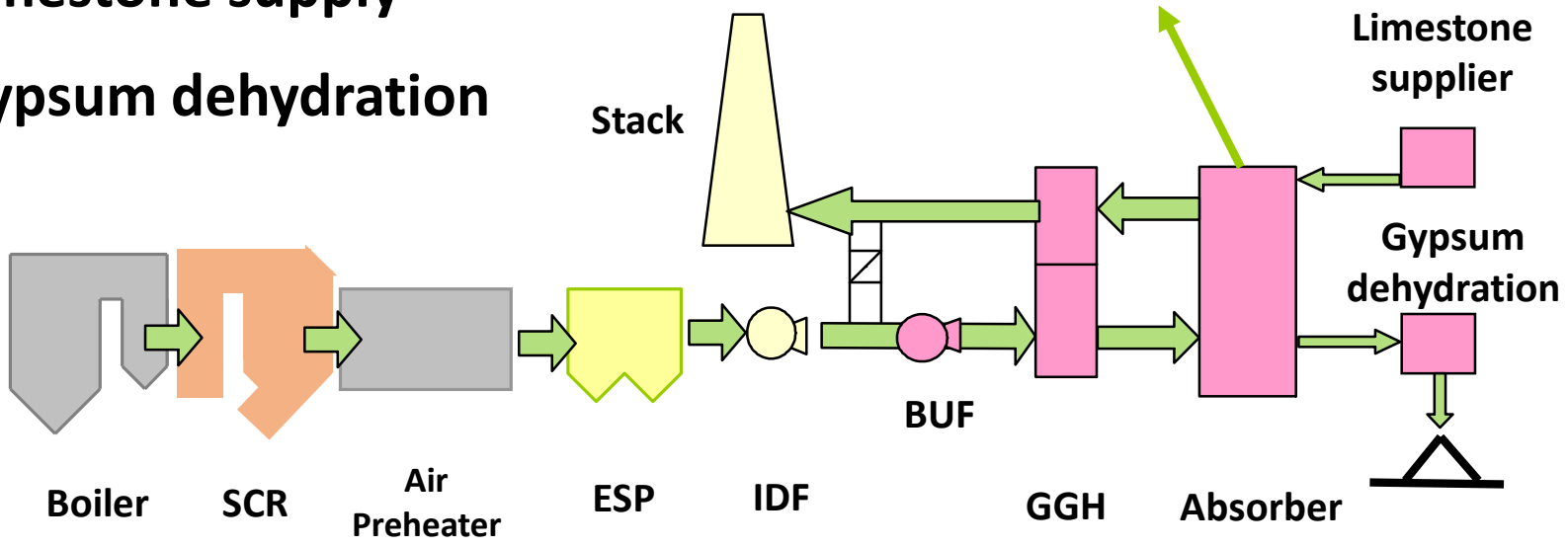
FGD-Limestone

Process of FGD-Limestone

- **Absorber**
- **GGH**
- **BUF**
- **Limestone supply**
- **Gypsum dehydration**

Principle

$$SO_2+CaCO_3+1/2\ O_2+2H_2O \rightarrow CaSO_4\cdot 2H_2O+CO_2$$



FGD-Limestone Absorber

Spray = simple

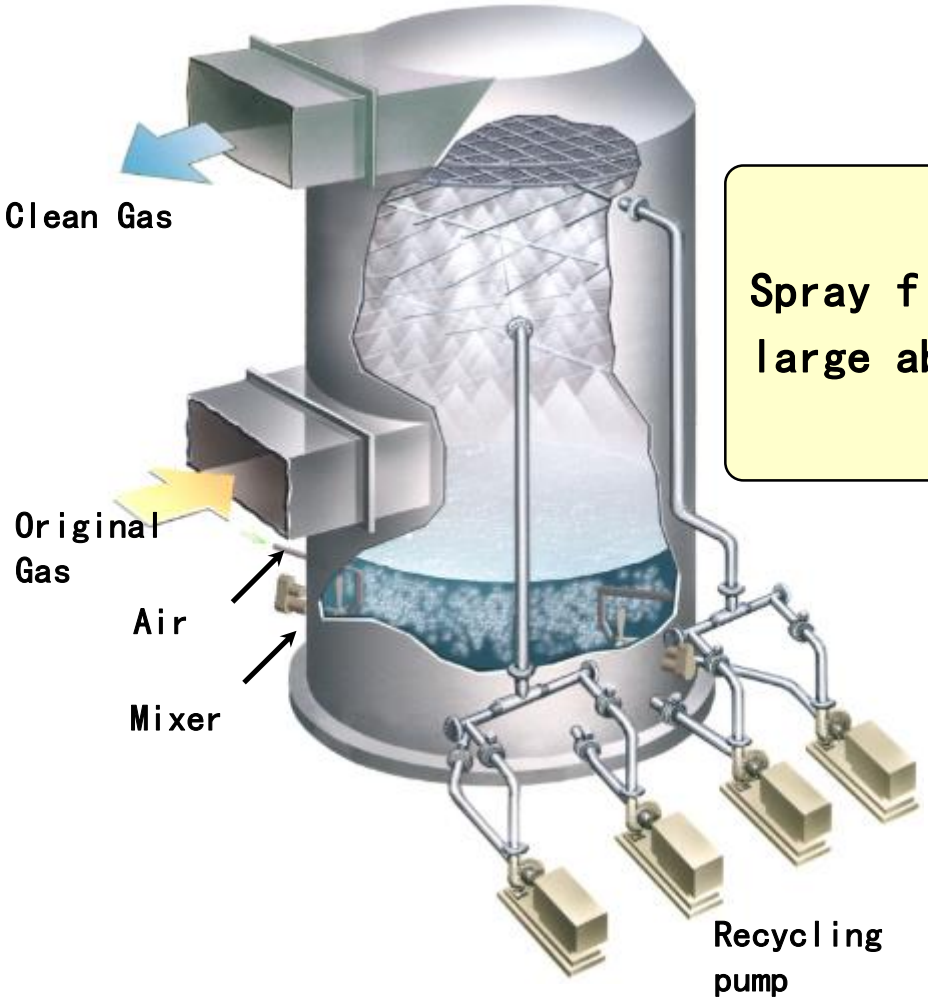
large absorber

Low pressure drop

No block

Easy for maintenance

High Stability



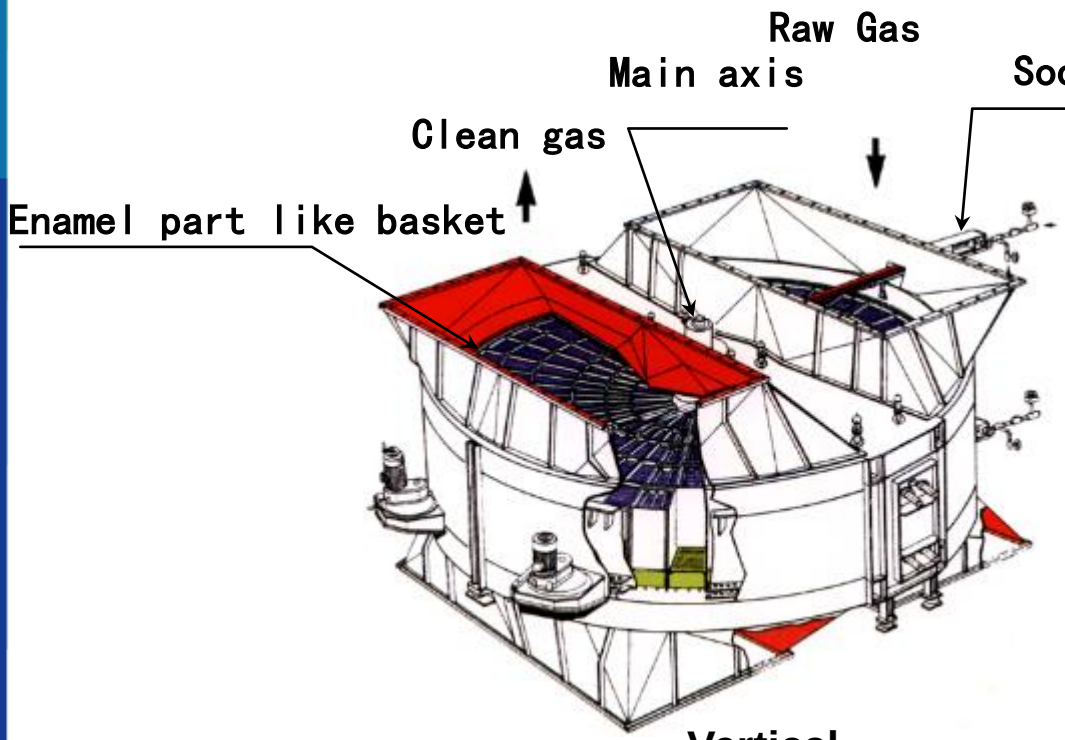
Spray fit for large absorber

FGD-GGH

Specifications

- Higher heat exchange efficiency
- No steam Needed
- Less scaling(Enamel)
- Lower cost, longer life

Enamel Part

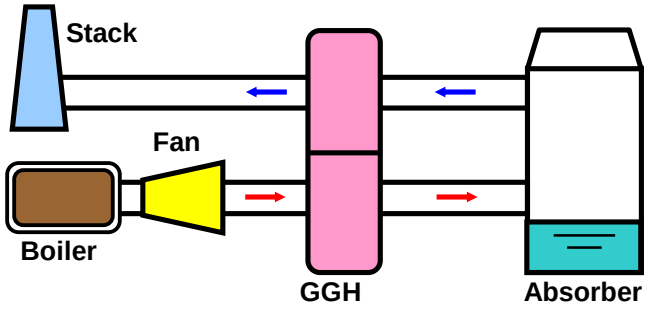
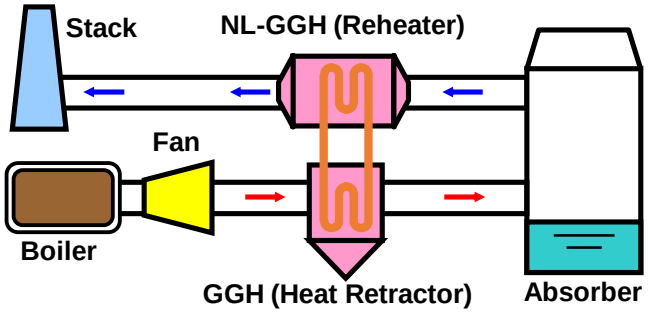
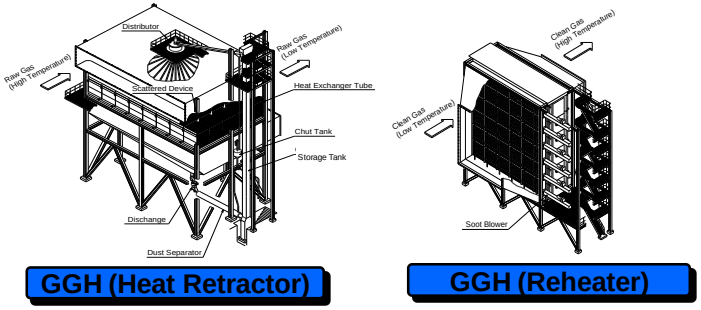


Vertical

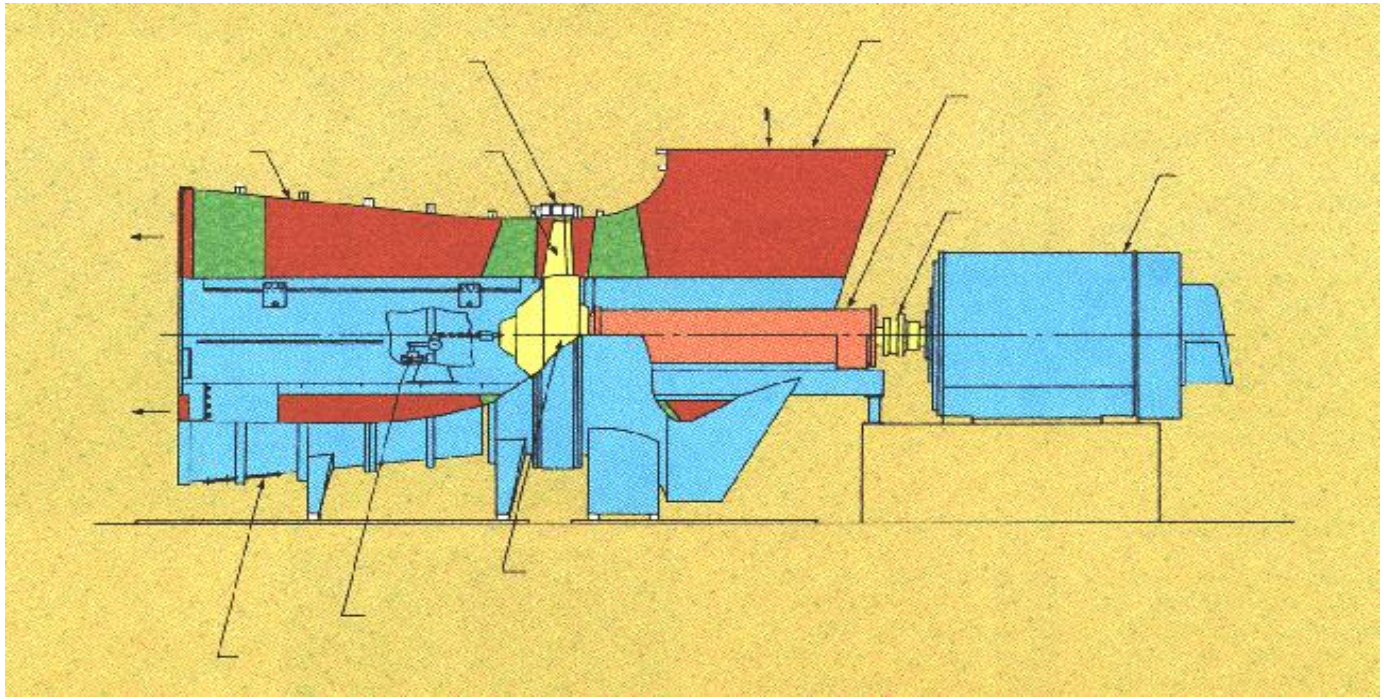
Horizontal

上海电气 SHANGHAI ELECTRIC

GGH/NLGGH

	GGH	Non-leak GGH
Process		
Picture		
medium	Enamel Steel	Water
Leak	Yes	No
Equipment	little	Many
Investment	Low	High

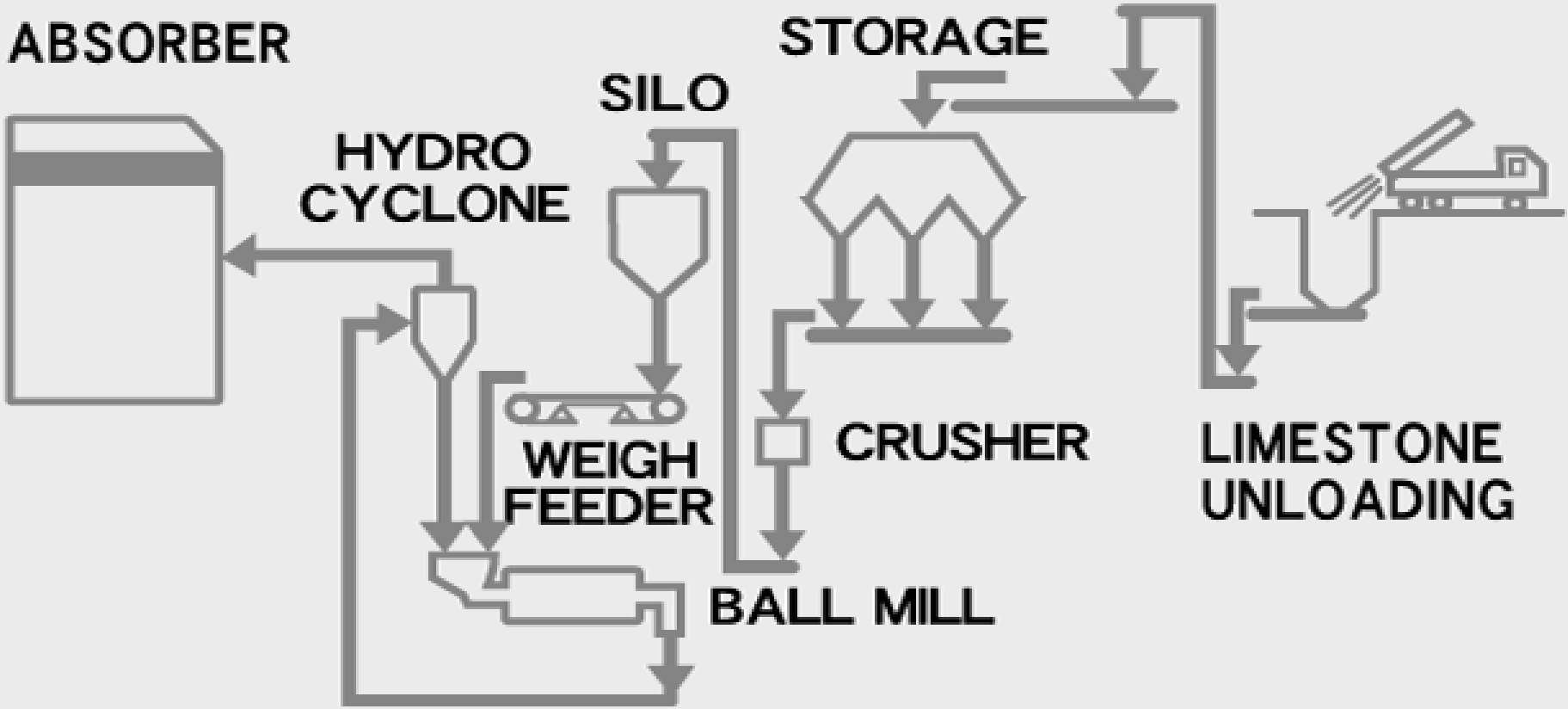
FGD BUF



BUF

Blades

Limestone supply system



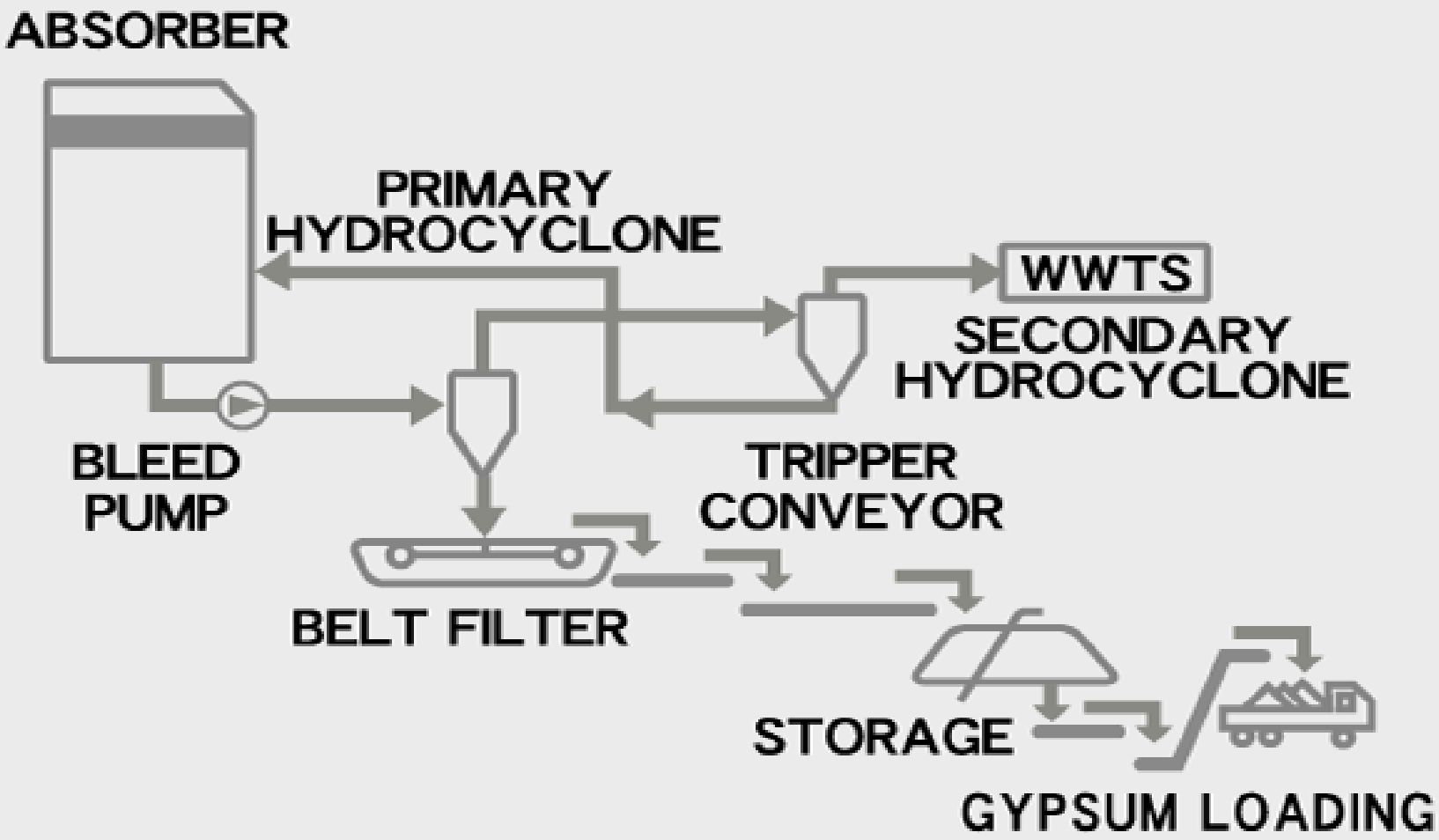
Limestone supply system

LIFTER →

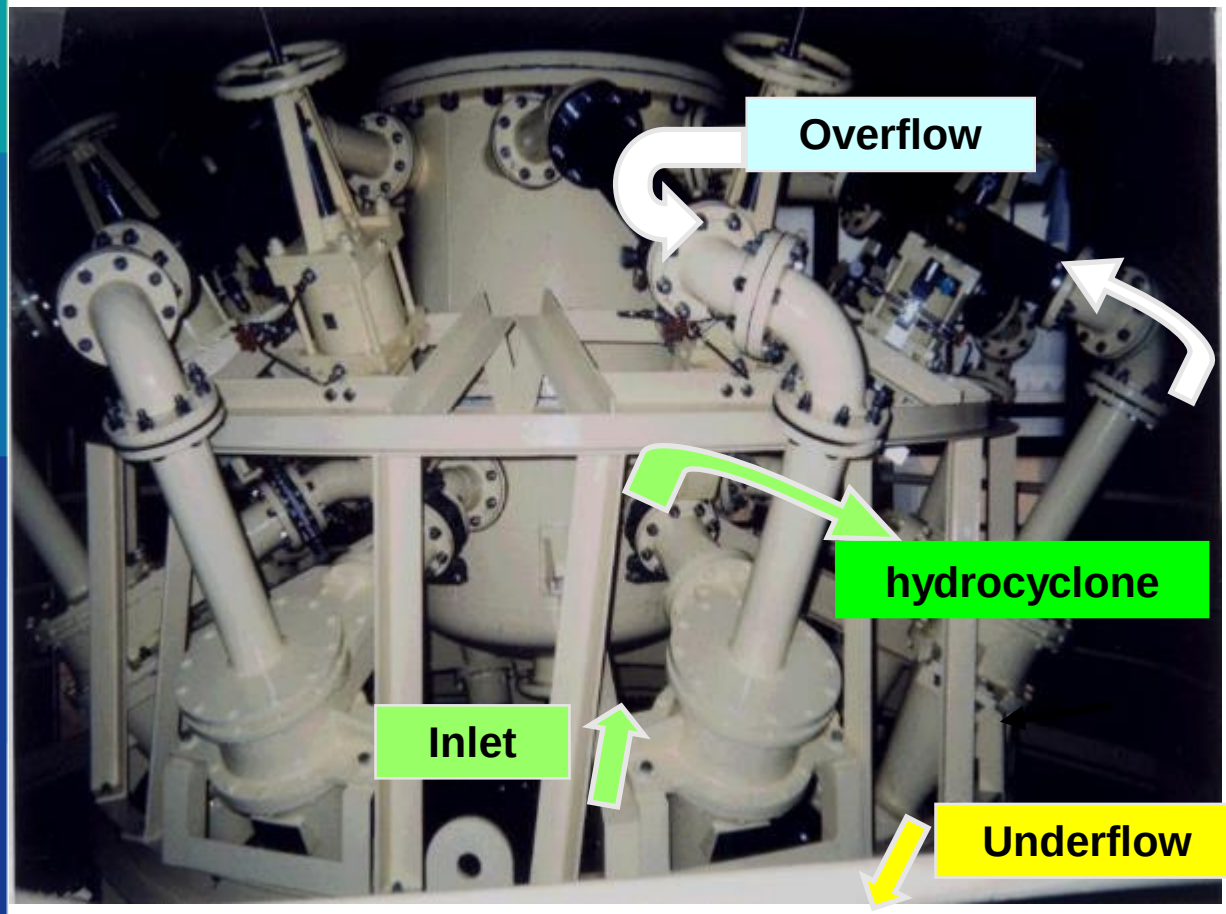
STORAGE ←

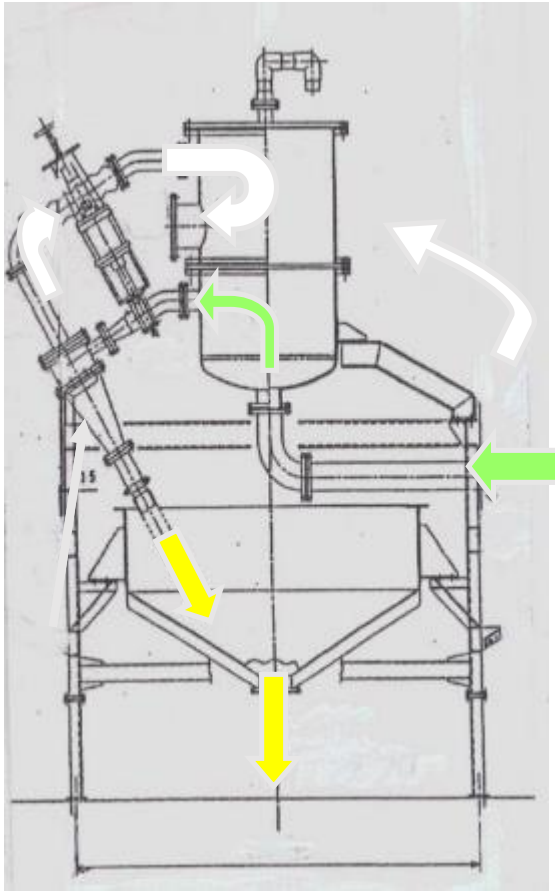
BALL MILL →

Gypsum dehydration



Gypsum dehydration



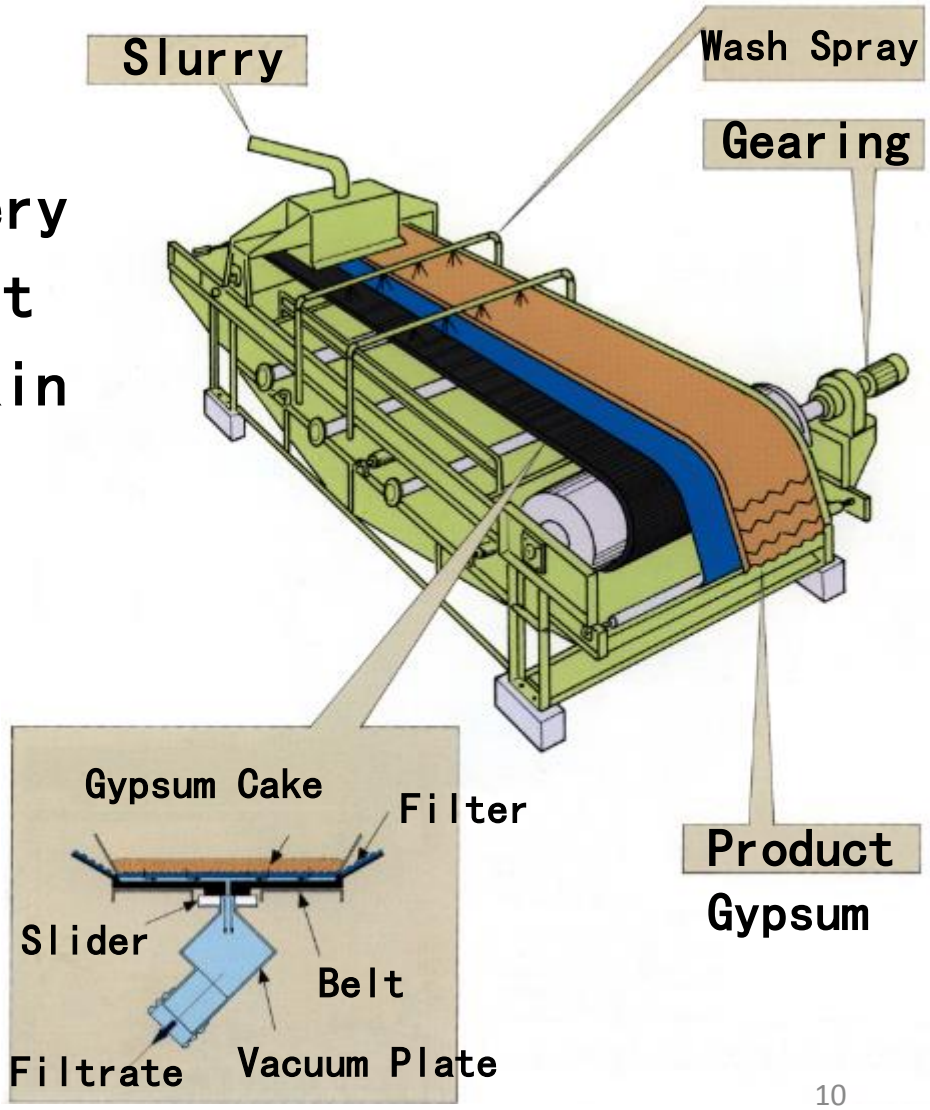


Hydro cyclone

Gypsum dehydration

Specifications

- Maximum Product recovery
- Lowest moisture content
- Easy to run and maintain
- Low operation cost



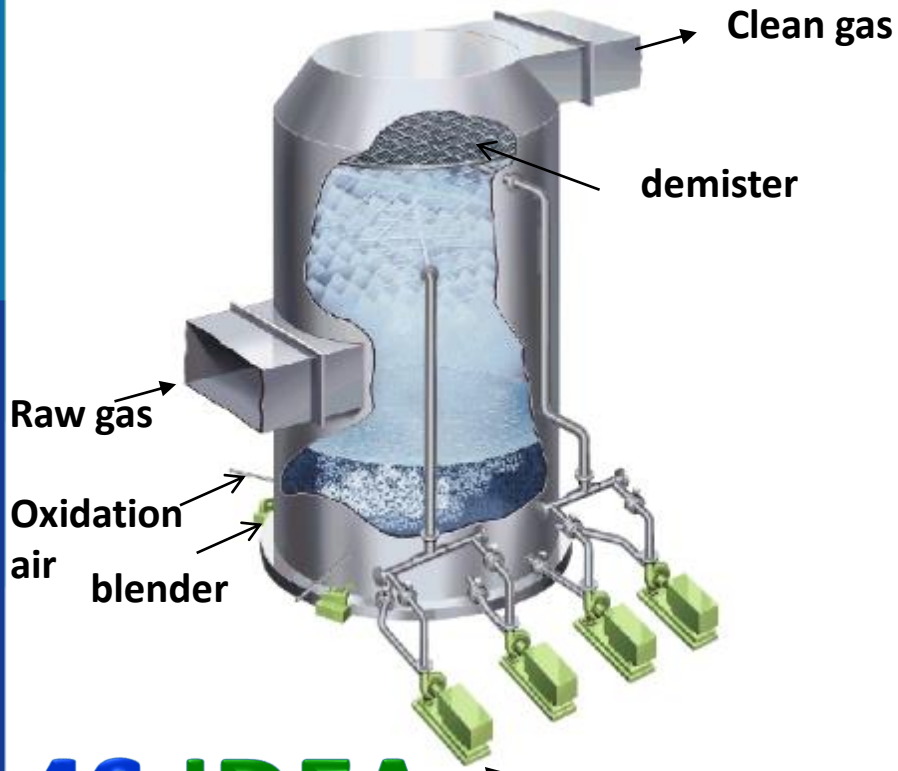
Dehydrate slurry on the belt, and filtrate goes down to the vacuum plate

Gypsum dehydration

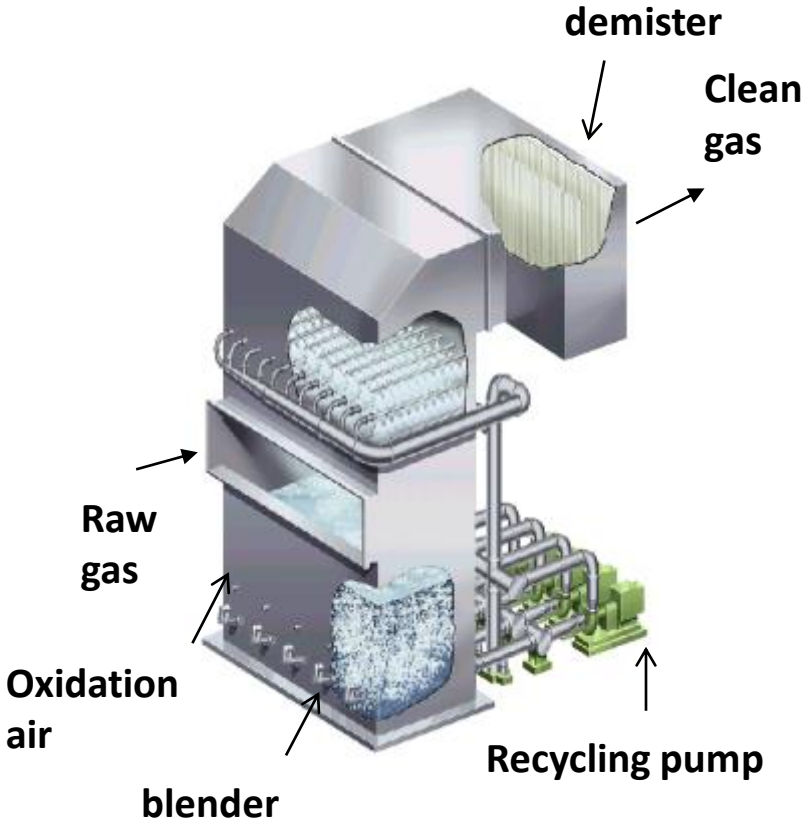
Belt filter

SELECTIVE AND SIMPLE

Cylinder Absorber



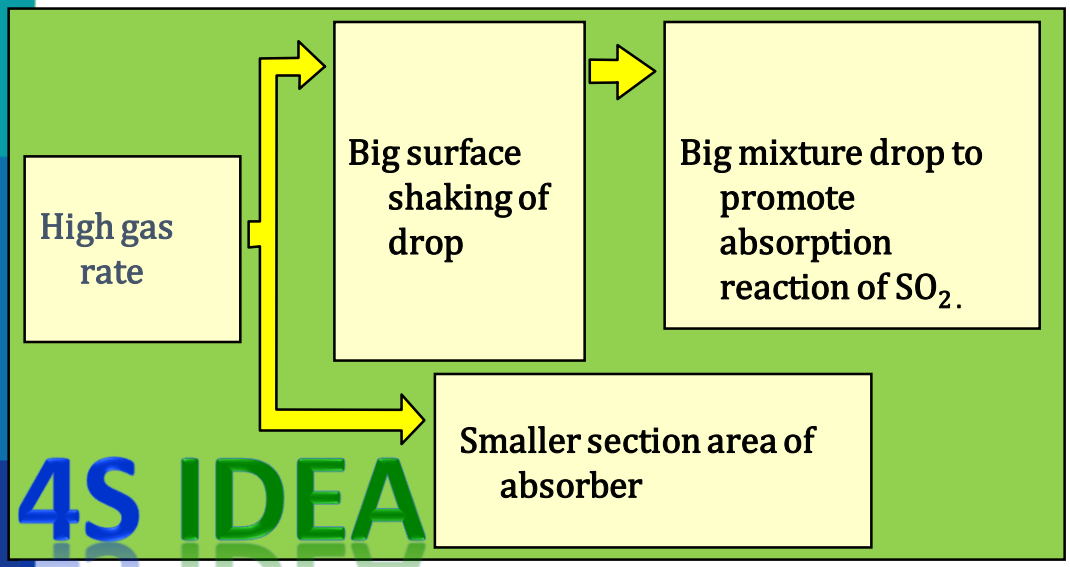
Square Absorber

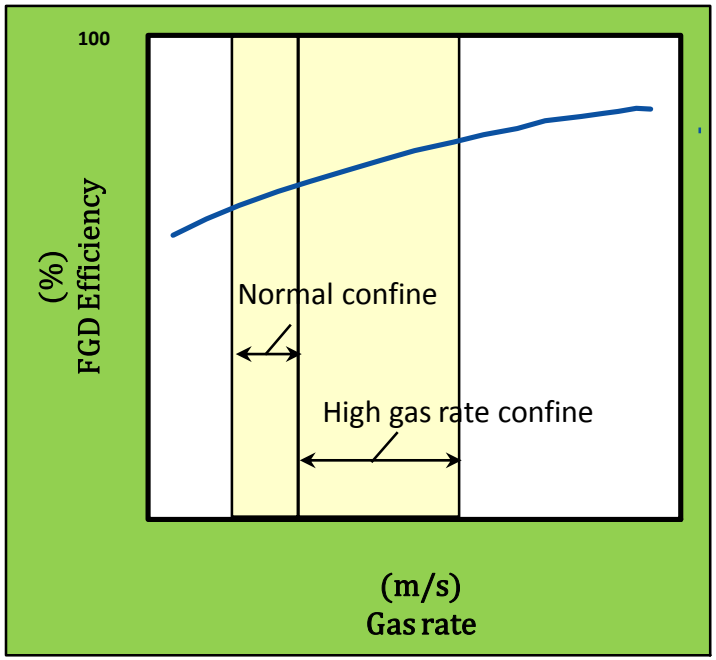


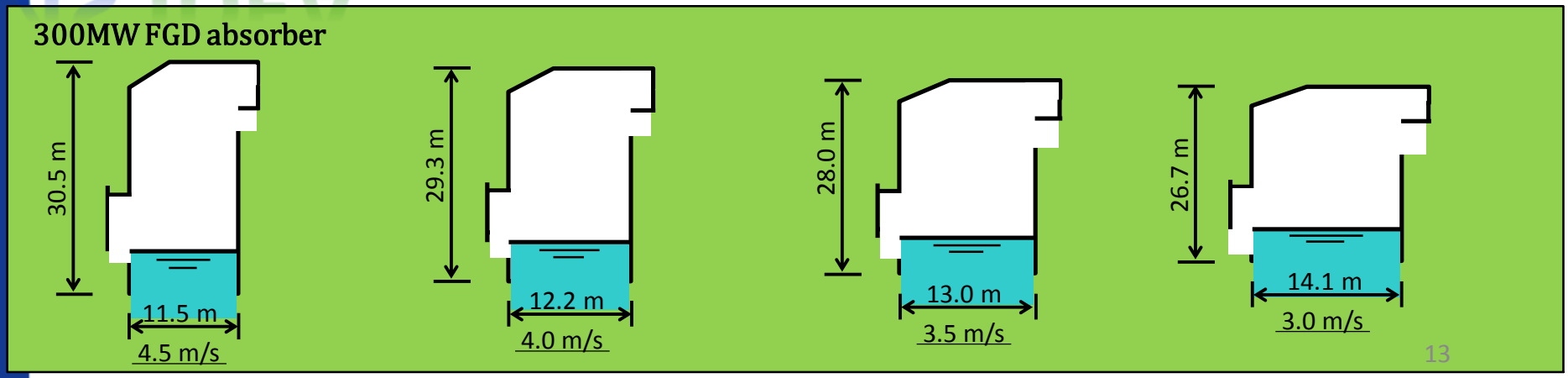
4S IDEA

SMALL

- **High FGD and De-dust**
- **The diameter of absorber can be narrowed.**

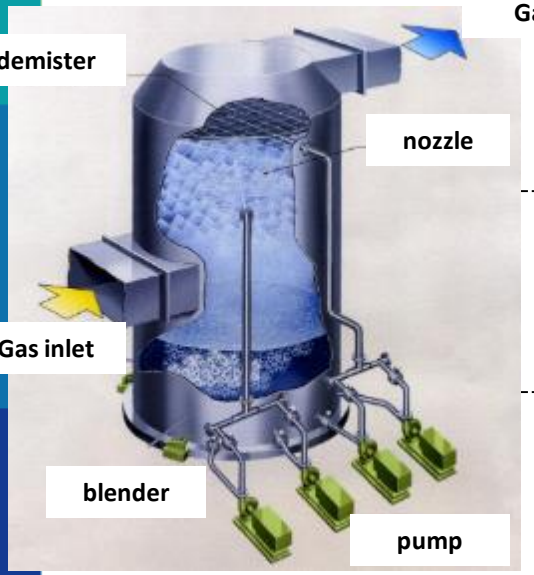






Saving

New low pressure loss nozzle is used to decrease power of circulation pump and increase De-duct performance of FGD



nozzle

◎spiral nozzle

low injection pressure and fine mist to increase the de-dust performance and decrease circulation pump power

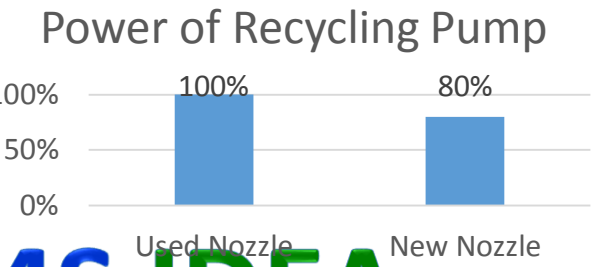
Used nozzle (hollow)

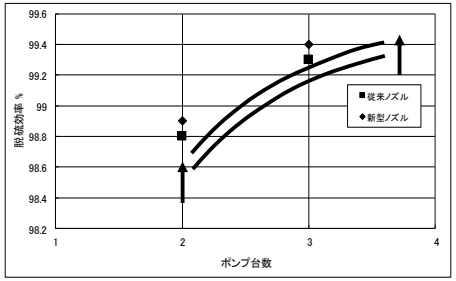
New nozzle (spiral)

FGD efficiency → 0.1% increase

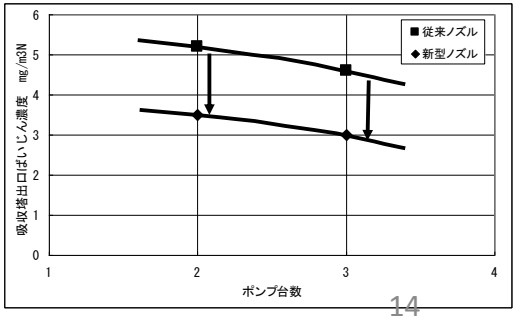
SO_2 reduced 10% at outlet

5 → 3 mg / m^3N





FGD Efficiency enhanced



Outlet Dust decreased

4S IDEA

FGD Projects

Baogang Power Plant 3x350MW
Retrofitting project
Time of Commission: 2008-2009

Gas Flow	1,629,000Nm³/h
Inlet Temp	147.2℃
Inlet SO2	1800mg/m3N-dry
Inlet Dust	162mg/m3N-dry
Outlet Temp	≧81.7℃
Outlet SO2	≦50mg/m3N-dry (η=96%)
Outlet Dust	≦50mg/m3N-dry
Byproduct	Gypsum (CaSO4•2H2O)
Purity	≧90%
Moisture	≦10wt%
GGH	Yes

FGD Projects

Baotou Power Plant 2x600MW
New project
Time of Commission: Dec, 2006

Gas Flow	2,258,393Nm³/h
Inlet Temp	120℃
Inlet SO2	2471mg/m³N-dry
Inlet Dust	150mg/m³N-dry
Outlet Temp	≧81.7℃
Outlet SO2	≦124mg/m³N-dry (η=96%)
Outlet Dust	≦100mg/m³N-dry
Byproduct	Gypsum (CaSO4•2H2O)
Purity	≧90%
Moisture	≦10wt%
GGH	Yes

FGD-Projects

Gas Flow	2011342Nm3/h
Inlet Temp	87℃
Inlet SO2	1948mg/m3N-dry
Inlet Dust	15mg/m3N-dry
Outlet Temp	44.5 ℃
Outlet SO2	≦20mg/m3N-dry (η=99%)
Outlet Dust	≦10mg/m3N-dry
Byproduct	Gypsum
Purity	≧90%
Moisture	≦10wt%
GGH	No

Pingshan Power Plant 2X660MW

New project, Time of Commission: Feb, 2016

FGD- Projects

Waigaoqiao 2 Power Plant 2×900MW

Retrofitting project

Time of Commission: Dec, 2015

Gas Flow	3097060Nm³/h
Inlet Temp	90℃
Inlet SO2	905mg/m³N-dry
Inlet Dust	15mg/m³N-dry
Outlet Temp	49 ℃
Outlet SO2	≦14mg/m³N-dry (η=98.47%)
Outlet Dust	≦10mg/m³N-dry
Byproduct	Gypsum
Purity	≧90%
Moisture	≦10wt%
GGH	Yes, NL-GGH

上海电气 SHANGHAI ELECTRIC

www.shanghai-electric.com

De-SOx Ref. (Partial)

No.	Project Site	Capacity	Efficiency(%)	Completion	Byproduct	Remarks
1	Shanghai Waigaoqiao #1	300 MW	≥95	2005.12	GYPSUM	FGD Design, Purchase
2	Shanghai Waigaoqiao #2	300 MW	≥95	2005.12	GYPSUM	FGD Design, Purchase
3	Bao Steel #2	350 MW	≥95	2005.12	GYPSUM	FGD Design, Purchase
4	Hunan Liyujiang B #1	600 MW	≥95	2007.5	GYPSUM	FGD EPC
5	Hunan Liyujiang B #2	600 MW	≥95	2007.5	GYPSUM	FGD EPC
6	Inner Mongolia Baotou #1	600 MW	≥95	2006.10	GYPSUM	FGD EPC
7	Inner Mongolia Baotou #2	600 MW	≥95	2006.10	GYPSUM	FGD EPC
8	Hunan Liyujiang A #1	300 MW	≥95	2007.12	GYPSUM	FGD EPC
9	Hunan Liyujiang A #2	300 MW	≥95	2007.12	GYPSUM	FGD EPC
14	Sanghai Petrochemical #1	410 T/H	≥95	2007.5	GYPSUM	FGD EPC
15	Sanghai Petrochemical #2	410 T/H	≥95	2007.5	GYPSUM	FGD EPC
16	MA'ANSHAN 2 #1	300MW	≥95	2007.6	GYPSUM	FGD EPC
17	MA'ANSHAN 2 #2	300MW	≥95	2007.6	GYPSUM	FGD EPC
18	Shanghai Shidongkou 1 #1	300MW	≥95	2008	GYPSUM	FGD EPC
19	Shanghai Shidongkou 1 #2	300MW	≥95	2008	GYPSUM	FGD EPC
20	Shanghai Shidongkou 1 #3	300MW	≥95	2008	GYPSUM	FGD EPC
21	Shanghai Shidongkou 1 #4	300MW	≥95	2008	GYPSUM	FGD EPC
22	Shanghai Shidongkou 2 #1 (ACCESSORIAL AREA)	600MW	≥95	2008	GYPSUM	FGD EPC
23	Shanghai Shidongkou 2 #1 (ACCESSORIAL AREA)	600MW	≥95	2008	GYPSUM	FGD EPC
24	ShangHai WuJing 2 #1	600MW	≥95	2007.12	GYPSUM	FGD EPC
25	ShangHai WuJing 2 #2	600MW	≥95	207.12	GYPSUM	FGD EPC
26	Bao Steel #1	350MW	≥95	2008	GYPSUM	FGD EP
27	Shanghai Waigaoqiao 2 #5	900MW	≥95	2008.10	GYPSUM	FGD EPC
28	Shanghai Waigaoqiao 2 #6	900MW	≥95	2008.12	GYPSUM	FGD EPC
29	Guang Dong Yangxi #3	660MW	≥95	2010	GYPSUM	FGD EPC
30	Guang Dong Yangxi #4	660MW	≥95	2010	GYPSUM	FGD EPC

上海电气 SHANGHAI ELECTRIC

www.shanghai-electric.com

De-SOx Ref. (Partial)

No.	Project Site	Capacity	Efficiency(%)	Completion	Byproduct	Remarks
31	ORIENTAL PETROCHEMICAL (SHANGHAI) CORPORATION #1	100t/h	≥95	2010	Magnesium	FGD EPC
32	ORIENTAL PETROCHEMICAL (SHANGHAI) CORPORATION #2	100t/h	≥95	2010	Magnesium	FGD EPC
33	Ningbo Sanlin #1	50MW	≥95	2010	GYPSUM	FGD EPC
34	Ningbo Sanlin #2	50MW	≥95	2010	GYPSUM	FGD EPC
35	Ningxia Shuidonggou #1	660MW	≥95	2010	GYPSUM	FGD EPC
36	Ningxia Shuidonggou #2	660MW	≥95	2010	GYPSUM	FGD EPC
37	Henan Xinmi #1	1000MW	≥95	2011	GYPSUM	FGD EPC
38	Henan Xinmi #2	1000MW	≥95	2011	GYPSUM	FGD EPC
39	Inner Mongolia #1	600MW	≥95	2011	GYPSUM	FGD EPC
40	Inner Mongolia #2	600MW	≥95	2011	GYPSUM	FGD EPC
41	Bao Steel #3	300MW	≥95	2011	GYPSUM	FGD EPC
42	Xinjiang Jiarun 1#	350MW	≥95	2014	GYPSUM	FGD EPC
43	Xinjiang Jiarun 2#	350MW	≥95	2014	GYPSUM	FGD EPC
44	Xinjiang Kuishan Baota Petrochemical	350MW	≥95	2015	GYPSUM	FGD EPC
45	Xinjiang Kuishan Baota Petrochemical	350MW	≥95	2015	GYPSUM	FGD EPC
46	Xinjiang Tianfu First-stage 1#	600MW	≥95	2015	GYPSUM	FGD EPC
47	Xinjiang Tianfu First-stage 2#	600MW	≥95	2015	GYPSUM	FGD EPC
48	Pingshan Huaibei #1	660MW	≥97	2016	GYPSUM	FGD EPC
49	Pingshan Huaibei #2	660MW	≥97	2016	GYPSUM	FGD EPC
50	Wujing No.2 Power Plant #2	600MW	≥97	2013	GYPSUM	FGD Retrofit
51	Wujing No.2 Power Plant #1	600MW	≥97	2014	GYPSUM	FGD Retrofit
52	Waigaoqiao No.2 Power Plant #5	900MW	≥98	2014	GYPSUM	FGD Retrofit
53	Waigaoqiao No.2 Power Plant #6	900MW	≥98	2015	GYPSUM	FGD Retrofit
54	Jiarun #1	350MW	≥96	2015	GYPSUM	FGD EP
55	Jiarun #2	350MW	≥96	2015	GYPSUM	FGD EP
56	Zhanjiang Baosteel #1	350MW	≥95	2016	GYPSUM	FGD EP
57	Zhanjiang Baosteel #2	350MW	≥95	2016	GYPSUM	FGD EP
58	Qiguang Lingshi #1	350MW	≥99.6	2017	GYPSUM	FGD EPC
59	Qiguang Lingshi #2	350MW	≥99.6	2017	GYPSUM	FGD EPC
60	Yangxi Stage 2 Guangdong #5	1240MW	≥98	2017	GYPSUM	FGD EPC
61	Yangxi Stage 2 Guangdong #6	1240MW	≥98	2017	GYPSUM	FGD EPC