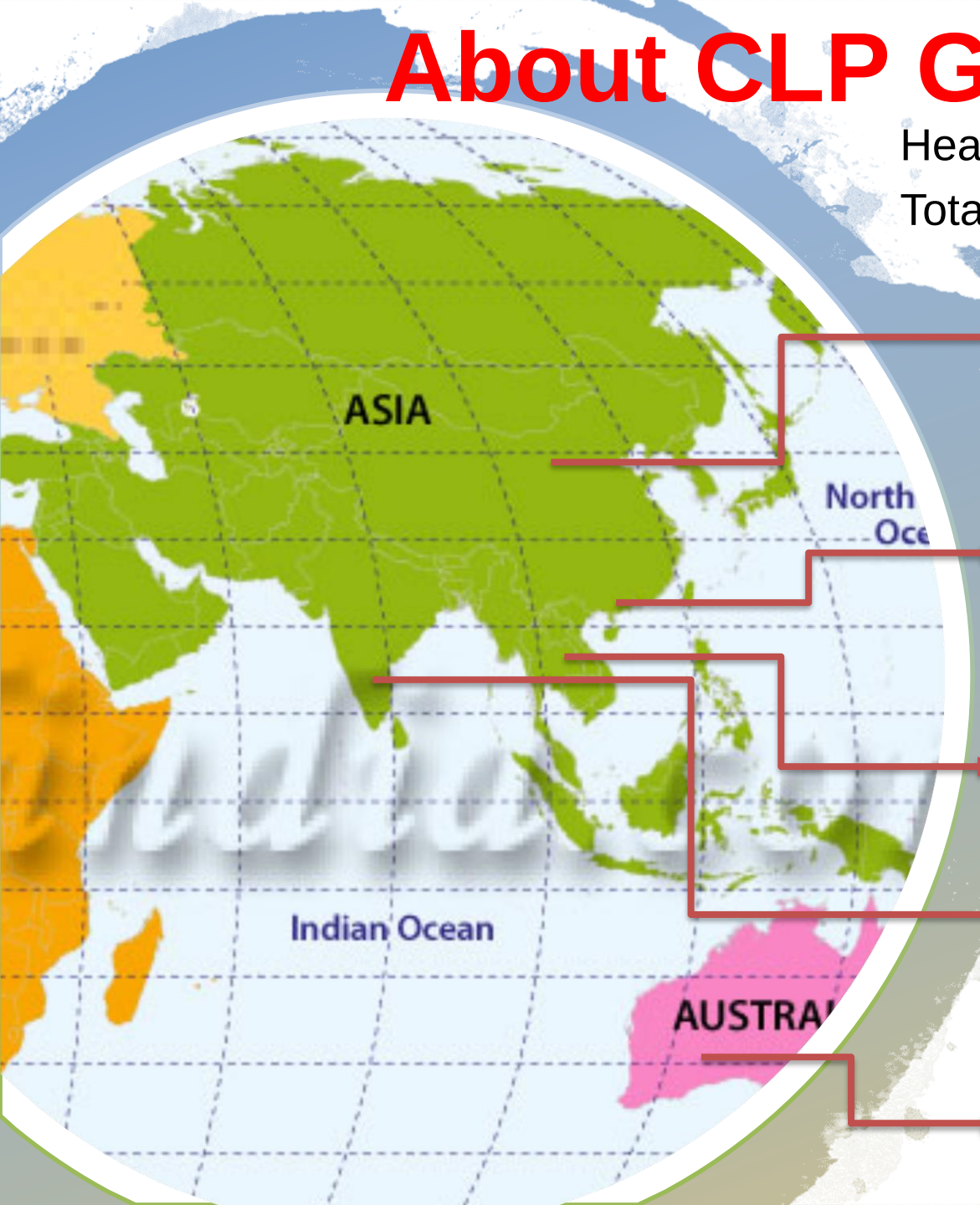
Hands-on approach, knowledge and best practices in addressing environmental norms at

About CLP Group

Head-quartered in Hong Kong

Total Generation Capacity: 20GW+



China: Mainland – 6,649 MW

- *One of the largest foreign investors in Chinese power sector.*

Hong Kong - 6,908 MW

- *Largest energy supplier of Hong Kong.*

Thailand/Taiwan - 832 MW

India – 3,026 MW

- *1320 MW Thermal+655 MW CCPP*
- *1051 MW Wind + Solar*

Australia – 3,190 MW

- *3rd largest integrated utility*

Source:

The Hindu news paper dated 18-Oct-2019

Jhajjar Power Limited is recognized as the most compliant and clean power plant in Delhi - NCR

Only 1 of 11 coal plants set to meet emission deadline

Norms to come into force from December in plants in NCR

SPECIAL CORRESPONDENT
NEW DELHI

Only 1 out of 11 thermal power plants in the National Capital Region (NCR) is compliant with emission norms that are set to come into force by December, a Right to Information application by Greenpeace has revealed.

Eleven coal-fired power plants in the NCR are expected to retrofit their units with technology called flue-gas desulphurisation (FGD).

As per Centre for Science and Environment (CSE) estimates, these norms can help reduce PM emissions by about 35%, NOx emission by about 70%, and SO2 emissions by more than 85% by 2026-27 against a business-as-usual scenario with no pollution control technologies.

The norms are applicable to nearly 440 plant units across the country. In 2015, the Union Environment Ministry ordered plants to comply by 2017.

Staggered plan

Power plants – both private and state owned – said that the costs and technology access where prohibitive and implementation would take more time. Later on, the Central Electricity Authority, a Union Power Ministry body, agreed to a staggered plan where all units were expected to comply by 2024. Plants which were in a 300 km radius of Delhi were, however, expected to be compliant by December 2019 because of their propensity to increase pollution in the Capital.

According to an RTI application by environmentalist Sunil Dahiya, who is with environmentalist group Greenpeace, demanding the status of the compliance, it emerged that there were 11 plants traversing Haryana, Uttar Pradesh and Punjab, that comes under NCR that were to have implemented the FGD technology by December this year. Of these, only one plant, the Mahatma Gandhi Thermal Power Station in Haryana was compliant with the new norms.

18-24 months needed

The rest of the plants were in various stages of implementation. "It needs nearly 18-24 months for the plants to be compliant with the new norms, However, the documents show that except for one plant, most are in the early stages of bidding or implementation," according to Dahiya.

Non-compliance by thermal power plants was raised at the National Green Tribunal through a petition filed in April 2017 and there is an ongoing case in the Supreme Court regarding the extensions given to these plants.

Cause for concern

State	Plant name	Units*	Status
Haryana	Mahatma Gandhi Thermal Power Station	2	Compliant
Haryana	Panipat Power Station	3	Non-compliant
Haryana	Rajiv Gandhi Power Station	2	Non-compliant
Haryana	Yamuna Power station	2	Non-compliant
Haryana	Indira Gandhi Thermal Power Plant	3	Non-compliant
Punjab	Nabha Thermal Power Plant	2	Non-compliant
Punjab	Guru Hargobind TPS	4	Non-compliant
Punjab	Talwandi TPS	3	Non-compliant
Punjab	Ropar TPS	4	Non-compliant
Uttar Pradesh	Dadri TPS	6	Non-compliant
Uttar Pradesh	Harduaganj TPS	2	Non-compliant

*No of Power generating units (power rating **number)

Managing Environment at JPL

Some key achievements:

- Certified ISO 14001 power station since 2014.
- 36% Green belt coverage area.
- Real time emissions data transfer to HSPCB and CPCB.
- 100% Ash Utilization.
- Winner of Mission Energy Award-2016 for Environment compliance
- Winner of TERI Award-2019 for water conservation
- Member of CII's key policy advisory committee.

BUREAU VERITAS Certification

JHAJJAR POWER LTD.

CLP INDIA
The power of new standards

VILLAGE KHANPUR, TEHSIL MATENHAIL, DIST. JHAJJAR – 124 142, HARYANA, INDIA

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the Management System standard detailed below.

Standard

ISO 14001:2015

Scope of certification

OPERATION AND MAINTENANCE OF 2x660MW COAL BASED THERMAL POWER PLANT FOR CONTINUOUS SUPPLY OF ELECTRICITY TO GRID

Original cycle start date: **16 May 2014**
Expiry date of previous cycle: **15 June 2017**
Recertification Audit date: **10 March 2017**
Recertification cycle start date: **16 May 2017**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **15 June 2020**

Certificate No. **IND17.5683/U/E** Version: **1** Revision date: **16 May 2017**

Signed on behalf of BVCH SAS UK Branch
Ramesh KOREGAVE
Director, CERTIFICATION
South Asia Region

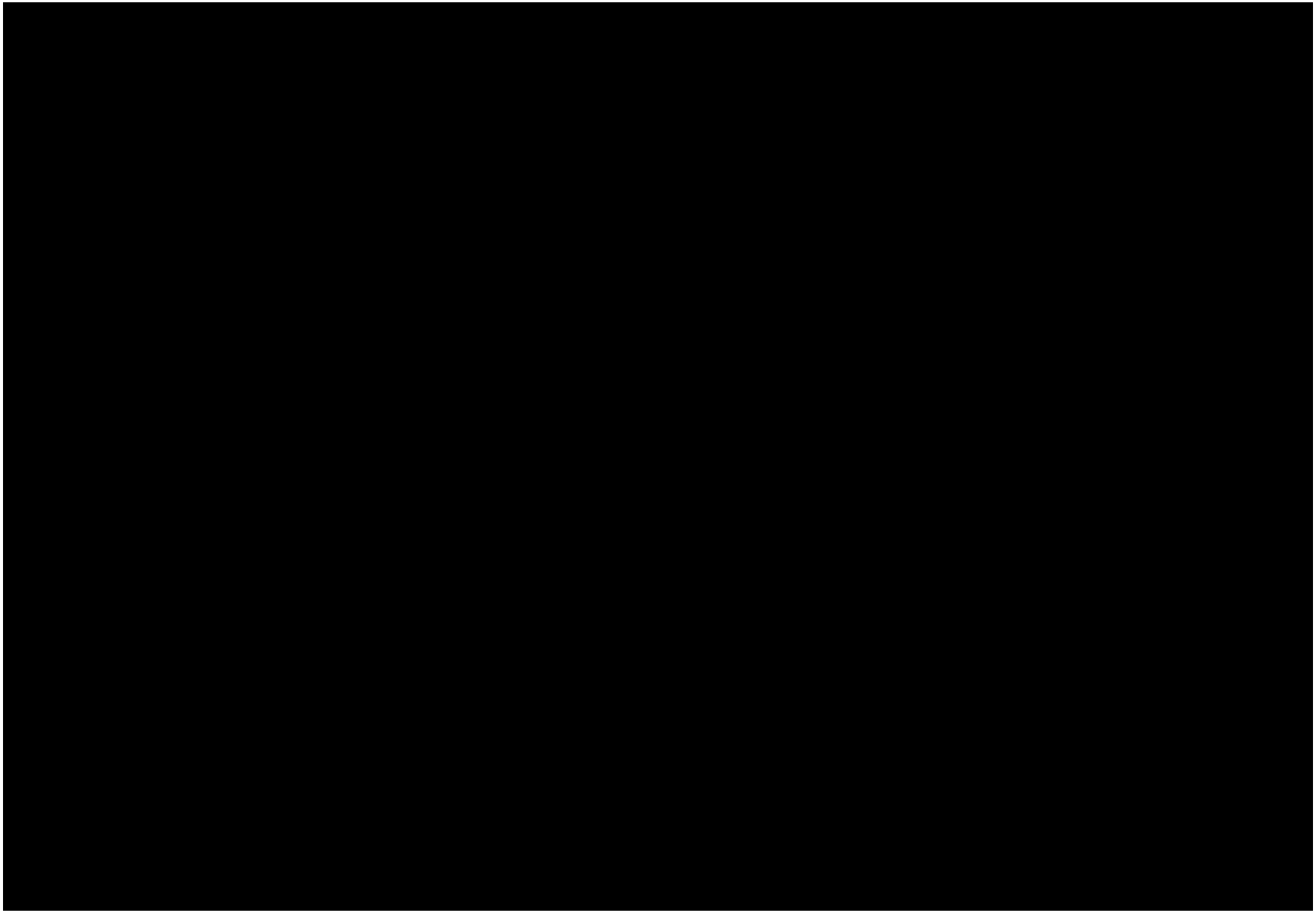
UKAS MANAGEMENT SYSTEMS 0008

Certification body address: 5th Floor, 66 Prescot Street, London, E1 8HG, United Kingdom.

Local office: "Marwah Centre" 6th Floor, Krishanlal Marwah Marg, Opp. Ansa Industrial Estate, Off Saki Vihar Road, Andheri (East), Mumbai – 400 072, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization. To check this certificate validity please call **+91 22 6695 6300.**

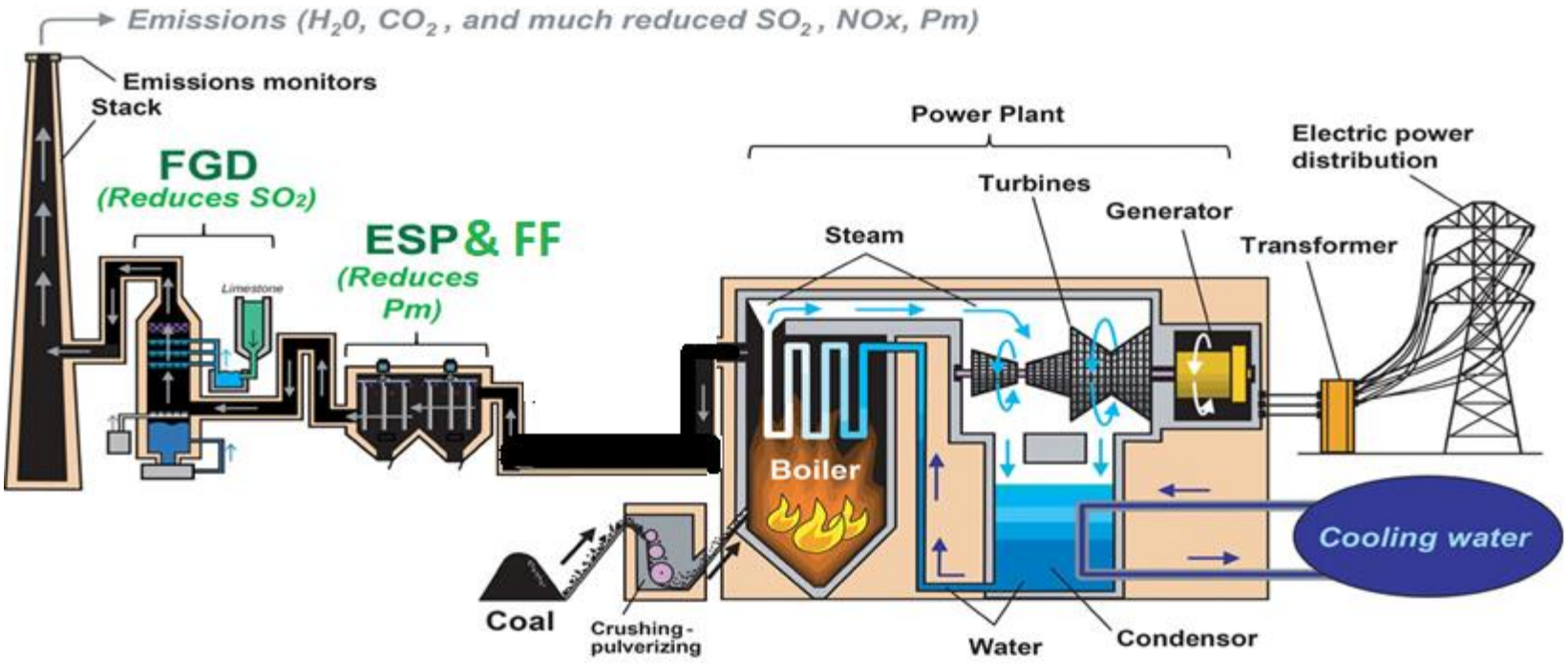
JPL Introduction:



Compliance Summary

Emission Parameters	Statutory Limits	JPL Emission Level	Technology
PM (mg/Nm^3)	50	< 30	Hybrid ESP + Bag filter
NOx (mg/Nm^3)	300 (It may be revise to 450)	>95% complied at full load	By combustion tuning, • Low NOx burners • SOFA damper control
SO_2 (mg/Nm^3)	200	150 to 160	FGD operational from 1st Feb 2019.
Mercury (mg/Nm^3)	0.03	< 0.0001 (BDL)	NA
Water Use (M^3/MWh)	3.5	< 2.5	Zero Liquid Discharge & Dry Ash Handling System

Air pollution control devices at JPL

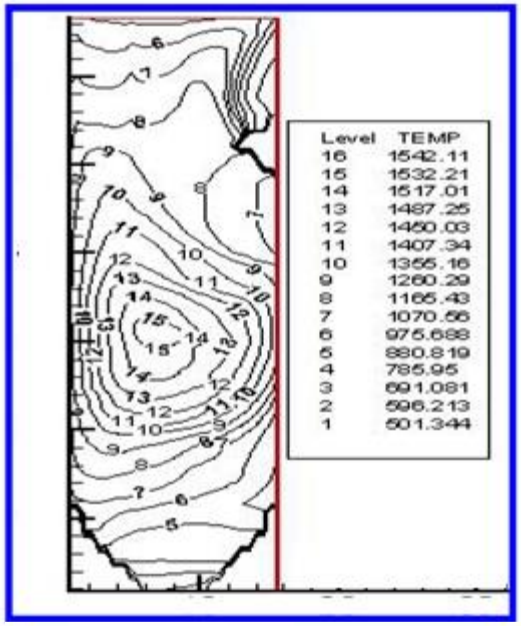


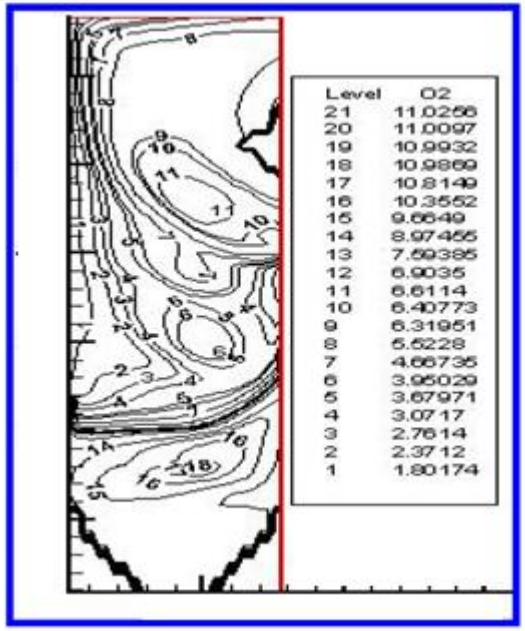
- **PM Control**: Hybrid ESP + Bag Filter.
- **NOx**: Low NOx burners with Secondary Over Fired Air control.
- **SOx**: Wet Flue Gas Desulphurization (FGD) System

NOx Control

NOx control

- Appointed Finland based consultant - Fortum
- Hot flame and oxygen streams were simulated by CFD technique
- Implemented new SADC and SOFA dampers curves
- Tuning of individual burner and coal auxiliary air damper.





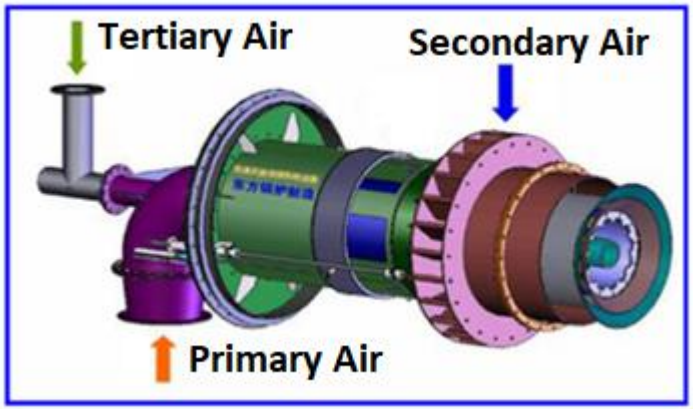
Result Achieved:

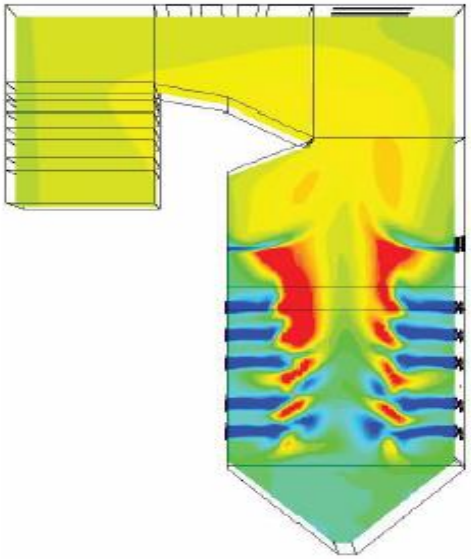
Compliance	Before		After	
	Part Load	Full load	Part Load	Full Load
Unit-1	38%	95%	83%	98%
Unit-2	2.5%	34%	81%	93%

(corrected in terms of NO_2 @ 6% O_2)

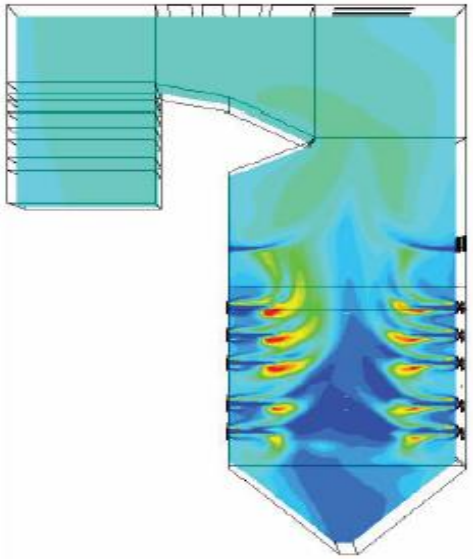
Plan for Ultra Low NOx Burners

- Successfully installed at our Castle Peak Plant, Hong Kong by Doosan Babcock.
- NOx < 300 mg/Nm3 (at all loads)

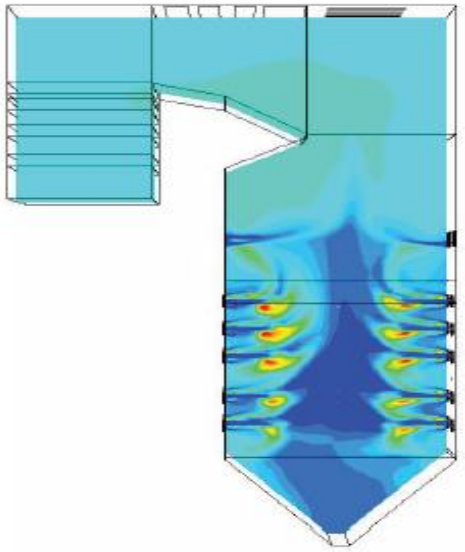




Conventional Burners



Low NOx Burners



Ultra Low NOx Burners

SOx Control

Broad Specifications of JPL FGD:

Parameters	Design Values
Sulphur in coal	0.35%
Absorber Inlet SO_2	1094 mg/Nm^3
FGD Outlet SO_2	108 mg/Nm^3
Desulfurization Efficiency	90.1%
Flue gas Inlet Temperature	125 deg C.
Operating Condition	40% - 100% BMCR

Chemical Reaction:

SO_2 Absorption:

$$SO_2 + H_2O \rightleftharpoons H_2SO_3$$
$$H_2SO_3 \rightleftharpoons H^+ + HSO_3^-$$

Limestone Dissolution:

$$CaCO_3 + H_2O \rightleftharpoons Ca^{++} + HCO_3^- + OH^-$$

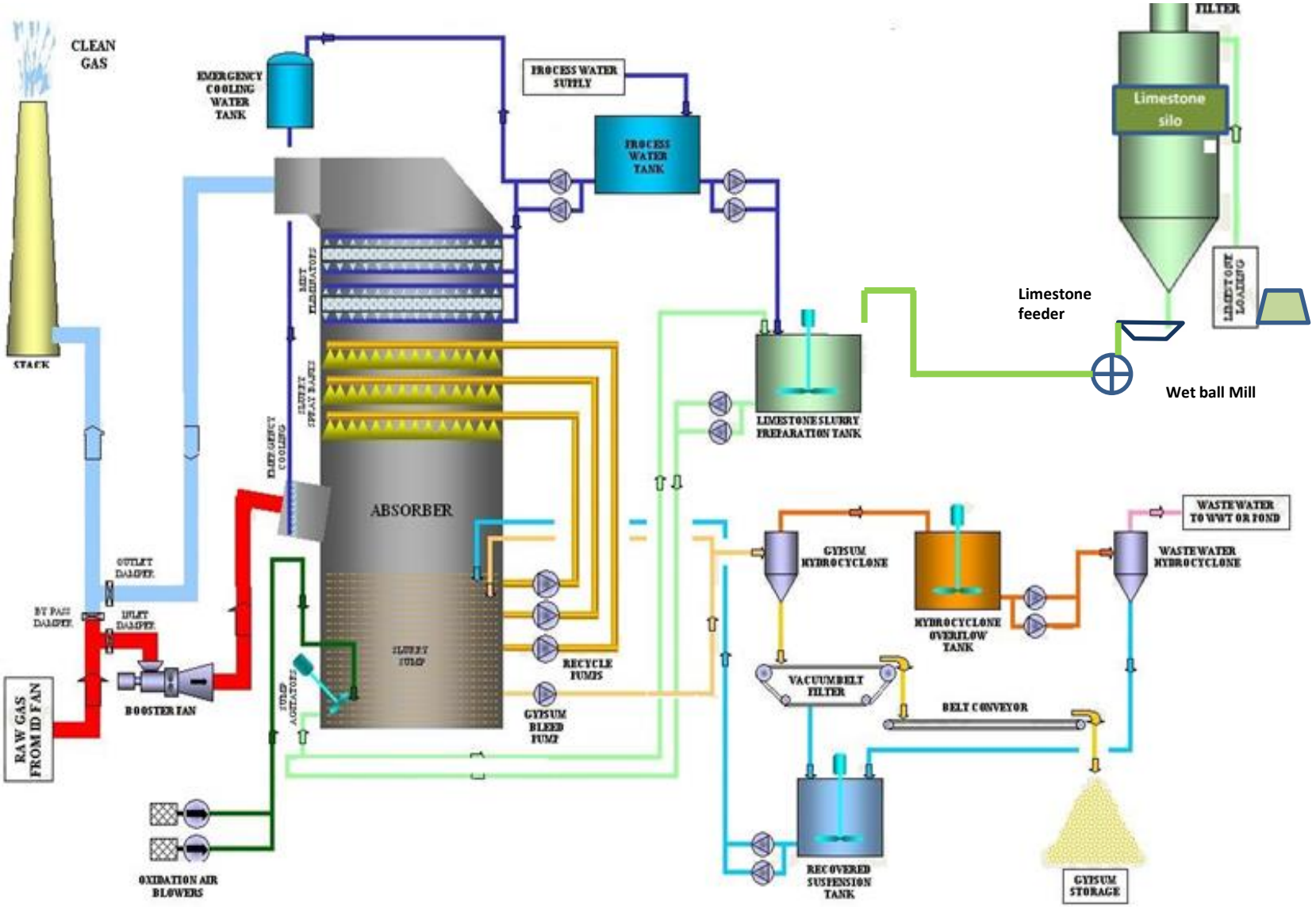
Oxidation:

$$HSO_3 + O_2 \rightleftharpoons H^+ + SO_4^=$$

Precipitation:

$$Ca^{++} + SO_4^= + 2H_2O \rightleftharpoons CaSO_4 * 2H_2O$$

Schematic Overview of Wet LS FGD



Absorber Tower Details:

Shell Material	Carbon steel lined with glass flake resin

Agitators	4 agitator (SS make)

Spray Bank	Three Layer, FRP pipes
Spray Nozzles	Made from silicon carbide

Process Control

- SO_2 absorption is controlled by:
  - ✓ Bypass damper opening
  - ✓ pH and density of slurry
  - ✓ No of Recirculation pumps in service

- Slurry density : 1100 to 1150 kg/m^3 by gypsum bleeding and water addition through demister spray
- pH control: 5.4 ~ 5.8 by adding lime stone
- Demister DP control: Maintain DP<200 Pa by washing cycle and adding formic acid

Parameters affecting performance:

- Boiler Load
- Liquid to Gas Ratio (7.8) - higher is better
- Gas and liquid distribution
- Gas velocity (3- 4.5 m/s)
- Healthiness of mist eliminator
- Chloride control (lesser the better)
- Limestone fineness
- Absorber tank pH and density
- Reagent (Ca/S ions) ratio 1.02 to 1.05

Limestone handling equipment:

Oxidation process

- Calcium sulfite is oxidized to Calcium Sulphate. Oxidation Blower supplies air for reaction in the absorber.

Oxidation Air Fans


Oxidation Air Lance tubes

Vacuum belt Feeder:
(Gypsum Dewatering System)

Challenges faced while commissioning FGD plant

Performance Challenges:

Low Sox removal efficiency (70% as against 90%)

- Switch over from blowdown to clarified water
- Changing raw limestone quality
- Improving wet ball mill fineness
- Periodic maintenance of spray nozzles.
- Regularized demister washing cycle
- Increased L/G ratio by recirculation pump speed increase (Gearbox and Motor upgrade)

Performance Challenges:

Poor gypsum quality

- Improved hydro-cyclone performance
- Commissioned waste water system
- Increased slurry retention time
- Maintaining optimal pH (5.4 to 5.8)
- Improving wet ball mill fineness
- Vacuum belt cloth replacement

Performance Challenges

Poor Mist Eliminator performance

- Revised wash cycle sequence
- Dosed of formic acid
- Proper sequencing done to stop hammer blow effect on washing pipes and valves
- Periodic maintenance of wash valves and nozzles

Slurry carryover from chimney

- Plant stopped
- Replaced sticky limestone with non sticky
- Demister washed
- Attended Booster Fan hydraulic oil leakage

Redundancy improvement:

- ID fan upgrade project
- Emergency tank modification work
- Additional Limestone slurry preparation stream
- Sump pit interconnection work

THANK YOU

Know more about us @:

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