

# Project Description



*No. 11 Power Boiler Overfire Air Delivery System Upgrade*  
*NewPage Corporation*  
*Escanaba, Michigan*

## **Project Scope**

The No. 11 Power Boiler (PB) is a Combustion Engineering (CE) VU-40 boiler that was supplied in 1981. The unit burns pulverized coal and a combination of biomass fuels including clarifier sludge and tire derived fuel (TDF) on a traveling grate. The boiler was originally designed to generate up to 600,000 lb/hr of steam, including 365,000 lb/hr from biomass, at 1,500 psig and 890°F, and was upgraded in the 1990's to generate up to 750,000 lb/hr of steam.



The original overfire air (OFA) system supplied combustion air through several rows of small ports located on the front and rear walls. The OFA flow corresponded to a small fraction of the combustion air for biomass firing and was supplied at high pressure by a booster fan that also supplied air for cinder re-injection and grate fuel distribution. The old OFA system had shortcomings that led to operation at lower than desired biomass firing rates.

The project goals included the following:

- Maximize grate fuel firing to generate up to 420,000 lb/hr of steam from biomass.
- Minimize carryover of unburned char and ash.
- Minimize CO emissions.
- Minimize erosion of boiler components.

A new OFA system was installed in the fall of 2012. Four custom designed dual range Jansen High Energy Combustion Air Nozzles™ were placed on each side wall, arranged in an interlaced pattern. The existing OFA fan was modified with a new wheel and inlet damper allowing it to supply a larger fraction of the combustion air as OFA. New ducting, dampers, and expansion joints were also provided to supply the OFA from the modified fan to the new OFA nozzles.

## **Results**

Operation with the new OFA system demonstrated the following performance improvements:

1. Significantly higher biomass firing rates with low CO emissions.
2. CO emissions during the performance test were less than half of the guarantee value while biomass steaming rates exceeded the guaranteed value by 5%.
3. Ash re-injection was discontinued after a few weeks of operation with the new OFA system since it was no longer required due to the greatly improved char burnout.