



Abstract Format

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Co-firing with a high-ratio of wood biomass to make the most existing coal-fired power plant

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Abstract

Regarding coal-fired power plants, reduction of CO₂ emissions is essential. Accordingly, IHI has carried out a demonstration of a co-firing system for coal and a high-ratio of carbon-neutral wood biomass (up to 50% in calorific value) to significantly cut CO₂ emissions.

The accidents at nuclear power plants triggered by the Great East Japan Earthquake in 2011 left thermal power generation as the crucial source of base power in Japan. Coal-fired power generation is a particularly important source, accounting for about thirty percent of the total supply of power. Meanwhile, coal-fired power generation accounts for as much as half of the annual CO₂ emissions for all power generation. In other words, coal-fired power generation emits much CO₂, which hardly makes it a desirable source of energy from the viewpoint of preventing global warming.

Still, CO₂ emissions from carbon-neutral wood biomass can be excluded from the carbon accounting of any viable co-firing of coal with wood biomass. Supposing that all major power companies operated with 50% co-firing of wood biomass in their coal-fired boilers, CO₂ emission could be slashed by 100 million tons, making a great contribution in the activity for global warming. IHI has been developing the technology to make this happen.

In major coal-fired power plants, pulverized coal-fired boilers are employed as a mainstream solution. Conventional pulverizer for coal can handle only up to 2-3% wood biomass. To solve this problem, a coal pulverizer was modified for handling wood biomass for combustion. The some test clarified that modified conventional pulverizer works well for biomass of pellet type at least.

In addition, several tests were conducted on the combustion and it was found that if the pellets were produced with certain fine wood powder, they could be burn even with a burner for pulverized coal. The test of co-firing rate 50% was conducted in a coal combustion test facility having with multi-burners and its thermal input was approx. 2,000kg/h-coal. Moreover the characteristic inside of the furnace under 50% co-firing was analyzed using with CFD model, the ash adhesion behavior and corrosion rate of boiler tube was confirmed experimental, and the influence for flue gas treatment system were carried out.

A new pulverized coal fired power plant applying higher-ratio of wood pellet co-firing just started operation in September 2017.