



## Frequently Asked Questions

### Mono County Biomass Utilization Project

#### ***What is a thermal-only biomass unit?***

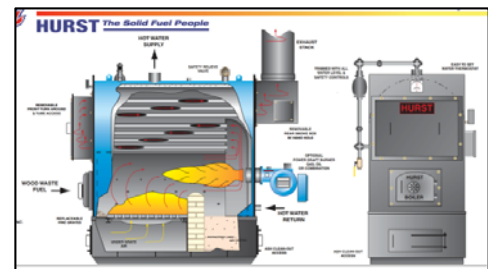
A thermal-only biomass unit is a traditional boiler, just like propane, natural gas, and fuel oil boilers. The term “thermal” means heat and is used to differentiate bioenergy development projects that make electricity and heat (known as combined heat and power, CHP) and projects that only produce heat in the form of hot water or steam. The only similarity between biomass thermal projects and geothermal projects is that both systems create heat.

#### ***What is a biomass boiler?***

A biomass boiler is a furnace with the ability to heat water that is designed to combust solid fuels such as woodchips, wood pellets, and agricultural byproducts (such as straw and grain husks, olive kernels, rice). Biomass availability in the Mammoth Lakes region includes forest-sourced harvest byproduct (chipped tree limbs and tops) and clean urban wood from construction/demolition and tree trimmings material.

#### ***What does a biomass boiler unit look like?***

There are many biomass boiler manufacturers across the United States. A biomass boiler looks much like the traditional propane, natural gas, and fuel oil boilers except their combustion chamber is larger in order to handle solid wood fuel. To the right is a representative schematic from of a biomass boiler made by Hurst Boilers.



#### ***Can a biomass boiler be connected to an existing heating system?***

Yes, as with any other boiler, a biomass boiler can be connected to an existing boiler system.

#### ***Are boiler back-ups necessary?***

A properly designed and installed biomass boiler will be as reliable as a fossil fuelled (fuel oil, propane, natural gas) boiler and therefore the typical rules for back-up boiler sizing should be applied. Biomass boilers react more slowly to heat demand changes than fossil fuel boilers, therefore it is recommended to maintain a fossil-fuel boiler to service peak thermal demand.

#### ***What arrangements are required for feedstock storage?***

Onsite storage of wood chips should be designed to ensure that a steady supply of fuel is available to the boiler. Sizing of feedstock storage takes into account weather patterns, supply availability, and site accessibility. Biomass feedstock around Mammoth Lakes is available year-round from woody material that is sorted for recycling and reuse at the local landfill. A week or two of storage is typically recommended for a project site. For many projects this amounts to accommodating storage of one to two truckloads of chipped biomass fuel. A truck load is 25 green tons and is delivered in a standard semi-truck trailer.



### ***How are chips stored?***

Chips are stored in a concrete bunker and are fed automatically from the storage area into the biomass boiler. The storage should be covered in a facility to avoid exposure to inclement weather (rain, snow) with sufficient space heating to avoid chips freezing together and clogging the conveyance system.

### ***How much does wood cost compared to other fuels?***

In northern California, wood chips are currently available at delivered cost of approximately \$27/ton.<sup>1</sup> The cost per ton will vary depending on the wood source and may range from \$15 to \$40 per ton. Below is a table comparing traditional energy sources.

| <b>Energy Source</b> | <b>Unit Price</b> | <b>Energy Content</b> | <b>Conversion Efficiency</b> | <b>Price of Delivered Energy</b> |
|----------------------|-------------------|-----------------------|------------------------------|----------------------------------|
| Electricity (SCE)    | \$0.085/kWh       | 3,412 Btu/kWh         | 100%                         | \$24.9/MMBtu                     |
| Fuel Oil             |                   | 140,000 Btu/gal       | 80%                          |                                  |
| Propane              | \$3.50/gal        | 91,500 Btu/gal        | 80%                          | \$47.81/MMBtu                    |
| Propane              | \$2.15/gal        | 91,500 Btu/gal        | 80%                          | \$28.83/MMBtu                    |
| Propane              | \$1.50/gal        | 91,500 Btu/gal        | 80%                          | \$20.49/MMBtu                    |
| Wood Chips           | \$27/ton          | 5,100 Btu/lb          | 70%                          | \$3.78/MMBtu                     |

### ***What maintenance does a biomass boiler require?***

Biomass boilers require more attention than fossil fuel boilers. Biomass boilers can operate unattended, but weekly inspection visits are required to carry out a visual inspection of the boiler and the feed system, to check the lubrication of bearings, and dispose of the ash. If the boiler is not fitted with automatic flue cleaning, regular cleaning of the flue tubes is required using a flue brush.

### ***How much does a biomass boiler cost?***

While the cost of a biomass boiler itself is comparable to fossil fuel boilers, the additional costs from engineering work associated with feedstock storage and conveyance can increase the cost of installation when compared to a traditional fossil-fuel boiler. Installation costs will vary significantly from site to site.

### ***Are air permits necessary for biomass boilers?***

Air permits in Mammoth Lakes are issued by the Great Basin Unified Air Pollution Control District. There will be no visible smoke emitted from the boiler when operating correctly.

### ***How is the ash disposed?***

Ash produced from biomass boilers can be used as soil amendment in agricultural settings. If insufficient quantities are produced to utilize on rangeland or farmland, the ash may be disposed of at the local landfill.

*Information for the FAQ has been compiled by TSS Consultants from many sources with significant information provided by the Biomass Energy Centre, UK.*

<sup>1</sup>TSS is currently working with local contractors and potential wood chip suppliers to confirm the delivered cost of wood chips that meet boiler manufacturer specifications.