

THE SPIRIT OF BLODGETT

During the summer and fall of 2012 and 2013, a series of workshops focused on forest health, climate change and air quality were held at the Blodgett Forest Research Station located in the central Sierra Nevada. Sponsored by the University of California College of Natural Resources, Placer County Air Pollution Control District, CAL FIRE, and US Forest Service the findings and recommended solutions from these workshops and follow up meetings are summarized below.

Problem

California's 2013 fire season has demonstrated just how at risk our forests are to catastrophic wildfire. Many communities and millions of acres of forest ecosystems are at significant risk to catastrophic events like the Rim Fire. In response, CAL FIRE, the US Forest Service, and the Sierra Nevada Conservancy are teaming with regional partners including Fire Safe Councils, Resource Conservation Districts and local fire districts to implement strategic projects to proactively restore forest health and treat hazardous forest fuels by implementing sustainable forest management projects. In addition to protecting communities, forest resources, wildlife habitat, watersheds and recreational lands, these efforts reduce greenhouse gases, improve air quality, benefit water quality and quantity, lower firefighting costs, develop energy security, and increase local jobs and rural community vitality.

Unfortunately, these projects are quite costly with treatment expenses as high as \$1,200 per acre. Public funding to support proactive forest fuels treatment is declining and will likely cause many projects to be cut back or completely curtailed. The scale of the current challenge is enormous and continues to increase due a variety of factors including (but not limited to) the dynamic nature of California forests, climate change and reduced funding allocated to hazardous fuels treatment activities. The table below summarizes the scale of the challenge:

CALIFORNIA FOREST OWNERSHIP	HIGH, VERY HIGH AND EXTREME FIRE THREAT ¹ ACRES	CURRENT TREATMENT ACRES	TARGETED TREATMENT ACRES	FOREST BIOMASS TARGETED FOR REMOVAL TONS ²
US Forest Service	8,985,800	60,000	200,000 - 500,000	4,800,000 - 12,000,000
Other Public	1,768,300	25,000	50,000 - 80,000	1,200,000 - 1,920,000
Private	7,244,400	40,000	175,000 - 300,000	4,200,000 - 7,200,000
Totals	17,998,500	125,000	425,000 - 880,000	10,200,000 - 21,120,000

The Placer County Air Pollution Control District, with the cooperation of various stakeholders, convened a series of workshops at Blodgett Forest Research Station to address this wildfire risk. The discussions identified the need for supporting forest management activities through non-traditional, market-based funding approaches that properly and fully recognize and value the significant and wide range of economic benefits that can result from proactive and sustainable forest management and fuels reduction projects.

¹Figures are provided by CAL Fire - Fire and Resource Assessment Program.

²Green tons of excess forest biomass assuming 24 GT/acre.

Opportunity

An alternative, market-based opportunity to generate funding to support these projects is utilization of woody biomass generated as a byproduct of forest management and hazardous forest fuels reduction activities. In some regions of California, excess forest biomass from forest management and fuels reduction projects is utilized as feedstock for baseload renewable power generation. California has the most significant bioenergy infrastructure in the United States; however, this infrastructure is aging and some facilities have closed in recent years. There are currently 30 commercial-scale bioenergy facilities operating in the state with a generation capacity of approximately 600 megawatts (MW) of renewable power. There is a need to support this existing infrastructure (including existing bioenergy plants that are idle) while initiating development of additional, strategically located bioenergy facilities in California.

Societal Benefits

A robust and expanding California bioenergy market sector provides a number of compelling societal benefits, some of which are in addition to typical benefits of other renewable energy technologies.³

- **Promotes healthy forests and defensible communities.** Provides a ready market value for woody biomass material generated as a byproduct of forest management, hazardous fuels reduction and forest restoration activities.⁴ This helps encourage projects that contribute to defensible communities and healthy forest ecosystems through the generation of income to fund additional treatment activities.
- **Protects key watersheds.** A significant portion of California's in-state water resources flow from forested landscapes. Healthy forest ecosystems in these upland watersheds ensure that sustainable quantities of high quality water for both domestic and agricultural uses will continue to flow.^{5,6,7,8} In addition, water to support California's significant hydropower assets originates in these watersheds. This is particularly important given the predicted effects of climate change on future water production and the ability of forest management projects to protect and enhance both quality and quantity of water from forested landscapes. Increased water yield of 9-16%⁹ could result should additional forest acres be thinned within a watershed (see targeted treatment acres table on page 1).

³C. Mason, B. Lippke, K. Zobrist et al., "Investments in Fuel Removals to Avoid Forest Fires Results in Substantial Benefits," *Journal of Forestry*, January/February 2001, pp. 27-31.

⁴M. North, P. Stine, K. O'Hara, W. Zielinski, and S. Stephens, "An Ecosystem Management Strategy for Sierran Mixed-conifer Forests," USDA Forest Service, PSW General Technical Report PSW-GTR-220, 2009.

⁵D.G. Neary, K.C. Ryan and L.F. DeBano (eds.), *Wildland Fire in Ecosystems: Effects of Fire on Soils and Water*, Gen. Tech. Rep. RMRS-GTR-42-vol 4. Ogden, UT, USDA Forest Service Rocky Mountain Research Station, 2005.

⁶R.R. Harris, and P.H. Cafferata, *Effects of Forest Fragmentation on Water Quantity and Quality*. Paper presented to the Conference on California Forest Futures, Sacramento, CA, May 23-24, 2005.

⁷J.D. Murphy, D.W. Johnson, W.W. Miller, R.F. Walker, E.F. Carrol, and R.R. Blank, "Wildfire Effects on Soil Nutrients and Leaching in a Tahoe Basin Watershed," *Journal of Environmental Quality*, Volume 35, 2006, pp. 479-489.

⁸Numerous studies led by Lee H. MacDonald, Colorado State University, Department of Forest, Rangeland, and Watershed Stewardship.

⁹R.C. Bales, et al., "Forests and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project" November 2011.

- **Provides net air quality and greenhouse gas benefits.** Forest biomass material that would otherwise be disposed of by burning in the open in piles, in prescribed broadcast burns, or would have been consumed in a wildfire, can be utilized in a controlled manner to provide renewable energy (energy conversion units including boilers and gasifiers that are equipped with Best Available Control Technology), thus reducing air emissions and improving regional air quality. The air quality benefits are significant, with 95-99% reduction in particulate matter, carbon monoxide, and volatile organics, and a 60-80% reduction in nitrogen oxides when compared to open burning.^{10,11,12} An additional climate change benefit results from replacing fossil fuel fired power generation with renewable bioenergy.
- **Provides economic development and employment.** Most bioenergy facilities are sited in rural areas that are currently experiencing significant economic hardship. Jobs include plant operations and maintenance as well as fuel collection, processing and transport. Approximately five jobs are created per MW of bioenergy generation.¹³
- **Reduces waste going to landfills.** Wood waste destined for landfills can be recovered and utilized, thus extending the service life of landfills and reducing the need to develop additional landfill facilities while producing renewable energy and reducing greenhouse gases.
- **Delivers distributed, baseload generation.** Locating new, small-scale bioenergy facilities strategically across forested regions in California will mitigate the need for transmission system upgrades, as small generation facilities require relatively little transmission capacity to deliver power to load centers. This will also provide strategic 24-7 baseload generation in regions that are remote and prone to inconsistent power availability, thus minimizing the need for large diesel fired generator sets that serve as standby generation.
- **Protects transmission/distribution infrastructure.** Power distribution infrastructure in California is significant. Many of the state's generation assets utilize transmission and distribution systems located in forested regions to deliver generation to load centers. Forest management and hazard reduction projects can reduce the likelihood of wildfire damage to valuable power distribution infrastructure.
- **Utilizes renewable and sustainable feedstocks.** Bioenergy facilities are sized appropriately to utilize biomass from sources that continue to produce biomass in a long-term, sustainable way.

¹⁰Bruce Springsteen, Tom Christofk, Steve Eubanks, Tad Mason, Chris Clavin, and Brett Storey, "Emission Reductions from Woody Biomass Waste for Energy as an Alternative to Open Burning," *Journal of the Air and Waste Management Association*, Volume 61, January 2011, pp. 63-68.

¹¹Greg Jones, Dan Loeffler, David Calkin, and Woodam Chung, "Forest Treatment Residues for Thermal Energy Compared With Disposal by Onsite Burning: Emissions and Energy Return," *Biomass and Bioenergy*, Volume 34, 2010, pp. 737-746.

¹²Carrie Lee, Pete Erickson, Michael Lazarus, and Gordon Smith, *Greenhouse Gas and Air Pollutant Emissions of Alternatives for Woody Biomass Residues*, prepared by the Stockholm Environment Institute for the Olympic Region Clean Air Agency, November 2010.

¹³G. Morris, *The Value of the Benefits of US Biomass Power*, November, 1999, NREL Publication SR 570-27541.

- **Helps California meet greenhouse gas reduction, waste reduction and renewable energy objectives.** The bioenergy market sector helps the state meet specific policy objectives as set by the California legislature and the Governor:
 - AB 32 – Greenhouse Gas Reduction.
 - AB 939 – Waste Reduction – Reduced Landfill Deposits.
 - SB 1078 – Establishes a Renewable Portfolio Standard for California.
 - Executive Order S-06-06 – Sets Bioenergy Production Targets.
 - SBX 1-2 – Increases the Renewable Portfolio Standard to 33%.
 - SB 1122 – Establishes a 250 MW set aside for bioenergy projects scaled at up to 3 MW of generation capacity.
- **Reduces wildfire suppression costs.** Forest management fuel reduction activities significantly reduce the economic costs for fighting wildfires.

Barriers

- Appropriated budgets for federal agency land management are far less than necessary for adequate levels of sustainable forest management and hazardous fuels reduction.
- There has been a dramatic loss of physical and human forest management infrastructure in California. This infrastructure is logistically and economically difficult to reestablish.
- Woody biomass that is a byproduct of forest management and hazard reduction projects has value for energy production or other products (like mulch) and therefore offers the potential for additional income for forest owners and managers. However, woody biomass market value as a renewable fuel has dropped in recent years (partly due to low cost fossil fuels like natural gas), so large volumes of woody biomass is currently not utilized and is instead open-burned on site.
- There is a lack of consensus among key interests as to what constitutes sustainable forest management. This often results in appeals or litigation that delay project implementation.
- Current wholesale market pricing for industrial-scale bioenergy (greater than 3 MW) does not provide the necessary financial incentive for existing bioenergy facilities to operate past current power purchase agreement termination dates.
- Many of the investor-owned-utilities are focused on least cost/best fit for renewable generation, which does not favor the relatively high cost bioenergy generation sector.

Solutions

Solution sets that provide specific and tangible results to address forest health and defensible communities are identified below, grouped as short-term, mid-term and long-term targets.

Short-Term Solutions
<ul style="list-style-type: none">• AB 32 Investment Plan - State should invest in forest health projects now to realize carbon storage enhancement by 2050.• CPUC - SB 1122 implementation process - focus on fair and equitable treatment of forest bioenergy projects. Provide input on societal and ratepayer benefits (CPUC workshop planned this winter). Share Mokelumne Watershed Avoided Cost Study findings with the CPUC.• Implementation of PCAPCD Biomass to Energy Protocol through the CAPCOA Emissions Offset Exchange.• Brief key state agencies (CPUC/CEC) on the need to invest EPIC \$ in research, development and deployment of emerging bioenergy technologies.• Coordinate implementation of bioenergy technology workshops to align key players (e.g., financial institutions, project developers, investors, state agencies) to the potential opportunities. Consider asking Cal EPA/BAC and/or UC Extension to sponsor these workshops.• Support upcoming bioenergy workshops planned for Chester/Eureka/Merced (sponsored by UC Extension).• Meet with Assembly members Dahle and Gordon to brief them on Wood Energy Group and BWG initiatives. Discuss possible field trip to Blodgett or other appropriate locations.• Participate in Biomass Work Group meetings to continue to help build support for sustainable forest management and bioenergy development among a broad range of interests.
Mid-Term Solutions
<ul style="list-style-type: none">• Research in support of a Biomass to Biochar GHG emissions offset protocol.• Continue to pursue research related to defining the GHG benefits of sustainable forest management that reduces the negative impacts of wildfire.• State Legislative Solutions:<ul style="list-style-type: none">○ Cost Sharing Account for IOU's to share costs that benefit all ratepayers/society. (Consider cost shifting options - post AB 1890). Correct "unfair burden" to IOU's. Possibly team with key stakeholders (e.g., BAC, CBEA, CFA).○ Least Cost/Best Fit and baseload energy. Need to solve this dynamic so existing biomass infrastructure can continue to exist.
Long-Term Solutions
<ul style="list-style-type: none">• Develop a GHG protocol for benefits associated with forest management that reduces wildfire effects.