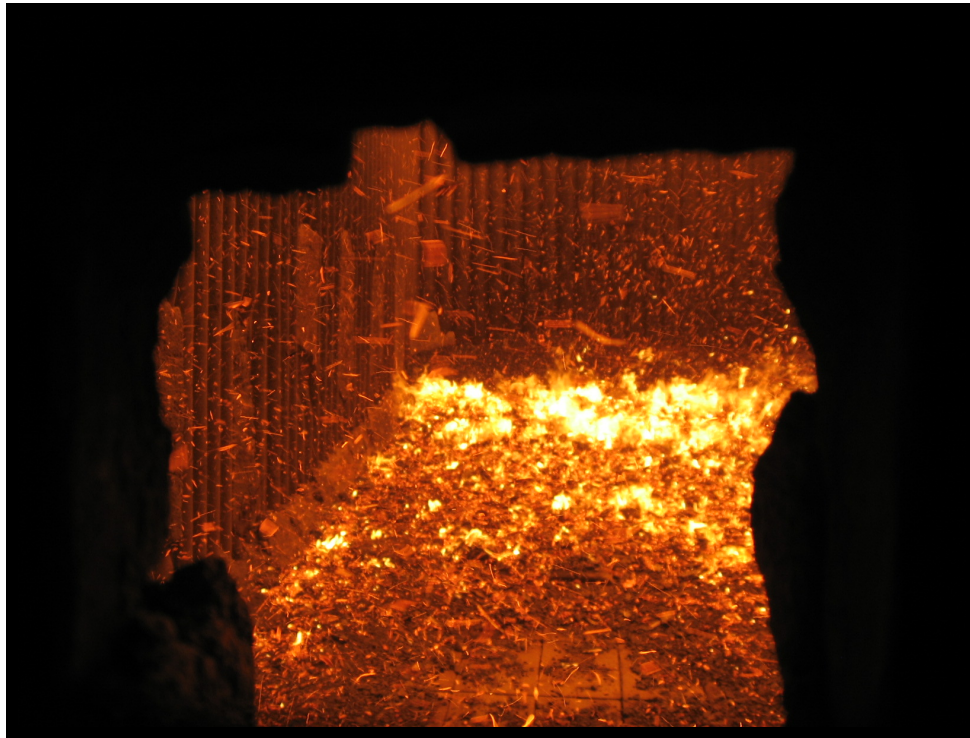


## PROJECT CAPABILITIES



## BIOMASS BOILER EVALUATIONS



### Capacity, Operational Performance, Fuel Economy, and Emissions

Fuel economy, maximum availability, steam generating capacity, optimized emissions performance, and operating flexibility at the lowest cost are the key goals of biomass-fueled power boiler operation. JANSEN has conducted engineering evaluations for more than 250 biomass-fired boilers. We have assisted numerous mills with implementing operational and hardware changes to improve the performance and thermal efficiency, minimize fossil fuel co-firing, reduce landfill costs, and reduce air pollution emissions from their biomass boiler operations.

### Scope of Services

- Waste fuels combustion problem solving (waste wood, bagasse, agro-waste, TDF, NCG, sludge, etc.).
- Improved performance and steam generating capacity from biomass.
- Application of advanced combustion technology.
- Reduced CO, VOC, NO<sub>x</sub>, SO<sub>2</sub>, and particulate emissions.
- Computational Fluid Dynamics (CFD) modeling and analysis (in-house).
- Measurement and analysis of boiler circulation.
- Incineration of concentrated and dilute non-condensable gases (CNCG & DNCG), and sludges.
- Boiler MACT Compliance Review and Implementation.

### Selected References (see next page)

## Selected References Biomass Boiler Evaluations

Alabama River Pulp Company - Perdue Hill, AL  
 Alliance Forest Products - Coosa Pines, AL  
 Appleton Papers, Inc. - Roaring Spring, PA  
 Atlantic Power Corporation - Williams Lake, BC  
 Avista Corporation - Kettle Falls, WA  
 Boise Cascade Corporation - DeRidder, LA (2 units)  
 Boise Cascade Corporation - Steilacoom, WA  
 Boise Cascade Corporation - Rumford, ME  
 Boise Cascade Corporation - Int'l Falls, MN (2 units)  
 Boise Cascade Corporation - Wallula, WA  
 Burney Forest Products - Burney, CA  
 CAIG, SA, Ing. Madre Tierra - Santa Lucia, COTZ, Guatemala  
 Canfor Intercon - Prince George, BC  
 Canfor Northwood - Prince George, BC  
 Canfor PGP&P - Prince George, BC (2 units)  
 Capital Power - Southport, VA  
 Cariboo Pulp & Paper - Quesnel, BC  
 Caracol Knits - San Pedro Sula, Honduras  
 Cargill - Minga Guazú, Paraguay  
 Cargill - Primavera do Leste, Brazil  
 Cargill - Três Lagoas, Brazil  
 Cargill - Uberlândia, Brazil  
 Carter Holt Harvey - Kawerau, New Zealand  
 Carvajal - Cali, Colombia  
 Catalyst-Hudson - Anderson, CA  
 Catalyst Paper - Crofton, BC  
 Catalyst Paper - Port Alberni, BC  
 Catalyst Paper - Powell River, BC  
 Clearwater Paper - Lewiston, ID  
 Consolidated Papers, Inc. - Wisconsin Rapids, WI  
 Corn Products International - Winston-Salem, NC (2 units)  
 Corner Brook Pulp & Paper - Corner Brook, NF  
 Daishowa America - Port Angeles, WA  
 Daishowa Marubeni - Peace River, AB  
 Delta Natural Kraft - Pine Bluff, AR  
 Dominion Virginia Power - Altavista, VA (2 units)  
 Dominion Virginia Power - Hopewell, VA (2 units)  
 Dominion Virginia Power - Hurt, VA (3 units)  
 Dominion Virginia Power - Southampton, VA  
 Domtar Inc. - Ashdown, AR (3 units)  
 Domtar Inc. - Espanola, ON  
 Domtar Inc. - Kingsport, TN  
 Domtar Inc. - Nekoosa, WI  
 DTE Energy - Cassville, WI  
 DTE Energy - Stockton, CA  
 Eurocan Pulp & Paper Company - Kitimat, BC  
 Evergreen Packaging - Canton, NC  
 FibroMinn - Benson, MN  
 Finch Paper LLC - Glens Falls, NY  
 Flambeau Paper - Park Falls, WI  
 Fletcher Challenge - Crofton, BC  
 FMC Corporation - Green River, WY  
 Fortistar Biomass - Hillman, MI  
 Fraser Papers, Inc. - Park Falls, WI  
 Fraser Papers, Inc. - Plaster Rock, NB  
 Georgia-Pacific Corporation - Cedar Springs, GA  
 Georgia-Pacific Corporation - Crossett, AR  
 Georgia-Pacific Corporation - Palatka, FL  
 Georgia-Pacific Corporation - Perry, FL  
 Georgia-Pacific Wood Products - Corrigan, TX  
 Georgia-Pacific Wood Products - Diboll, TX  
 Georgia-Pacific Wood Products - Gurdon, AR  
 Georgia-Pacific Wood Products - Pineland, TX  
 Georgia-Pacific Wood Products - Prosperity, SC  
 Grupo Cassa - Izalco, El Salvador  
 Hercules Pinova - Brunswick, GA  
 Idaho Forest Group - Moyie Springs, ID  
 Incauca S.A.S. - Cali, Colombia (2 units)  
 Inland Paperboard and Packaging - Rome, GA  
 International Paper Company - Augusta, GA (2 units)  
 International Paper Company - Bastrop, LA  
 International Paper Company - Bogalusa, LA (2 units)  
 International Paper Company - Corrigan, TX  
 International Paper Company - Courtland, AL  
 International Paper Company - Eastover, SC  
 International Paper Company - Franklin, VA  
 International Paper Company - Georgetown, GA (2 units)  
 International Paper Company - Luíz Antônio, SP, Brazil (2 units)  
 International Paper Company - Mansfield, LA (2 units)  
 International Paper Company - Mogi Guaçu, SP, Brazil  
 International Paper Company - Orange, TX  
 International Paper Company - Pensacola, FL  
 International Paper Company - Pine Bluff, AR  
 International Paper Company - Pine Hill, AL  
 International Paper Company - Pineville, LA  
 International Paper Company - Prattville, AL  
 International Paper Company - Riegelwood, NC  
 International Paper Company - Saillat, France  
 International Paper Company - Selma, AL  
 International Paper Company - Terre Haute, IN  
 International Paper Company - Ticonderoga, NY  
 International Paper Company - Vicksburg, MS  
 KapStone Papers - Charleston, SC  
 KapStone Papers - Roanoke Rapids, NC  
 Ketchikan Pulp Company - Ketchikan, AK  
 Kimberly-Clark Corporation - Everett, WA  
 Kimberly-Clark Corporation - Loudon, TN  
 Koch Cellulose - Brunswick, GA  
 L'Anse Warden Electric - L'Anse, MI  
 Longview Fibre - Longview, WA  
 Louisiana-Pacific - Chetwynd, BC  
 Louisiana-Pacific - Roaring River, NC (2 units)  
 MacMillan Bloedel Ltd. - Port Alberni, BC  
 Mead Paper - Chillicothe, OH  
 Mead Paper - Escanaba, MI  
 Mead Paper - Stevenson, AL  
 MeadWestvaco Corporation - Covington, VA  
 MeadWestvaco Corporation - Luke, MD  
 MeadWestvaco Corporation - Phenix City, AL (2 units)  
 Minnesota Power - Duluth, MN (2 units)  
 Minnesota Power - Grand Rapids, MN (2 units)  
 Mondi SCP - Ružomberok, Slovakia  
 Neucel Specialty Cellulose - Port Alice, BC  
 NewPage Corporation - Escanaba, MI (2 units)  
 NewPage Corporation - Wickliffe, KY  
 NewPage Corporation - Wisconsin Rapids, WI  
 NewPage Corporation-Biron - Wisconsin Rapids, WI  
 Orange County Container Group - Forney, TX  
 Ohio Edison Company - Akron, OH  
 Packaging Corporation of America - Counce, TN  
 Packaging Corporation of America - Valdosta, GA (2 units)  
 Packaging Corporation of America - Tomahawk, WI  
 Plum Creek - Columbia Falls, MT (2 units)  
 Port Townsend Paper - Port Townsend, WA  
 Portucel - Cacia, Portugal  
 Primary Power - Flint, MI  
 PurEnergy - Rabun Gap, GA  
 ReEnergy Holdings - Kenansville, NC  
 ReEnergy Holdings - Lyonsdale, NY  
 Riverwood International - Macon, GA  
 Riverwood International - West Monroe, LA  
 RockTenn Company - Demopolis, AL (2 units)  
 RockTenn Company - Panama City, FL (2 units)  
 RockTenn Company - Stevenson, AL  
 Roseburg Forest Products - Dillard, OR  
 Roseburg Forest Products - Weed, CA  
 SAPPi North America - Cloquet, MN  
 SAPPi North America - Skowhegan, ME (2 units)  
 SAPPi North America - Muskegon, MI  
 Simpson Paper Company - Gilman, VT  
 Simpson Tacoma Kraft - Tacoma, WA  
 Smurfit-Stone Container Corporation - Fernandina Beach, FL  
 Smurfit-Stone Container Corporation - Florence, SC  
 Smurfit-Stone Container Corporation - Hodge, LA  
 Smurfit-Stone Container Corporation - Missoula, MT  
 Smurfit-Stone Container Corporation - Stevenson, AL  
 Smurfit-Stone Container Corporation - West Point, VA  
 SP Newsprint - Newberg, OR  
 Spruce Falls, Inc. - Kapuskasing, ON  
 Stone Container (Canada) Inc. - Portage du Fort, PQ  
 Stora Enso North America - Biron, WI  
 Suzano Papel e Celulose - Suzano, Brazil  
 Tembec Inc. - Chetwynd, BC  
 Temple-Inland - Bogalusa, LA (2 units)  
 Thilmany Papers - Kaukauna, WI  
 Tolko Manitoba - The Pas, MB  
 Twin Rivers Paper - Edmundston, NB  
 Verso Paper - Sartell, MN  
 West Fraser / Weldwood - Hinton, AB  
 Westvaco - Evadale, TX  
 Weyerhaeuser Company - Columbus, MS  
 Weyerhaeuser Company - Cosmopolis, WA  
 Weyerhaeuser Company - Emerson, AR  
 Weyerhaeuser Company - Everett, WA  
 Weyerhaeuser Company - Kamloops, BC  
 Weyerhaeuser Company - Longview, WA  
 Weyerhaeuser Company - New Bern, NC  
 Weyerhaeuser Company - Oglethorpe, GA  
 Weyerhaeuser Company - Plymouth, NC  
 Weyerhaeuser Company - Port Wentworth, GA  
 Weyerhaeuser Company - Rothschild, WI  
 Weyerhaeuser Company - Springfield, OR  
 Weyerhaeuser Company - Valliant, OK  
 Wheelabrator - Auburndale, FL  
 Wheelabrator-Spokane - Spokane, WA  
 Willamette Industries - Bennettsville, SC  
 Willamette Industries - Campti, LA  
 Willamette Industries - Hawesville, KY  
 Xcel Energy - Ashland, WI