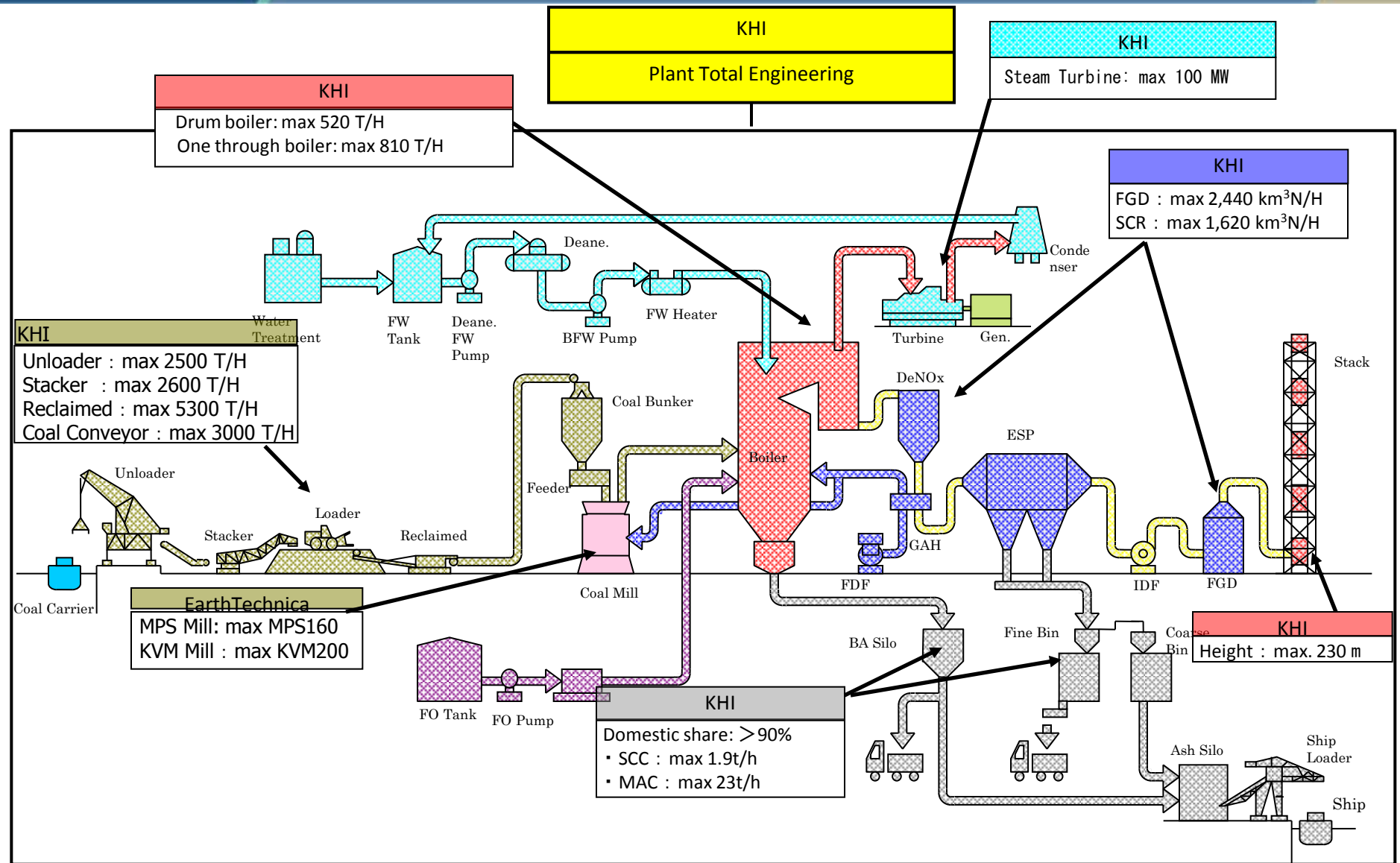


Kawasaki PC Boiler (Pulverized Coal Fired Boiler)

Kawasaki Heavy Industries, Ltd.

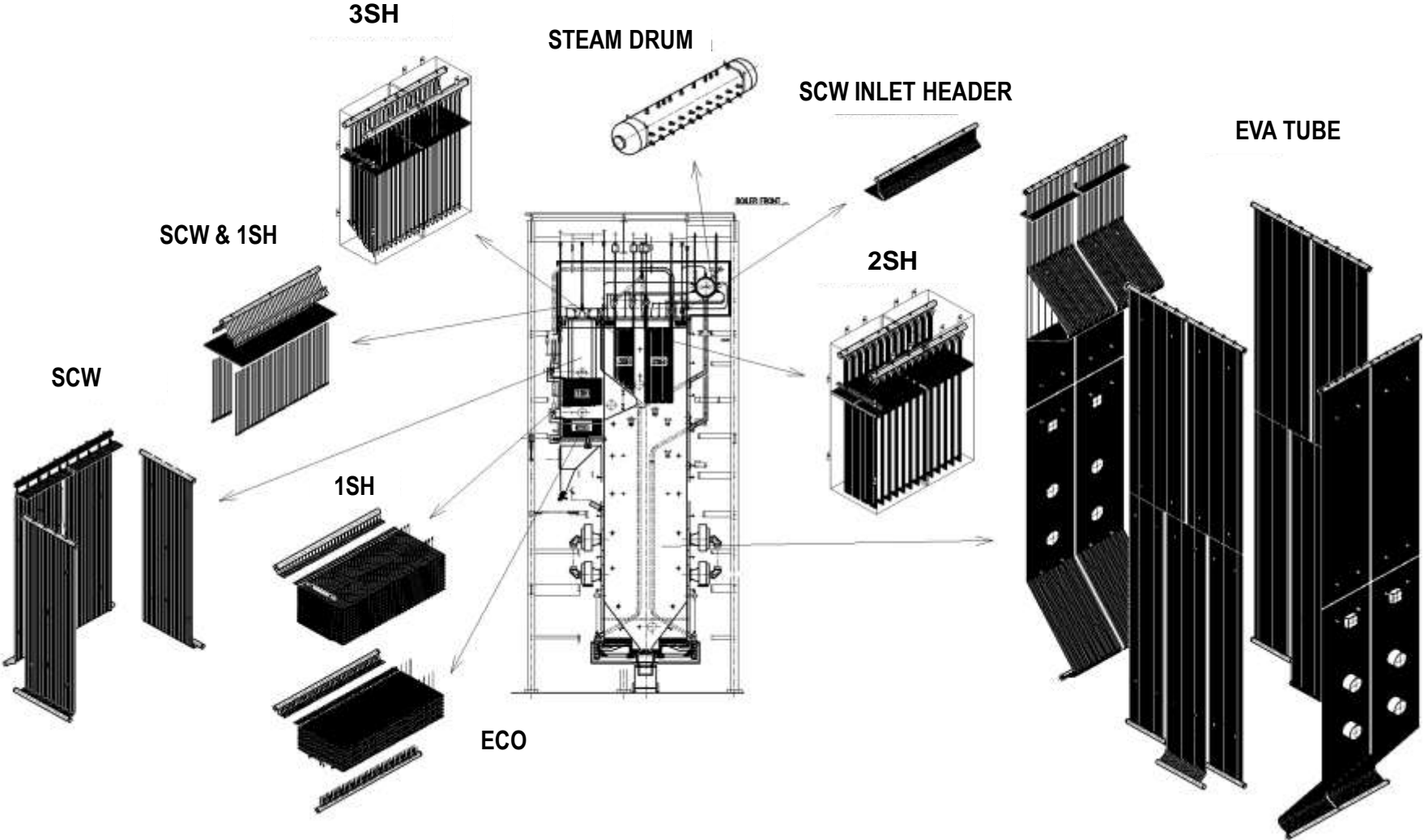
Capability of KHI for Coal Fired Power Plant



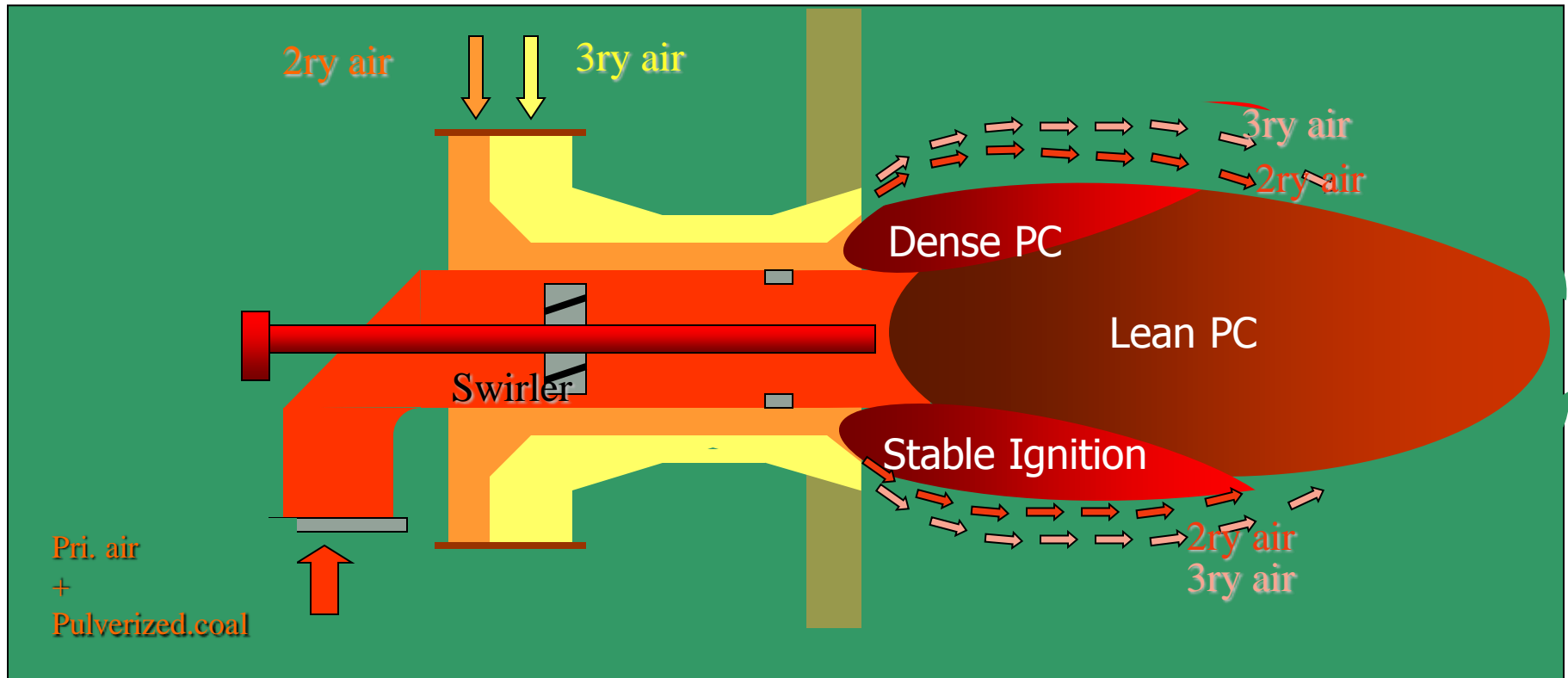
Capacity Coverage

Type		Application	Max Capacity
Drum Boiler	Self Standing Type	Small Size Boiler	Max: 120 t/h
	Hanging Type	Middle Size Boiler	Max: 520 t/h
One-through Boiler		High press/temp Boiler, Rather large size Boiler	Max: 810 t/h
Fluidized Bed Boiler		For low grade coal	Max: 156 t/h

Simple Structure of Boiler Pressure Part



Kawasaki Original Low-NOx Coal Burner - CC burner -



- Pulverized coal is separated to dense layer and thin zone by swirler.
- Outer flame is composed of dense PC while flame center is lean.
- Combustion air, 2ry and 3ry air are fed to outer flame, which makes burner flame stable.
- 3ry air is fed swirling, which uniforms combustion air distribution.

Kawasaki Original Vertical Mill (KVM Mill)

KHI designs and manufactures KVM Type Vertical Mill for a very extensive range of industries as power generation, iron manufacturing, cement manufacturing and chemical industry.

In the milling industry, KHI has to date manufactured and delivered over 1,000 mills for use in the treatment of raw materials. KHI has thus accumulated invaluable knowledge and experience in every field and developed a high reputation for their broad technological competence and reliability.



- High grindability**
- Low abrasively**
- Low running cost**
- Stable operation at load fluctuation**
- Low noise and vibration**
- Required small space**
- Easy maintenance**

Major installations of PCB Boiler (From 1985)

Customer/Location		Nos. Of Unit	Evaporation t/h	Boiler Specification		Turbine specification	Delivery Year
				Pressure MPaG	Temp. °C		
Naikai Salt Industries	Okayama	1	66	7.16	485	Condensing extraction 8.9MW	1985
Electric Power Development	Ishikawa	2	490	19.12	569/569	Condensing extraction 156MW	1986
Nippon Paper Industries	Kushiro	1	380	13.63	553	Condensing extraction 54MW	1986
Idemitsu Kosan Co.	Aichi	1	200	12.75	540	Condensing extraction 36MW	1987
Nippon Paper Industries	Fushiki	1	150	13.63	553	Condensing extraction 33MW	1989
Nichiha Corporation	Nagoya	1	100	9.81	528	Condensing extraction 10.75MW	1994
Okinawa Electric Power	Gushikawa	1	520	17.26	569/541	Condensing extraction 156MW	1994
Nippon Paper Industries	Kushiro	1	260	14.71	569/541	Condensing extraction 88MW	2004
Nippon Beet Sugar Mfg	Memuro	1	170	6.08	483	Back pressure extraction 15MW	2004
Ishihara Sangyo Kaisha	Yokkaichi	1	200	12.74	540	Condensing extraction 38MW	2005
Nippon Beet Sugar Mfg	Bihoro	1	80	8.14	473	Back pressure extraction 6.5MW	2005
STEAG-STATE Power Inc.	Philippine Mindanao	2	370	16.82/14.02	541/541	Condensing extraction 116MW	2006
Nippon Paper Chemicals Co.	Gotsu	1	105	6.86	465	—	2008
Hokuren Federation of Agricultural Coop	Nakashari	1	145	8.53	503	Back pressure extraction 15.5MW	2010
PT. Semen Tonasa	Indonesia	2	144	9.0	513	Condensing extraction 35MW × 2	2013
PT. Pupkik Sriwidjaja Palembang	Indonesia	2	240	5.5	487	Condensing extraction 38MW x1	2015

Installation (1)

Electric Power Development Corp./ Ishikawa



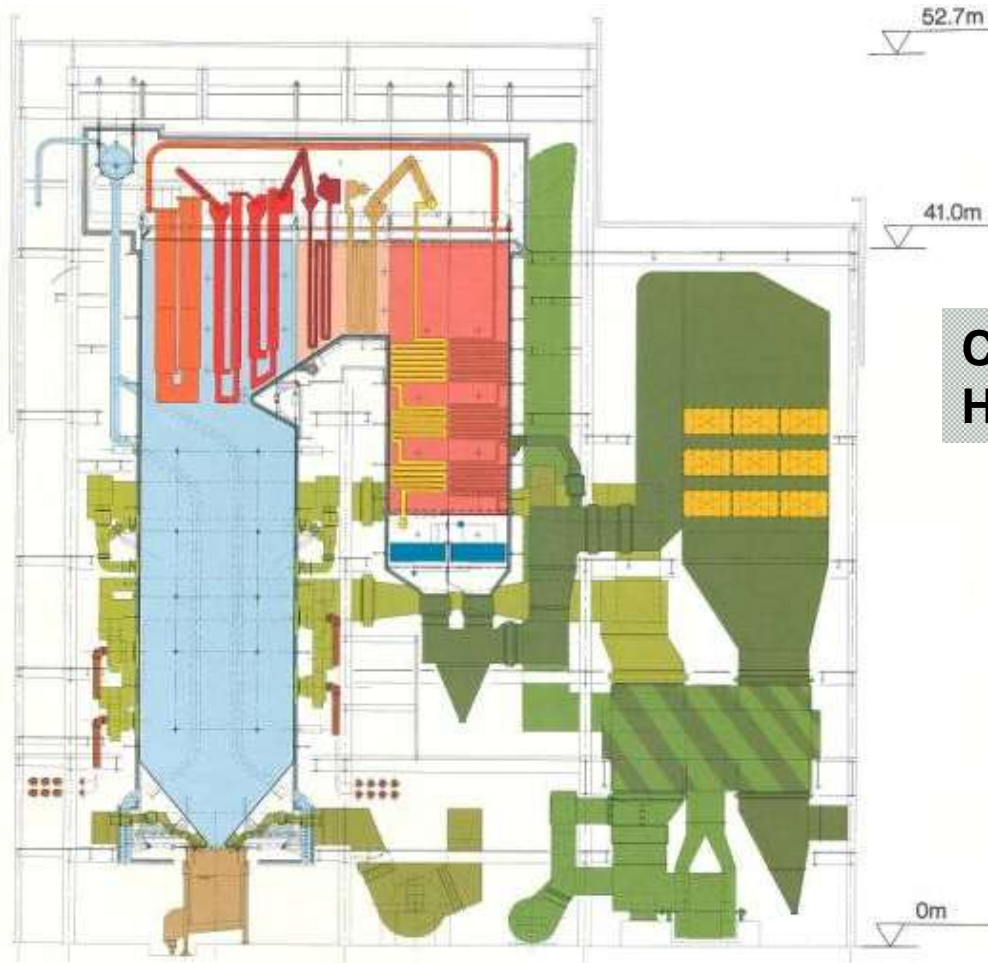
Steam Generation	: 490 t/h
Steam Pressure	: 205 / 195 kgf/cm ² G 20.3/19 MPa
Steam Temperature	: 569/569 °C
Fuel	: Coal
Operation Start	: 1986

Coal Fired one-through sub-critical pressure boiler installed in a small island



Installation (2)

Okinawa Electric Power Corp./ Gushikawa

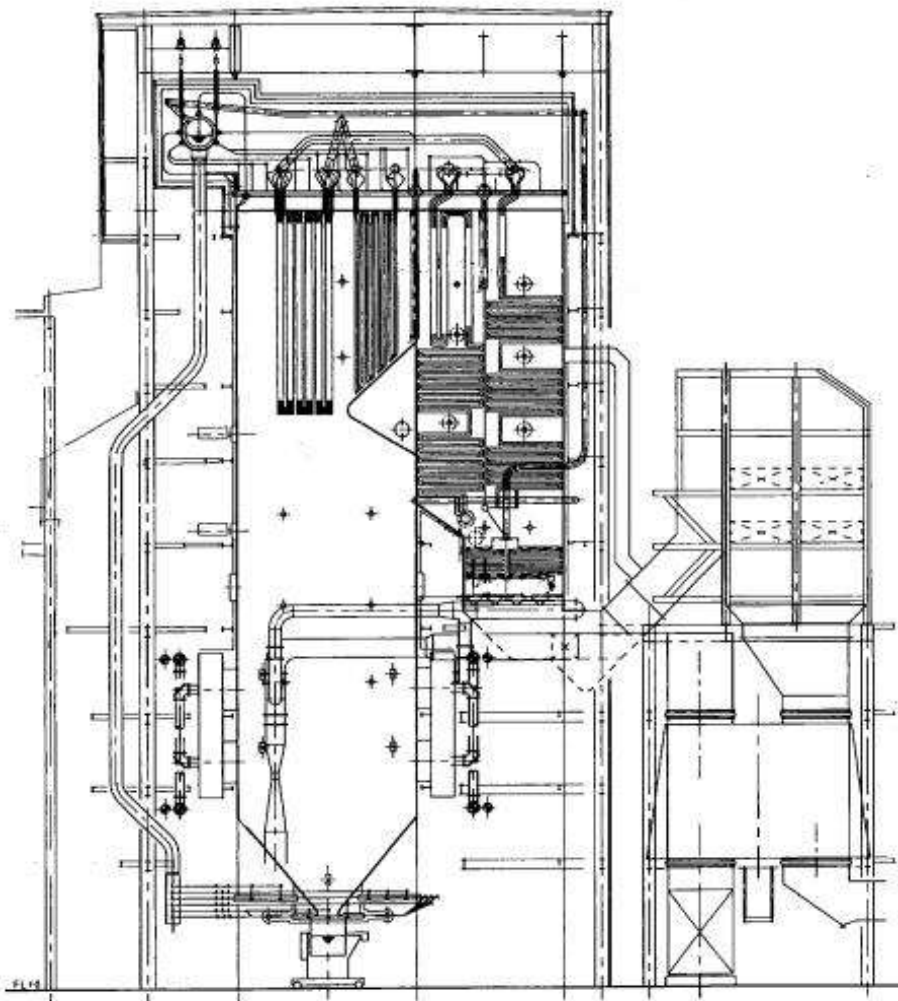


Steam Generation	: 520t/h
Steam Pressure	: 176 kgf/cm ² G 17.5 MPa
Steam Temperature	: 569 / 541°C
Unit Capacity	: 156 MW
Fuel	: Coal
Operation Start	: 1994

**Coal Fired Drum Boiler with
Hybrid sliding pressure operation**



Installation (3) Nippon Paper Ind./ Kushiro



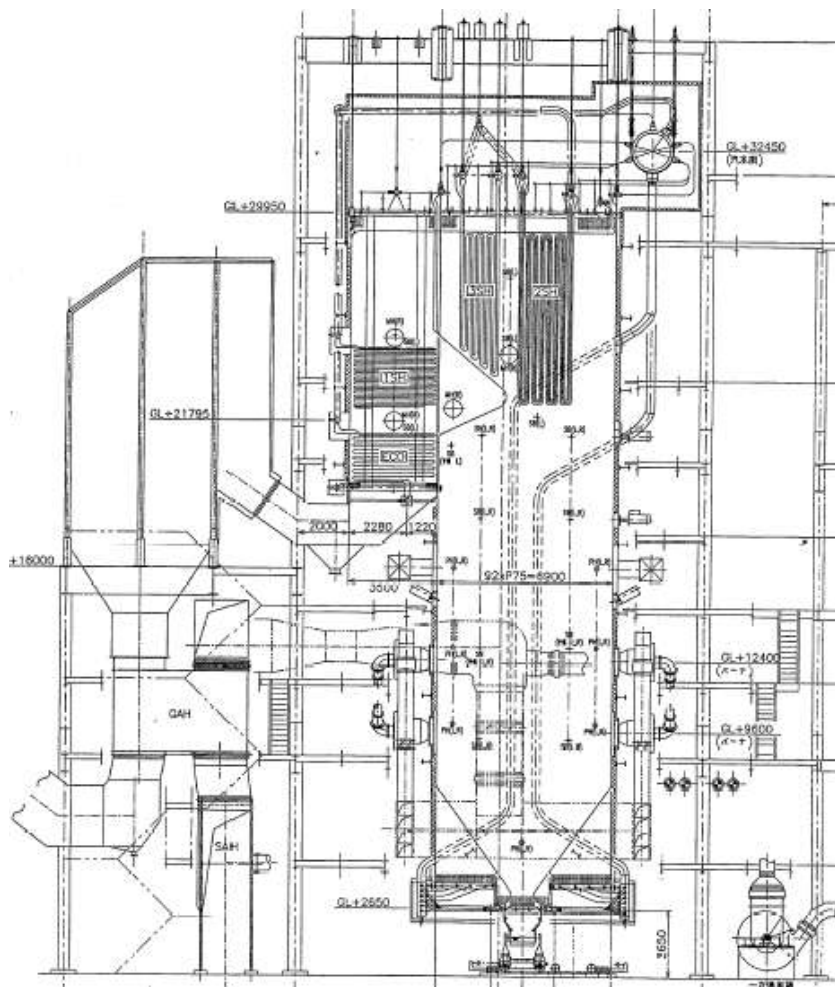
Steam Generation	: 260 t/h
Steam Pressure	: 150 kgf/cm ² G 14.7 MPa
Steam Temperature	: 569 / 541°C
Power Output	: 88 MW
Fuel	: Coal
Operation Start	: 2004

Coal Fired Reheat Cycle IPP



Installation (4)

Ishihara Sangyo Kaisha / Yokkaichi



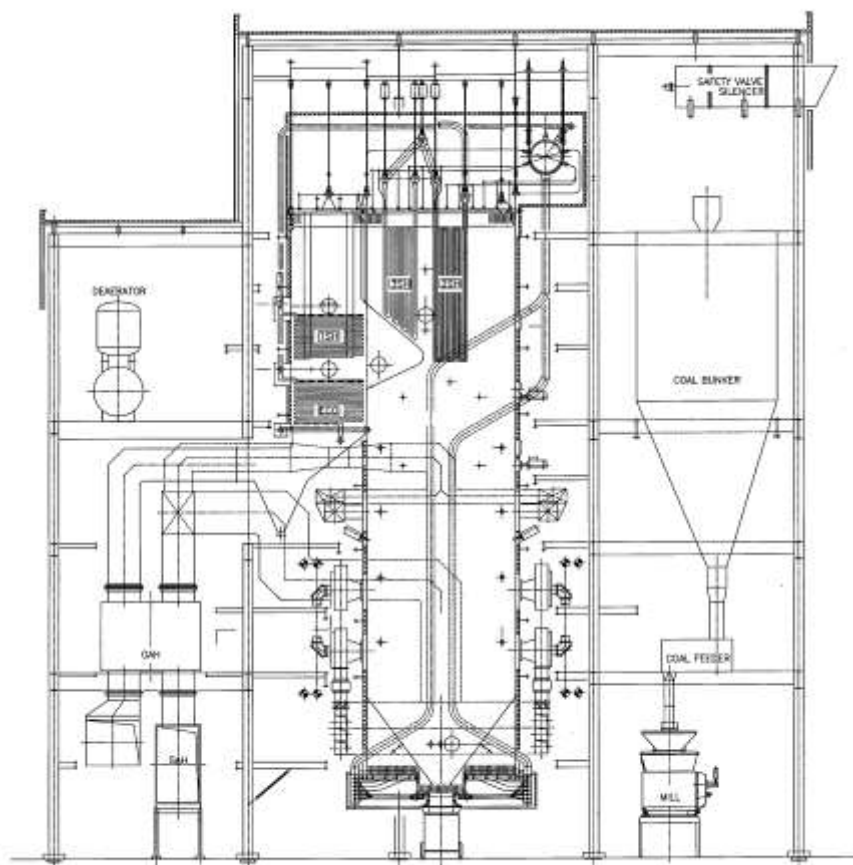
Steam Generation	: 200 t/h
Steam Pressure	: 12.7 MPa (130 kg/cm ² g)
Steam Temperature	: 540 °C
Feed Water Temp.	: 195 °C
Fuel	: Coal ,Heavy Oil
Emission regulation	:
NOx	: 30 ppm (with SCR)
SOx	: FGD Efficiency \geq 97%
Particulate	: 40 mg/m ³ N
Operation Start	: 2005

PCB in the region of very stringent emission level.
BTG full plant supplied by KHI as full turnkey job



Installation (5)

Nippon Beet Sugar mfg. / Memuro



Steam Generation	: 170 t/h
Steam Pressure	: 62 kgf/cm ² G
Steam Temperature	: 483 °C
Turbine	: 15,000 kW
Operation Start	: October 2004

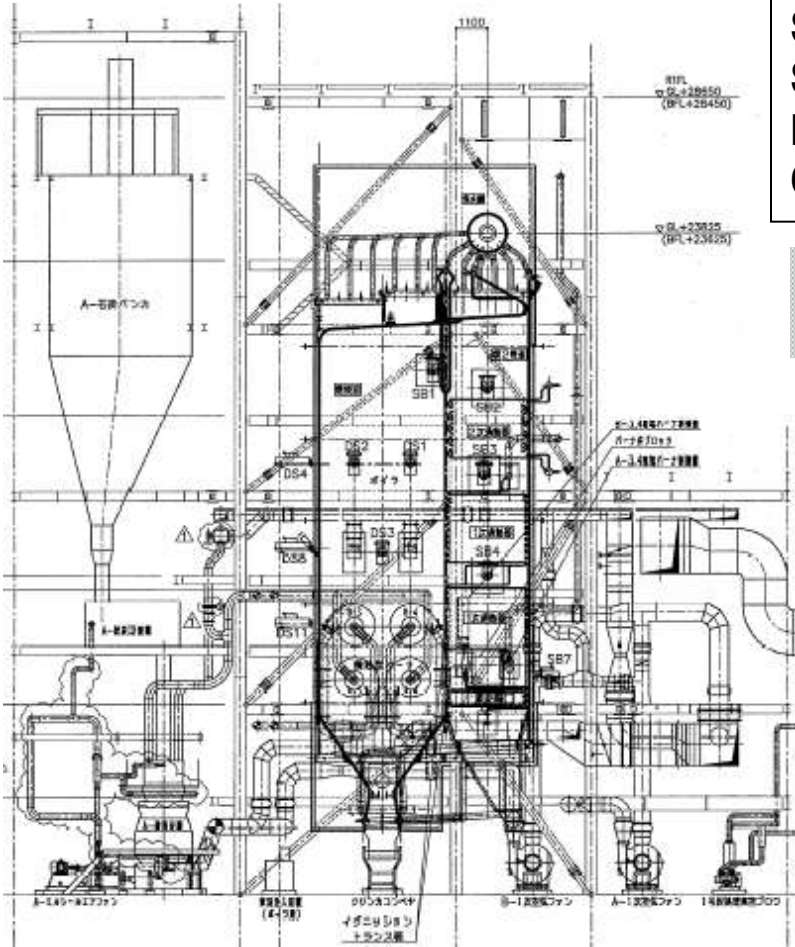
PC Boiler of normally island operation providing steam and electricity to sugar plant.



Installation (6) Nippon Beet Sugar mfg./Bihoro

Steam Generation	: 80 t/h
Steam Pressure	: 8.14 MPa (83 kg/cm ² g)
Steam Temperature	: 473 °C
Fuel	: Coal, Heavy Oil
Operation Start	: October 2005

Small size PC Boiler, normally island operation providing steam and electricity to sugar plant.



Installation (7)

STEAG-STATE Power Inc. /Mindanao, Philippine



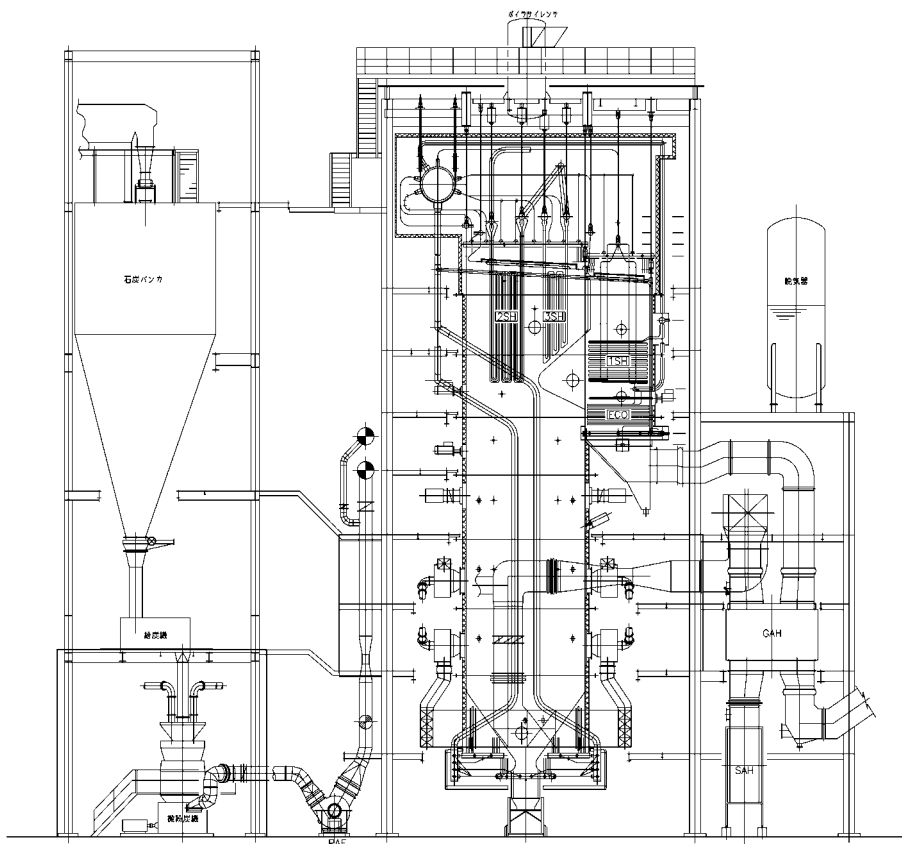
Power output : 210 MW
Steam generation : 370 t/h × 2 units
Steam pressure : 171.5 cm²g
Steam temperature : 541/541 °C
Fuel : Coal, FO
Operation start : 2006

Full turn key job, including Boiler, Turbine, Generator, Fuel handling system, Ash handling system, Demineralizer, Waste water treatment system, Jetty for coal unloading, Sea water injection, Power transmission cable and so on.



Installation (8)

Nippon Paper Chemicals / Gotsu



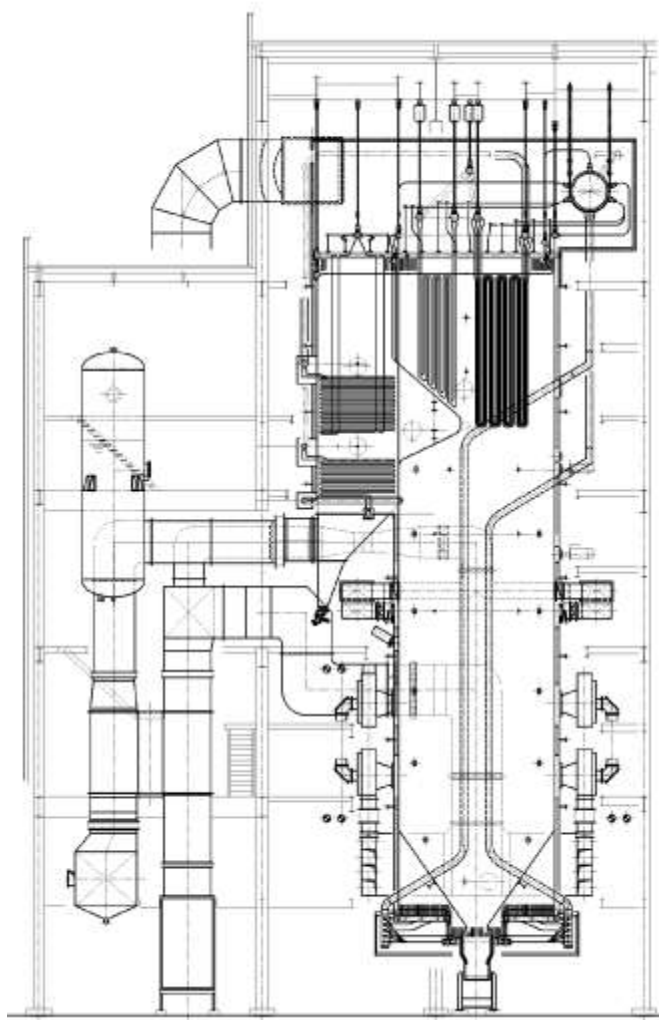
Steam Generation	: 105 t/h
Steam Pressure	: 70 kgf/cm²G 6.86 MPa
Steam Temperature	: 465 °C
Fuel	: Coal, Heavy Oil
Operation Start	: 2008

Typical small sized PC Boiler for paper-manufacturing company.



Installation (9)

Hokuren Federation of Agricultural Cooperatives / Naka Shari



Steam Generation	: 145 t/h
Steam Pressure	: 87 kgf/cm²G 8.53 MPa
Steam Temperature	: 503 °C
Power Output	: 15.5 MW
Fuel	: Coal, Heavy Oil
Operation Start	: 2010

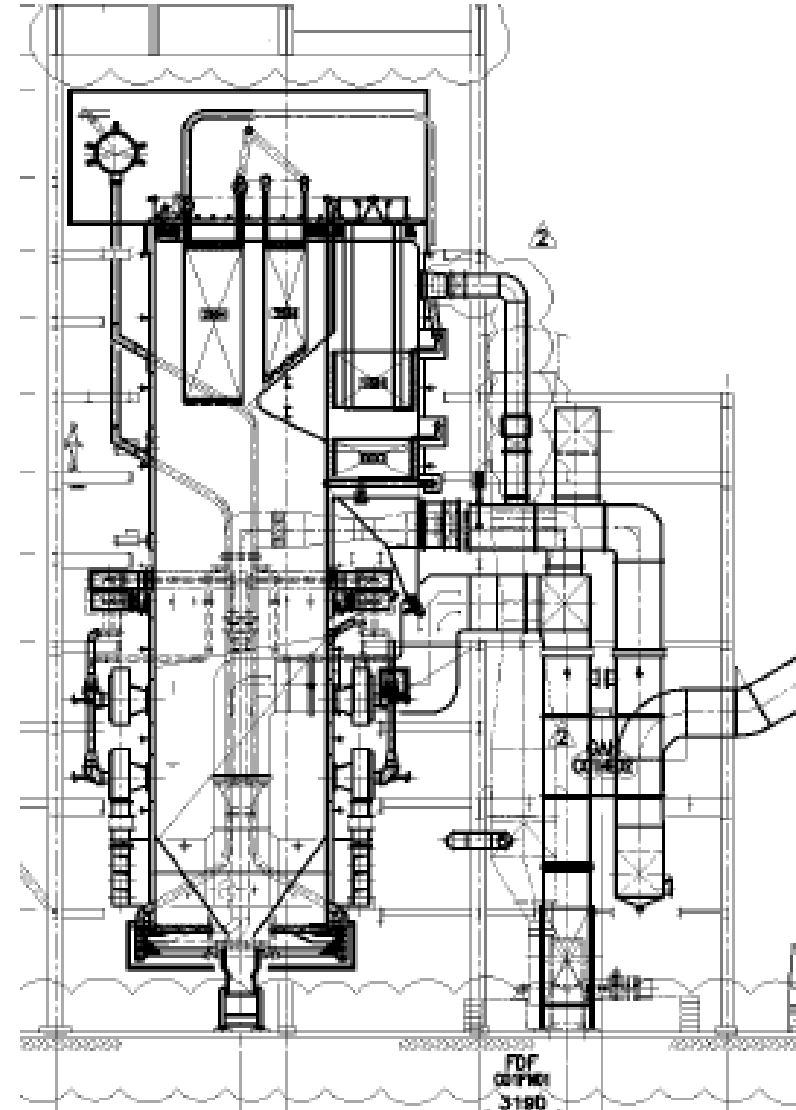
PC Boiler normally island operation providing steam an electricity to sugar plant.



Installation (10) PT. Semen Tonasa / Indonesia

Steam Generation	: 144 t/h × 2 units
Steam Pressure	: 9.0 MPa
Steam Temperature	: 513 °C
Power Output	: 35 MW × 2 units
Fuel	: Low Grade Coal
Operation Start	: 2013

Sub-bituminous with 40% moisture coal fired island operation Boiler.



Kawasaki, working as one for the good of the planet
“Global Kawasaki”