UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Forest Stewardship

Forest Stewardship Education Newsletter
October 2022
Woody Biomass & Forest Products, Part I

Greetings from UC ANR

There has been much discussion during our Forest Stewardship Workshops around the topic of biomass and how private forest landowners can utilize biomass from their properties as an environmental and/or economic benefit. Some of you have even taken initial steps to begin utilizing your biomass material! UC ANR is fortunate to have recently hired Woody Biomass and Forest Products Advisor Cindy Chen (cxnchen@ucanr.edu). Cindy is located in Sonora and serves El Dorado, Amador, Calaveras, Tuolumne, Alpine and Mariposa Counties. Cindy and I will be exploring woody biomass topics over two newsletters, this being the first installment.

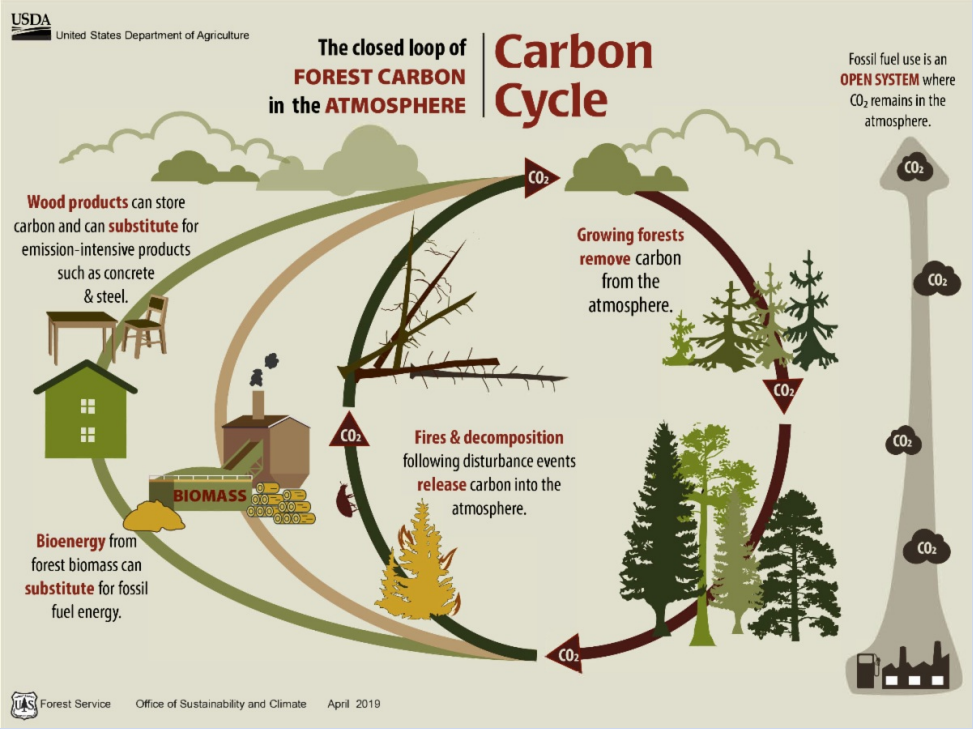
We would love to hear from you about your biomass utilization experiences, send us an email!

Cheers,
Kim Ingram, Forest Stewardship Coordinator

Utilizing forest and woody biomass provides environmental and economic benefits. - Cindy Chen, UCCE Woody Biomass and Forest Products Advisor

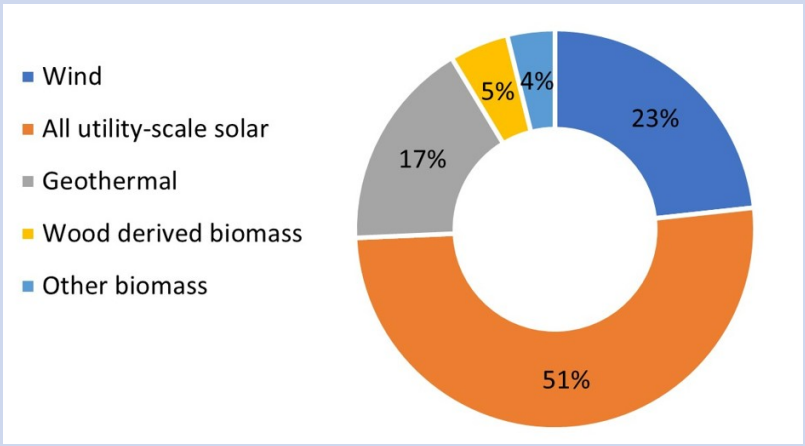
Adding Value to Woody Biomass

Woody biomass is defined as the nonstructural products derived from trees. It can be produced from various sources, including thinning activities, harvest residuals (e.g., branches and tops), and byproducts from sawmills. Woody biomass can be reprocessed into low value products such as mulch and hog fuel, as well as higher value products such as composite panels and biofuel. Utilization of woody biomass can help minimize net greenhouse gas (GHG) emissions through avoided emissions (residues left in the forest can become fuel and increase wildfire severity resulting in greater air pollution, health hazards, and wildfire risk) or offset products with a higher carbon footprint.



Forest and sawmill residues release carbon back to the atmosphere if they are burned or decomposed. Substitution using wood-based products reduces emissions from non-renewable products.

According to the U.S. Energy Information Administration (EIA), although woody biomass only accounts for 5% of annual renewable energy generated in California, the state remains a leader in biomass energy generation: the amount of electricity generated from biomass in California was higher than any other states as of August 2022. In 2021, 30 power plants fueled by wood and wood waste accounted for nearly 60% of the state's utility-scale biomass generating capacity. The rest are generated from sources such as crops and municipal solid waste (MSW).



Annual net generation of renewable energy in California by source (EIA, 2021)

Although electricity generation remains the largest market for woody biomass, wood utilization can go far beyond that. Liquid fuel, biochar, and pellets are all higher value products which can be produced from woody biomass. These products adjusting the parameters (e.g., particle sizes, species mix, temperature, oxygen) during the gasification process to manufacture a wide array of products. For

example, biochar is produced under a relatively lower temperature, usually between 200 and 350 degrees Celsius, while syngas requires a temperature of over 700 degrees Celsius.

Building products such as particle board, or composite decking can also be manufactured from woody biomass and will be discussed in part 2.

Wood Pellets and Torrefied Pellets

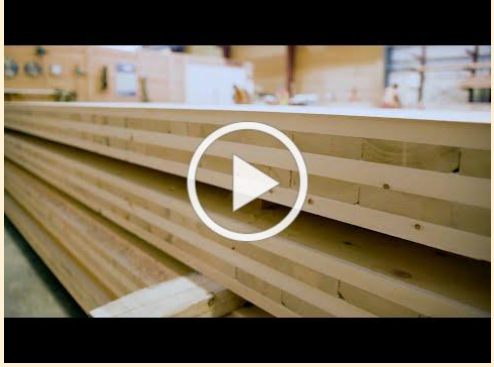
The use of wood pellets as an energy source has gained increasing popularity recently due to its environmental and economic advantages over primary fuels. Woody biomass or finished wood pellets can be further processed to produce torrefied, or black, pellets. Black pellets are hydrophobic, which makes them easier to transport and store, and have a energy density that is comparable to coal. As of 2021, California has two active wood pellets manufacturing facilities located in Rocklin and Ukiah, producing 140,000 tons of pellets per year.

Manufacturing process of wood pellets

Benefits of Forest and Woody Biomass Utilization

California's goals in reducing GHG emissions have led to a number of programs and legislation that encourage the utilization of forest and woody biomass resources. Woody biomass utilization reduces wildfire risk and to promote forest health and improve water and air quality. Using wood residues from industry and harvesting also reduces wastes and plays a role in climate change mitigation.

From a socioeconomic perspective, the wider use of locally sourced biomass benefits local jobs in sectors such as transportation, manufacturing, engineering, and forest management. Multi-use biomass utilization campuses can also support innovative products and contribute to long-term regional economic developments.



Improving forest and biomass resources utilization means more jobs, better economy, and a healthier environment

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More to come in Part 2

Our forests provide a lot more than woody biomass. In Part 2, we will explore more about biomass-based products and forest products beyond bioenergy and pellets.

Engineered wood products

Wood fiber insulation

Particle boards

[UC Woody Biomass Utilization website] [USFS Forest Products Laboratory] [California Biomass Collaborative]

Q&A with Cindy Chen, UC Woody Biomass & Forest Products Advisor, Central Sierra

What excites you about this Woody Biomass and Forest Products position?
California has rich forest resources but they are often not being fully utilized to produce the best environmental and economic value. This position gives me the opportunities to share my knowledge and explore innovative ways to bring jobs, economic opportunities, and a healthier environment to the Central Sierra, and possibly the state. I am very excited to be a part of California's effort in building a more sustainable future. With the outreach ability of UC Cooperative Extension and the research capacity of UC campuses, we can help more Californians recognize the value of forests and woody biomass and how to make the best uses of them.

What topics or projects will you be initially working on?
In order to effectively work with the community, it is important to accurately identify the needs. I am in the process of developing a needs assessment that require the involvement of local government officials, land owners, and other community-based organizations. Together, we can identify the

challenges and find the most viable options for biomass and forest resources utilization in the Central Sierra. In addition, I also plan to develop workshops that address community concerns and provide educational materials. These are my initial plans, of course, in the future, there will be much more to do, for example, seeking grant opportunities and conducting research that provides scientific backing of using wood-based products.

What future do you see for private forest landowners in their quest to utilize woody biomass?
A growing bioenergy sector opens up a lot of great opportunities for private landowners. Woody biomass is often seen as having low commercial value, but that has changed as new technology and ideas emerge. As a leader in bioenergy generation, California is very determined in changing the way it uses forest resources, which means we may see more new policies that favor biomass utilization, for instance, increasing financial assistance to help landowners remove and transport forest biomass. Also, we see growing interests in biomass processing facilities in the state, meaning potential demand increase for locally sourced biomass.

Currently, what are the biggest challenges in woody biomass utilization?
In my experience, finance is always one of the biggest challenges. This may include the cost to establish a facility, as well as operational and capital costs. That's why it is important to gain state and federal support in order to have the types of policies that promote woody biomass utilization like BioRAM. Having these types of support means more funding opportunities to develop facilities, provide job trainings, and conduct research. Difficulties associated with the collection and transportation of biomass lead to another challenge. This involves infrastructure enhancement and requires extensive research to address what needs to be done. For example, there are different ways of processing and transporting biomass from forest sites and the equipment and labor requirement vary.

We also need to learn more about the impacts of applying biochar to soils. What will happen if burned biomass is left in the forest? Some studies showed that biochar can increase the acidity of soils and some suggested that biochar promotes plant growth. The important task for us is to find the balance point of how much biomass should be removed and how much should be left so we can reduce fire risks and maintain soil health. We need to find out the most appropriate options through research.

With the outreach ability of UC Cooperative Extension and the research capacity of UC campuses, we can help more Californians recognize the value of forests and woody biomass and how to make the best uses of them. - Cindy Chen, Uc Woody Biomass and Forest Products Advisor

Photo credit: WFPA

Biochar Basics

The USDA Rocky Mountain Research Station developed an 'A-to-Z Guide to Biochar Production' that addresses the use of piles, kilns, and air curtain burners. It also details potential uses for biochar (agricultural, forest restoration, and mine land reclamation), and methods for application, including biochar spreaders.

According to the guide, alternative biomass removal options like changing the way slash piles are constructed or using kilns or air curtain burners provide forest managers with opportunities to not only remove unwanted biomass, but also increase production of biochar.

For forest landowners, the guide does point out that biochar applied to forest soils that have an intact surface organic horizon, it takes a couple of years for biochar to work its way into the soil.

Photo credit: Northwest Natural Resources Group (NNRG).

Woody Biomass Guides

The UC Woody Biomass Utilization website provides a wood facility map that monitors the current wood processing capacity in California. This webpage is public and updated quarterly as new data becomes available. Users can look up facilities by categories such as size and type.

The US Forest Services provides a desk guide on woody biomass utilization. This guide provides an overview of different types of woody biomass products and recommendations for land owners and manufacturers.

The U.S. Department of Energy provides guidelines on how to choose, install, and maintain wood pellet-burning heating appliances to efficiently use wood pellets as a cleaner-burning and cheaper energy source.

Other items of note...

- Have you had your initial site visit with an RPF, Burn Boss or Certified Range Manager? There is still time! No matter which workshop you participated in (even back in 2020!), if you completed the workshop, you are eligible. You DO NOT need to complete your forest management plan before your site visit, just having your management goals thought out is good enough! Need to make up a session in order

to qualify for your free site visit, we can arrange that. Contact Kim Ingram at kcingram@ucanr.edu for more details.

- If you were not able to join us for the Forest Stewardship - My Sierra Woods Tuolumne Project Field Day, please contact Jessi Baker (jbaker@forestfoundation.org) for more information. My Sierra Woods (MSW) Tuolumne works with private forest landowners in the Martinez fire shed to help fund chipping, fuels thinning, and fuel break projects. MSW Tuolumne is funded through Cal Fire. The Tuolumne program bundles vegetation management projects together (post link and info from field visit), where MSW pays 75 - 100% of costs depending on total project acreage and number of landowners. For information on this project visit: https://www.mysierrawoods.org/programs/

Forest Stewardship and MSW Tuolumne Project Field Day Participants, Photo by Kim Ingram

Award for the Forest Stewardship Education Initiative!

Each year, National Woodland Owners Association and the National Association of University Forest Resources Program (NAUFRP) jointly sponsor an awards program that recognizes the best individual educational project and the best comprehensive educational program conducted by a NAUFRP member university. There are 80 universities in the organization which was formed in 1981. The comprehensive family forest education program is one that includes a broad educational effort to address a diverse array of family forest issues and problems using a wide range of educational approaches and programs.

The Comprehensive Program award was presented to University of California Agriculture and Natural Resources (UC ANR) for their Forest Stewardship Education Initiative.

Evaluator's comments included:

"Excellent submission and programming. Highly complementary that personnel follow-up with participants AFTER the program to determine impacts cited."

“Also impressed with recognition in the narrative that program managers would like to reach more private landowners about participating in the program with a benefit/barrier assessment.”

“This is a very high quality program. It easily rates very high in each of the criteria categories. The nomination package was thorough and it is evident that those involved in the development and delivery of these workshops are knowledgeable and passionate about landowner and professional education. Kudos to California!”

And Kudos to all of you who have participated in the program and provided us with excellent feedback, so we can continue to provide relevant and high quality information. Thank you!

For more information on the workshop, and to share with a friend, please visit: http://ucanr.edu/forestryworskhopregistration

Upcoming Forest Stewardship Workshops and Field Days:

- November 19th - DIY Skills Field Day: Hand Tools for Vegetation Management, Blodgett Research Forest (flyer)
- Forest Stewardship Workshop Series, Napa Co-hort beginning January 19th - March 16th.
- Forest Stewardship Workshop Series, Trinity Co-hort beginning Spring 2023. Exact dates TBD.

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