

Circulating Fluidized Bed Boilers

Circulatory Fluidized-Bed (CFB) boilers can be used with a wide range of fuels, contributing to more efficient use of energy resources and reduction of CO₂ emissions

SHI/Foster Wheeler Circulating Fluidized Bed Boiler

SHI's Circulating Fluidized Bed (CFB) boiler has been adapted to handle a wide range of types of coal, including low-grade coal (with high water content and low calorific value), which have traditionally proved difficult to burn efficiently and stably. In recent years, we have also broadened the range of waste-based fuels, such as biomass (using woodchips, etc) and waste tires (used in place of fossil fuels) that can be burned in CFB boilers. This system is making a name for itself as a means of combating global warming and enabling more efficient use of resources.

Combustion Process

The CFB boiler is able to efficiently combust a wide range of fuels using a method in which air is blown from the bottom part of the boiler, and high-temperature particles (ash from the fuel) mix evenly in the air with the fuel. The fuel particles that rose with the combustion gas are separated with a cyclone, causing them to return to the bottom of the boiler again. This increases combustion efficiency.

Features

- **Suitable for a wide range of fuels**

Can handle difficult-to-combust fuels such as low-grade coal, waste construction materials, waste tires, waste plastics, coal waste and paper sludge.

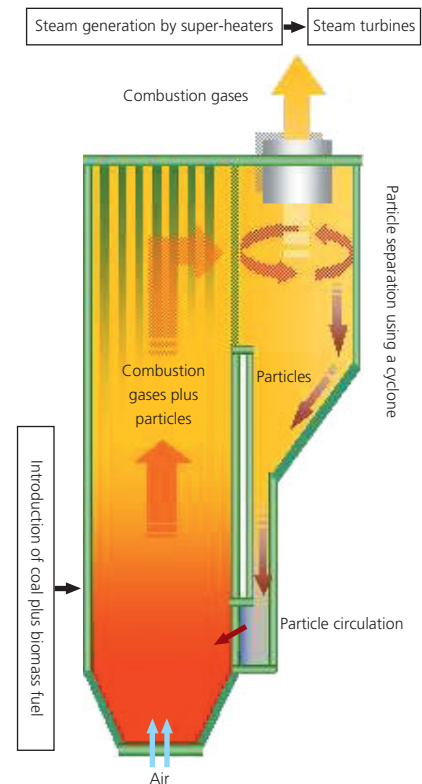
- **Fuel based on waste materials**

No need to pulverize fuel materials, as materials ground down to a particle size of 10 mm or less can be used. Prior separation of wire from waste tires is also unnecessary as the system can smoothly extract it.

- **Lower combustion temperature**

Because combustion efficiency is high, a combustion temperature of 850-900°C will suffice, lower than with other systems. This enables NO_x generation to be curbed.

SHI has a technological alliance with Foster Wheeler Ltd. (of the US), which leads the world in CFB boiler technological capability and market share. Using our independently developed techniques, we have achieved stable particle circulation and ash emission. With our wide-ranging expertise in the configuration and positioning of heat exchangers-superheaters-and our know-how in the selection of raw materials, our system can be used to generate high-temperature, high-pressure steam, over long periods, enabling high-efficiency power generation by steam turbines.



Note 1: Biomass

Biomass refers to organic, non-fossil-based, fuels from biological sources such as woodchips from lumber, forest undergrowth, processed wood products and old construction materials, and sludge. CO₂ generated by the combustion of biomass was originally contained in the atmosphere and absorbed by plants by photosynthesis, and is therefore recyclable and does not raise original CO₂ levels in the atmosphere. This recyclable energy source, which makes it possible to reduce consumption of fossil fuels such as oil, is used as a fuel that does not add to CO₂ levels. Because its CO₂ content does not vary, it is known as carbon-neutral.

Systems delivered

Biomass: (woodchips, sludge) co-combustion CFB boilers



Summit Myojyo Power / Itoigawa plant
Steam-generation capacity: 196t/h



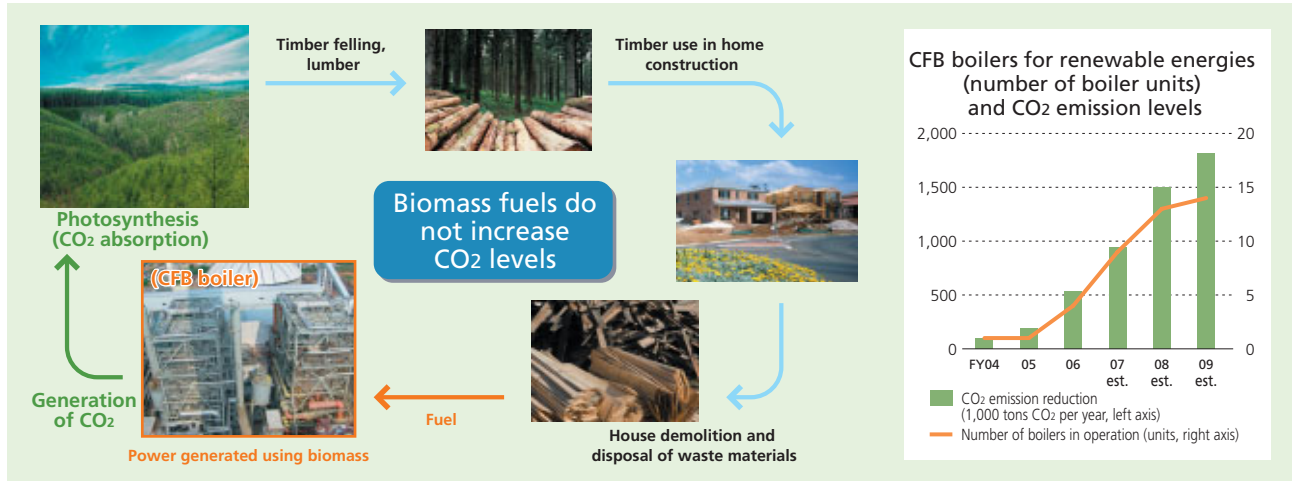
Hokuetsu Paper Mills / Kanto plant (Katsuta)
Steam-generation capacity: 195t/h



Nippon Paper / Fuji plant (under construction)
Steam-generation capacity: 230t/h

Contributing to Reduced CO2 Emissions

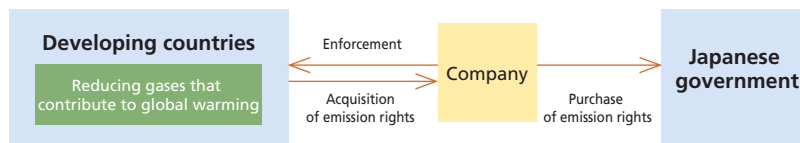
When power is generated efficiently using renewable energy sources such as biomass, CO2 emissions volumes are lower than when fossil fuels are used. This contributes to combating global warming. The figure below shows by how much CO2 emissions can be reduced through introduction of SHI's CFB boilers. In theory, total CO2 volumes in the air do not change as the materials that absorb the gas are used as fuels (carbon neutrality).



Globalizing the Technology

Based on our solid track record in introducing power generation facilities using renewable energy in Japan, we aim to launch this technology in overseas markets. We expect to see steadily growing demand for CFB boilers using renewable energy in the rest of East Asia and in North America, where significant growth is expected in power demand and pressure is also rising for reductions in CO2 emissions. We also expect to be able to develop new businesses using the Clean Development Mechanism* in line with the growth of the emissions trading industry.

Clean Development Mechanism



Note 2: Clean Development Mechanism
A tool for combating global warming (Kyoto mechanism). Advanced countries carry out projects to combat global warming in developing countries, and if CO2 emissions are reduced, the volume is set off against the reduction targets of the advanced country in question.

Waste fuel (waste tires, plastic waste) co-combustion CFB boilers



Oji Paper Co., Ltd. / Nichinan plant
Steam-generation capacity: 130t/h



Chuetsu Pulp & Paper / Futatsuka plant
Steam-generation capacity: 130t/h

Low-grade coal CFB boilers (sold overseas)



Dragon Special Resin Co., Ltd., China
Steam-generation capacity: 3x220 t/h