REINHOLD ENVIRONMENTAL Ltd.

2011 NOx-Combustion Round Table & Expo Presentation

February 7-8, 2011, in Birmingham, AL / Hosted by Southern Company

Update on EPA Rules Impacting the Biomass Power Industry

US Tailoring Rule
- The Bumpy Road to US CO2 Regulation Continues

- **In May 2010, EPA issued its tailoring rule setting thresholds for when PSD (Prevention of Significant Deterioration) and Title V operating permits will require GHG BACT standard**
  - 1st Phase (Jan-Jun 2011), no new permits are required solely based on GHG emissions. Only for sources emitting over 75 ktpy CO2e (11 MWe) and require permits for other pollutants
  - 2nd Phase (July 2011-July 2013), all new sources with GHG emissions over 100 ktpy CO2e (15 MWe) or modified sources with over 75 ktpy CO2e will be required to get a permit, reducing to 50 ktpy beginning July 1, 2013
- **Since Jan 1, 2011, States are required to follow GHG rules when issuing permits**
  - EPA threw BACT determination “hot potato” to states, providing only loose guidance for efficiency improvements and biomass as possible BACT measures
- **Expect continued bumpy road for US GHG regulation**
  - The EPA has taken away Texas’s authority to grant PSD and Title V permits involving GHG emissions. Texas temporarily blocked EPA’s permitting “coup” but ultimately failed
  - To settle lawsuits from states and environmental groups, in Dec 2010, EPA agreed to propose GHG BACT standards for power plants by July 26, 2011 and to issue final standards by May 26, 2012
  - States now have GHG BACT “hot potato” and don’t know how to line-up with EPA’s 2012 standards
  - After receiving 7000 comments on the greenness of biomass CO2 emissions, EPA announced a 3 year delay (2014) of its GHG permitting requirements for biomass fueled sources

SOx and NOx Regulation
- In the middle of a transition

- **The Death of the Clean Air Interstate Rule (CAIR)**
  - In place since 2005 allowing 31 eastern states to freely trade SOx and NOx allowance credits
  - Two step 2009/2010 and 2015 cap reduction with overall 60-70% NOx and SOx reduction from 2005 base year
  - Invalidated by DC district court in 2008 due to disconnect with state national ambient air quality standards (NAAQS)
  - Resulted in complete loss of SOx and NOx allowance value needed as payback to AQCS investments
  - To stabilize the market, the EPA temporarily reinstated CAIR until a new program was in place
- **The Birth of the Transport Rule (TR)**
  - In August 2010, EPA releases the draft of TR for public comment
  - Expected to be finalized after the comment period in Spring 2011 and be up and running by end of 2011, but rule could get tied up in litigation causing substantial delay
  - Very similar to CAIR SOx, NOx cap and trade program with about same overall 60-70% reductions
  - Key difference: TR will limit trading among states which contribute to downwind state NAAQS non-compliance.
  - Upwind states like Ohio, Pennsylvania, Michigan, Kentucky could see much tighter SOx, NOx budgets
  - Also has additional 2012 compliance point that we don't believe can be achieved due to poor timing

The Industrial Boiler MACT Rule
- Outlook and Impact

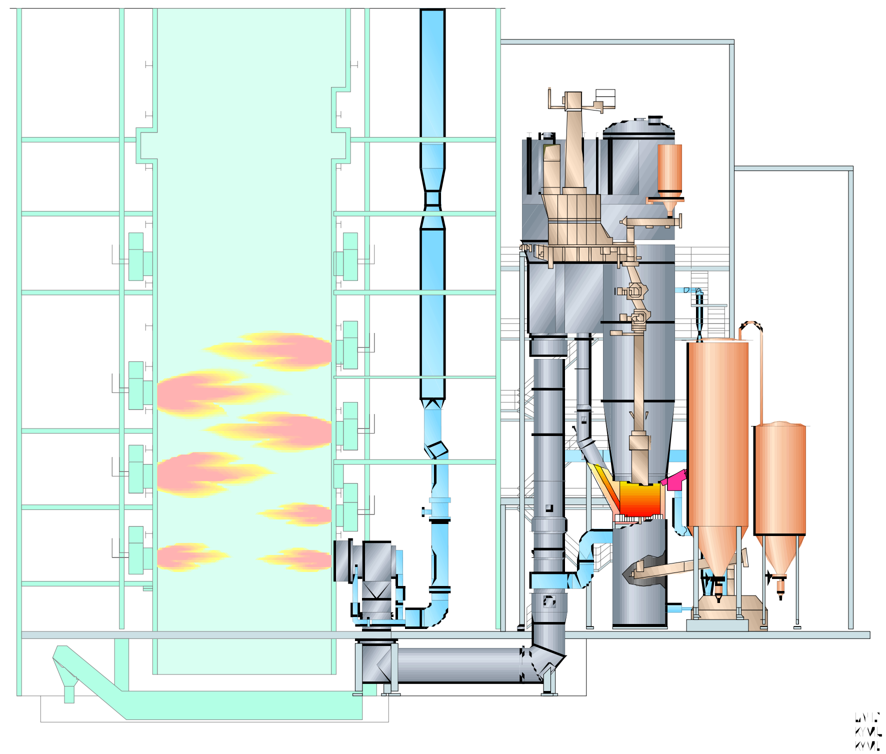
- **Targets major sources facilities and will Impact:**
  - 13.5K boilers and process heaters at 1600 industrial facilities
  - Some universities, municipalities, and military installations
  - All types of boilers and heaters: coal, biomass, gas and liquid fueled
  - Major sources defined as producing over 10 tpy of any single HAP or 25 tpy for all HAPs
  - Up to 25 MWe in size at which point the Utility MACT rule applies
- **Set emissions limits and MACT standard for boilers over 10 Mbtu/hr (1 MWe) heat input**
  - Sets emission limit and MACT standard for 5 HAPs: Hg, CO, HCl, PM, dioxin/furan
  - Annual compliance testing for all pollutants with annual unit tune-ups
  - CEMs for CO, PM (units over 250 Mbtu/hr heat input) with 30 day rolling average compliance
  - Establishes MACT standards: ACI+Baghouse for Hg, PM, FGD for HCl, Combustion for CO, dioxin
  - Natural gas and units under 10 Mbtu/hr heat input require only work practice standard and annual tune-ups
  - **Biomass, agricultural and industrial group opposing rule due to its high cost burden**
  - 106 members of Congress sent a bi-partisan (45 Democrats) letter to EPA
  - 41 Senators sent letter to EPA
  - **EPA requested 15 month delay (Apr 2012) to issue rule due to strong pushback but request denied by DC District court and must issue by Feb 21, 2010**
  - **EPA saying final rule will be "significantly" different from proposed rule**

Utility Clean Air Mercury Rule (CAMR) - Regulation Outlook

- **In 2005, EPA proposed a mercury cap-and-trade regulation (under section 110 of the Clean Air Act) which was struck down in its entirety by the DC Circuit Court of Appeals in March, 2008**
- **The court instructed EPA to develop a new rule under section 112 of the CAA requiring a maximum achievable control technology (MACT) standard for hazardous air pollutants (HAPs)**
  - including mercury and other yet-to-be defined metallic HAPs, acid gases, dioxin/furan organic HAPs; and other organic HAPs. Expect definition in mid March 2011
- **The MACT standard requires unit-level performance commensurate with the average emission rate of the best 12% of the fleet and applies to all coal utility boilers**
- **Currently the draft rule requires all units to be in be in compliance by 2015**
- **To settle lawsuits from environments groups, the EPA agreed to release a draft of its Utility MACT Rule by March 16, 2011 and a final version of the rule by November 16, 2011**

Biomass Solutions for Existing Steam Generators

- **Co-firing – Direct Combustion**
  - Blend biomass with coal or separate injection with or without burner modification
  - Up to 5+% by heat input for PC
  - Up to 100% for CFB
- **Co-Firing – Gasification**
  - Substitute fuel for coal, oil/gas boilers
  - Substitute fuel for HRSG firing duct burner
  - Over 50% by heat input
  - FW has supplied 8 gasifiers commercially
- **100% Biomass Conversions**
  - Converting PC firing system to fire 100% pulverized biomass in suspension mode
  - Convert existing oil, gas, or PC units into bubbling bed units
  - FW has performed over 25 BFB conversions



FW Biomass Gasifier in PC Co-fire Application

Biomass Steam Generators

Module 50 Biomass Boilers 011111

We have been very active in Biomass Technology

- **We have Supplied a Wide Range of Technologies**
  - 66 CFB Boilers
  - 94 Bubbling Boilers
  - 204 Grate Boilers
  - 11 Biomass Gasifier
  - 25 Biomass Boiler Conversions
- **We Have Delivered Some of the Largest 100% Biomass Units in the World**
  - 125 MWe Kaukas Biomass Unit in Finland
  - 56 MWe Fibrominn Turkey Liter Unit in the US
  - 50 MWth Biomass Gasifiers in Europe
- **We Are Advancing Biomass Technology**
  - Building World's Largest Biomass unit in Poland
    - 190 MWe Polaniec unit can burn up to 20% Agro
  - Increasing Agro Fuel Range and Steam Conditions
  - Developing Biomass Gasification Technology for Renewable Diesel Production.

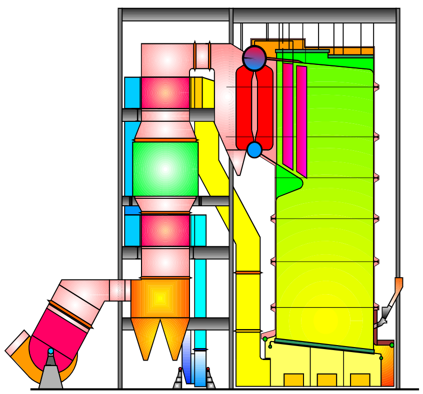
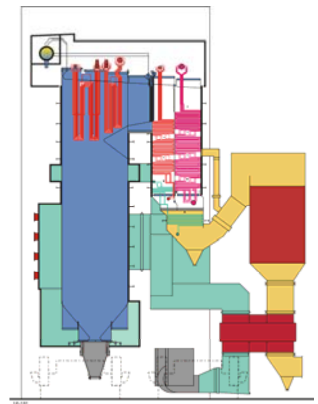
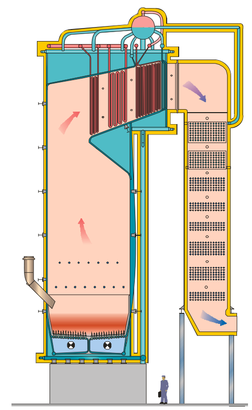
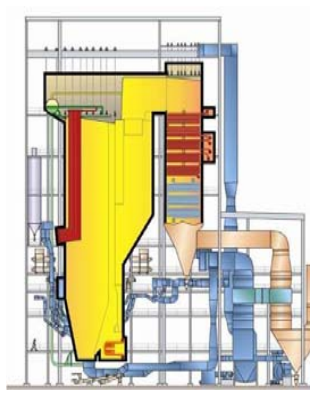
FW Biomass Fuel Experience

- **Demolition Wood**
- **Recycled Wood**
- **Saw Dust**
- **Forest Residue**
- **Bark**
- **Sludges**
- **Peat**
- **Paper Waste**
- **Plastic**
- **Bagasse**
- **Rice Husk**
- **Straw**
- **Wood Residue**

- **Wood Chips**
- **Hog Fuel**
- **Olive Pits**
- **Coffee Grounds**
- **Waste Fiber**
- **Chicken & Turkey Litter**
- **Agricultural Waste**
- **Sun Flower Seed Hulls**
- **MSW & RDF**
- **Broom Corn Refuse**
- **Hogged Plywood**

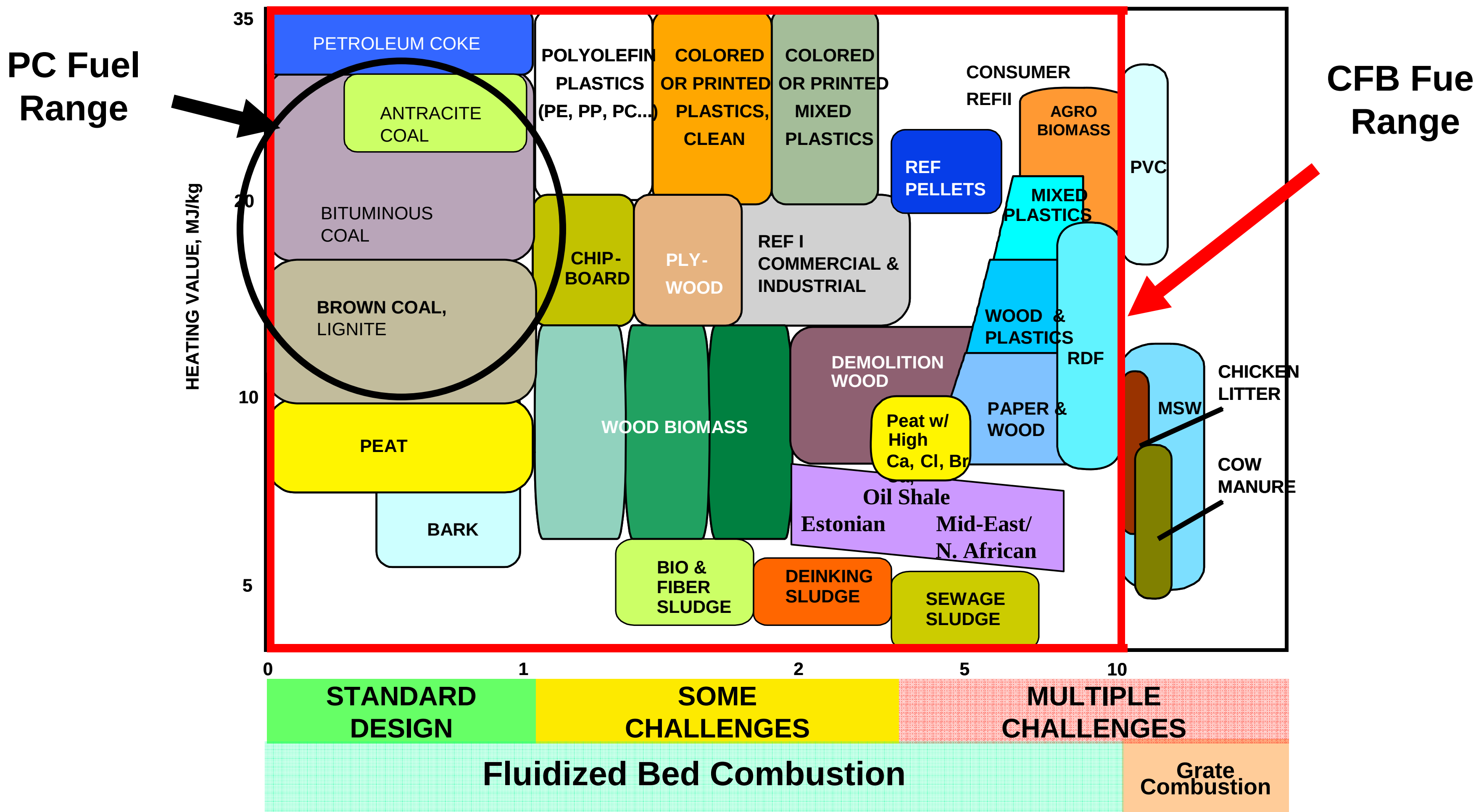
A Comparison Of Biomass Steam Generator Technologies

GRATE FIRING	PULVERIZED FIRING	FLUIDIZED-BED FIRING	
(FIXED BED)	(ENTRAINED BED)	BFB	CFB

Furnace Gas Velocity	**8-10 ft/sec**	**15-30 ft/sec**	**4-10 ft/sec**	**15-22 ft/sec**
Fuel Feed Size	**1-1/2”x 0**	**1/100”x 0**	**1/2”x 0**	**1/2”x 0**
Furnace Temp.	**2000-2500°F**	**2200-2800°F**	**1500-1700°F**	**1500-1700°F**
	1093-1371ºC	**1204-1538ºC**	**816-927ºC**	**816-927ºC**

FW has a Wide Solid Fuel Experience



Biomass Properties

	Peat	Saw Dust	Recycled Wood	Timber Pellets	Timber Chips	Grass	RDF	Bagasse	Straw
Moisture %	50	45-60	25	5-10	20-50	13	25	8	12
MJ/kg	9.3	6-10	14	17	7.5-13.9	17	13	16	14.7
Btu/lbm	4000	2580-4300	6020	7310	3225-5975	7310	5590	6875	6320
Bulk Density kg/m^3	340	300-350	300-400	650	130-280	650	650	650	650
Bulk Density lb/ft^3	21	19-22	19-25	41	8-17	40	40	40	40
MWh/m^3	0.9	0.45-0.7	1.3	3	0.55	3	2.3	2.9	2.7
Ash % ka	5.1	0.4-0.5	5	0.9	0.4-5.3	3	12	6	7
S % ka	0.22	<0.05	0.1	<0.1	<0.1	0.1	0.1-0.5	<0.05	0.01-0.03
Cl % ka	0.02-0.06	<0.03	0.1	<0.03	<0.05	0.3	0.3-1.2	<0.03	0.1-0.8
Alkalis mol/MWh	1.0	3.2	6.1	7.8	7.8	11	24	29	60
S/Cl	6	0.7	2.2	1.9	1.9	1.2	0.7	0.5	0.4

We have Classified Biomass Fuels for their "Burn-ability"

BIO-1
"Clean BIO"

- no contaminated
- no agro
- no fast growing
- K+Na <…; Cl<…
- Ca,K> Si,
- physical properties

BIO-2
"Challenging BIO"

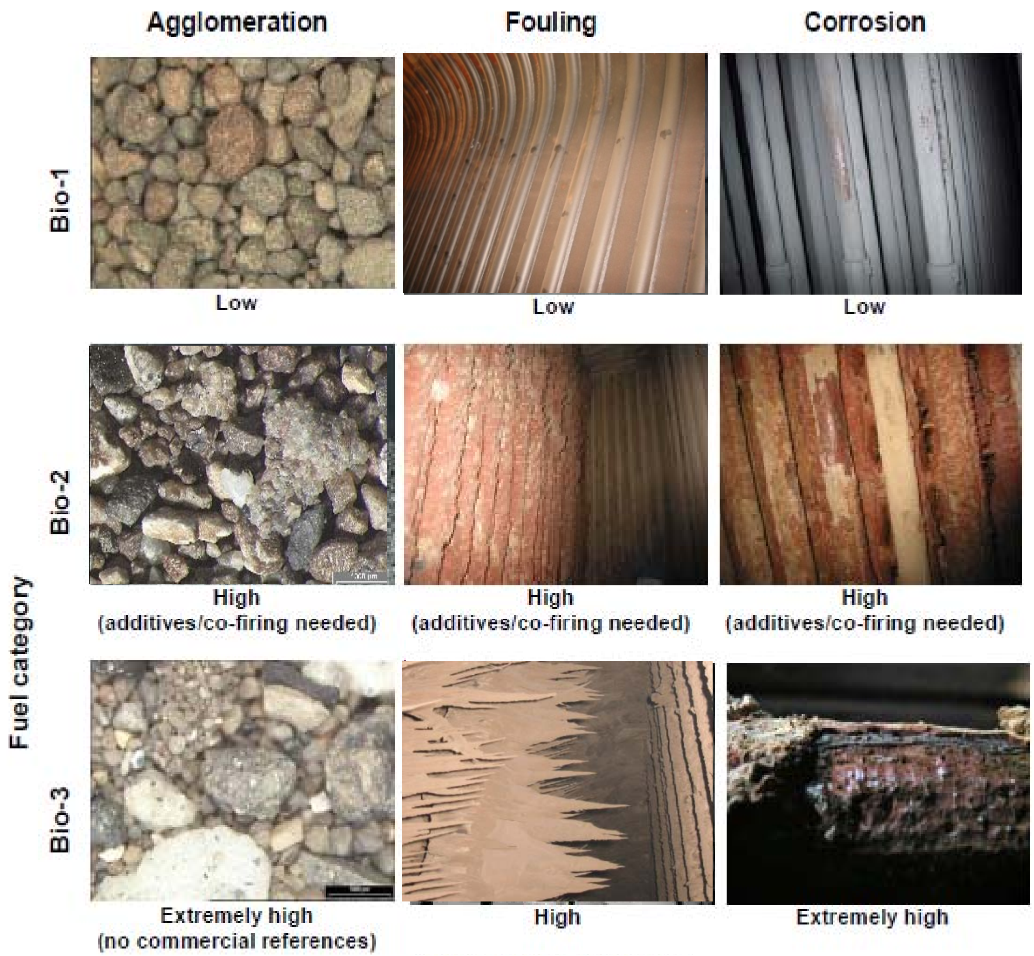
- some agricultural residues, straw, contaminated, fast growing
- FW has experience, know the limits,,,
- K+Na <…; Cl<… (eng.)
- Ca,K< Si
- S, P low; Cl high

BIO-3
"Hard to burn BIO"

- grain residues (corn, oat, barley, wheat, …)
- FW has no reference info.
- K+Na <…; Cl<… (eng.)
- Ca,K> Si
- S, P high; Cl low/high

Chemical and physical properties of biomass determine technology fit and design for 0-100% biomass firing

Impacts to Steam Generators by “Bio” Type



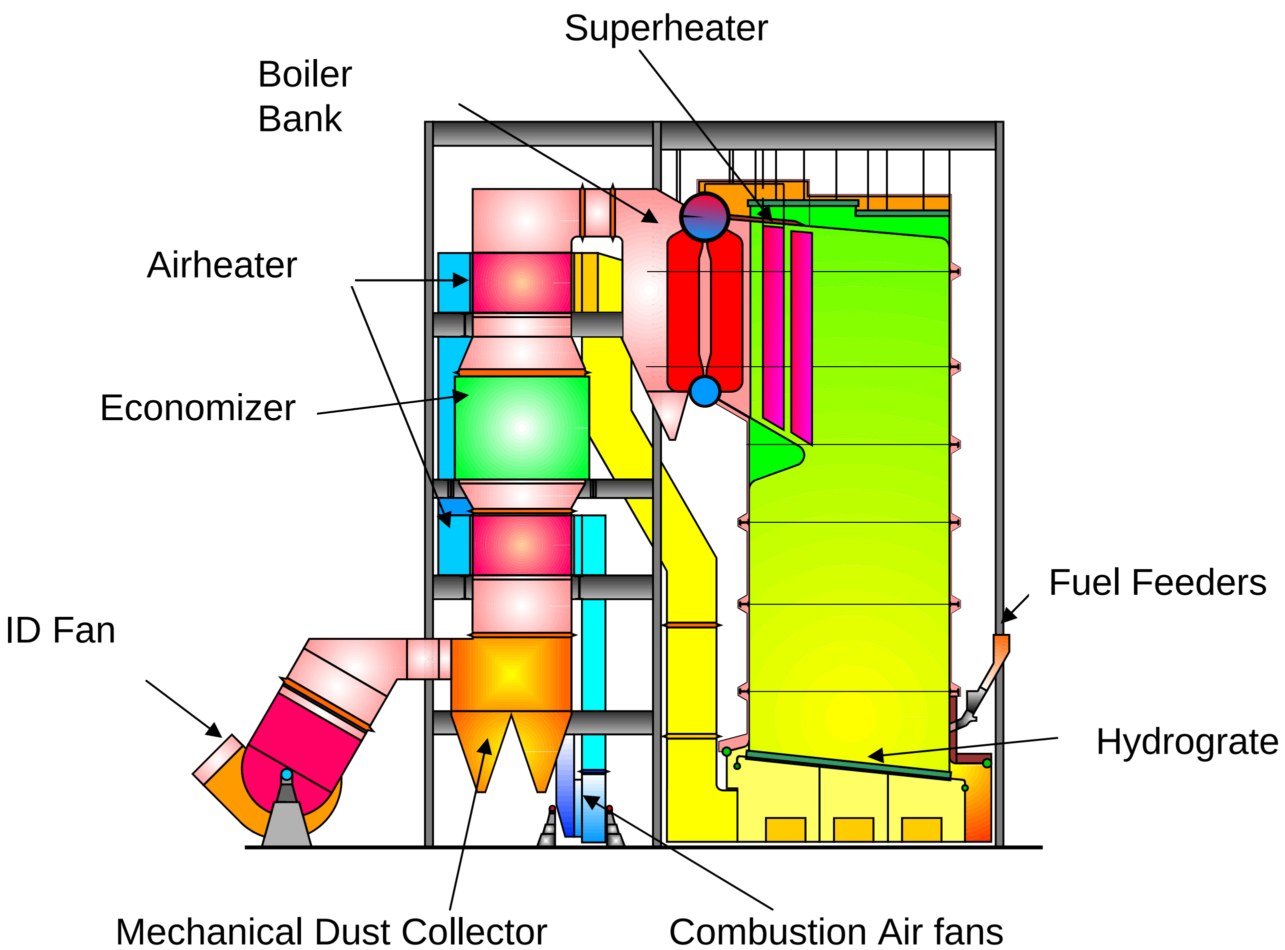
Which Technology is Right for Your Application?

Unit Reference Basis: 500 kpph Steam Flow (50 MWe), 950ºF, 1500psig Steam, Bio-1 Fuel

Emissions		Grate	BFB	CFB
Max SO_2, SO_3, Reduction[1]	% Reduction	0	20-30	70-90
Max HCl, HF Reduction[1]	% Reduction	0	30-50	80-100
NOx				
Combustion NOx	lb/mbtu	0.20-0.30	0.15-0.25	0.10 - 0.15
Boiler Exit NOx w/SNCR (assumes 30% reduction)	lb/mbtu	0.14-0.21	0.10-0.18	0.07-0.10
Boiler Exit NOx w/SNCR+SCR (assumes 60% reduction)	lb/mbtu			0.03-0.06
Max Stack Ammonia Slip w/SNCR only	ppm	20-30	10-20	5-10
Max Stack Ammonia Slip w/SNCR+SCR	ppm			0-3
CO	lb/mbtu	0.20-0.30	0.07-0.15	0.05-0.12
Schedule				
Project NTP to CO	months	22-24	32-39	32-39
Equipment Delivery	strt-fin mnth	15-18	12-24	12-24
Budgetary Steam Generator Capital Cost Range				
Design and Supply of Boiler Island Equipment[2]	M$	28-32	36-40	38-42
Boiler Island Erection[3]	M$	22-26	29-32	31-34
Installed Boiler Island	M$	50-58	65-72	69-76
% Difference Installed Boiler Island		-23%-10%	Base	0%-+5%
% Difference on Overall Plant Cost[4]		-7%-3%	Base	0%-2%
Power Consumption[5] (% of Grss Plt Power)		3	5	5
Combustion Efficiency				
Fuel Carbon Loss in Ash	%	2.0-2.5	0.5	0.3
Boiler Efficiency	%	70-75	72-77	73-78
Fuel Flexibility				
Max. Fuel Chlorine Content[6]	% in Dry Fuel	0.20%	0.20%	0.20%
Max. Fuel Alkali[6] (Total Acid Soluble Sodium Eq in Ash)		20%	5%	8%
Max % firing of fuels containing sulfur w/o FGD		0%	up to 30%	100%
Max % firing of high carbon fuels (Tires, Coal, Pet Coke)		0%	up to 30%	100%

Grate Steam Generators

Anatomy of FW's Grate Fired Boiler System

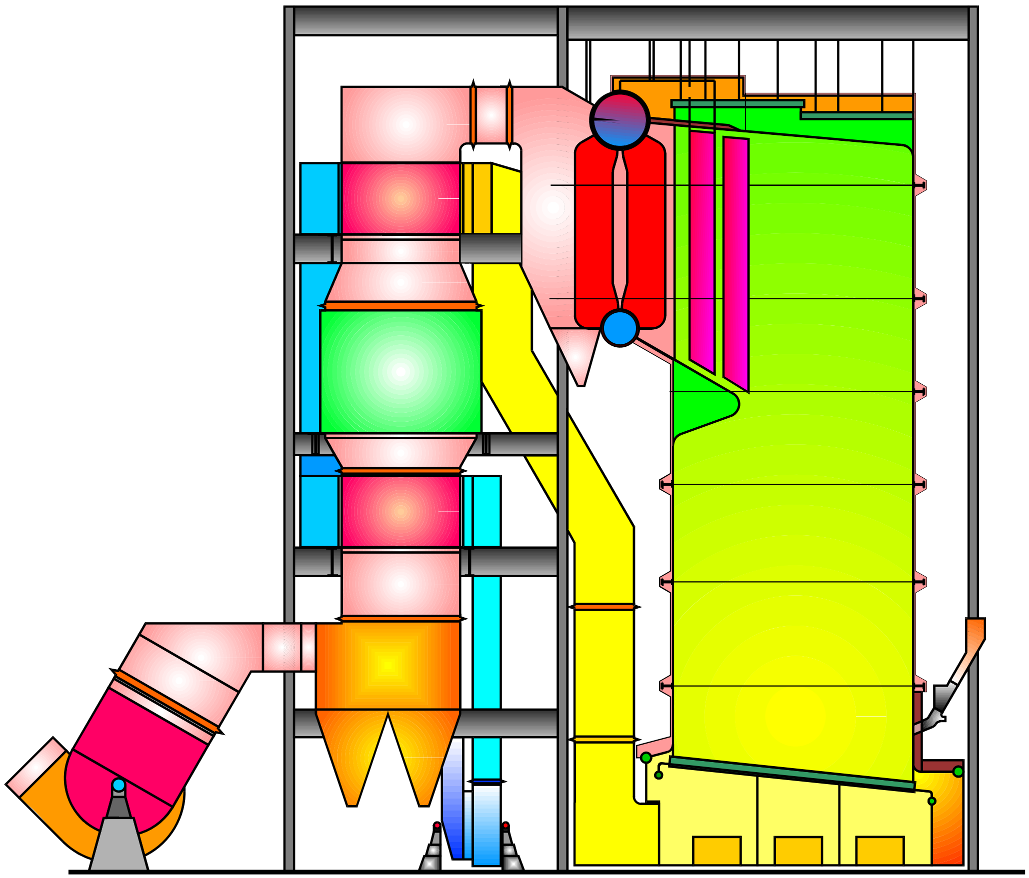


FW Grate Boiler Design Features

- **Conservative Furnace Design**
  - Volumetric Liberation Rates
  - Cross-sectional Heat Flow Rate less than 2.5 mbtu/ft^2/hr
- **Conservative Superheater Design**
  - Convective and Drainable
  - Conservative Metallurgical Design over Operating Range
  - Advanced Anti-vibration Design
- **Drums And Drum Internals**
  - Two Steam Drum Options for each Model to Minimize Cost and Optimize Performance Flexibility
  - Utility Quality Drum Internals
- **Convective Bank**
  - Three Convective Banks for each Model to Minimize Horsepower and Maximize Performance

FW's Grate Boiler Technology Experience

- **Extensive Experience with Grate Technology**
  - 210 Units Sold
  - 2,889 MWe
  - Units Sold Since 1930
- **Fuel Experience**
  - Up to 57% Moisture Fuel
  - Up to 20% Tires
  - Up to 20% Sludge
  - Up to 30% Hulls
  - Up to 40% Coal
- **Steam Capacity Range**
  - 20-650 kpph
  - 2-56 MWe



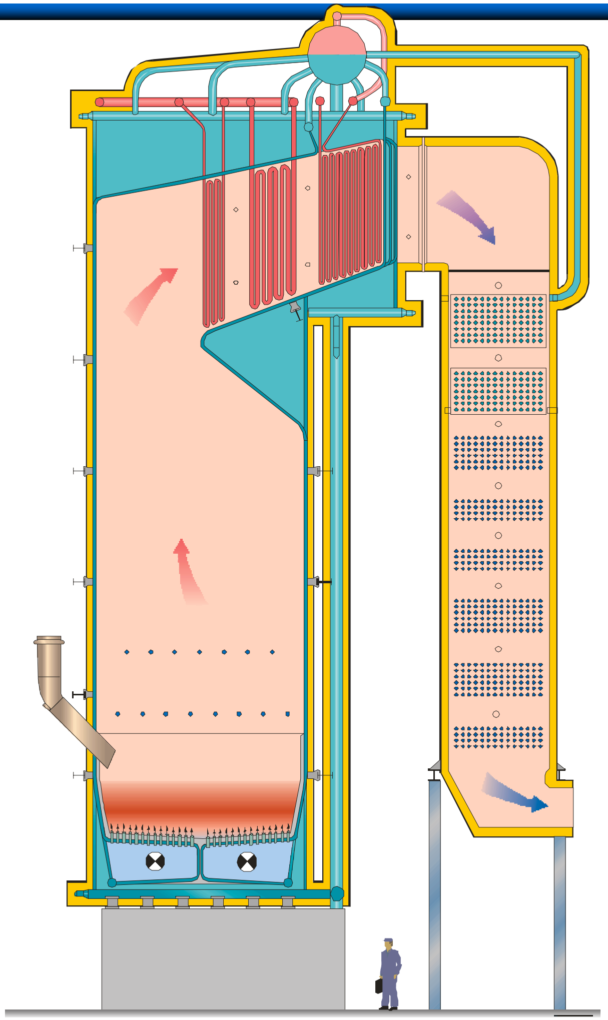
Recent FW Grate Fired Installations

Order Date	Start-Up Date	Client	Plant	Plant Country	Steam Capacity		Main Steam Flow		Main Steam Pressure		Main Steam Temp		Primary Fuel
					MWe	MWth	kpph	kg/s	psi(g)	bar(g)	ºF	ºC	
2005	2006	Laurentian Energy Authority	Virginia Pub. Utility	USA	15	37	135	17	614	42	830	443	Biomass- Energy Crop Biomass- Wood Residual
2005	2006	Laurentian Energy Authority	Virginia Pub. Utility	USA	15	37	135	17	614	42	830	443	Biomass- Energy Crop Biomass- Wood Residual
2004	2007	Fibrominn LLC	Fibrominn	USA	56	165	489	62	1,552	107	981	527	Biomass- Turkey Litter
2003	2007	Sumitomo Heavy Industries	Miyazaki Plant	Japan	14	41	120	15	909	63	847	453	Biomass- Chicken Litter
2001	2005	Trigen-Cinergy Solutions	St. Paul Cogen	USA	35	105	309	39	1,249	86	950	510	Biomass- Wood Residual
1999	2003	Greif Bros. Corporation	Riverville Mill	USA	17	45	150	19	624	43	716	380	Biomass- Wood Residual
1998	2002	Potter Station Power Company	Potter Station	Canada	28	85	249	32	909	63	855	457	Biomass- Wood
1996	2000	Taylor Woodrow	Taylor	United Kingdom	45	135	396	50	950	66	842	450	Biomass- Chicken Litter
1996	2000	The Mead Corporation		USA	34	102	299	38	1,300	90	905	485	Biomass- Wood Residual

Bubbling Fluid Bed Steam Generators

FW's BFB Technology Experience

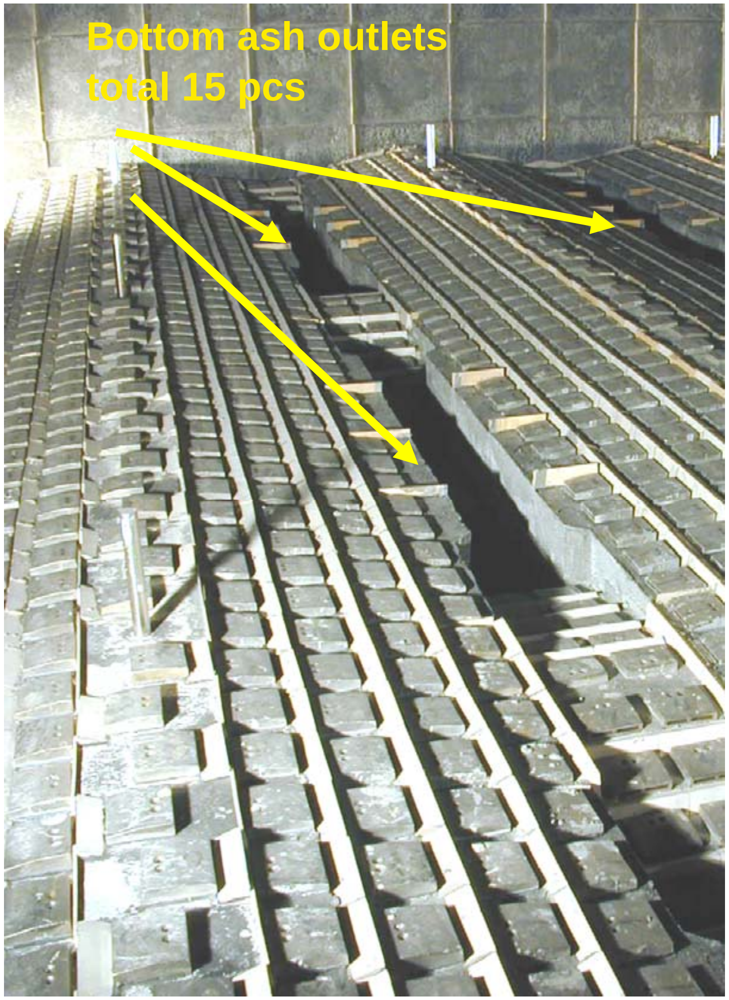
- **Extensive Experience with Bubbling Bed Technology**
  - 91 Units Sold Firing or Co-Firing Biomass Fuels
  - 2,347 MWe
  - Units in Operation Since 1970
- **Fuel Experience**
  - 100% Biomass and Waste Fuels
  - Up to 25% Demo Wood
  - Up to 30% Coal
- **Steam Capacity Range**
  - 20-600 kpph
  - 2-65 MWe



BFB Boiler Design Features

- Stepped Grid for Most Difficult Fuels, Conventional Grid for Cleaner Fuels
- Bed Temperature Selection and Continuous Bed Flushing Minimizes Bed Agglomeration with the Most Difficult Fuels
- Fuel Gas Recirculation for Bed Temperature Control Avoids In-Bed Tubes
- High Gas Residence Time to Ensure Dioxin, CO, and Fly Ash Carbon Decomposition
- Multiple Levels of Secondary Air to Minimize NO_x Formation
- Wide Superheater, Evaporator and Economizer Tube Banks Spacing and Retractable Soot Blowing to Maintain High Boiler Efficiency and Long Tube Life
- Low Gas Velocity for Minimum Heat Transfer Surface Erosion

Two Grid Options - Step Grid vs. Arrow Head



Step Grids Can Effectively Remove Bed Contaminants

Recent BFB Projects

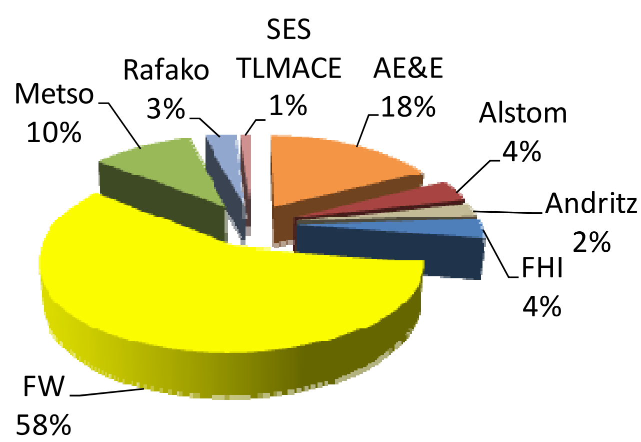
Order Date	Start-Up Date	Client	Plant	Plant Country	Steam Capacity		Main Steam Flow		Main Steam Pressure		Main Steam Temp		Primary Fuel	Secondary Fuel
					MWe	MWth	kpph	kg/s	psi(g)	bar(g)	°F	°C		
2005	2007	SembCorp Utilities Ltd.	Wilton 10	United Kingdom	31	92	293	37	1,334	92	900	482	Biomass - Wood	Biomass - Demo Wood Biomass - Crop Waste
2002	2006	Portucel Viana	Portucel Viana 1	Portugal	11	35	93	12	914	63	806	430	Biomass - Bark	Waste - Paper Sludge
2002	2006	Stora Enso Hylte AB	Hylte Bruk	Sweden	23	69	198	25	914	63	842	450	Waste- Deinking Sludge	Waste - Paper Sludge Biomass - Demo Wood Biomass - Bark
1999	2003	Celulosa Arauco y Constitcion	Valdivia	Chile	17	51	156	20	899	62	842	450	Biomass - Bark	Biomass - Wood Residual Waste - Sludge, Oil
1998	2002	Aanevoima Oy	Aanevoima Mill	Finland	38	157	477	60	1,523	105	995	535	Biomass - Bark	Biomass - Wood Residual Waste - Sludge, Peat, Oil
1998	2002	Jamsankosken Voima Oy	Jamsankosken Mill	Finland	62	185	554	70	1,552	107	995	535	Peat	Biomass - Bark, Biomass, Forest Residual, Crop Waste, Oil
1998	2002	Katrinefors Kraftvarme AB	Katrinefors Bruk	Sweden	12	36	103	13	1,160	80	896	480	Waste- Deinking Sludge	Biomass - Wood Residual

Circulating Fluid Bed Biomass Boilers

FW is the Leading Global Supplier of CFBs

- **Sold 370 Units Firing All Fuels***
  - 48 Units Firing 100% Biomass
  - 7 Units Firing 100% Refuse Derived Fuel (RDF)
  - 46 Units Co-firing Biomass
  - Units in Operation Since 1979
- **Fuel Experience**
  - 100% Biomass
  - 100% Coal
  - 100% MSW
  - 100% Pet Coke
  - Up to 70% Demo Wood
- **Steam Capacity Range**
  - 20-5,000 kpph
  - 2-800 MWe

Historic World CFB Biomass Boiler Market
GPG Served Market Over 2001-2010 Period



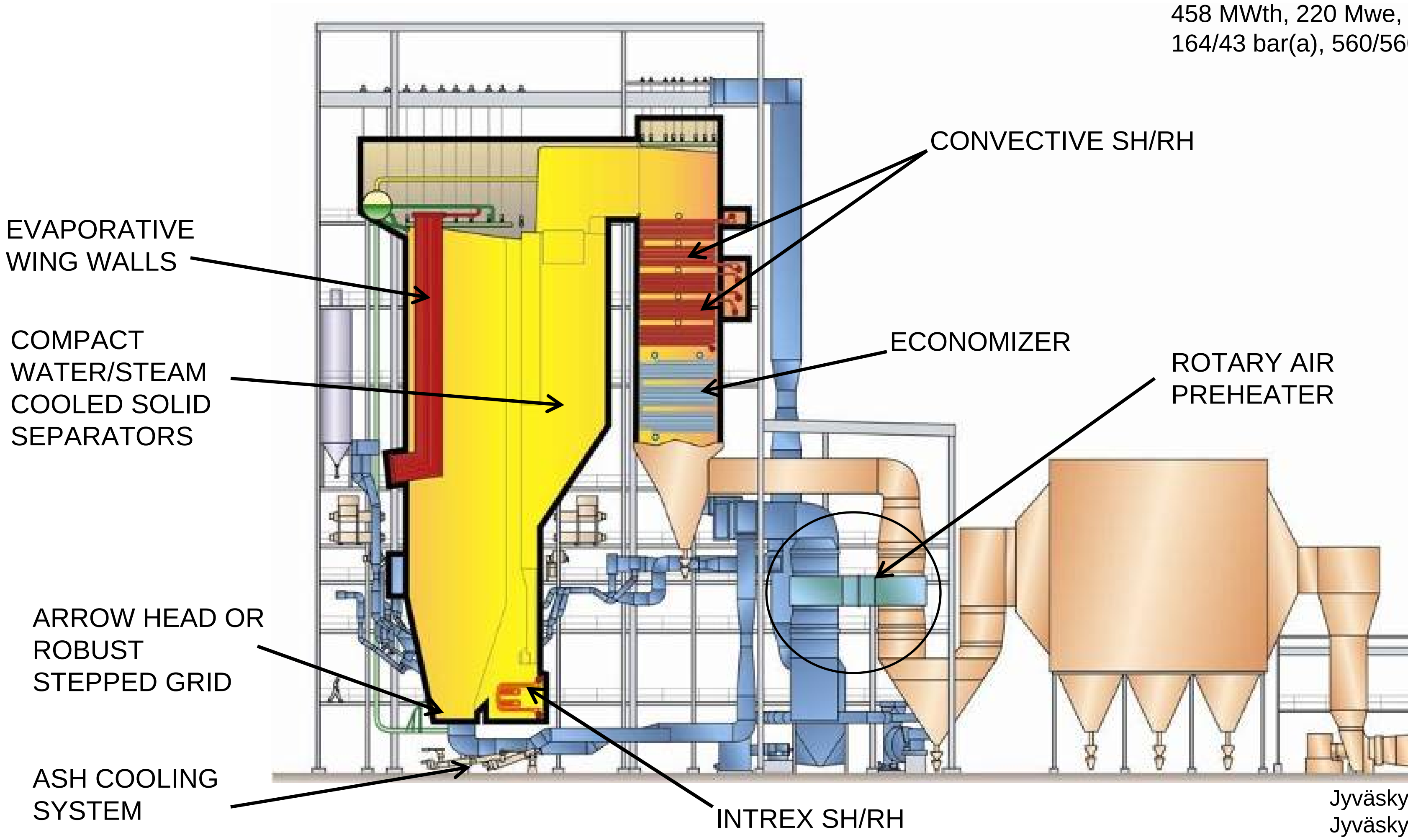
Total 1.3 GWe, 29 Units

Units Firing 100% Biomass include all Biomass and all Waste Fuels as Primary Fuels. Units Co-firing Biomass include all Biomass & all Waste Fuels as Secondary Fuels

FW Order database. All Biomass CFB Fuel types excluding refused derived fuels. Served market excludes domestic orders provided by domestic suppliers in China, India, Japan, and S. Korea. Other includes suppliers with less than 2% of the market share. Market share based on GWe.

Typical CFB Plant Configuration

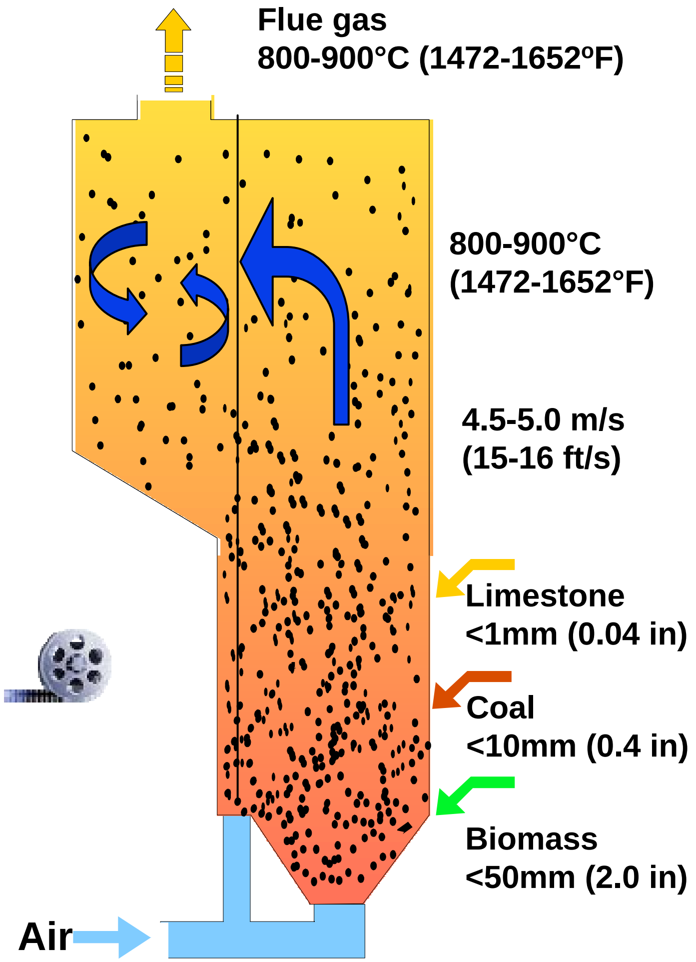
458 MWth, 220 Mwe, 160/142 kg/s, 164/43 bar(a), 560/560^{o}C



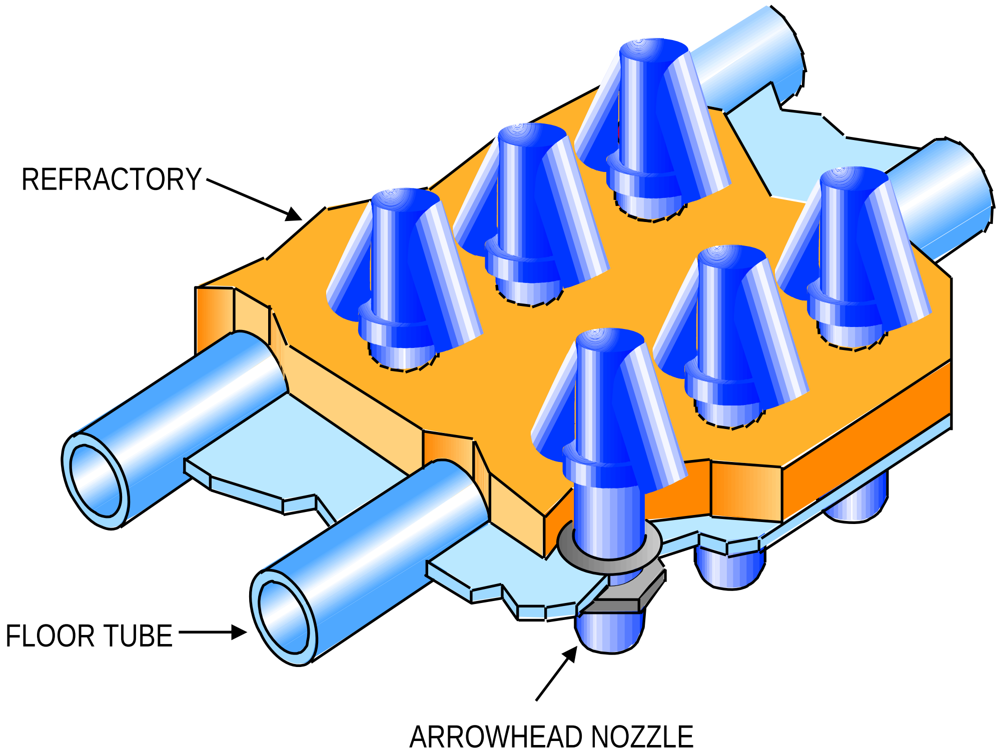
Jyväskylän Energia Oy
Jyväskylä, Finland

CFB Process Advantages

Feature	Benefit
Low Furnace Temps	Low NO_x In-Bed SO_2 Capture Fuel Flexibility
Hot Circulating Solids	Tolerant to Fuel Variations Simple Feed Systems Uniform Heat Flux Ideal for SNCR
Long Solid Residence Time	Good Fuel Burnout Good Sorbent Utilization



Arrowhead Grid Nozzles Reduce Pluggage and Pressure Drop



- Over 82 Units in Operations
- Operating Units since 1996
- Experience in Unit Sizes Ranging from 12 MWe to 460 MWe
- Over 12 Retro-fitted Units

Step Grids Can Handle the Most Difficult Fuels

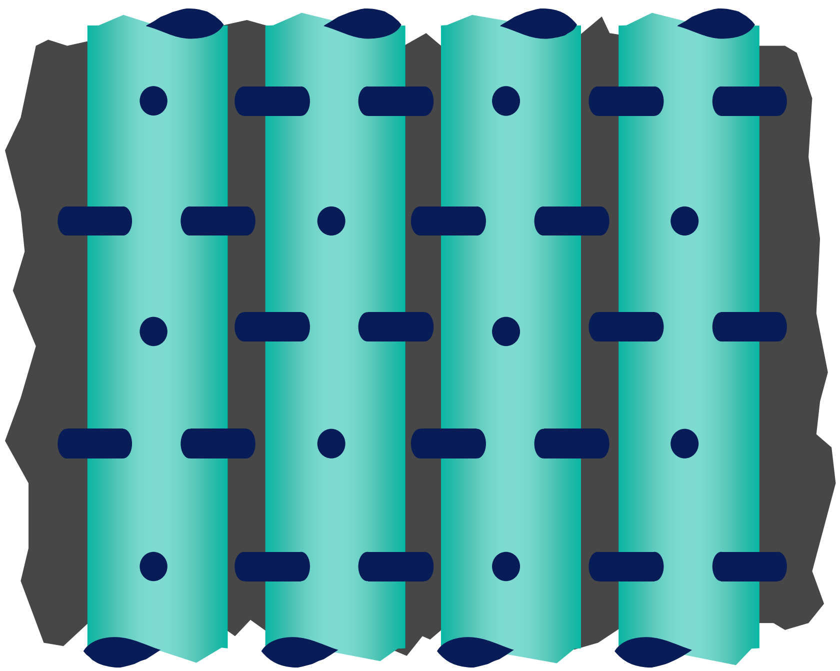
28 CFBs Operating with Stepped Grid

PROJECT	MWe	Start-up Year
PAK, S.A.	55	2012
Prokon Nord, Oostrozebeke	25	2010
Kaukaan Voima	125	2010
Soderenergi	85	2009
NV Huisvuilcentrale	28	2008
Bundersforste	23	2008
Oji Paper	30	2006
Prokon Nord, Emlichheim	20	2006
Prokon Nord, Hamburg	20	2006
Harpen Energie	20	2005
Stora Kvarnsveden	39	2005
Prokon Nord	19	2003
MVV	18	2003
Narva	73	2003
Jamtkraft	38	2002
Kehl	13	2002
Munksund	29	2001
Kauttua*	20	2000
Horntex, Horn	28	2000
TCC	41	2000
Lycksele	14	2000
Vasteras	47	2000
Viken	11	2000
Hogdalen	27	1999
YFY*	31	1999
Lomma	5	1998
Horntex, Beekskow	26	1997
Norske Skog	15	1997

*Year if retrofit for these plants

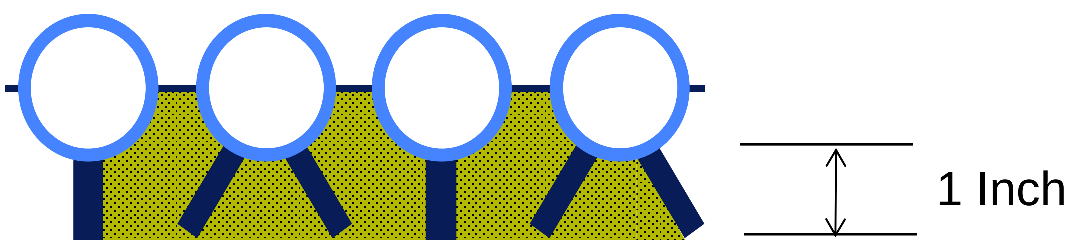
![FOSTER WHEELER]

Advanced Refractory Lining Offer The Longest Life



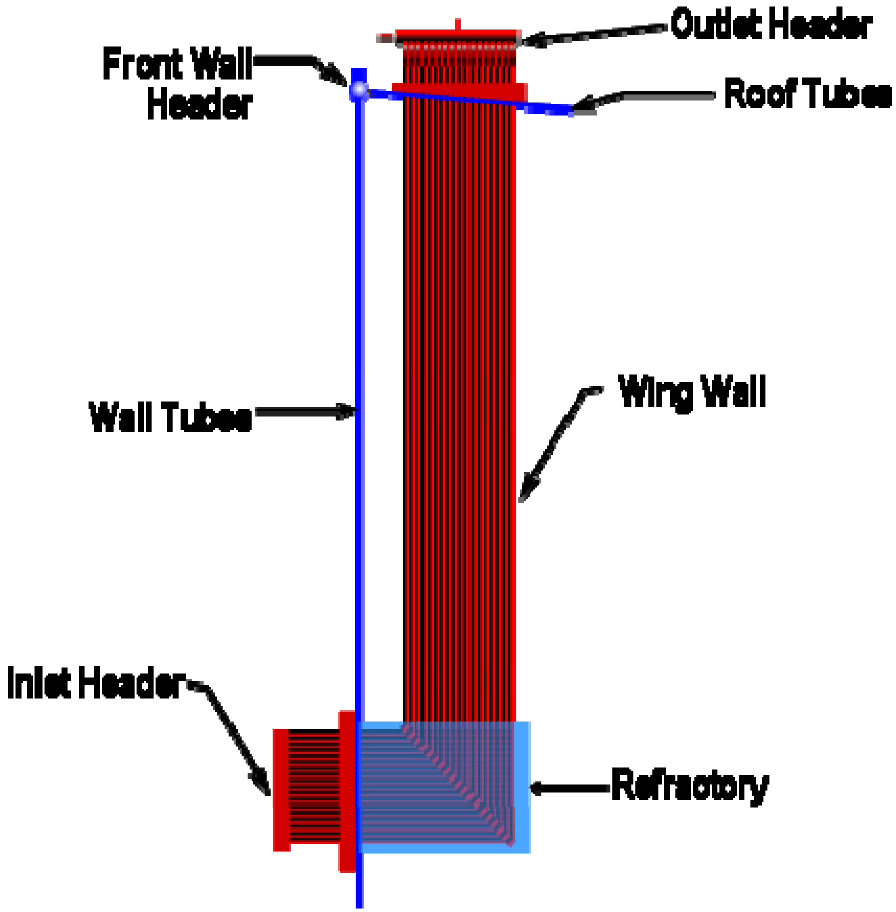
Thin Studded Refractory Lining Provides:

- **Reduced Weight**
- **Reduced Maintenance**
- Studs Stabilize Refractory
- Cooler Refractory Reduces Erosion Rates



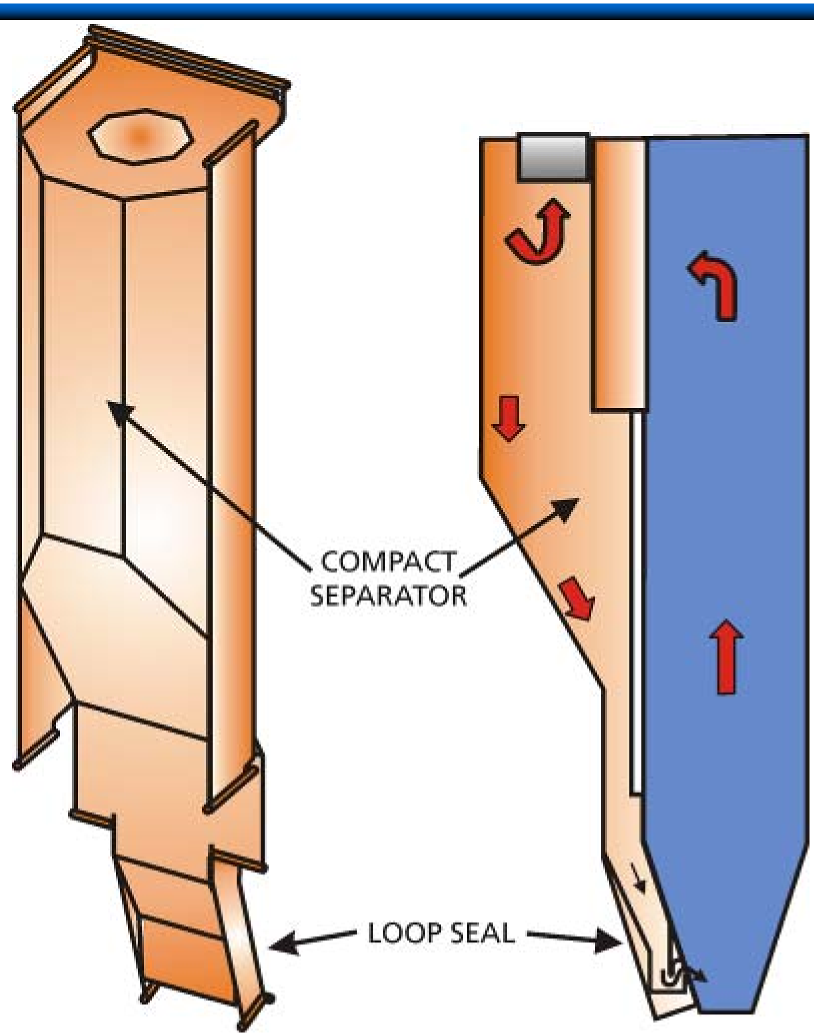
Vertical Superheater and Evaporator Panels Designed For Long Life

- **Offered Since 1990**
- **Operating in over 60 Units Worldwide**
- **Mostly Superheater Applications (45)**

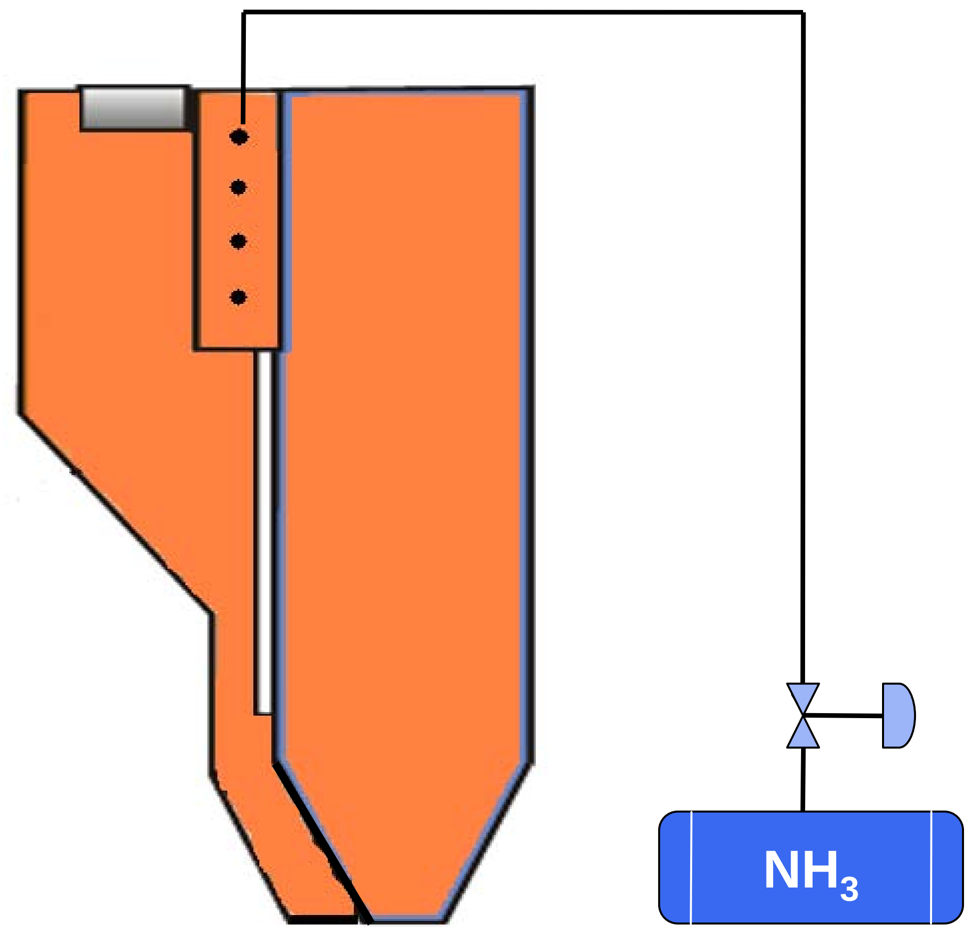


Compact Separator: Improves Unit Reliability

- **Eliminates Traditional Expansion Joint and Associated Maintenance**
- **Common Furnace/ Separator Wall Reduces Boiler Footprint**
- **Offered Since 1992**
- **Operating in over 40 Units Worldwide**

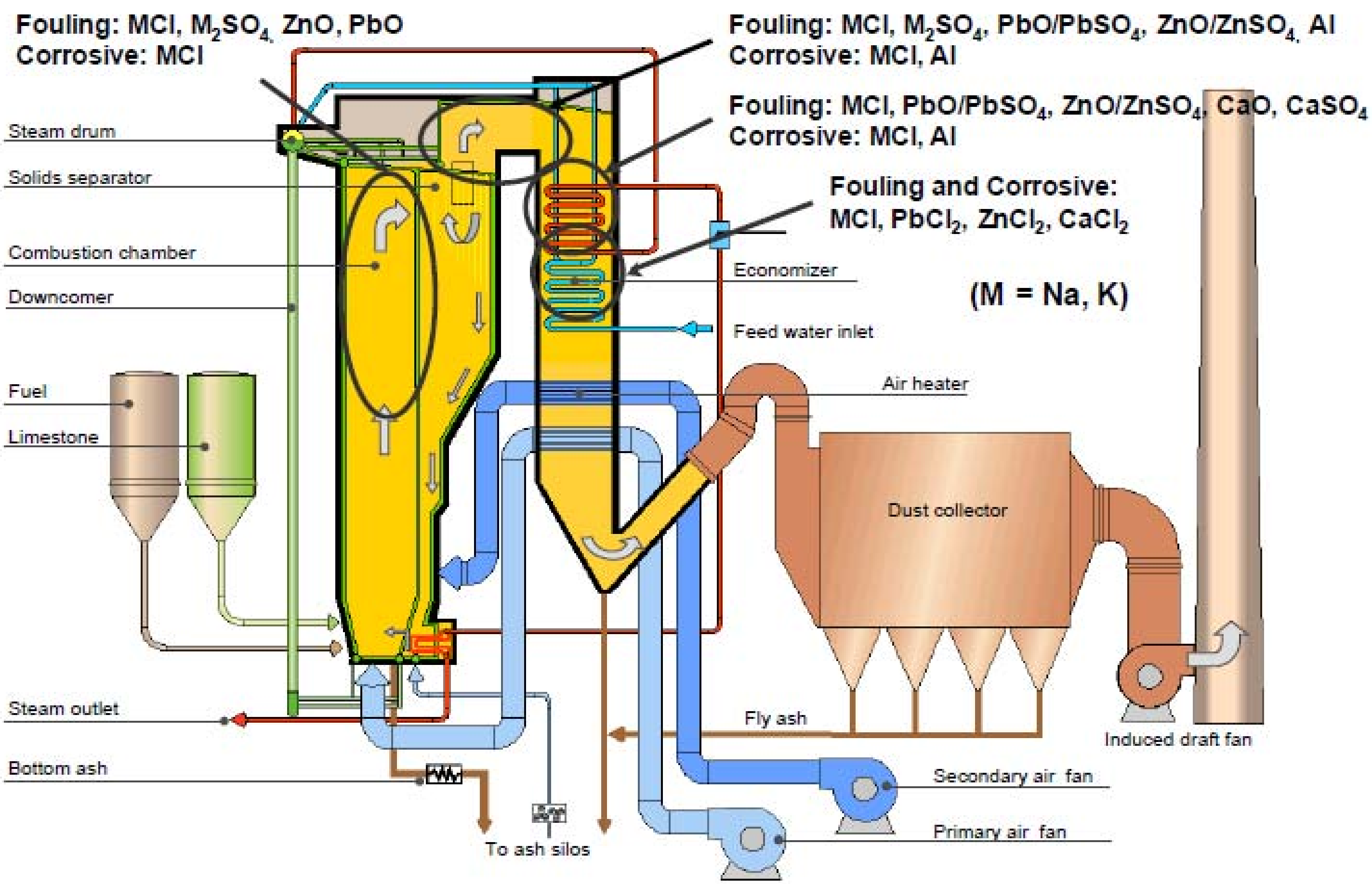


SNCR Delivers Low NO_x Emissions, Low Cost and Low Maintenance



- **No Catalyst Replacement Required**
- **Simple Reagent Injection Based on NO_x Limits**
- **Excellent Mixing in Solids Separator Minimizes Ammonia Slip**
- **Operating in over 20 Units since 1985**

Fouling and Corrosion Areas Experienced with Biomass and Waste Fuels

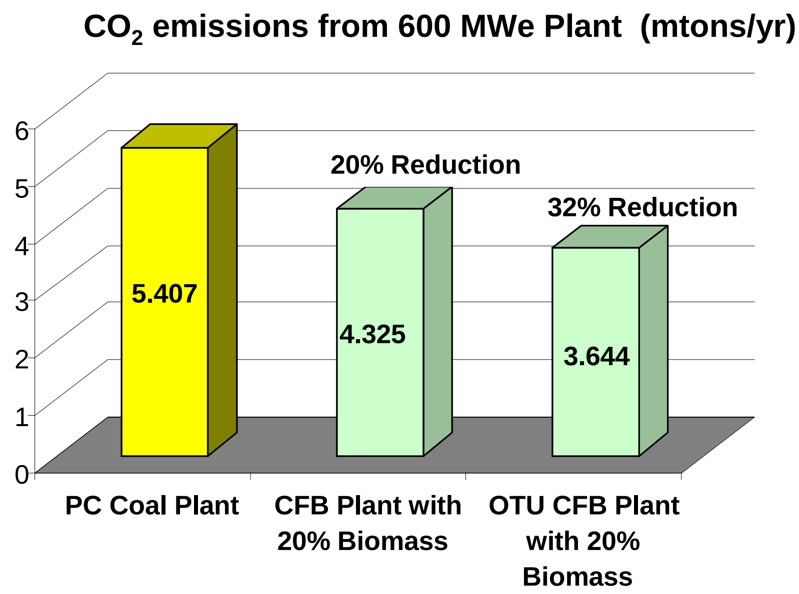


Reducing the Risk of Fouling, Corrosion, Agglomeration for Biomass and Waste Fired CFBs

- Locating Superheater and Reheater Coils in INTREX
- Idle Back Pass
- Quick Change Superheaters
- Reducing Final Design Stream Temperature
- Continuous Flushing of Bed with Sand
- Adding Bed Conditioners
- Reducing Bed Temperature
- Limiting K, Na, P, and Ca concentration in Fuel

The Market is seeing value in the Biomass Flexibility of CFB Technology

- **Co-Firing Carbon Neutral Fuels in utility CFBs provides an Optimum Solution**
  - Maximum Environmental Benefit since CFB is Flexible to Cope with Seasonally Varying Biomass Supply
  - Economical Electricity due to Large Plant Scale
  - Reliable Electricity due to Coal Back-up
- **Large utility CFBs are being built today designed to utilize biomass with traditional fuels like coal, peat, lignite, and pet coke**
- **We are developing Supercritical CFB technology capable of burning more challenging Agro biomass**



Dominion is Building a 600 MWe CFB Plant that can Co-Fire up to 20% Biomass

Note: PC coal plant assumed to have an annual capacity factor of 90% and a heat rate of 10,000 Btu/KWh, CFB plant assumed to have same capacity factor and a heat rate of 10,000 Btu/KWh (subcritical), 8200 Btu/KWh (supercritical)

Recent 100% Biomass CFB Projects

Order Date	Start-Up Date	Client	Plant	Plant Country	Steam Capacity		Main Steam Flow		Main Steam Pressure		Main Steam Temp		Primary Fuel
					MWe	MWth	kpph	kg/s	psi(g)	bar(g)	°F	°C	
2010	2012	GDF Suez Energia Polska	Polaniec Power Station	Poland	190	447	1251	158	1,828	126	995	535	Biomass – Wood (80%) Biomass – Crop Waste (20%)
2009	2012	PAK, S.A.	Konin	Poland	55	154	473	60	1,407	97	1,004	540	Biomass – Wood (80%) Biomass – Crop Waste (20%)
2008	2010	Prokon Nord Energiesysteme GmbH	A & S Oostrozebeke	Belgium	26	71	222	28	1,305	90	932	500	Biomass - Demo Wood
2008	2010	E.ON Varme Sverige AB	P15	Sweden	30	85	246	31	957	66	842	450	Waste - RDF
2007	2010	Kaukaan Voima Oy	Kaukas	Finland	125	385	1180	149	1,668	115	1022	550	Biomass
2007	2009	Soderenergi AB	Igelsta	Sweden	85	240	721	91	1,291	89	1004	540	Biomass
2006	2008	NV Huisvuilcentrale Noord-Holland (HVC-NH)	HVC Bio-energiecentrale, Alkmaar	Netherlands	28	171	222	28	1,291	89	932	500	Biomass - Demo Wood
2005	2008	Lomellina Energia S.r.l.	Lomellina	Italy	17	75	234	30	918	63	830	443	Waste - RDF
2002	2006	Prokon Nord Energiesysteme GmbH	BMHKW Emlichheim	Germany	20	67	212	27	1,305	90	932	500	Biomass - Demo Wood

FW CFB Boilers with SCR catalyst

Start-up Date	Client / Plant / Country	Capacity MW$_e$	Steam data Flow kpph	Pressure psi(g)	Temp. F	Fuel	
2012	GDF Suez Energia Polska / Polaniec / Poland	190	1251 / 1071	1828 / 276	995 / 995	Biomass – Wood / Crop Waste	
2011	Kawasaki Biomass Electric Power Corporation / Japan	33	301	1479	955	Biomass – Wood Chips	(1
2006	BKMW / Simmering / Austria	23	160 / 138	1805 / 235	968 / 968	Biomass – Wood Chips	(2
2002	Jämtkraft AB / Östersund / Sweden	45	404	2100	1013	Biomass – Wood Residue	
2001	Mälarenergi AB / Västerås / Sweden	58.7	440 / 398	2480 / 580	1004 / 1004	Biomass – Wood Residue	
1996	Brista Kraft AB / Märsta / Sweden	45	397	2088	1004	Biomass – Wood Residue	
1996	Växjö Energi AB / Växjö / Sweden	35	325	2059	1004	Peat	

(1 Boiler Delivered By Doosan Heavy Industries (complete SCR System)
(2 Boiler Delivered By Sumitomo Heavy Industries

FWOy SCR Catalyst Life with Biomass Experience

Vaxjo, delivered 1996	SCR replaced 2004
Brista, delivered 1996	SCR not replace yet, but the current NOx reduction is low
Vasteras, delivered 2001	SCR replaced 2005
Jamtkraft, delivered 2002	SCR partially replace 2006 (damage from tube failure)
Simmering, delivered 2006	SCR not replaced

Kaukaan Voima Oy, CFB Boiler

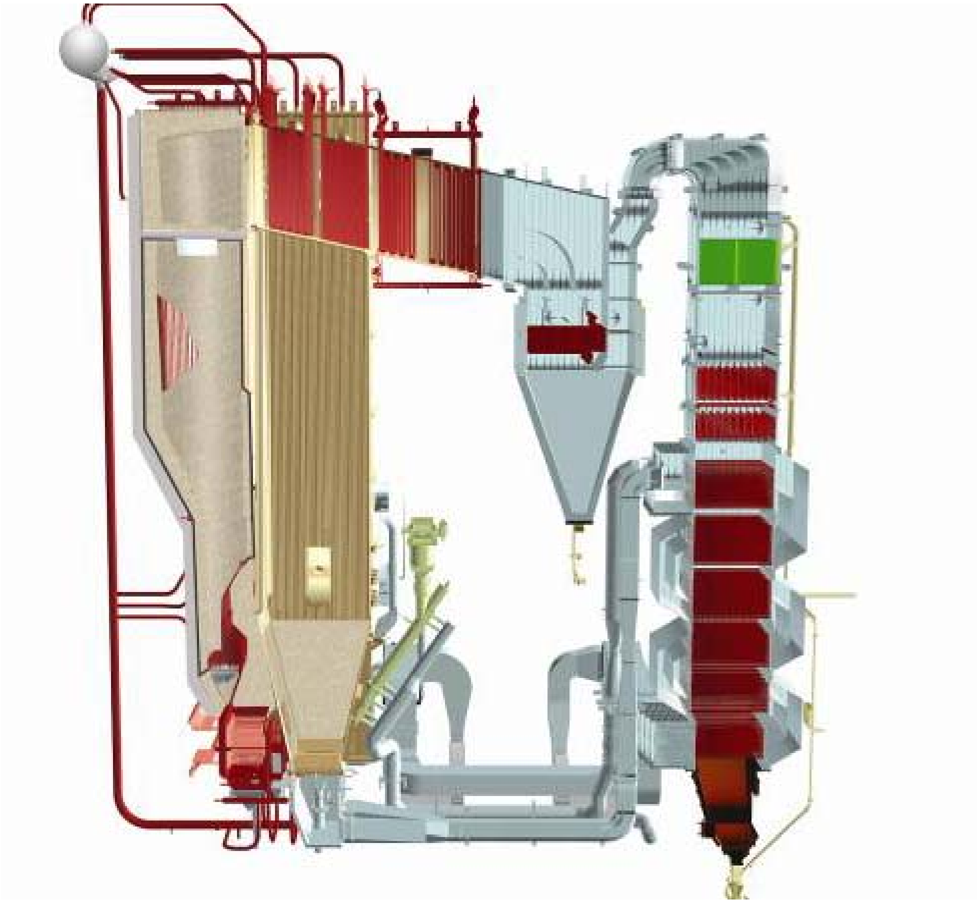
Location: Lappeenranta, Finland
Customer: Kaukaan Voima Oy
Fuel: Biomass, Peat

SCHEDULE:

Contract Award: 2007
Start of Erection: 2008
Commercial Operation: 2010

Steam Capacity	Main Steam Flow	Main Steam Pressure	Main Steam Temp.	Feed-Water Temp.
125 MWe	1183 kpph	1668 psi	1022°F	415°F
385 MWth	149 kg/s	115 bar	550°C	213°C

Simmering CFB Boiler



Steam Capacity	Main Steam Flow	Main Steam Pressure	Main Steam Temp.
23 MWe	160 kpph	1,805 psi	968°F
61 MWth	20 kg/s	124 bar	520°C

Location: Vienna, Austria
Customer: Bundersforste Biomasse Kraftwerk
Start-Up Year: 2006
Fuel: Biomass- Wood Chips

Optional Slides

Soderenergi (Igelsta) CFB Boiler

Location: Sodertalje, Sweden
Customer: Soderenergi AB
Fuel: Biomass- Demo Wood
Waste- RDF (up to 25%)

SCHEDULE:

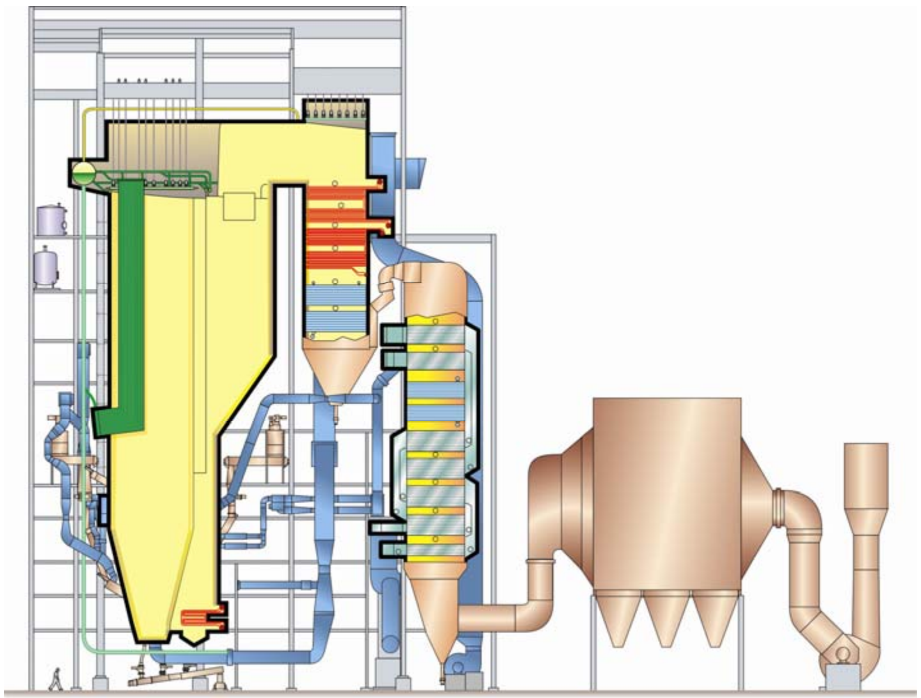
Contract Award: 2007

Start of Erection: 2008

Commercial Operation: 2009

Steam Capacity	Main Steam Flow	Main Steam Pressure	Main Steam Temp.	Feed-Water Temp.
85 MWe	730 kpph	1,305 psi	1005°F	392°F
240 MWth	92 kg/s	90 bar	540°C	200°C

Kaukaan Voima Oy, CFB Boiler



FUEL DATA

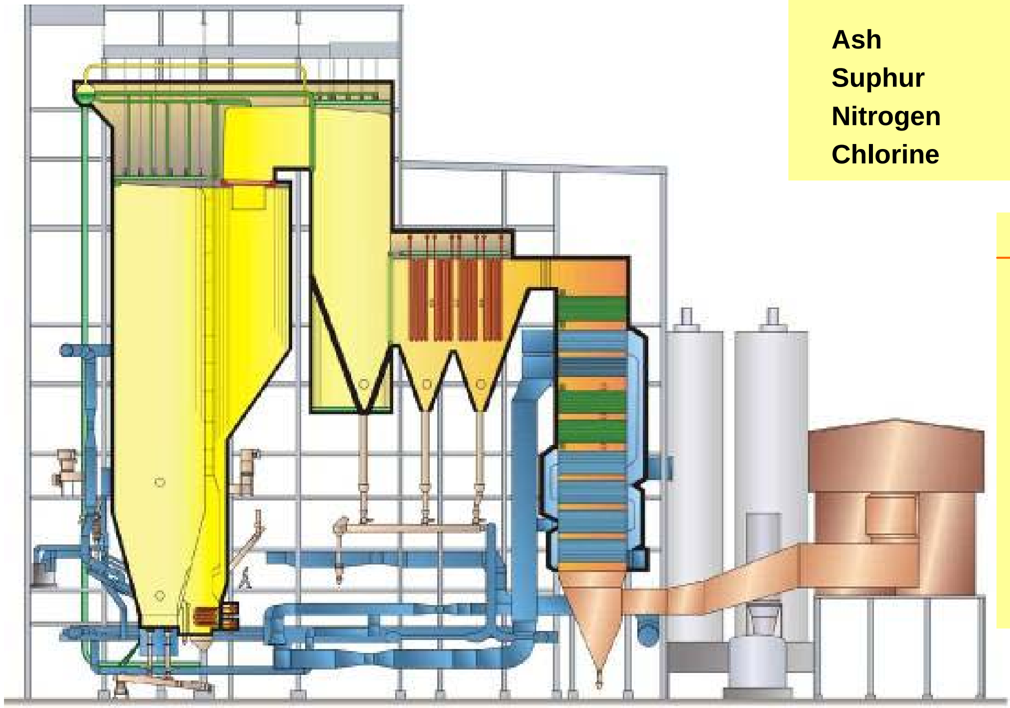
	Biomass	*Peat*
Sulphur	0.05%	0.2%
Nitrogen	0.6%	1.9%
Moisture	48.0%	45.0%
Ash	2.5%	5.0%
LHV	9.2 MJ/kg (3955 btu/lbm)	11.3 MJ/kg (4858 btu/lbm)

DESIGN PERFORMANCE, O_2 6% in dry gases

	Biomass	*Peat (75% of MCR)*
Flue Gas Exit Temperature	149 °C (300°F)	140 °C (284°F)
Boiler Efficiency	91%	
Emissions		
- *NO_x*	150 mg/Nm³	150 mg/Nm³
- *SO_2*	200 mg/Nm³	200 mg/Nm³
- *CO*	200 mg/Nm³	200 mg/Nm³
Particulate Matter (dry)	20 mg/Nm³	20 mg/Nm³

Soderenergi (Igelsta) CFB Boiler

MAIN FUEL MIXES	*Mix 1*	*Mix 2*	*Mix 3*
Brances and Tops	75%	30%	100%
REF Pellets	25%	0%	0%
Demolition Wood	0%	70%	0%
H_2O	44.3%	35.6%	50.0%
LHV	9.7 MJ/kg (4170 btu/lbm)	11.0 MJ/kg (4729 btu/lbm)	8.3 MJ/kg (3568 btu/lbm)
Ash	3.6% a.f.	3.0% a.f.	2.0% a.f.
Suphur	0.05% a.f.	0.05% a.f.	0.03% a.f.
Nitrogen	0.6% in d.s.	0.8% in d.s.	0.5% in d.s.
Chlorine	0.12 in d.s.	0.08 in d.s.	0.02 in d.s.



DESIGN PERFORMANCE, O_2 6% in dry gases

Emissions

- *Particles*	10 mg/nm^3	HCl	10 mg/nm^3
- *SO_2*	75 mg/nm^3	HF	1 mg/nm^3
- *NO_X*	35 mg/MJ (0.081 lb/Mbtu)	Cd + T	10.05 mg/nm^3
- *CO*	50 mg /nm^3	Hg	0.05 mg/nm^3
- *NH_3*	10 ppm	Metals	0.5 mg/nm^3
- *TOC*	10 mg/nm^3	Dioxines & Furanes	0.1 ng/nm^3

E.ON Varme Sverige CFB Boiler

Location: Norrkoping, Sweden
Customer: E.ON Varme Sverige AB
Fuel: Refuse Derived Fuel

SCHEDULE:

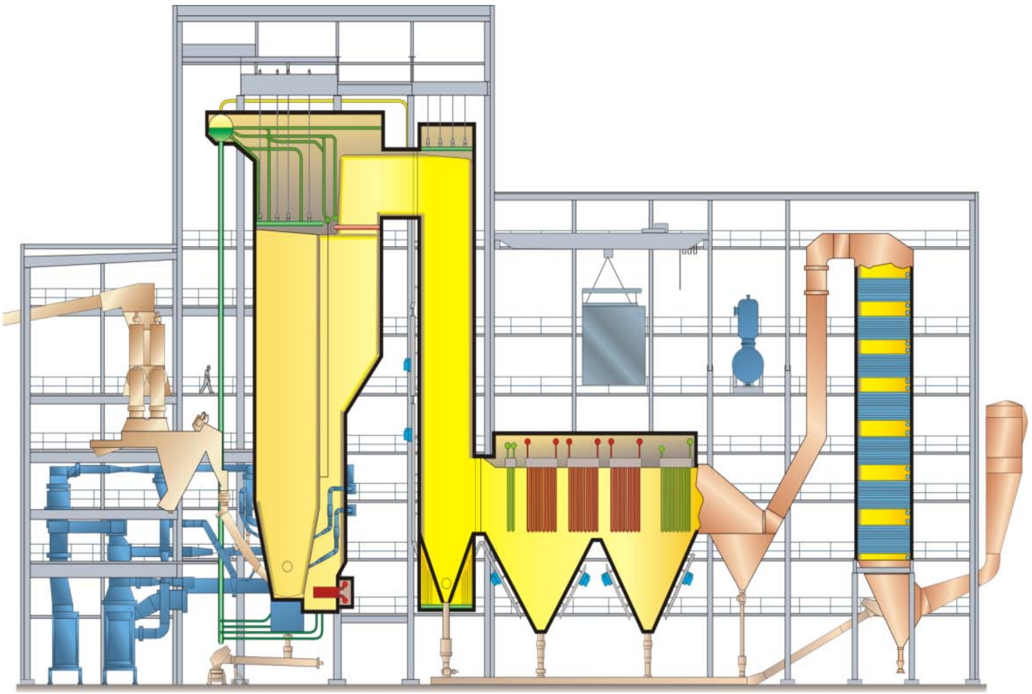
Contract Award: 2008

Start of Erection: 2009

Commercial Operation: 2011

Steam Capacity	Main Steam Flow	Main Steam Pressure	Main Steam Temp.	Feed-Water Temp.
30 MWe	246 kpph	957 psi	842°F	275°F
85 MWth	31 kg/s	66 bar	450°C	135°C

E.ON Varme Sverige CFB Boiler



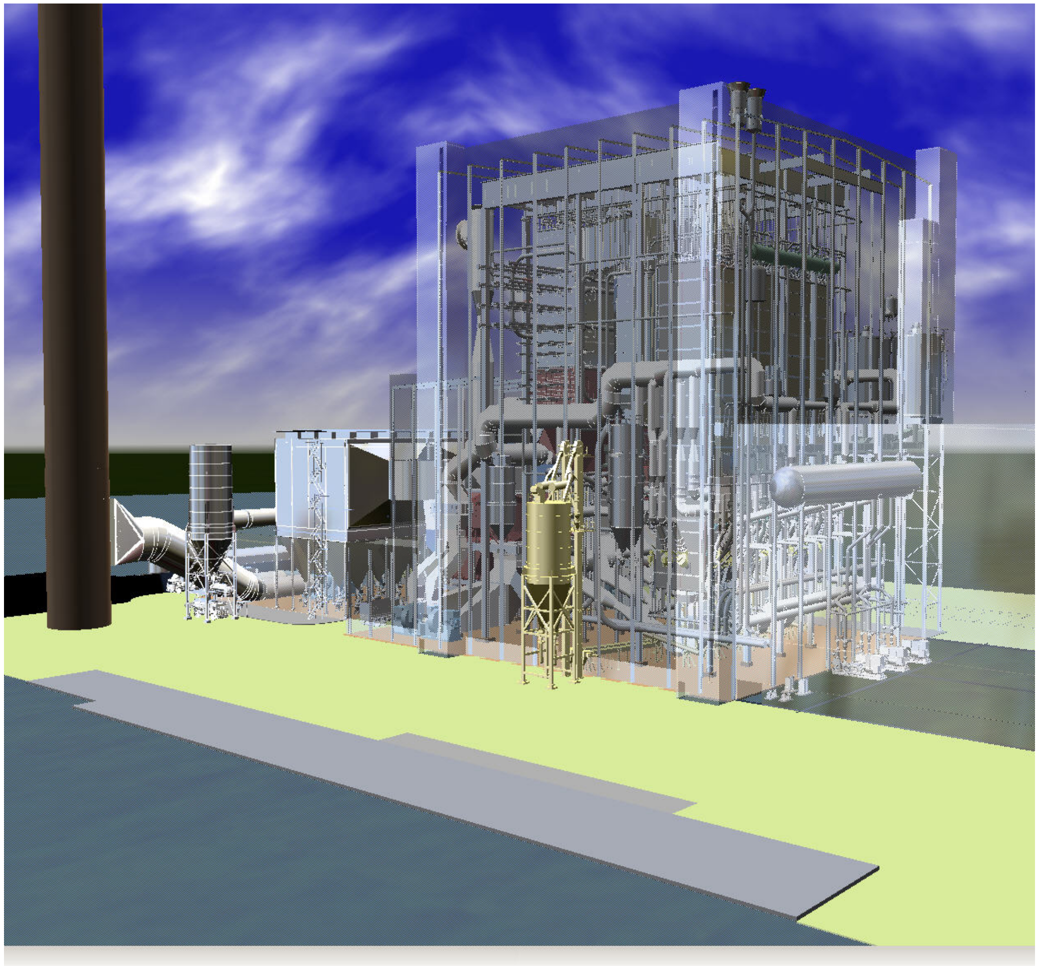
FUEL DATA

	Refuse Delivered Fuel (RDF)
Sulphur (as received)	0.08% (weekly average)
Nitrogen (as received)	0.22% (weekly average)
Moisture	27%
Ash (as received)	14.3%
LHV (as received)	12.9 MJ/kg (5546 btu/lbm)

DESIGN PERFORMANCE, O_2 11% in dry gases

	RDF
Flue Gas Exit Temperature	168 °C (334°F)
Boiler Efficiency	90.2%
Emissions	
- *NO_x*	< 35 mg/MJ (0.081 lb/Mbtu)
- *CO*	< 50 mg/Nm^3

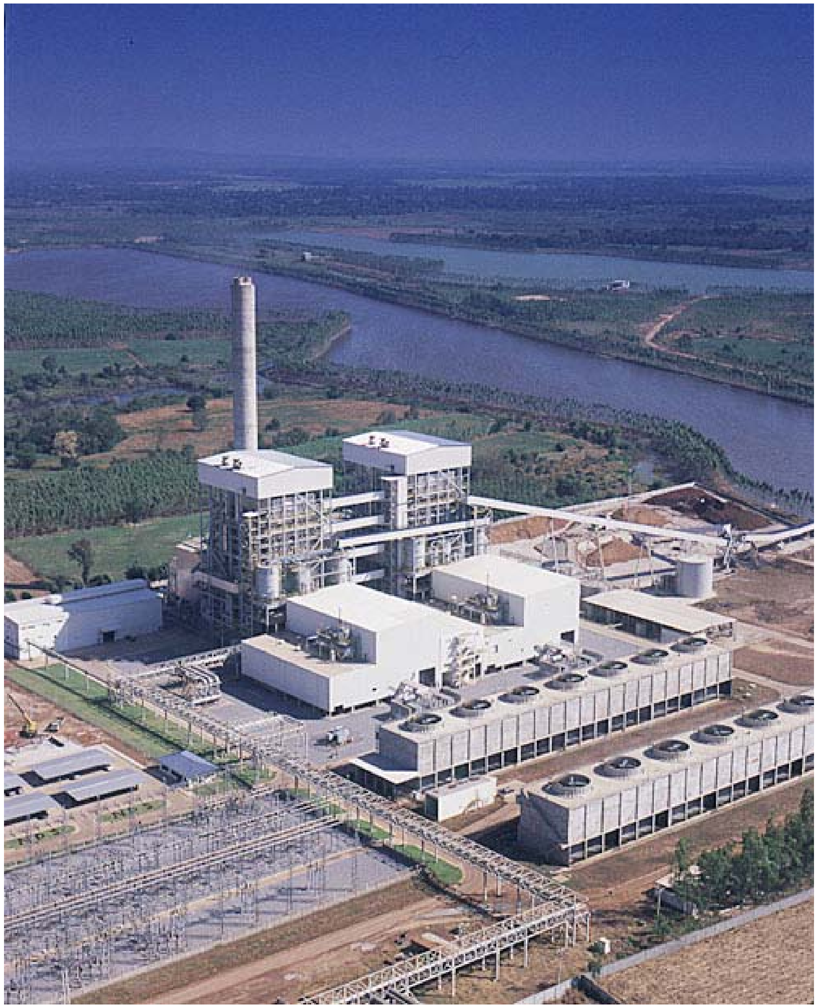
Large Scale and High Efficiency CFB for Clean Biomass
300MW$_e$ with Wood Pellets & Wood chips
179/43.5 bar(a), 560/565°C



Steam Capacity	Main Steam Pressure	Main Steam Temp.
300 MWe	2,500 psi	1040°F
815 MWth	179 bar	560°C

Fuel		Wood Pellets
Moisture	$[\%]_{ar}$	6 - 10
Ash	$[\%]_{dry}$	0,4 – 2.5
Nitrogen	$[\%]_{dry}$	0 – 2.7
Sulfur	$[\%]_{dry}$	0 – 0.05
Chlorine	$[ppm]_{dry}$	< 500
LHV	$[MJ/kg]_{ar}$	15.5 - 18

Coal and Biomass Co-Combustion in CFB
National Power Supply Co. Ltd.



2 x 370 MW_{th}, 134/122 kg/s, 161/35 bar, 542/542 °C

FUELS:
- Anthracite
- Bit. Coal
- Bark
- Rice Husk

(Bark and Rice Husk:) 50% Biomass of Energy

Located in Tha Toom, Prachinburi, Thailand

FOSTER WHEELER

Bubbling Fluid Bed Boiler Conversions

BFB Conversion Benefits

- **Fuel Switch to Low Cost Opportunity Fuels**
- **Reduce Boiler Emissions**
- **Restore Unit Steam Capacity**

FW's BFB Conversion Experience

Original Unit Design

- Grate Fired
- Chemical Recovery
- Pulverized Coal
- Pulverized Peat
- Oil
- MgO
- La Mont
- Pyrite Roasting

New Fuels

- Anthracite
- Coal
- Peat
- Graphite
- Bark

- Wood Residue
- Wood Chips
- Waste Fiber
- Primary Sludge
- Bio Sludge
- De-inking Sludge

Converted 30 Units With Over 2000 MWth Capacity

FOSTER WHEELER

Bubbling Fluid Bed Retrofits In Europe and Russia

Paper Mill
Rauma, Finland
BFB, 50 MW
Delivery year: 1985
Fuels: Wood waste, peat, oil
Retrofit to a recovery boiler

Outokumpu Oy
Kokkola, Finland
BFB, 17.5 MW
Delivery year: 1977
Fuels: Coal, peat, wood waste
Retrofit to a pyrite roasting plant

Outokumpu Oy
Kokkola, Finland
BFB, 24 MW
Delivery year: 1977
Fuels: Coal, peat, wood waste
Retrofit to a pyrite roasting plant

Mäntän Energia Oy
Mänttä, Finland
BFB, 94.3 MW
Delivery year: 1993
Fuels: Peat, oil, biofuel, sludge
Retrofit to a MgO-boiler

Metsä-Sellu Oy
Äänekoski, Finland
CFB, 76 MW
Delivery year: 1985
Fuels: Coal, wood, peat, oil
Retrofit to a recovery boiler

Imatran Voima Oy
Uimaharju, Finland
BFB, 91.4 MW
Delivery year: 1993
Fuels: Bark, sludge
Retrofit to a recovery boiler

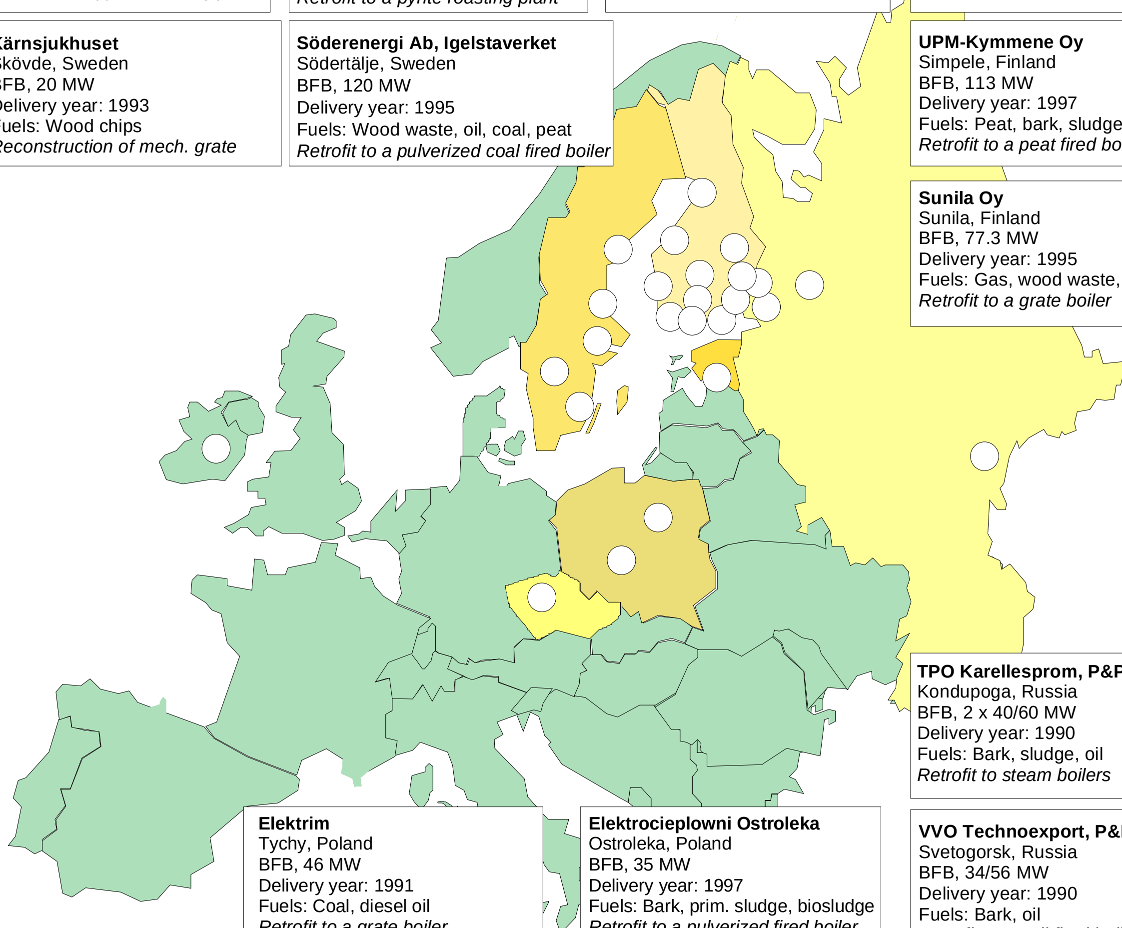
Paper Mill
Rauma, Finland
BFB, 60 MW
Delivery year: 1990
Fuels: Waste fiber, bark, coal
Retrofit to a recovery boiler

Kärnsjukhuset
Skövde, Sweden
BFB, 20 MW
Delivery year: 1993
Fuels: Wood chips
Reconstruction of mech. grate

Söderenergi Ab, Igelstaverket
Södertälje, Sweden
BFB, 120 MW
Delivery year: 1995
Fuels: Wood waste, oil, coal, peat
Retrofit to a pulverized coal fired boiler

UPM-Kymmene Oy
Simpele, Finland
BFB, 113 MW
Delivery year: 1997
Fuels: Peat, bark, sludge, oil
Retrofit to a peat fired boiler

Kaukas Oy
Lappeenranta, Finland
BFB, 109.3 MW
Delivery year: 1996
Fuels: Bark, sludge, peat, gas
Retrofit to a grate boiler



Stora Cell AB
Norrsundet, Sweden
BFB, 50 MW
Delivery year: 1997
Fuels: Bark
Retrofit to a grate boiler

Sunila Oy
Sunila, Finland
BFB, 77.3 MW
Delivery year: 1995
Fuels: Gas, wood waste, sludge
Retrofit to a grate boiler

Oy Metsä-Botnia Ab
Kaskinen, Finland
BFB, 77.5 MW
Delivery year: 1997
Fuels: Wood waste, sludge, oil
Retrofit to a grate boiler

Södra Cell AB
Mönsterås, Sweden
BFB, 73/105 MW
Delivery year: 2000
Fuels: Bark, sludge, oil
Retrofit to a grate boiler

Enso Oy
Varkaus, Finland
CFB, 20 MW
Delivery year: 1983
Fuels: Wood waste
Retrofit to a La Mont boiler

AS Anne Soojus
Luunja, Estonia
BFB, 2 x 18 MW
Delivery year: 1995
Fuels: Peat, wood chips
Retrofit to oil fired boilers

Suomen Kuitulevy
Pihlava, Finland
CFB, 15 MW
Delivery year: 1979
Fuels: Peat, wood waste
Retrofit to a grate boiler

Modo Paper AB
Husum, Sweden
BFB, 87 MW
Delivery year: 2000
Fuels: Bark, sludge, oil
Retrofit to a grate boiler

TPO Karellesprom, P&P Mill
Kondupoga, Russia
BFB, 2 x 40/60 MW
Delivery year: 1990
Fuels: Bark, sludge, oil
Retrofit to steam boilers

Oy Metsä-Botnia Ab
Kemi, Finland
BFB, 115 MW
Delivery year: 1994
Fuels: Wood waste, peat, sludge
Retrofit to a grate boiler

AssiDöman Sepap a.s.
Steti, Czech Republic
CFB, 176 MW
Delivery year: 1998
Fuels: Coal, bark, sludge
Retrofit to a coal fired boiler

Elektrim
Tychy, Poland
BFB, 46 MW
Delivery year: 1991
Fuels: Coal, diesel oil
Retrofit to a grate boiler

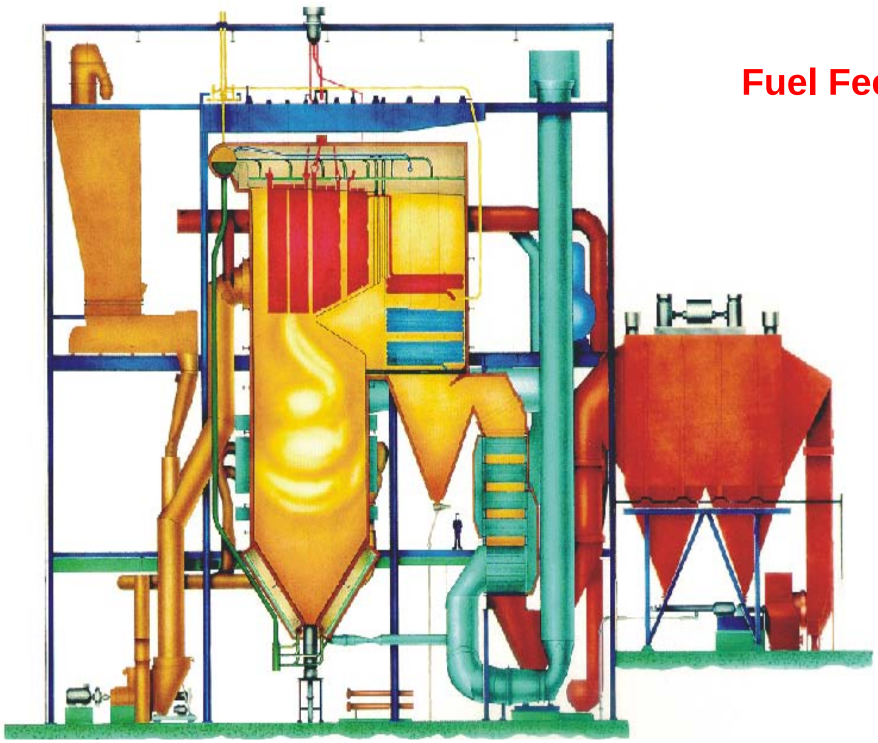
Elektrocieplowni Ostroleka
Ostroleka, Poland
BFB, 35 MW
Delivery year: 1997
Fuels: Bark, prim. sludge, biosludge
Retrofit to a pulverized fired boiler

VVO Technoexport, P&P Mill
Svetogorsk, Russia
BFB, 34/56 MW
Delivery year: 1990
Fuels: Bark, oil
Retrofit to an oil fired boiler

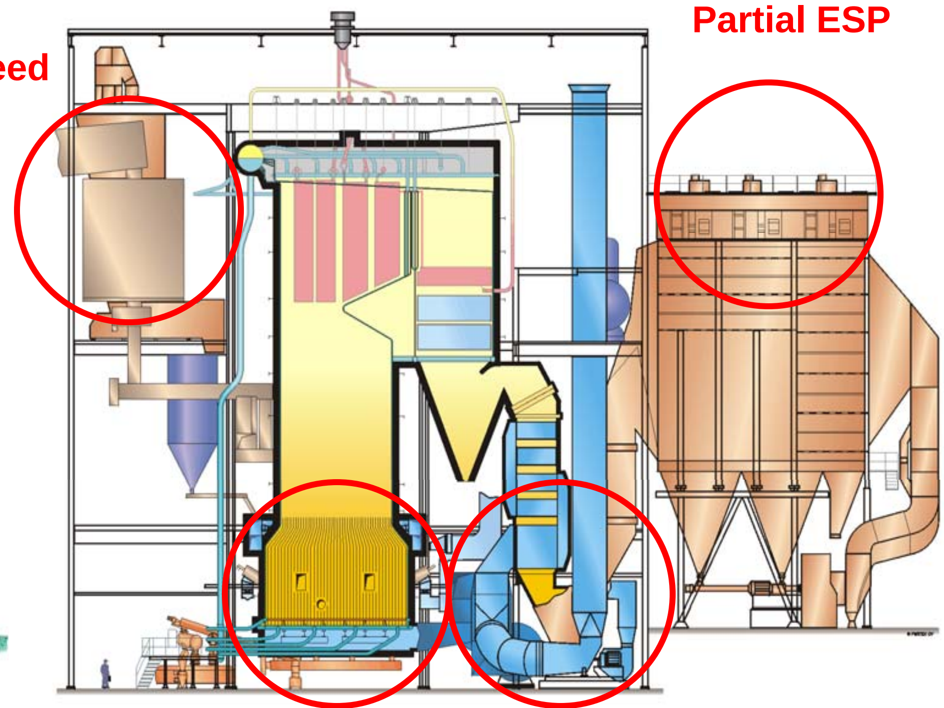
Electrode Works
Novosibirsk, Russia
BFB, 2 x 116 MW
Delivery year: 1990
Fuels: Graphite, coal, anthracite
Retrofit to pulverized coal boilers

Before and After BFB Conversion

Before: Pulverized Peat Boiler



After: Peat, Bark, Sludge BFB



Metsa Serla Project in Simpele, Finland

Potential BFB Conversion Scope Items

- Fuel Prep, Storage and Feed System
- SH, Econ Material Upgrade
- SH, Evap and Economizer Surface Rebalance
- Air Heater Sizing and Location
- PA and SA Upgrade
- ESP Upgrade
- Primary Air Boost
- Ash Systems Upgrade (Bed and Fly)
- Steel Support Structure Modification
- Soot Blowing Upgrade
- Electrical
- I & C

Key Steps To BFB Conversion

- **Establish Goals:**
  - Fuel, Emissions, Performance
- **Boiler Assessment:**
  - Space, Boiler Capacity
- **Design Study to Establish Project Scope**
- **Perform Conversion**
- **Commissioning and Performance Testing**

No Two Projects Are Alike

Grate Boiler Response Characteristics

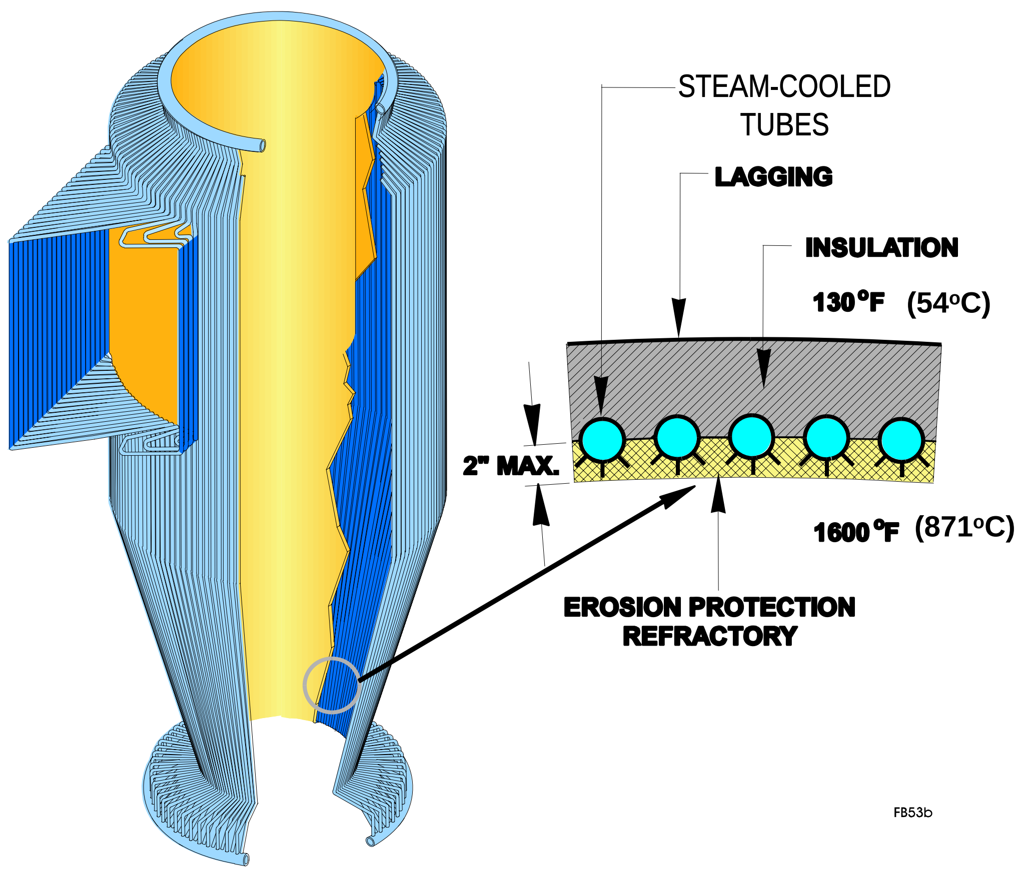
- **Start-up times**
  - Cold start 70°F (21°C) drum water to full pressure is based on 100°F (38°C) rise in drum saturation temperature per hour (i.e., for a boiler operating pressure of 650 psig (45 bar) (saturation temp of 497°F (258°C)), the start time would be approximately 4.3 hours
  - Warm and hot standby follow the same criteria, so timing depends on drum saturation temperature at restart
- **Steam swing**
  - 10% of boiler MCR (no steam accumulation) without boiler trip
- **Boiler ramp rate**
  - 10%/min of 100% MCR steam flow
  - Range 40 - 100% MCR increasing or decreasing
  - Steam temp ±15°F over the specified control range
  - Steam pressure ±10% of set point based on header pressure fluctuations

BFB Response Characteristics

- **Start-up times**
  - 7 Hours for Cold Start (over 36 hrs Standby)
  - 2 Hours for Warm Start (less than 10 hrs Standby)
  - 1 Hour for Hot Start (less than 1 hr Standby)
- **Steam swing**
  - 10% of boiler MCR (no steam accumulation) without Boiler Trip
- **Boiler ramp rate**
  - 4%/min of 100% MCR Steam Flow
  - Range 50 - 90% MCR increasing, 100 - 50% MCR decreasing
  - Steam Temp +5/-8°C (+9/-15ºF)
  - Steam pressure ±8 bar (± 116 psig)

Water/Steam Cooled Cyclone Offers Many Benefits

- Thin Refractory Means Reduced Weight
- Thin Refractory Means Low Maintenance
- Low Surface Temperature Means Reduced Fuel Costs
- Operating in 26 Units
- Installed Since 1988



CFB Response Characteristics

- **Start-up times**
  - 7 Hours for Cold Start (over 36 hrs Standby)
  - 2 Hours for Warm Start (less than 10 hrs Standby)
  - 1 Hour for Hot Start (less than 1 hr Standby)
- **Steam swing**
  - 10% of boiler MCR (no steam accumulation) without Boiler Trip
- **Boiler ramp rate**
  - 5%/min of 100% MCR Steam Flow
  - Range 50 - 90% MCR increasing, 100 - 50 % MCR decreasing
  - Steam Temp +5/-8°C (+9/-15ºF)
  - Steam pressure ±8 bar (±116 psi)

Expected Emissions Controls (Grate)

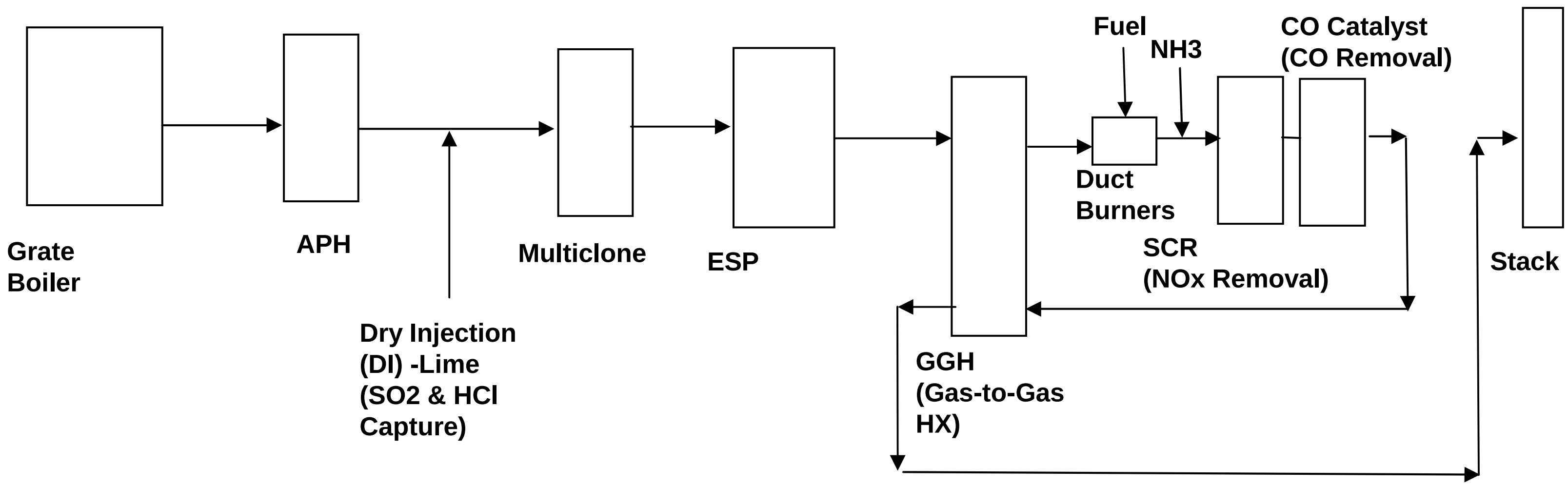
Emission	Avg. Uncontrolled Emission at Boiler Exit (lb/MMBtu)	Adage Emission Limit at Stack (lb/MMBtu)	Emissions Removal Required	(PRELIMINARY) Expected Control Technology
CO	0.25	0.08	67%	Tail-End CO Catalyst(1)
NOx	0.25	0.08	67%	Tail-End SCR Catalyst(2)
NH3	n/a	10 (ppmvd @7%O2)	n/a	Tail-End SCR Catalyst
SO2	0.11	0.08	24%	Dry Injection(3)
HCl (60 tpy MACT limit)	0.027	0.02	23%	Dry Injection(3)
HCl (10 tpy MACT limit)	0.027	0.0034	87%	Dry FGD(4)
PM-10	5.88	0.012	99.8%	ESP(5)

1. Preliminary information indicates it may be better to install CO catalyst downstream of Dust Collector - FW is evaluating both options.
2. Tail-End SCR is expected to be more economical than Hot-Side SCR, since gas must be reheated anyway to accommodate CO Catalyst. Also, it may not be feasible to install Hot-Side SCR due to possible catalyst poisoning - FW is evaluating cost and feasibility of both options.
3. Involves only injection of dry sorbent (Lime), with no water injected or Scrubber vessel required.
4. If 60 tpy MACT limit is required this will likely require a Dry-FGD - i.e., Scrubber vessel similar to Allied-type, with water and Lime injection.
5. Baghouse cannot be used on Grate boiler due to potential for fire from embers.

Possible Emissions Control Options

Option 1 (Grate)

(Grate Boiler w/Tail-End SCR -- No Dry FGD Required for HCl)



Expected Emissions Controls (BFB)

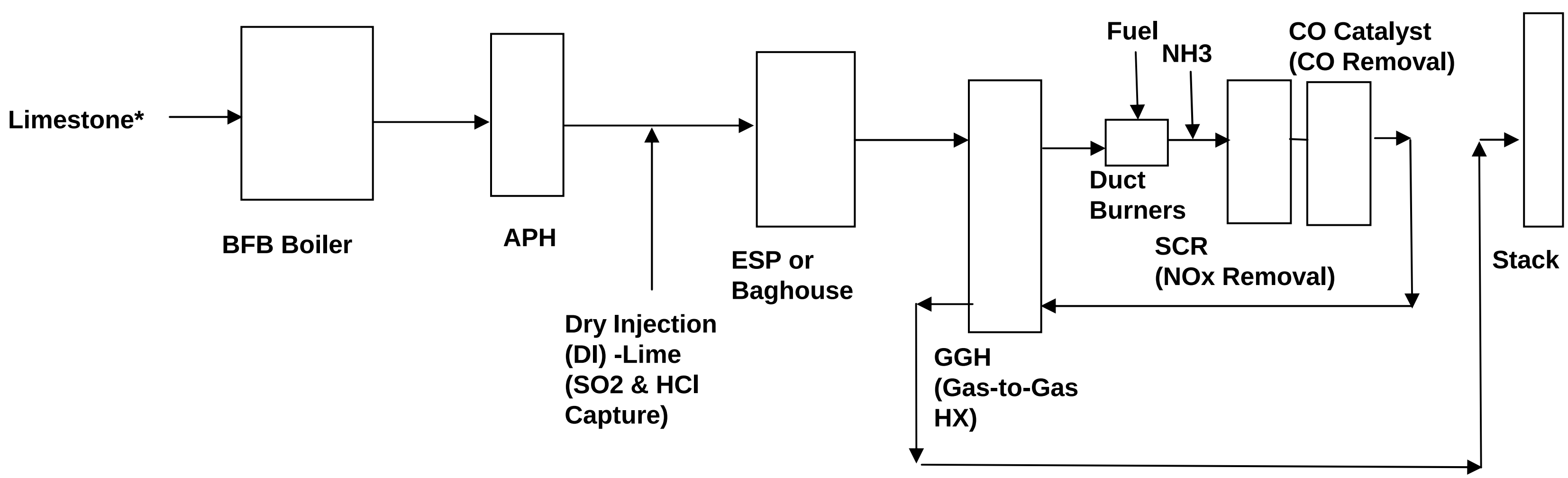
Emission	Avg. Uncontrolled Emission at Boiler Exit (lb/MMBtu)	Adage Emission Limit at Stack (lb/MMBtu)	Emissions Removal Required	(PRELIMINARY) Expected Control Technology
CO	0.110	0.08	26%	Tail-End CO Catalyst(1)
NOx	0.20	0.08	59%	Tail-End SCR Catalyst(2)
NH3	n/a	10 (ppmvd @7%O2)	n/a	Tail-End SCR Catalyst
SO2	0.11	0.08	24%	Dry Injection(3)
HCl (60 tpy MACT limit)	0.027	0.02	23%	Dry Injection(3)
HCl (10 tpy MACT limit)	0.027	0.0034	87%	Dry FGD(4)
PM-10	5.88	0.012	99.8%	ESP or Baghouse(5)

1. Preliminary information indicates it may be better to install CO catalyst downstream of Dust Collector - FW is evaluating both options.
2. Tail-End SCR is expected to be more economical than Hot-Side SCR, since gas must be reheated anyway to accommodate CO Catalyst. Also, it may not be feasible to install Hot-Side SCR due to possible catalyst poisoning - FW is evaluating cost and feasibility of both options.
3. Involves only injection of dry sorbent (Lime), with no water injected or Scrubber vessel required.
4. If 60 tpy MACT limit is required this will likely require a Dry-FGD - i.e., Scrubber vessel similar to Allied-type, with water and Lime injection.
5. ESP may be cheaper.

Possible Emissions Control Options

Option 2 (BFB)

(BFB Boiler w/Tail-End SCR -- No Dry FGD Required for HCl)



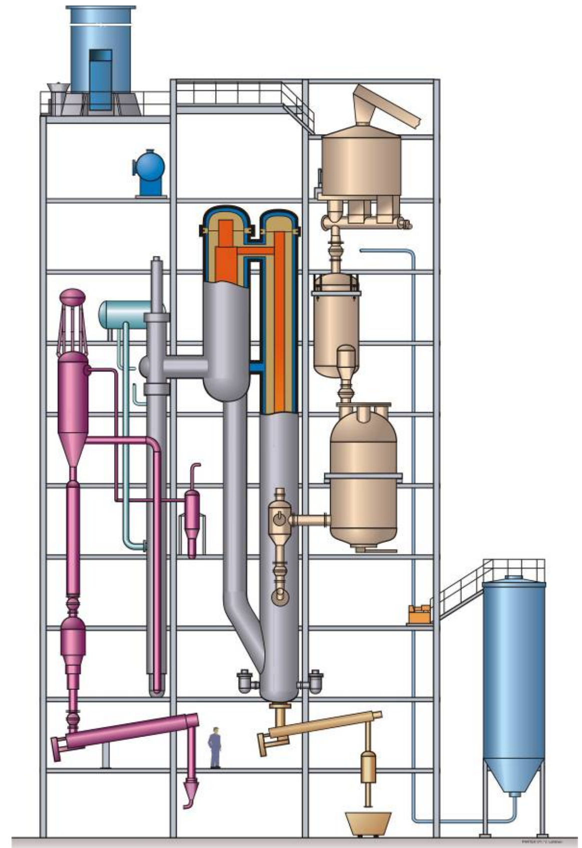
* Limestone injection into Boiler may not be necessary if DI system can also meet the required SO2 removal.

Possible Impact of Using Hot-Side SCR

- **Potential for Catalyst Poisoning**
  - Due to presence of potassium, sodium, and phosphorous in wood
    - Potassium aerosols formed in back-pass section of Boiler may be major cause
      - Stoker boilers may be more likely to form these aerosols than BFB or CFB
        - Ceram has stated they will not quote Hot-Side SCR for Grate Boilers, but will consider on case-by-case for CFB and BFB
        - Haldor will consider Stoker, BFB, and CFB Boilers on case-by-case
        - Currently in discussions with Argillon, KWH, and other catalyst suppliers
    - If limestone is injected in CFB or BFB Boiler, presence of calcium in ash may partially offset catalyst deactivation due to poisoning
    - Type of wood (trimmings, demolition, etc.) may have substantially different levels of poisons – fuel, ash, and trace analysis should be carefully evaluated for each project
    - Whenever possible, testing catalyst sample in actual flue gas slipstream is highly recommended

Technology Solutions that FW is Developing for Tomorrow's Transportation Fuels

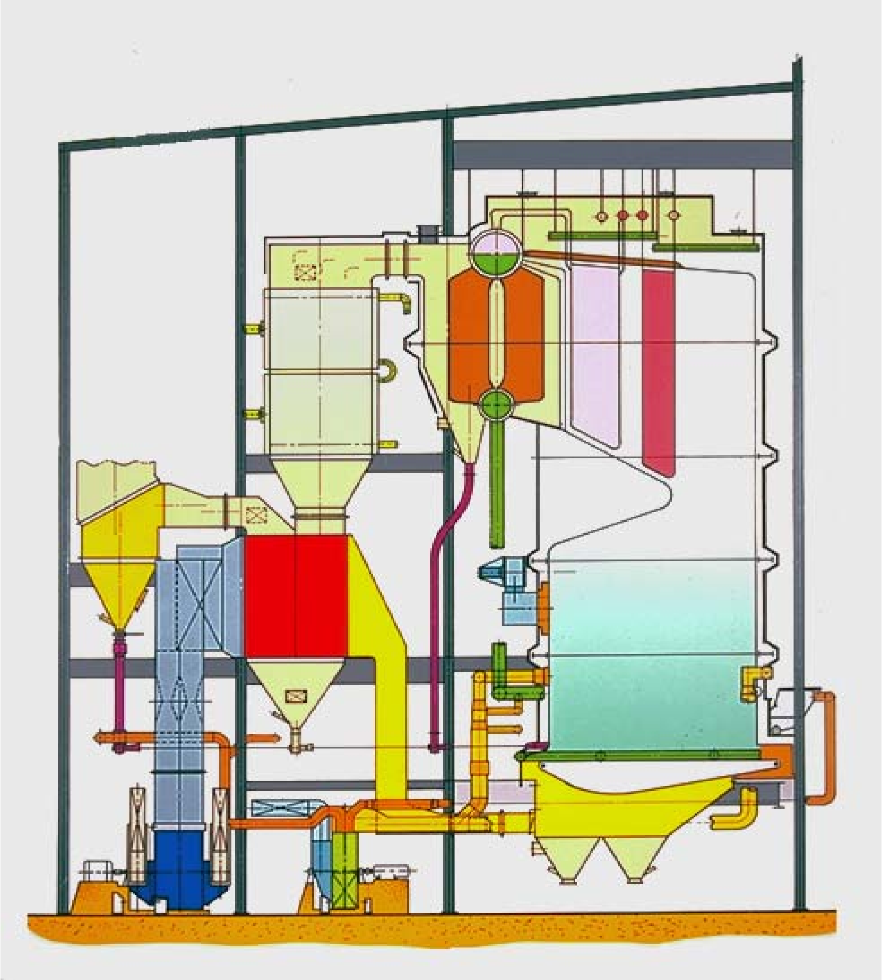
- **Awarded Contract for Pilot-Scale Biomass CFB gasifier and Syngas Cleaning System in Finland**
  - Client is NSE Biofuels Oy Ltd., a joint venture between Stora Enso Oyj and Neste Oil Corporation
- **FW's Technology is a Key Part of Renewable Diesel Fuel Plant**
  - Potential for converting a wide spectrum of biomass and wastes into carbon-neutral diesel fuels for transportation
  - Avoids "Food Competition" Issue
  - Uses Fischer-Tropsch process to produce renewable diesel fuel from clean syngas
- **Pilot Plant has been Operating for Over a Year**
  - 12 MWth plant capable of producing 4 kton/yr of FT Liquids
- **Follow-on Commercial Size Plant under Discussion with Client**
  - 450 MWth plant producing 150 kton/yr of FT Liquids



GPG's Biomass Gasifier Island

FW's Traveling Grate Boiler Technology

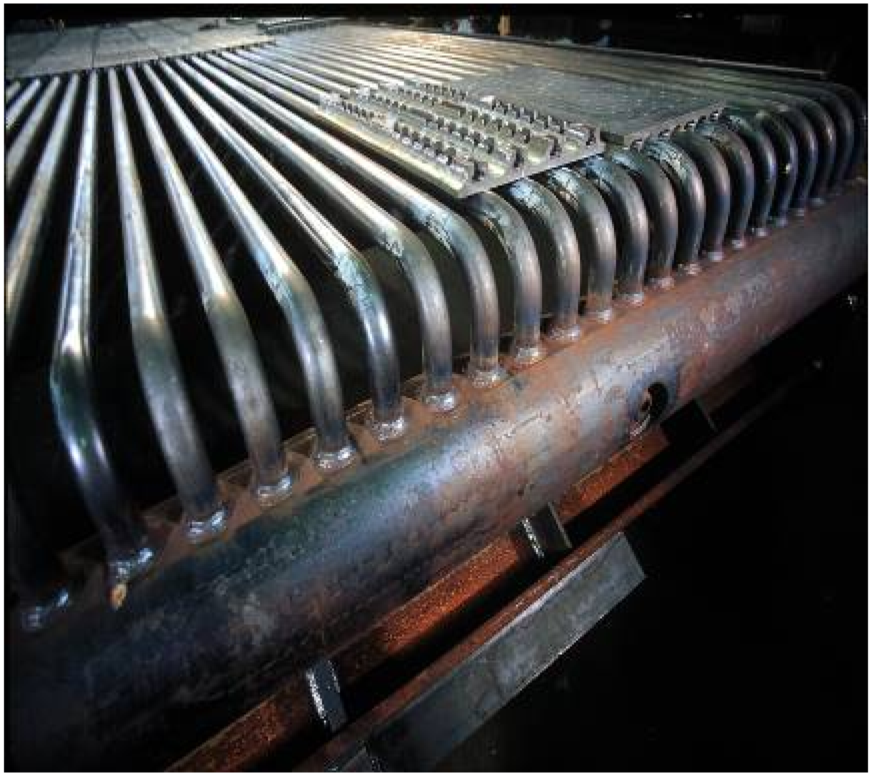
- **Used for most difficult fuels**
- **Extensive experience with Detroit Stoker's Rotor Grate**
- **Most experience firing 100% Poultry Litter**
- **Steam capacity range:**
  - 75-300 kpph (9-38 kg/s) on Poultry Litter
  - 75-600 kpph (9-76 kg/s) on Biomass



Advantages of the Vibrating Grate

- Minimal Moving Parts for High Availability and Lowest Maintenance Cost
- Drive Components Located Outside Hot Zone
- One Piece Grate Half the Size as Travelers
- Easy Under Grate Access with Zoning for Better Air Control
- Shop Assembled Grate Modules for Sizing Flexibility
- Intermittent Grate Drive Operation
- Automatic Ash Removal

Water Cooled Vibrating Grate



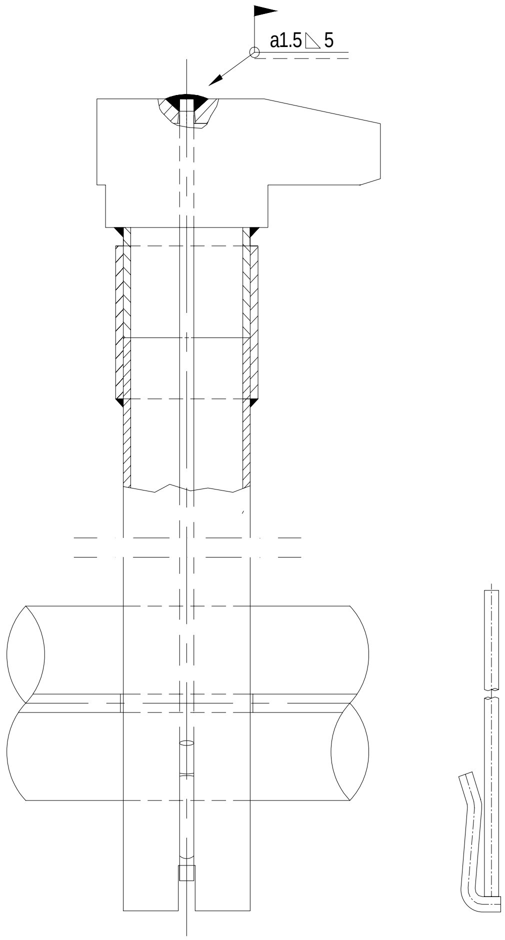
Step Grids Can Handle the Most Difficult Fuels

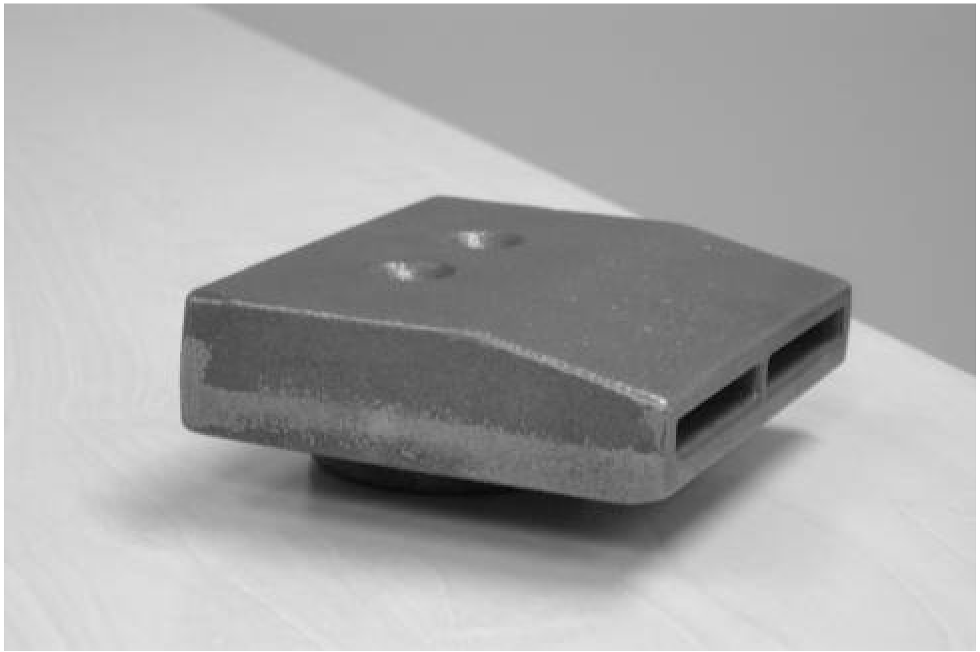
PROJECT	MWth	START-UP
Wilton	92	2007
Hylte	69	2006
Jamsankoski	185	2002
Aanekoski	157	2002
Myllykoski	88	2001
Katrinefors	36	2001
Haapajarvi*	7	2000
Voimavasu	32	2000
Stracel*	31	2000
Rauma*	60	1999
Forssa*	57	1998
Kaukas	109	1996
Cheng Kung	6	1995
Mikkeli	27	1984

***Retrofit Application**

14 BFBs Operating with Stepped Grid

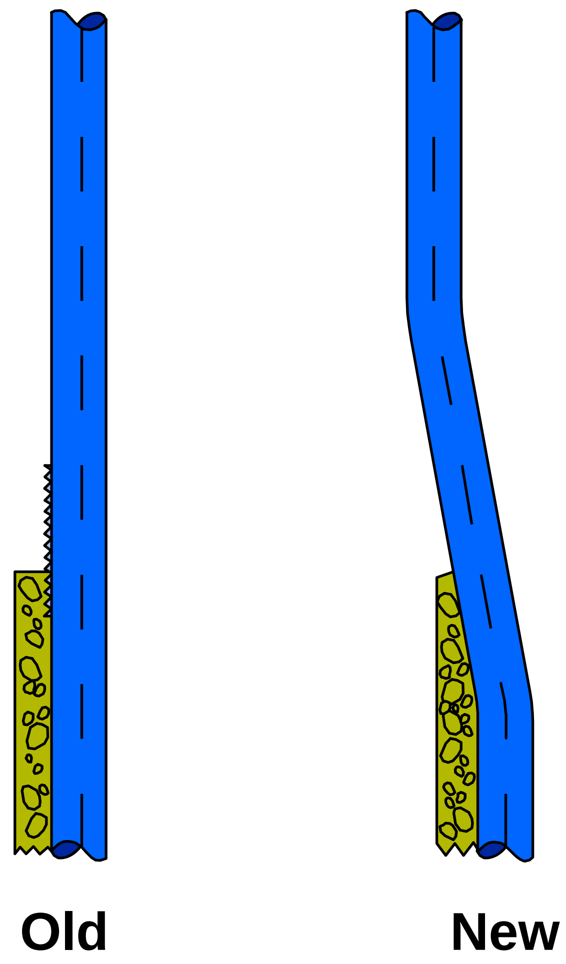
Step Grid Nozzles can easily be replaced





FW's Furnace Tube Design Eliminates Erosion

- Offered Since 1990
- Operating in over 100 Units Worldwide
- Up to 460 MWe Single Unit Experience



FW is a Proven Supplier of Biomass Boilers

Technology	Installed Units	Fuels	Size (MWe)
Circulating Fluid Bed	88	Demolition & Recycled Wood, Saw Dust, Forest Residue, Bark, Sludges, Peat, RDF, Paper Waste, Plastic, Bagasse, Rice Husk, Straw	4-125
Bubbling Fluid Bed	91	Bark, Wood Residue & Waste, Forest Residue, Saw Dust, Sludge, Peat, Recovered Fuel, Wood Chips, Hog Fuel, Olive Pits, Coffee Grounds, Rice Husk, Waste Fiber	2-62
Grate	210	Chicken & Turkey Litter, Agricultural Waste, Wood & Wood Waste, Wood Residue, Bark, Peat, Bagasse, Sun Flower Seed Hulls, Coffee Grounds, Muni-Refuse, Hog Fuel, Veneer, Sawdust, Broom Corn Refuse, Hogged Plywood	1-56

Note: Units listed fire biomass and waste as primary fuel. Some units also fire fossil fuels as secondary fuels. Capacity range based on 100% primary fuel firing.