

# BIOMASS

Renewable Energy  
at  
Colorado State University

**Biomass** is any biological material that can be used as fuel, such as wood chips, crop residues, and other low-grade wood wastes. Biomass fuel is burned or converted in systems to produce heat, and in some cases, both heat and electricity in a combined system.

In an effort to improve the health of the forests surrounding Fort Collins, Colorado State University and the Colorado State Forest Service have teamed together to build a biomass heating plant on Foothills Campus. This facility burns wood chips, rather than relying solely on natural gas, in order to produce hot water for the Infectious Disease Research Center (IDRC) on Foothills Campus. Wood chips come from mountain pine beetle management, fire mitigation projects, and potentially some urban tree prunings. The fuel is therefore considered renewable. By using this low value material for heating applications, Colorado State University upholds its pledge of environmental responsibility and stewardship.

Since the beginning of the 20th century, forest and wildfire policies have largely sought to eliminate the occurrence of wildfires from the landscape. A century of fire suppression activities (i.e., thinning and prescribed burning) “combined with the manifestations of climate change, regional drought, and a host of other human activities” (L. Dale) have resulted in a forest health crisis today that is neither easy nor cheap to resolve. Overcrowded forests negatively affect the ability of the forest ecosystem to function properly and increase the catastrophic effects of fires when they do occur.



*Above* - The devastation caused by pine beetles around Fort Collins is overwhelming. The infected trees are removed to protect the healthy trees and the wood is used to fuel the boiler

*Left* - Uniform pine chips are automatically delivered to the boiler via a system of augers & conveyors, with chips typically 2 inches and smaller.



# Biomass Boiler Facts



- The 46 bhp hot water boiler on Foothills Campus has the capacity to produce 1.5 million Btu/hr and is presently using an average of 300 tons of wood chips per year, with chips typically 2 inches and smaller.
- Forest thinning generally yields about 10 tons of wood/acre, so the boiler will support the thinning of 30 acres of forest per year.

- Burning biomass releases atmospheric carbon that was absorbed during the growth cycle of the tree and therefore has near zero carbon emissions.
- While the economics of a biomass boiler at this size are marginal, the University is investigating a larger boiler that may provide significant benefits.
- The biomass plant has the capacity to store the equivalent of 33 cords of wood and when running at full capacity, it can burn wood chips equal to 7 cords every day.



- Wood chips come from forest fire mitigation projects as well as pine beetle kill areas.
- Biomass energy produces 96 percent fewer overall emissions (CO, NO<sub>x</sub>, SO<sub>2</sub>, particulate matter, etc.) than natural forest fires and 97 percent fewer emissions than prescribed burning.
- The cost of wood chips is expected to be about half the cost of burning natural gas, saving the University about \$12,000 in fuel costs each year.



(Left) Front of the boiler where ash is deposited and (Right) back of the boiler where wood chips are fed via auger from the storage room.

For more information, visit <http://www.fm.colostate.edu/sustain/> or contact Carol Dollard, Energy Engineer at [Carol.Dollard@colostate.edu](mailto:Carol.Dollard@colostate.edu)