

South Carolina biomass facility announces commercial operation for state-of-the-art facility

Operation upgrade complete

Sonoco, a global provider of industrial products, consumer packaging, protective solutions and packaging services, has successfully constructed, commissioned and is commercially operating a new biomass facility at its Hartsville, South Carolina plant in the US. The biomass boiler is part of a \$100 million (€74 million) investment in the Darlington County facility.

Sonoco committed \$75 million back in 2011 when it decided to replace two aging coal-fired boilers and install a biomass one at the facility. The new boiler can generate around 16MW of renewable energy primarily from woody biomass sourced from the local logging industry, but can also run on natural gas. The renewable electricity will be used in the manufacturing complex, as well as steam that is used in the papermaking process.

‘A key part of Sonoco’s culture is our commitment to sustainability, including our dedication to improving the environment and our contributions to the future of the communities in which we operate,’ says Sonoco president and CEO Jack Sanders. ‘This boiler is proof of that commitment. We took more than two years to complete final engineering, fabricate the boiler, put together the infrastructure and complete construction of what we believe to be one of the nation’s most state-of-the-art biomass cogeneration boiler systems.’



Sonoco's new biomass boiler near completion

The steam generation system was designed, supplied and installed by the McBurney Corporation. The boiler

capacity is 300,000lbs steam per hour at superheated conditions of 1,325 psig and 515°C. The boiler’s furnace

design allows for additional residence time for staged combustion to enhance reduction of the products of combustion, particularly carbon monoxide (CO) and particulate matter.

Integral to the steam generator is the lower combustion system which incorporates a water-cooled, vibrating grate system manufactured by Detroit Stoker. This vibrating grate system is a modular design for easy installation which, for this project, required three modules for a total active combustion area of 570ft².

In addition to the grate system, a staged secondary air system, specifically



Grate system and fuel distributors

designed for this furnace, was provided. Fuel is distributed into the furnace with air swept distributors to maintain a consistent fuel and ash bed to mitigate fluctuations in boiler performance related to changes in fuel quality.

Compliance with state and federal rules for air emissions were key in pursuing this project. Subsequently, the major pollutants of concern were reviewed and evaluated based on published compliance values. Of greatest concern were CO, acid gases (HCl), NOx and particulate matter.

Reduction in NOx was required and a post combustion ammonia-based injection system, commonly referred to as a Selective Non-Catalytic Reduction (SNCR), was installed. Evaluation of particulate matter emissions revealed that a fabric filter arrangement would ensure compliance.

CO emissions, often associated with moisture content of biomass fuels and lower furnace combustion, was addressed by high pre-heated combustion air temperatures, conservative boiler and grate thermal release rates to obtain the required

Owner/developer	Sonoco
Engineers/architect	McBurney
EPC	McBurney
Steam generator supplier	McBurney
Steam generator type and design	<ul style="list-style-type: none"> Two Drum, field erected 300,000lbs steam/hr 1325 psig and 515°C steam conditions Economiser Tubular air heater to 260°C Mechanical Dust collector
Combustion system supplier	Detroit Stoker Company
Combustion system type	<ul style="list-style-type: none"> Water-cooled, vibrating grate Air swept fuel distributors Secondary air system
APC provider	FuelTech, Amerair
APC system	<ul style="list-style-type: none"> SNCR - NOx reduction Bag House - PM reduction
Emissions permit requirements	NOx: 0.20lbs/MMBtu CO: 160 PPMvd @ 3%O ₂ PM: 0.0011 Lbs/MMBtu HCl: 0.0022lbs/MMBtu VOC: 0.017lbs/MMBtu
Turbine generator supplier	Re-use existing GE STG
Turbine generator	Extraction condensing 30MW gross
Fuel handling	Bruks, Fesco, ProcessBarron
Auxiliaries	Fans: ProcessBarron Pumps: ITT Goulds, Flowserve

temperatures and residence times required to ensure permit compliance values.

An installed continuous emission monitoring system

was installed to measure the following pollutants: NOx, CO, CO₂, O₂, as well as opacity. To ensure emission compliance at all times, it was decided

to install full capacity natural gas burners to reliably start up, shut down and be used as a contingency if biomass fuel feed or supply is interrupted. |

For more information:

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