

Biomass Heating System Overview--Santa Fe Community College

*Mark Sardella, Local Energy
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General Description

The proposed biomass heating system for the Santa Fe Community College will add one 1,000 kilowatt (1 megawatt or 3.4 MMBTU/hr) biomass boiler to the two existing natural gas boilers to cover the base load (approximately 80-90% of the total heating demand) and will be housed in a 500 square-foot addition (approximately 20' x 25') to the existing boiler room. Peak load heating and back-up heating (about 10-20% of the total heating demand) will continue to be provided by the two natural gas boilers and the heat will be distributed to all of the buildings on the campus (except for the Early Childhood Development Center) through the existing network of piping within the buildings.

Appearance of the System

Adjacent to the boiler room addition, in the existing shipping and receiving courtyard area, a 1,000 square-foot (approximately 25' x 50') covered biomass fuel handling area that feeds the woodchips into the boiler will be installed. The design of the addition and fuel-loading area is not yet completed, but we will provide a sketch as soon as we can so that you get an idea of the footprint. The profile of the additions are expected to be no higher than the surrounding buildings and of comparable design and finish. Any changes to the piping system will not be visible from outside the buildings.

Comparable Systems in Operation

We know of no comparable biomass systems operating in New Mexico, so we have included photographs of biomass installations Europe. (See attached.) There is, however, one biomass system under construction at the Jemez Mountain Schools in Gallina, NM, but it is not directly comparable to the system planned for the college.

Water Vapor Exhaust

Biomass fuel contains moisture, and in very cold weather a plume of water vapor will rise from the exhaust stack. The thickness and length of the plume will vary depending on the outdoor temperature and relative humidity. Due to the dry climate in Santa Fe and the low relative humidity of the air, water vapor plumes are less likely than in regions with a wetter climate such as central Europe. If the plume does become a problem, it can be reduced or eliminated by bypassing the economizer. Doing so reduces the efficiency of the system, however, and therefore is not desirable. See the attached photos for examples of water vapor plumes from biomass systems operating in Europe.

Fuel Sources for the System

We conducted a biomass fuel study for a 50-mile radius surrounding the college that identified at least thirteen different existing fuel sources, including green waste at solid-waste disposal sites, sawdust from wood products manufacturers, and small-diameter timber and slash from a number of forest thinning projects. Which of these sources will be tapped for fuel for our project has yet to be determined.

Emissions from the Biomass Heating System

The attached chart *SFCC Heating System Emissions Comparisons* shows the expected and potential emissions from the proposed system as well as the threshold requirements for notification or permits from the New Mexico Air Quality Bureau (NMAQB) and the estimated emissions from the existing natural gas system. It is important to note that the NMAQB bases their requirements on operating a system year round, 24 hours per day, at peak load to determine the "potential emissions of a system". At SFCC the actual equivalent operating hours when the system will be operating at peak load are estimated to be 4,796 hours in comparison to the "potential hours" of 24 x 365, or 8760 hours, which means that the actual emissions are less than 55% of potential emissions of the system.

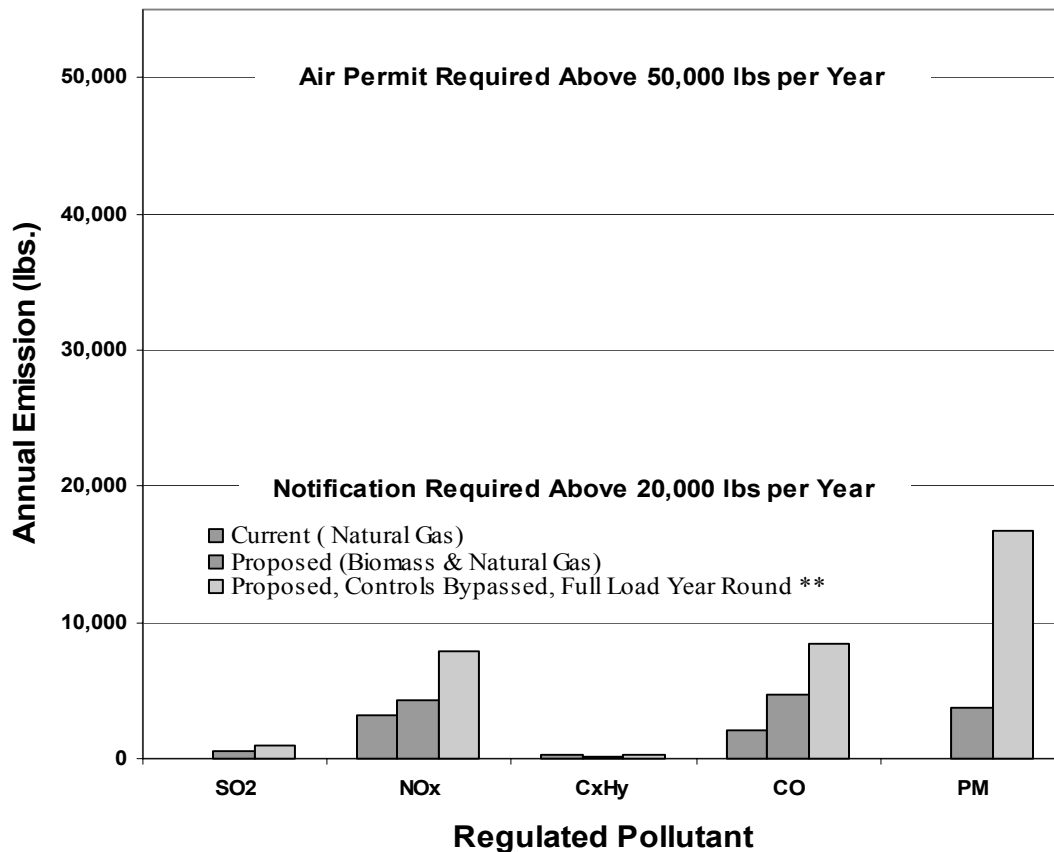
Quick Facts about the Biomass System

A comparison of the existing natural gas system and the planned biomass-fueled heating system is shown in the attached chart *Biomass Heating System at Santa Fe Community College* and in the graph titled *SFCC Heating System Emissions Comparisons*.

Existing and Proposed Heating Systems at Santa Fe Community College

	<u>Existing System</u>	<u>Proposed System</u>
Heating Fuels	natural gas only	woody biomass, natural gas backup
Nominal Heating Capacity:	8.6 MMBTU	3.4 MMBTU biomass + 8.6 MMBTU gas
Heat Load Served by Renewables:	none	approx. 80%
Heat Delivery System	hydronic, via insulated pipes	hydronic, via insulated pipes
Boiler Certification:	ASME H2 Stamp	ASME H2 Stamp
Operator on site?:	Yes, in daytime	Yes, in daytime
Boiler Room	1200 ft ²	1200 ft ² + 800 ft ² newly built
Fuel Handling Area:	none	approx. 1000 ft ²
Fuel Deliveries	via underground pipes	1 truck/day @ peak load
Ash Production:	none	approx. 9 tons/year
Ash Utilization:	n/a	recycled into soils
Regulated Emissions:	see below	see below
Net CO ₂ Emissions*:	1431 tons/year	39 tons/year

*Note: CO₂ emissions shown represent the effective annual increase to the atmospheric CO₂ level.



** Note: New Mexico Air Quality Bureau regulations are based on maximum possible emissions, not expected emissions.

Biomass Heating Systems in Operation



Oberlech, Austria
800 kilowatt Biomass
Altitude: 5,500 feet



Sannicolo, Italy
600 kilowatt Biomass
Altitude: 3,900 feet



Wolfsberg, Austria
1,000 kilowatt Biomass
Altitude: 6,900 feet