B&W for Biomass
Proven technologies to utilize biomass as a renewable energy source
Renewable energy is becoming a necessary and beneficial component of a power producer’s overall mix of energy sources.

While various levels of the United States government continue to enact renewable portfolio standards and implement renewable energy certificates, it is advantageous to look at the various options available as renewable energy sources.

One of those sources is biomass. Babcock & Wilcox (B&W) has been a trusted supplier of biomass combustion equipment for many years. Our extensive list of commercially demonstrated and industry-accepted products have stood the test of time in providing reliable steam generation for both process and electric power applications. While offering a highly available and readily dispatchable renewable energy source, the combustion of biomass also provides environmental benefits such as reduced emissions of nitrogen oxides (NOₓ), sulfur oxides (SOₓ), and mercury, when compared with other fossil fuels. Biomass is also a carbon dioxide (CO₂)-neutral renewable energy source.
B&W's BFB technology has been successfully applied to a wide range of biomass fuels. Either our CFB or stoker technology is recommended when wanting to fire coal with a biomass fuel.

New or retrofit

Depending on the application, it may be advantageous to consider installing new steam generating equipment or retrofitting existing equipment with modern combustion technology. B&W combines the engineering know-how and practical experience needed to completely analyze the available options and recommend the most cost-effective course of action.

Emissions control equipment

Today’s environmental regulations mean a supplier should not only have the capability to provide the steam generating equipment, but also the environmental equipment necessary to meet mandated air quality standards.

B&W puts it all together

When you work with B&W, you’ll get the complete package. As a single-source supplier, our capabilities extend well beyond steam generating equipment supply.

B&W’s line of environmental products includes technologies for NOx, SO2 and particulates:

- Selective catalytic reduction (SCR) systems
- Electrostatic precipitators (ESP)
- Fabric filter baghouses
- Flue gas desulfurization (FGD) systems

Core competencies include:

- Engineering
- Project management
- Construction
- Startup and commissioning
- Training programs
- Field engineering services
- Replacement parts
- Condition assessment
- Engineered improvements

From engineering, manufacturing and construction, to startup and field service, B&W knows how to make it all work together for maximum operating efficiency and dependability.
A wide variety of solutions for biomass

B&W has demonstrated experience with a wide range of fuels and technologies for burning biomass to produce steam for both utility and industrial customers. These include:

- Bubbling fluidized-bed (BFB) boilers
- Circulating fluidized-bed (CFB) boilers
- Stoker-fired boilers
- Black liquor recovery boilers (process recovery)

B&W, including its joint ventures and licensees, has installed numerous units using fluidized-bed technology. Additionally, our experience with traditional stoker-fired, pulverized coal-fired and recovery boilers is unmatched in the industry.

Regardless of the combustion technology, or whether steam is needed to produce electricity or for combined heat and power applications, we have the expertise and proven experience to cost-effectively utilize biomass as a renewable energy source.

**Bubbling fluidized bed**

B&W’s BFB technology has been successfully applied to a wide range of wood, wood waste, sludges and residues. Design features include an open bottom design which is particularly well suited for biomass fuel applications that contain non-combustible debris. The boilers can be designed as either bottom or top supported depending on the desired size and capacity. Designed with the capability to tightly control bed temperature, a BFB offers greater combustion efficiency and reduced emissions.

Our ability to successfully retrofit fossil fuel-fired power boilers and convert existing black liquor recovery boilers to fire solid fuel biomass using BFB technology has been repeatedly demonstrated. In short, B&W’s commercial experience with a wide range of unit sizes and fuels makes the BFB boiler a viable option in many situations for efficient and dependable steam generation from biomass.

**Circulating fluidized bed**

B&W’s internal recirculation circulating fluidized-bed (IR-CFB) boiler offers economy, reliability and flexibility. One of the main advantages of our CFB technology is that it provides the owner flexibility in specifying a variety of fuels. It is particularly attractive when wanting to fire coal with a biomass fuel. Its compact arrangement makes it ideal for both repowering and new installations. A unique U-beam particle separator reduces the refractory required and operates at low flue gas velocities which result in significantly lower mainte-

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**BFB features and benefits:**

- fuel flexibility – wood, bark, tires, sludges, residues
- open bottom bed for effective debris removal
- low emissions
- suitable for new or retrofit applications
- low maintenance and high availability
- modular or bottom supported designs reduce cost

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B&W’s commercially demonstrated and industry-accepted biomass-fired boilers have provided reliable steam generation for both process and electric power applications for many years.
nance than competitors’ units. Additional benefits include operating flexibility and low emissions.

**Stokers**
In addition to fluidized beds, water-cooled vibrating grate stoker-fired units may prove to be the technology of choice in certain applications, particularly for wood, agricultural crops and residues. B&W leads the way with proven products such as the Stirling® power boiler and Towerpak® boiler. These units are custom designed to meet specific steam and fuel conditions, but the design is done within a framework of pre-engineered components to minimize engineering costs and delivery time.

### Fuel Technology Matrix

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Boiler</th>
<th>Environmental Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Wood/Wood Waste</td>
<td>BFB</td>
<td>• Selective Non-Catalytic Reduction or Selective Catalytic Reduction</td>
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<tr>
<td>or</td>
<td></td>
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<tr>
<td>• Wood/Wood Waste, Sludge, Tires</td>
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</tr>
<tr>
<td>• Coal</td>
<td>CFB</td>
<td>• Selective Non-Catalytic Reduction</td>
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<tr>
<td>or</td>
<td></td>
<td>• Dry Flue Gas Desulfurization (in certain applications)</td>
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<tr>
<td>• Coal and Wood/Wood Waste,</td>
<td></td>
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<tr>
<td>Petroleum Coke, Tires</td>
<td>Stoker</td>
<td>• Selective Non-Catalytic Reduction</td>
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<tr>
<td>• Wood/Wood Waste</td>
<td></td>
<td>• Selective Catalytic Reduction</td>
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<tr>
<td>• Straw</td>
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<td>• Wet Flue Gas Desulfurization</td>
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<td>• Stover</td>
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<td>• Animal Waste</td>
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<td>• Coal</td>
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<td>Petroleum Coke, Tires</td>
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**CFB features and benefits:**
- ideal for firing with coal, biomass, or a combination of both
- low maintenance
- high availability
- compact size and arrangement is ideal for repowering projects
- low emissions

*Shop modularization of the BFB bottom hoppers and bubble cap air distribution system minimizes on-site construction time and costs.*
As utilities and industrial firms alike consider future strategies to utilize renewable energy, B&W can provide viable options for the combustion of biomass fuels. We have commercially demonstrated technologies and experience with firing a wide variety of biomass fuels. Contact us today to learn how biomass can be a part of your power and steam generation portfolio.

Established in 1867, Babcock & Wilcox is a global leader in advanced energy and environmental technologies and services for the power and industrial markets, with operations, subsidiaries and joint ventures worldwide.

For more information, or a complete listing of our sales and service offices, send an e-mail to info@babcock.com, or access our website at www.babcock.com.

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