

# CCST EXPERT BRIEFING SERIES

## Beneficial Uses of Woody Biomass from Wildfire Mitigation Efforts in California

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Photo: Woody biomass, UC Baker Forest, Plumas County / UC Woody Biomass Group

### BACKGROUND

- Wildfires are a **common and natural occurrence** in many California ecosystems. Historically, forests **depended on fire** to maintain a healthy and resilient ecosystem.
- However, over the last century during a period of fire suppression efforts, **tree densities** and **fuel loads** have increased, resulting in a greater risk of catastrophic wildfires.
- Forestry experts recommend increasing the number of acres treated with a combination of **prescribed fire, managed fire, thinning**, and **fuels reduction** to restore forest health.
- Wildfire mitigation efforts are expected to produce large quantities of **woody biomass** in remote areas scattered across the state.
- Woody biomass refers to small-diameter trees, trees damaged by fire, disease or infestation, branches, and other material **not suitable for traditional lumber production**.
- The **costs** of handling and transporting woody biomass out of the forest can quickly exceed the economic value of the material, making cost recovery mitigation efforts challenging.

### BIOMASS FROM FOREST MANAGEMENT

Prior to Euro-American settlement, an estimated **4.5 to 12 million acres** burned annually in California. At the turn of the 20th century, policies to suppress wildfires were implemented in an effort to protect both people and resources. However, a century of **fire suppression** efforts led to increased tree densities and fire loads, resulting in severe, unintended consequences to forest resilience including the promotion of more destructive wildfires.

Forest treatments such as thinning for wildfire mitigation produce large quantities of low-value, small-diameter, woody biomass material that is not suitable for traditional lumber. In the absence of an alternative use, the current practice is to dispose of woody biomass on site by burning, which creates no added value and contributes to carbon emissions.

### EXAMPLE USES OF WOODY BIOMASS

- **Biofuels:** conversion of biomass into products that can replace petroleum-based gasoline, diesel, or jet fuel.
- **Bioproducts:** conversion of biomass into engineered wood products or products that can replace petroleum-based plastics.
- **Bioelectricity:** electricity produced by burning or gasification of biomass.

Experts are working to create new technologies for high-value, beneficial uses of woody biomass and to understand its potential contributions to California's renewable energy and greenhouse gas mitigation goals.



**CCST**  
CALIFORNIA COUNCIL ON  
SCIENCE & TECHNOLOGY

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# BENEFICIAL USES OF WOODY BIOMASS

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## WOOD PRODUCTS

Woody biomass can be converted into a variety of products including chips, pellets, shavings, biochar, composite products like particle board, or engineered wood products such as laminated veneer lumber.

### Examples:

- State and Federal grant programs are creating opportunities for innovative wood products to encourage the removal of woody biomass out of the forest.
- **Photo:** Heating biomass in the absence of oxygen creates **biochar**, which can be used for long term carbon sequestration or as an amendment to promote healthy soils.

**Photo:** Schatz Energy Research Center

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## MICROBIAL BIOREFINERIES

Microbial “factories” can be used to convert woody biomass into basic chemical building blocks, which can then be used to create high-value biofuels and bioproducts to replace petroleum-based products.

### Examples:

- The lignins in wood cells that provide rigidity to a tree also make it more challenging to breakdown compared to non-woody biomass such as agricultural crops.
- Identifying cost-effective ways to process the lignins in woody biomass is a key research challenge.



**Photos:** US DOE Joint BioEnergy Institute

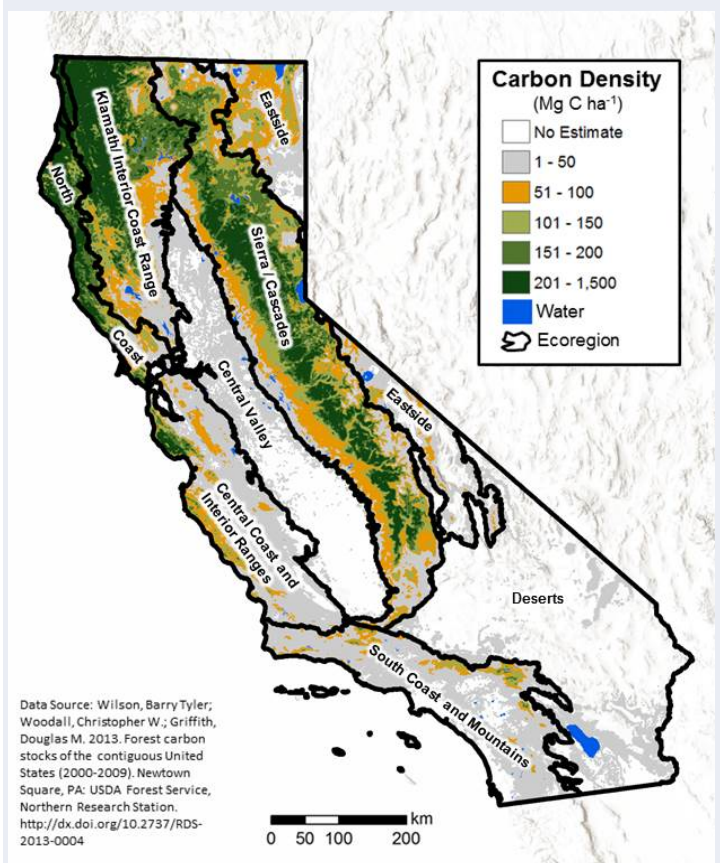
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## CARBON PATHWAYS

Assessments of different biomass utilization pathways can be used to determine which options provide the greatest net reductions in greenhouse gas (GHG) emissions or increases in carbon sequestration.

### Examples:

- After woody biomass is removed from a forest, the equivalent amount of carbon can be sequestered back into the forest within a few decades as the remaining trees grow to be larger and healthier.
- **Figure:** The distribution of forest carbon varies across the state, as measured by carbon density.



**Figure:** California Forest Carbon Plan, Figure 13