

Rice straw as biomass for power plants

Contributed by Western Regional Biomass Energy Program

The direct combustion of rice straw in biomass power plants has been tested for limited periods of time at various locations including the Wadham Power Plant in southern Colusa County. There has, however, been no sustained long term usage of this feedstock as a fuel in biomass powerplants. This is in part due to numerous problems in the utilization of rice straw, including:

- alkalinity of the straw which creates serious and costly slagging problems in the boilers,
- high silica content resulting in higher ash, which creates disposal problems,
- costs of providing rice straw as a fuel,
- low Btu content of rice straw,
- fuel handling problems (storage, dust, fugitive emissions) and
- lack of a well developed infrastructure to provide large, reliable, quantities of straw.

During 1999 combustion and emission tests of leached rice straw as a fuel were conducted at biomass power plants in the Sacramento Valley. Figure 6.1 illustrates part of the fuel testing (Note that dust was a notable problem in the processing of spring collected/over-wintered rice straw) conducted by Dr. Jenkins at the Wadham Power Plant in the spring of 1999. These tests to evaluate the potential of using leached rice straw as a fuel were conducted at three different types of commercial biomass plants (grate, spreader stoker, and fluidized bed). Rice straw was blended 20 to 25 percent with the plants standard biomass fuels. No adverse effects due to slagging or fouling were observed and no bed agglomeration occurred (in the circulating fluidized bed). NOx emissions increased and required increased ammonia injection for control. The results suggest that leached rice straw is technically suitable as a fuel in existing biomass boilers of various types under normal operating conditions and when blended with other fuels. Impacts included increased ash handling requirements and need for increased ammonia injection for NOx. Fuel feeding may prove difficult depending on type of plant and fuel mix. Longer tests and further economic evaluations to assess fuel and ash handling and boiler operating costs are needed.

Based on survey results and the history of the biomass power industry in California, distances to plants, fuel costs, low density of the fuel, and fuel handling problems will add to the alkalinity and ash problems noted earlier. These must be overcome if rice straw is to be utilized in any significant volume.

<http://www.westbioenergy.org/ricestraw/six.html>