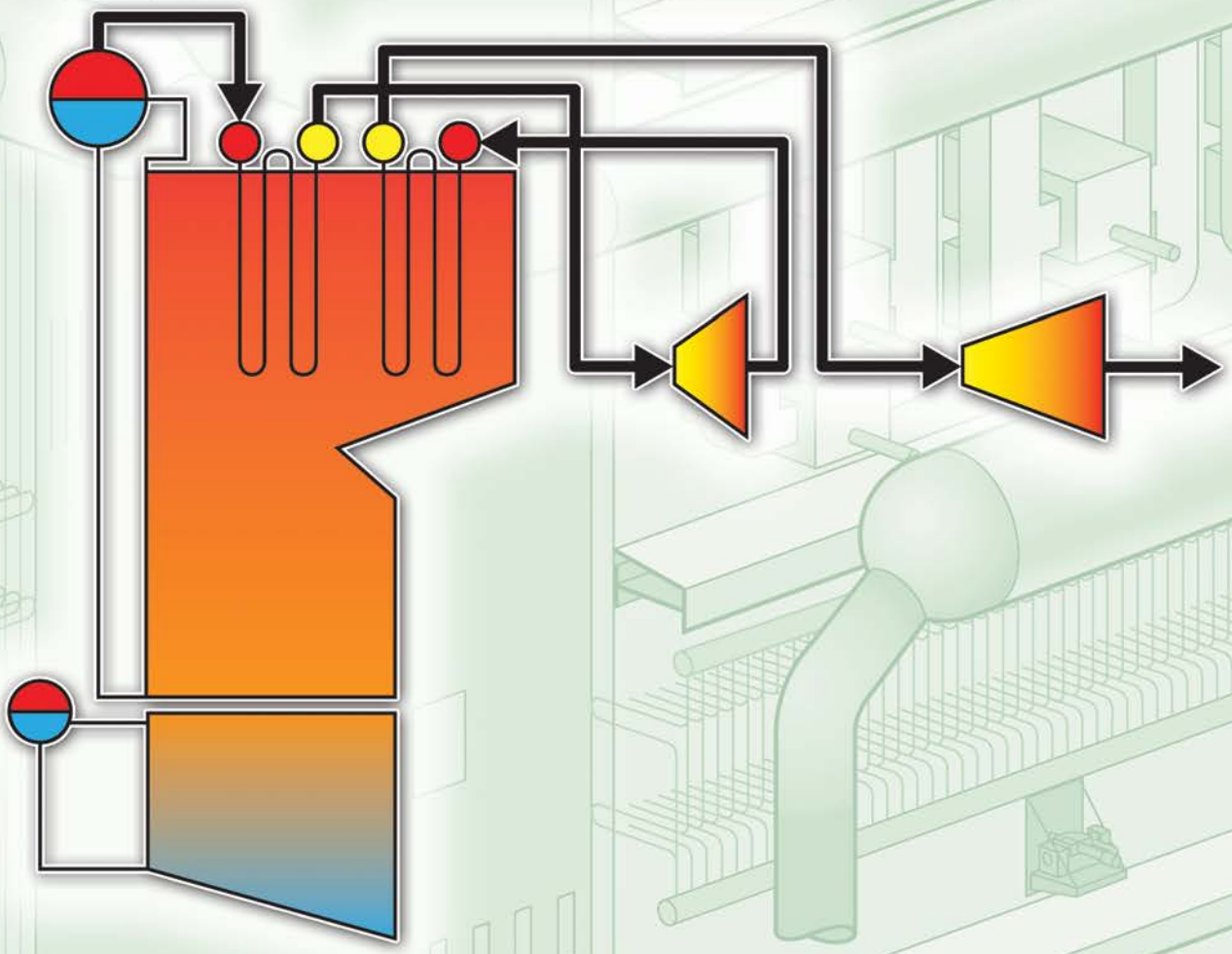
Dual Pressure Reheat Recovery Boiler

Generate green power and reduce energy costs



BABCOCK & WILCOX

RENEWABLE | ENVIRONMENTAL | THERMAL

Electric utility companies achieve high cycle efficiency partly through the use of high pressure reheat boilers. Babcock & Wilcox (B&W) has been a leading supplier of this technology since the 1950s. There is a vast operational experience base on which to draw.

Until now, this technology had not been implemented in pulp and paper mills due to concerns with corrosion in the lower furnace. B&W has patented a dual pressure furnace (along with other patents pending) to allow pulp mills to take advantage of the power generation potential of high pressure reheat on a recovery boiler.

The dual pressure furnace enables the upper furnace to operate at the high pressure and temperature needed for a reheat cycle, while the lower furnace operates at low pressures. This design eliminates the need for the exotic metals that are required to withstand a corrosive operating environment in the lower furnace.

The introduction of reheat to a pulp mill steam cycle can greatly increase the power generation efficiency. Reheat can be applied to both recovery boilers and power boilers.

Features:

- Dual pressure configuration can be part of a greenfield design or the cycle can be incorporated into an existing mill
- Patented design enables lower furnace to operate at low pressure, eliminating the need for the exotic metals and expensive alloy tubing that are required to withstand a corrosive operating environment
- Upper furnace operates at higher temperature and pressure, boosting cycle efficiency and providing optimum conditions for reheat steam production

Benefits:

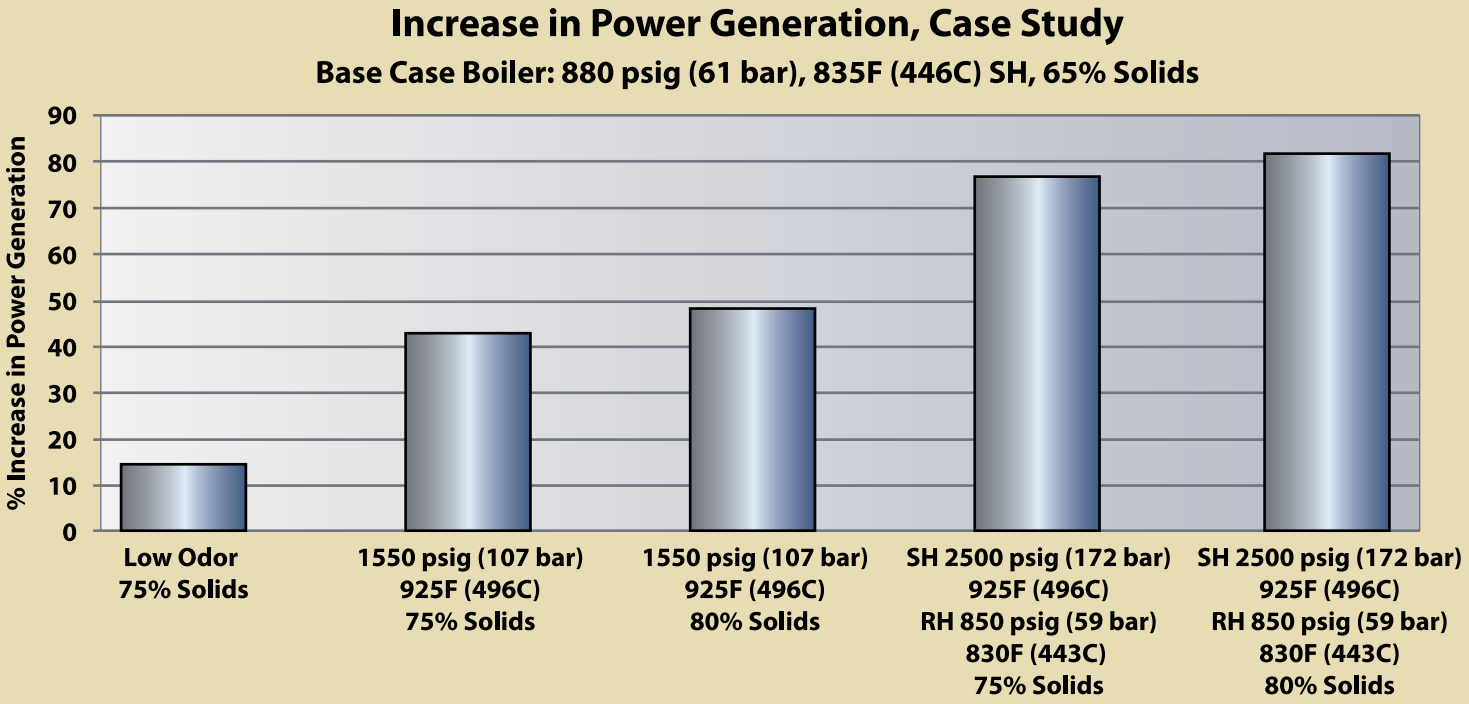
- Generates more power from improved steam cycle efficiency
- Uses existing fuel supply
- Takes advantage of existing plant infrastructure
- Can be operated by existing powerhouse personnel
- Lower emissions due to higher efficiency and reduced fossil fuel consumption
- Reduces carbon footprint of the mill
- Excess power can be sold to the grid as “green power” [possible carbon dioxide (CO_2) Cap-and-Trade credits]
- Fast return on investment

Patented Design Overcomes Obstacles of Corrosive Environment

Pulp mills have used recovery boilers since the 1930s to burn the waste products (black liquor) and reconstitute the chemicals of the pulping process. The energy in the black liquor is a biomass-derived fuel that comes from the lignins that are within the feedstock. The steam generated from the boiler is used primarily to supply the pulping process and to generate electricity. Due to reliability and safety issues, pulp mills have not been able to operate at the high pressures that are common at electrical utility thermal generating stations, which are far more efficient electrical generators.

To reconstitute the chemicals in the boiler, the combustion environment in the lower furnace must be in a reducing (oxygen deficient) state. This creates a very corrosive environment. Boiler tubes operated at higher pressures and temperatures will corrode quickly in this environment unless protected by very exotic metallurgy. There are no known metals capable of surviving in a recovery boiler at the pressures required (2600 psig; 179 bar) to operate a reheat steam cycle.

With more than 350 units, B&W has the largest installed base of recovery boilers in the world.



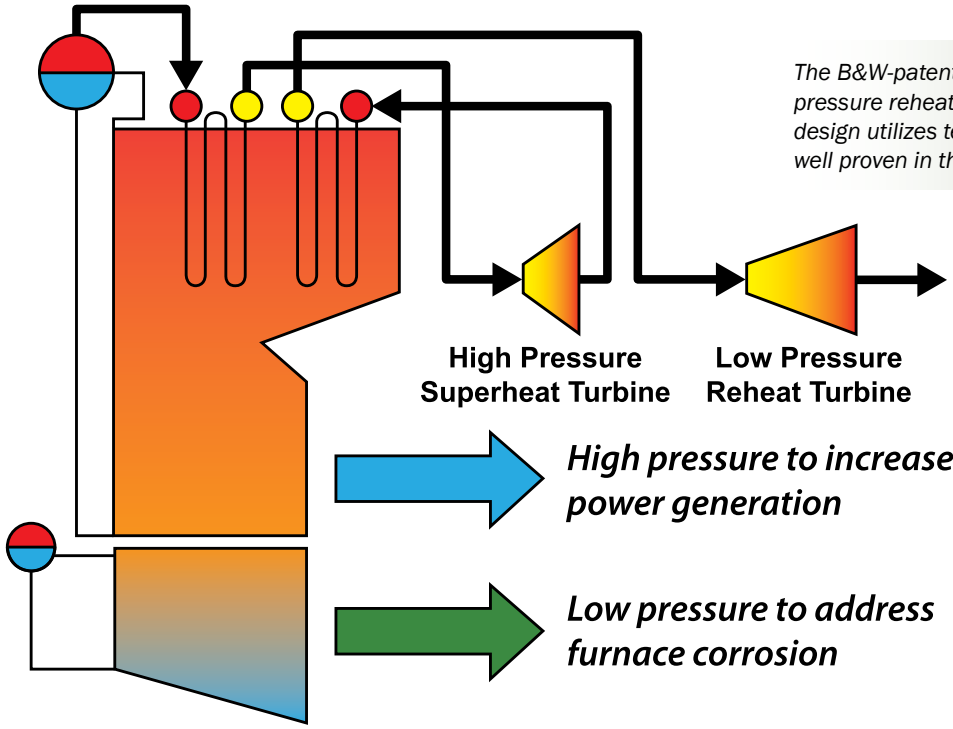
The dual pressure furnace design takes advantage of higher pressures and temperatures for increased steam cycle efficiency.

High Pressure Reheat Solution from B&W

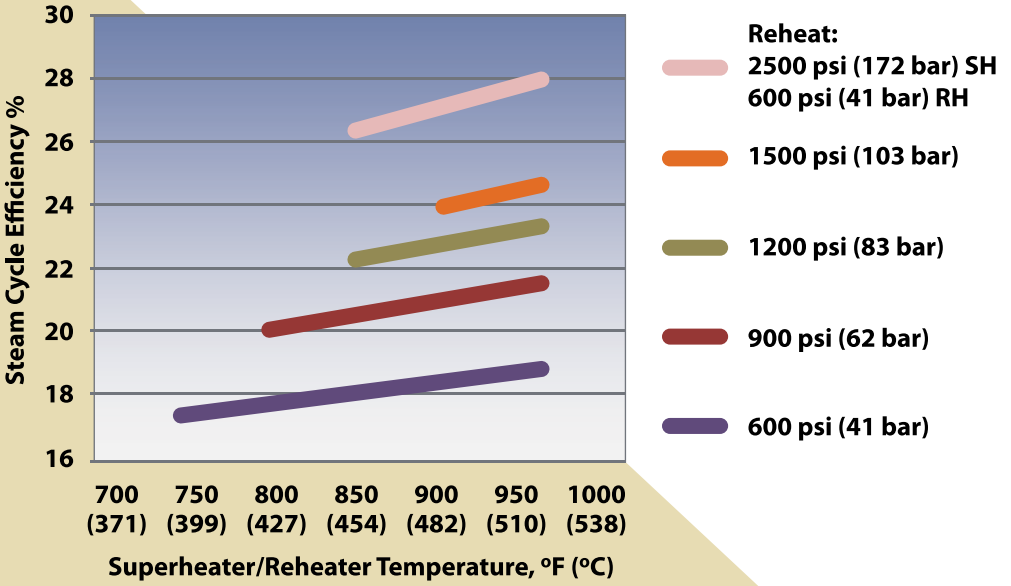
The B&W-patented dual pressure furnace design allows the lower furnace, which is exposed to the corrosive environment, to operate at a low pressure. This prevents high corrosion rates. Meanwhile, the upper furnace operates at high enough pressure to facilitate a reheat steam cycle.

Although this is a new configuration of equipment in a recovery boiler, the technologies used are mature, proven and very familiar to the boiler industry. Improvements in power generated from recovery boilers are in the 70 to 130% range for mills that have low solids and direct contact evaporators.

Implementing reheat on both the recovery boiler and the power boiler can greatly increase the electrical generating capacity of a pulp mill. This additional "green power" can transform some mills into net power generators and reduce the mill's carbon footprint at the same time.



The B&W-patented dual pressure reheat recovery boiler design utilizes technology that is well proven in the utility industry.



Clean Energy at Lower Cost

- 30 to 130% more power for the same fuel input
- Displace purchased fossil fuels
- Generate carbon credits
- Reduce carbon footprint
- Reduce emissions

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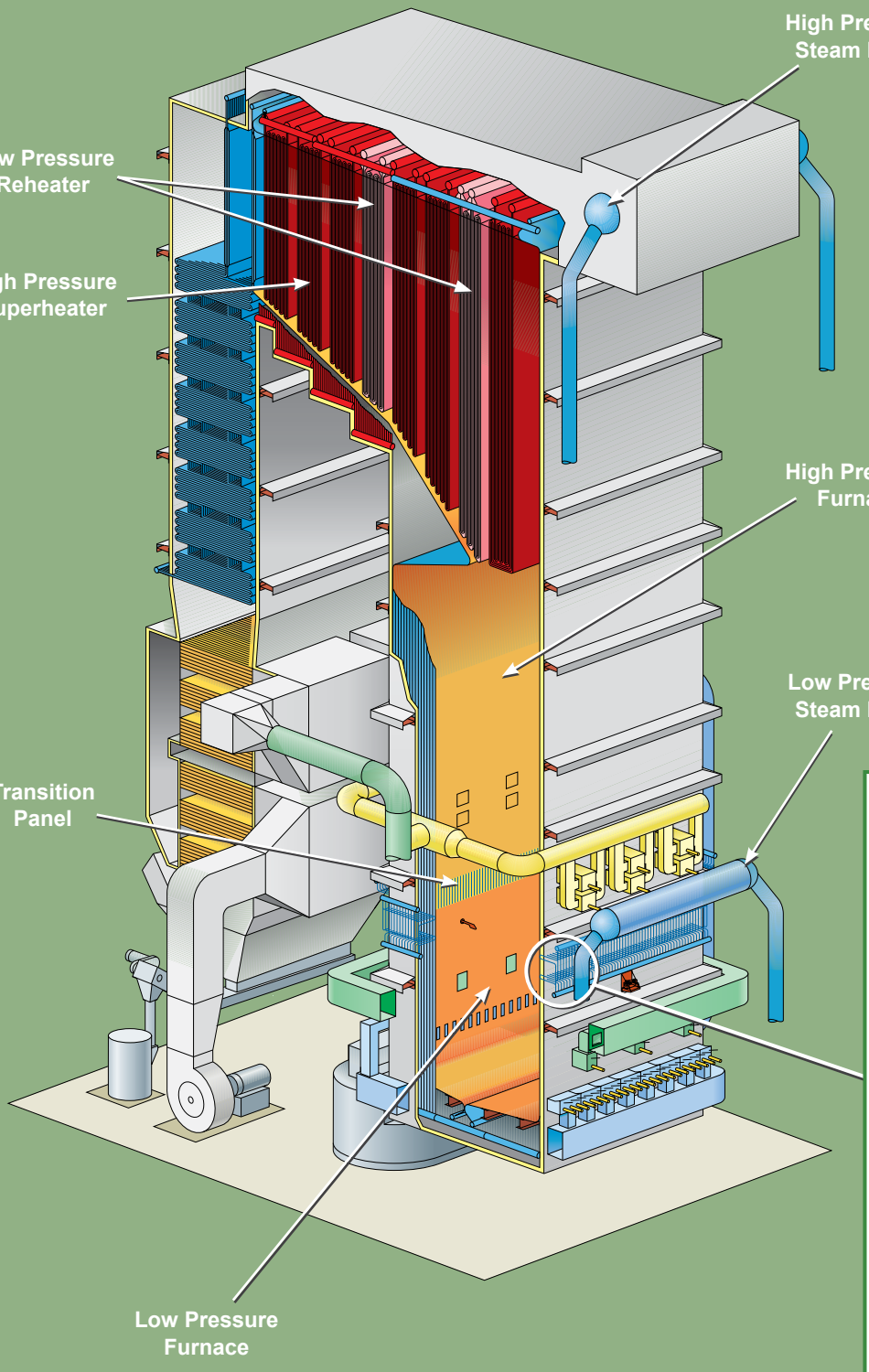

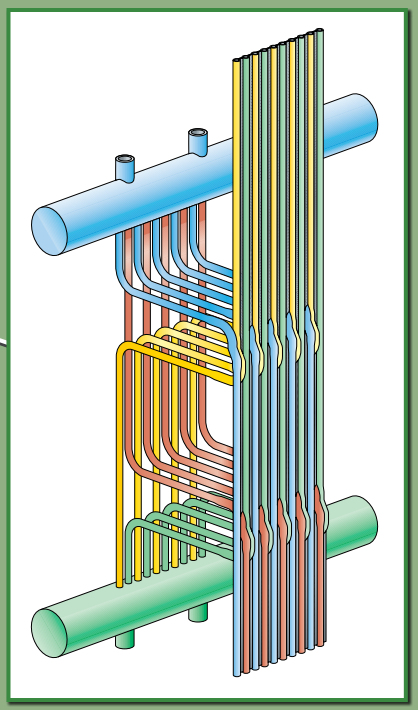

The transition panel between the low pressure furnace and the high pressure furnace has been used in B&W boiler applications for more than 40 years.

Established in 1867, Babcock & Wilcox is a global leader in renewable, environmental and thermal technologies and services for power and industrial applications.

For more information or to contact us, visit our website at www.babcock.com.

Babcock & Wilcox is the only North American-based supplier of recovery boilers.

B&W built the first recovery boiler in 1929, and approximately 50% of the operating recovery boilers in North America are B&W units.

B&W has the technical depth to manage this transformational technology for your mill application.

The Dual Pressure Reheat Recovery Boiler is one of many products from B&W that enables our customers to supply clean energy as part of our continuing commitment to develop products and services that are both environmentally responsible and economically feasible.

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