



**NEW ENVIRONMENT NORMS ON SO_x FOR
THERMAL POWER GENERATION**

Topics

- MOEF Norms for Sulphur Dioxide
- Technology & Technical challenges, suitability under Indian conditions
- Annual Capacity of BHEL
- Implementation Schedule
- Space requirement
- Limestone transportation and storage
- BY Products
- Cost Implications
- BHEL readiness to meet the current requirement.
- Technology Tie-up with MHPS

MOEF Notification

Pollutants	TPPs (units) installed before 31st December, 2003*	TPPs (units) installed after 1st January,2004, up to 31st December, 2016*	TPPs (units) to be installed from 1st January, 2017**
Particulate Matter (PM)	100 mg/Nm ³	50 mg/Nm ³	30 mg/Nm ³
Sulphur Dioxide (SO ₂)	600 mg/Nm ³ (Units Smaller than 500MW) 200 mg/Nm ³ (for units having capacity of 500MW and above)	600 mg/Nm ³ (Units Smaller than 500MW) 200 mg/Nm ³ (for units having capacity of 500MW and above)	100 mg/Nm ³
Oxides of Nitrogen (NO _x)	600 mg/Nm ³	300 mg/Nm ³	100 mg/Nm ³
Mercury (Hg)	0.03 mg/Nm ³ (for units having capacity of 500MW)	0.03 mg/Nm ³	0.03 mg/Nm ³

*TPPs (units) shall meet the limits within two years from date of publication of this notification.

**Includes all the TPPs (units) which have been accorded environmental clearance and are under construction.

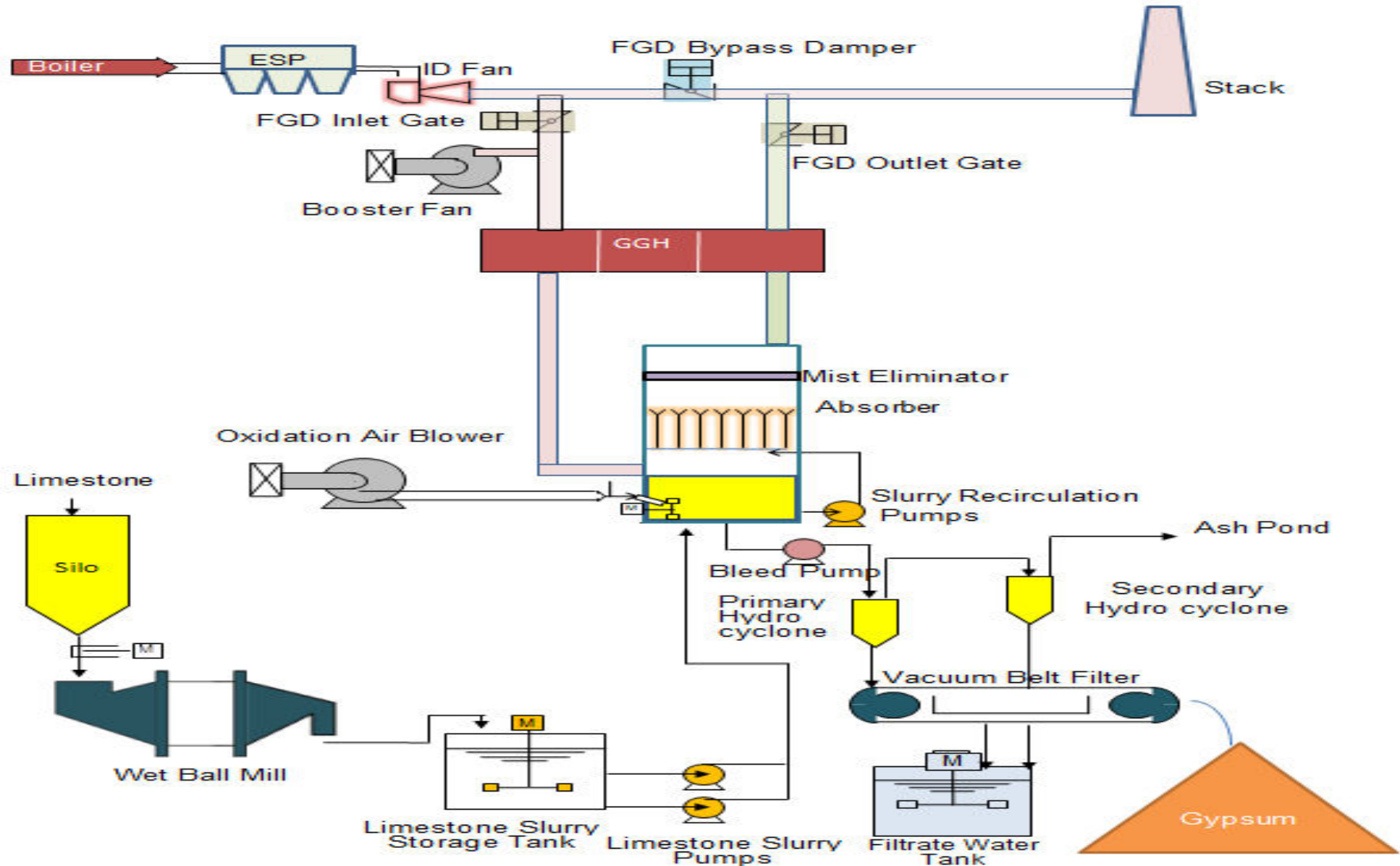
Technology & Technical challenges, suitability under Indian conditions

- Wet lime stone/ **Sea water** based FGD is suitable for Indian power plants
- Space and Layout to be finalized case to case basis.
- Additional Power consumption
- Additional Water requirement
- Lime stone source to be identified
- Gypsum disposal to be addressed
- Waste water disposal / treatment to be addressed

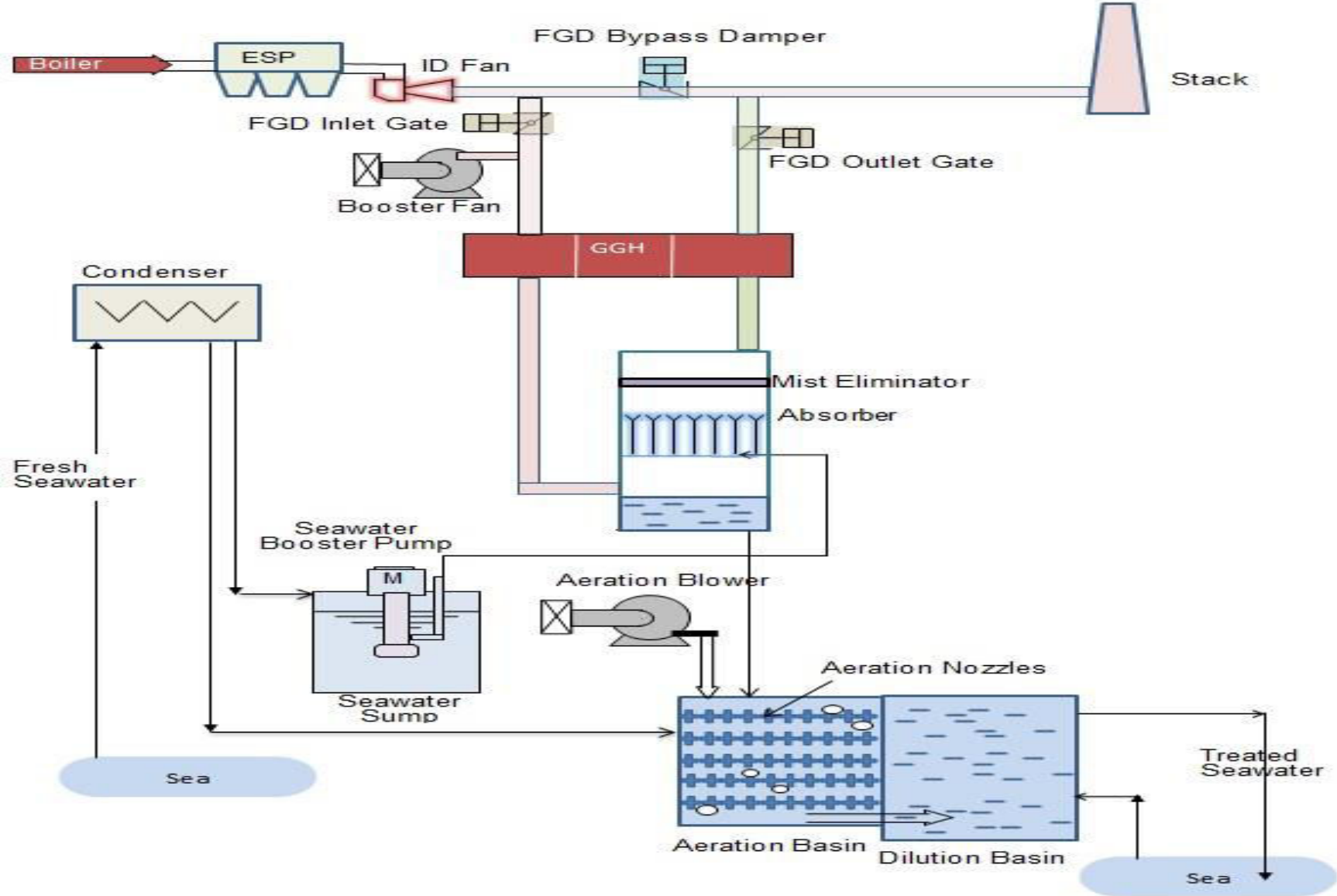
Annual Capacity of BHEL

- BHEL –Annual capacity- not a constraint, but limited by BOP vendors capacity.
- FGD major Bought out items
 - Wet Ball Mill
 - Vacuum Belt Filter – Dewatering system
 - Oxidation blower/ Aeration blower
 - Slurry Re-circulation/ Sea water pump
 - Gas to Gas Heater
 - Mist Eliminator

Wet lime/limestone FGD



Sea Water FGD



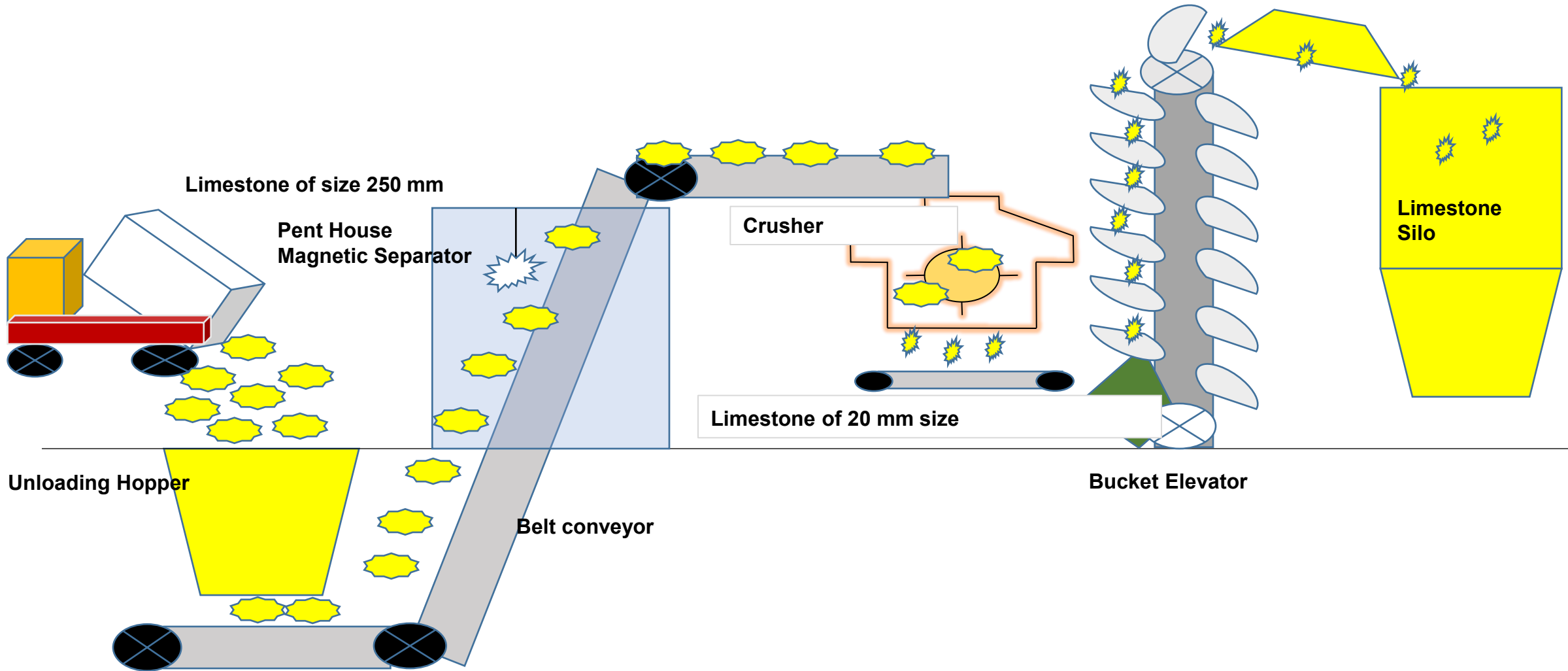
Implementation Schedule

- Engineering & Supply :15-18 months
- Erection of FGD System: Additional 15-18 months
- Shutdown of existing unit for installing FGD:2-3 Months

Space requirement

Typical 800MW unit FGD system requires 22000 m² excluding Gypsum storage area

Limestone transportation and storage



Limestone Handling System

S.No	Item	Remarks
1	Unloading hoppers	Underground-RCC Each hopper will be designed for 1 to 4 trucks capacity
2	Belt conveyors & Bucket elevators	Capacity is decided such that complete material handling system runs 3-6 hrs. in a day
3	Pent house	RCC
3	Crusher	Hammer mill type
4	Limestone storage silo	Silo is designed for 5-7 days of storage. If the capacity required is larger, Limestone stockyard is preferred

- Limestone size at the inlet of Unloading hopper-<250mm
- Limestone size at the crusher outlet-<20mm
- Limestone slurry particle size- 325mesh 90% pass through (at the outlet of Wet Ball mill)

Limestone availability in India

State	Area	Limestone purity (CaCO₃)
Andhra Pradesh	Mancherial area	80.8
	Hyderabad area	84.1
	Nadigudi area	81.9
Rajasthan	Kota area	94.3
	Gotan area	94.3
	Sirohi Area	83.7
Karnataka	Gulburga area	83.6
	Wadi area	83.2
	Tandur area	85.2
Himachal Pradesh/Haryana	Chandighar area	82.4
	Bilaspur area	86.1
	Solan Area	87.3
Meghalaya	Cherrapunji	96
	Laitryngew	98
Tamilnadu	Anaipadi	67
	Nallur	84
	Garudamangalam	74
	Kunram	79
Madhya Pradesh	Katni	91
Assam	Umrangshu Mines	91

By Product - Gypsum Handling system

Usage

Gypsum could be used in

- Cement plants
- Gypsum Wall board making

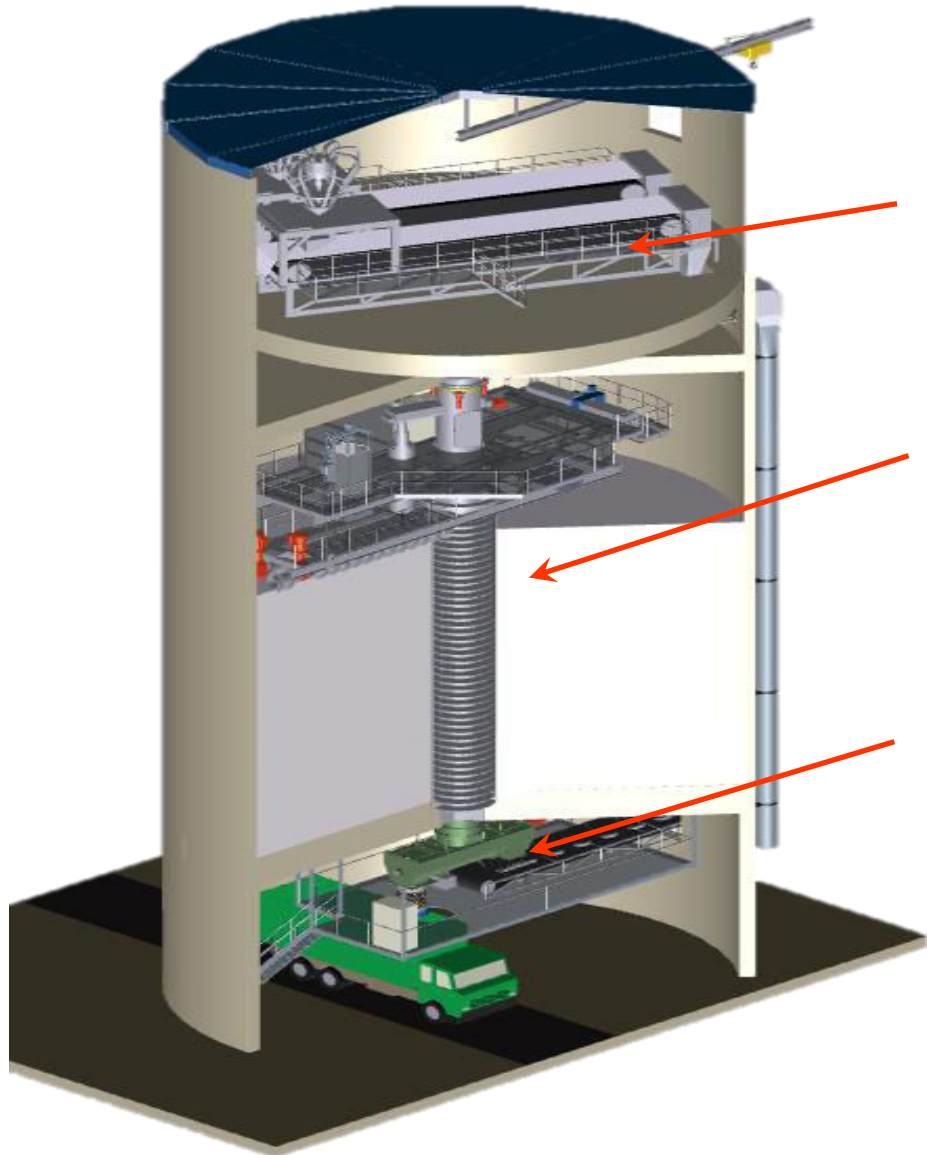
Storage

- Gypsum Storage shed
Gypsum Belt conveyors with Mobile tripper or reclaimer
- Gypsum Silo

For a storage volume of 30000 m³

- i) FGD Gypsum Covered Storage shed-50m(W)X120m(L)X27m(H)
- ii) FGD Gypsum Silo-44m(Dia) X 27m (H)

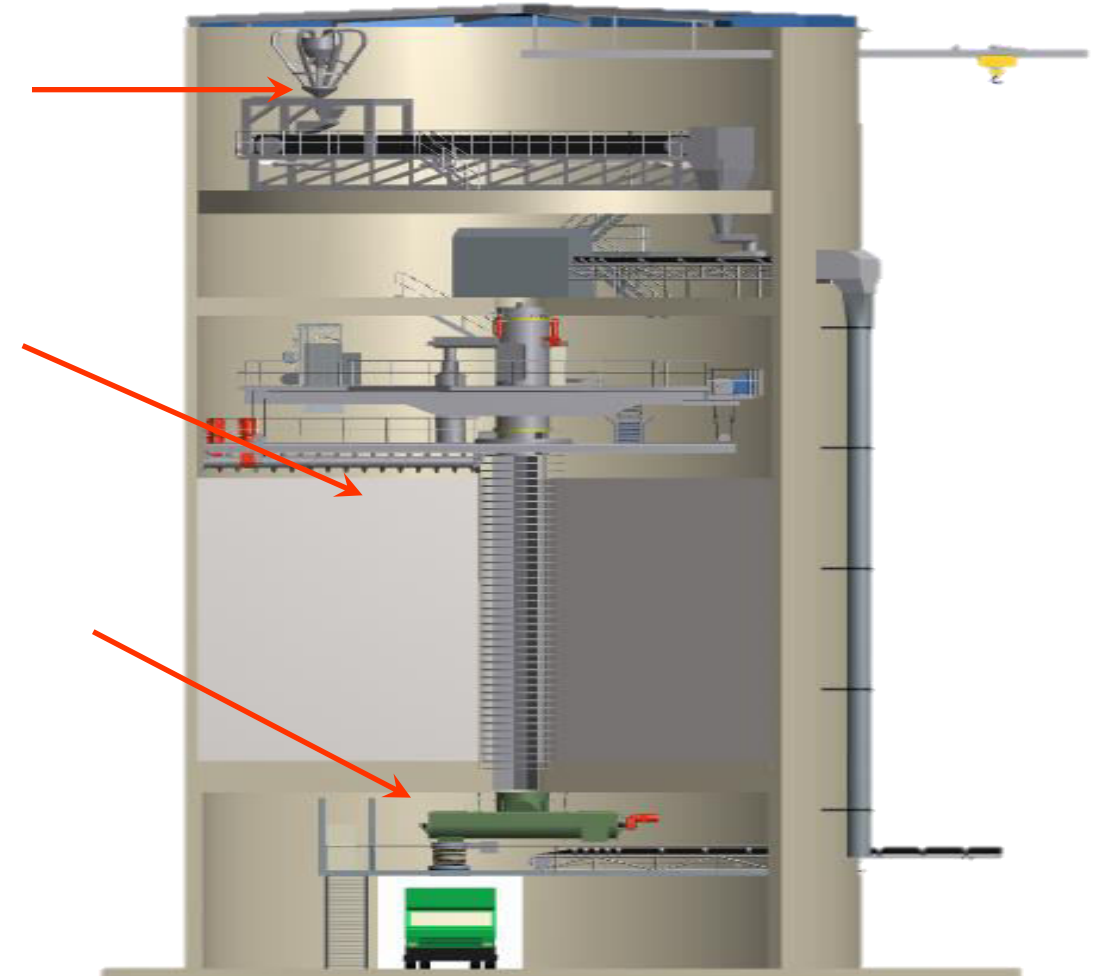
FGD Gypsum Silo-with auger & filling screw arrangement (For silo greater than 3000 T Capacity)



Dewatering
Section

Storage
Section

Load Out
Section



FGD Gypsum Silo- Bottom discharge arrangement (For silo less than 3000T Capacity)

