

Entry



EXECUTIVE SUMMARY: THERMAL BIOMASS BOILER PROJECT

Overview: This project replaced an aged and inefficient propane boiler with a new, state-of-the-art, 751,000 btu/hour thermal biomass system to heat the Bridgeport Road Shop.

Challenge: The Thermal Biomass Boiler Project addresses three main challenges, including 1) fire and forest health, 2) defensible space and waste diversion, and 3) aging County equipment:

- 1. Fire and Forest Health:** In the past decade, catastrophic forest fires in California have increased, causing loss of life and property in addition to health and ecosystem impacts, and tree mortality has increased with drought conditions, exacerbating the threat of wildfire. Fuel reduction treatments have increasingly been used as management tools to provide for healthy forests and reduce fire threat in the wildland-urban interface; however, the disposal of woody material from these treatments has remained a barrier. Chipping in place, pile burning, or removal and off-site disposal all have a variety of setbacks including cost, logistics, and/or air quality impacts that add complications to a project. A long-term market and cost-effective strategies for utilizing woody biomass "waste" are needed to drive future land management decisions in support of fuel reduction treatments.
- 2. Defensible Space and Waste Diversion:** Mono County is a rural and remote county with low population density and long travel distances to urban areas. While the vast majority (94%) of Mono County lands are in public ownership, private lands range from forested areas to high desert sagebrush scrub, all of which can be prone to catastrophic fires. In 2015, the Round Fire claimed ~40 homes and outbuildings in the Mono County community of Swall Meadows, and in 2016 the Marina Fire threatened the homes and communities in and near Mono Lake. Thus, defensible space for private development is a significant issue in Mono County, and Mono County provides a limited amount of free woody material disposal at the landfills and transfer stations to encourage homeowner compliance. To increase solid waste diversion from landfills, the County also has an interest in finding a better use for the woody material than landfilling it or chipping for alternative daily cover.
- 3. Aging County Equipment:** The propane boiler at the Bridgeport Road Shop had exceeded its useful life, and was in dire need of replacement. The road shop building is large (12,855 square feet), and heating demands in the winter are high due to extremely low winter temperatures, uninsulated portions of the building, large open spaces for vehicle bays, and the opening of garage doors to move vehicles.

Innovative Solution: The County had several options before us, the simplest of which was to replace the old propane boiler with a new propane unit. However, the County had just completed the *Comprehensive Feasibility Study for a Heat and/or Power Biomass Facility and Expanded Forest Products Utilization in Mono County, California* (2014), which concluded that local biomass utilization efforts should be geared toward

thermal systems. Given the other challenges described above related to fire and forest health, and defensible space and waste diversion, along with grant funding from the Sierra Nevada Conservancy, the County realized a golden opportunity was available to pursue a unique solution that perfectly matched our infrastructure need with public responsibilities and an exciting new field. Therefore, the County selected an untried and untested solution in California – a thermal biomass boiler. The thermal biomass system would 1) increase the market for woody biomass material, which would in turn support fuel reduction and defensible space treatments; 2) increases the County's diversion of waste at our landfills, and 3) provide a more cost-effective heating system for the County over the long term. An added benefit was that the use of alternative energy was consistent with the County's Resource Efficiency Plan, which functions like a climate action plan, and a biomass system would contribute to a reduction of greenhouse gas emissions.

The biomass boiler was installed by County Public Works Department staff within the existing mechanical room, along with a fuel hopper and water storage tank, and existing piping and pumps were reconfigured as necessary for full system integration. A new 900-square foot storage building for wood chips on-site ensures a one week fuel supply, and staff is fully trained in system operations and maintenance. The project was completed in March 2017, and is anticipated to consume ~103 bone dry tons (BDT) during the winter operating season. The project was funded by a grant from the Sierra Nevada Conservancy.

Originality: This Thermal Biomass Boiler Project is the first of its kind in the state of California. The County held an extensive vetting process to select a vendor and technology that met our specific needs, and found the installation instructions had not yet been translated into English from German! We also had to navigate air quality regulations which tended to combine clean biomass fuels with the much more complicated municipal waste stream, resulting in prohibitive testing requirements and fees. The County managed to resolve all these unexpected issues, and successfully constructed the first thermal biomass boiler in California. We have already received phone calls, inquiries and site visits from a number of other parties interested in reviewing this project, and a request from California Assemblyman Bigelow to tour the facility.

Cost Effectiveness: If a new propane boiler had been installed, the estimated annual operating cost would have been approximately \$45,000 for fuel and maintenance. The estimated operating cost for the thermal biomass boiler, at an assumed fuel cost of \$4,635/year (based on the 2014 feasibility study estimate of \$45/bone dry ton delivered) and maintenance costs of \$20,000, is approximately \$25,000 annually. The estimated savings of \$20,000/year results in a return on investment of approximately 12.5 years. In other words, the capital investment of \$250,000 to install the biomass boiler will be recovered in 12.5 years, and then then the annual savings (\$20,000) over the cost of propane results in direct savings for the County.

Results: The Thermal Biomass Boiler Project has been successfully installed and operated, and provides a model in California of a successful thermal biomass system. This project potentially paves the way for other thermal projects and expands the utilization of forest-sourced biomass, which in turn supports forest fuel reduction and defensible space treatments to reduce wildfire threats.

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