

Biomass Heating System Overview--Santa Fe Community College

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General Description

The proposed biomass heating system for the Santa Fe Community College will add a one megawatt biomass boiler (3.4 million BTU per hour) to the College's heating system. This new boiler will supply approximately 80-90 percent of the College's total heating demand, and will be housed in a newly built 800 square-foot building near the existing boiler room. The natural-gas boilers will remain in place for backup, and will provide some additional heat during the coldest days of winter. The heat generated by the new boiler will be distributed throughout the campus via the existing network of pipes on the campus. The domestic hot water and the swimming pools will also be heated with biomass. The Early Childhood Development Center is not affected by the biomass system.

Layout of the System

Adjacent to the new boiler room, a 1,000 square-foot, covered biomass fuel-handling area will be built. This area will receive loads of woodchips, and will feed the fuel automatically into the boiler. The profile of the additions are planned to be no higher than the surrounding buildings, and will be of comparable design and finish. Changes to the plumbing will not be visible from outside the buildings.

Fuel for the System

We conducted a biomass fuel study for a 50-mile radius surrounding the college, and identified more than a dozen sizable biomass fuel sources. These included green waste at solid-waste disposal sites, wood slabs, chips and sawdust from wood-products manufacturers, and small-diameter timber and slash from forest thinning projects. Which of these sources will be tapped for fuel for our project has yet to be determined.

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 height of the plume will vary depending on the outdoor temperature and relative humidity. The dry climate and low relative humidity in Santa Fe means that water vapor plumes will generally be less pronounced than in regions with a wetter climate. The plume can also be reduced or eliminated if necessary by bypassing the boiler's economizer, but doing so reduces the system's thermal efficiency.

Air Emissions from the Biomass Heating System

Emissions from the system will be well below the level that requires a permit from the New Mexico Air Quality Bureau (NMAQB), and in fact they are even below the level at which notification is required. The NMAQB bases their requirements on the emissions that would result if the system were operated at peak load, 24 hours per day year-round with the emission-control system bypassed. The SFCC system will operate about 4,800 full-load-equivalent hours per year, or less than 55% of the time, and will have a multi-cyclone system for removing particulate emissions from the exhaust.

Comparable Systems in Operation

There is a biomass system in operation at the Jemez Mountain Schools in Gallina, NM, but it is 50 percent larger than the planned SFCC system, and uses a different fuel-handling system. In Austria, a country roughly one-fourth the size of New Mexico, there were 843 biomass-fired district heating systems operating as of January 2005.

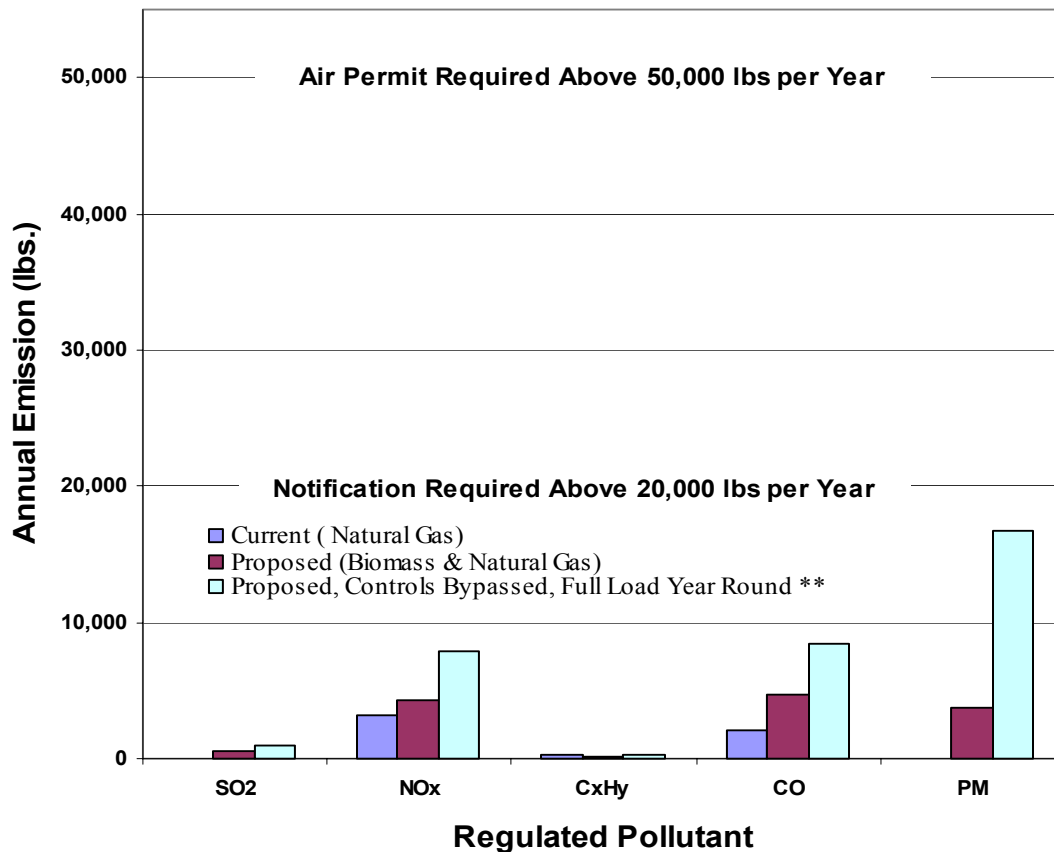
Project Schedule

The engineering design is complete, and schematic construction drawings are being prepared. The College hopes to begin building the system in the Fall of 2005, in time for biomass heating this coming winter.

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 CO₂ 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

