bark Residues

Sawdust. Sawdust is the wood residue created when a log is cut by saw to make lumber. For the most part, sawdust as it originates is green (not dry) and fairly uniform in size and shape (*Image 2*). Sawdust is also commonly referred to as "wood flour," which indicates the particles can pass through a 20-mesh gauge screen. Unfortunately, green sawdust has relatively limited uses. Green sawdust can be used for domestic heating in special sawdust furnaces, although this is not very common, as well as for smoking meats. After being dried, sawdust can be utilized via the gasification, combustion, and pyrolysis processes to generate electricity, heat, and oil. In addition, sawdust has many desirable qualities, making it a popular material for fiber composite manufacturing, It is absorbent, abrasive, bulky and fibrous, nonconductive, and granular. A variety of products, including bedding, abrasives, insulation, and packaging, can be produced from sawdust using this process.

Bark. Bark is the outermost part of woody stems and branches and makes up about 9 to 15 percent of a log's volume (*Image 3*). Historically, bark has been used to produce tannins, dyes, resins, flavorings, and medicinal products. Bark can be difficult to use due to soil contamination during harvesting operations. However, as utilization techniques improve, more and more chemical extracts become commercially available for use. Bark is commonly used in mulching or as a soil amendment. Bark has also been used commonly as a fuel source. On average, about 10 tons of completely dry bark is the equivalent of nearly seven tons of coal. In addition, bark is used in building materials such as fiber and particleboard as well as insulation board because it conducts heat less readily than wood. The chemical utilization of bark is still in its early stages, mainly due to the economic expense of transportation, storage, and volume of the material. Very few pure organic compounds extracted from bark have been isolated for large-scale production.

SUMMARY AND CONCLUSIONS

The nation's primary and secondary processing residues, such as those discussed here, are viable bio-based resources. They are in demand and very desirable for energy and other bio-based products. They are prime for utilization due to their relative cleanliness, uniformity, low moisture content and on-site location. Utilization of such residues can make economic and environmental sense in many situations in the South.

For more information, please refer to the Encyclopedia of Southern Bioenergy at http://www.forestencyclopedia.com/Encyclopedia/bioenergy.

ENDNOTES

[1]McKeever, D. B. 2002. Inventories of Woody Residues and Solid Wood Waste in the United States, 2002. Madison, Wisconsin: USDA Forest Service, Forest Products Laboratory.

[2]Mayes, F. 2003. Energy Implications of Environmental and Technological Transition. http://www.eia.doe.gov/cneaf/solar.renewables/at_a_glance/wood/woodenfa-05.htm. [Date accessed: November 1, 2006]