



# FLY ASH DRYER PROJECT (FLASH TYPE)

Venue : **Fly Ash Utilisation Conference,**  
Country Inn & Suites - Goa  
**Mission Energy Foundation.**

Date : 22 April 2022

Presented By:  
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Head – Cement Business  
Walchandnagar Industries Limited

**I. Present Scenario of Ash in Power Plants**

**II. Pond Ash Scenario and Trend**

**III. Effect of Pond Ash**

**IV. Fly Ash Generation and Utilization Trend**

**V. Sector wise fly ash utilization**

**VI. Chemical and Physical requirements (As per IS 3812)**

**VII. Pond fly ash dryer project overview**

**VIII. Technical Details of the project (50 TPH)**

**IX. Performance Parameters**

**X. Project Viability**

**XI. WIL's Offerings**

## Our Business Areas:



EP /  
Turnkey

- Sugar Plant & Machinery
- Power Plant & Boiler
- Cement Plant & Machinery

Hi Tech  
Manufacturing

- Defense
- Aerospace
- Missile
- Nuclear

Engineering  
Products

- Gear Box
- Foundry
- Precision Instruments
- Centrifugal m/c
- Process Equipment

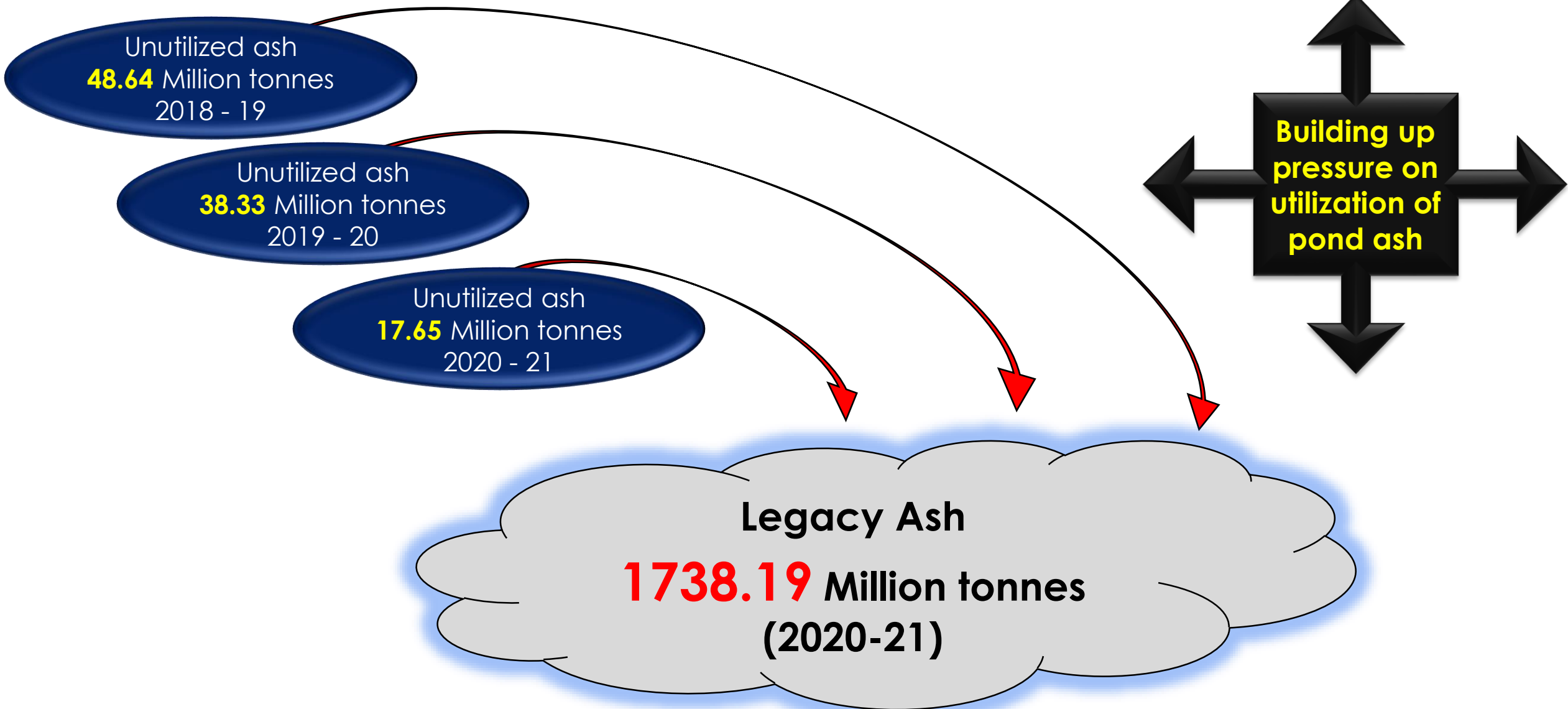
# I. PRESENT SCENARIO OF ASH IN POWER PLANTS



Description	Year 2020-21
Number of evaluated Thermal Power Stations	: 202
Installed capacity (MW)	: 209990.50
Coal consumed (Million tonnes)	: 686.34
Fly Ash Generation (Million tonnes)	: 232.56
Fly Ash Utilization (Million tonnes)	: 214.91
Percentage Utilization	: 92.41
Percentage of Unutilized fly ash	: 7.59
Unutilized fly ash in 2020-21 (Million tonnes)	: 17.65
Legacy Ash (Million tonnes)	: <b>1738.19</b>

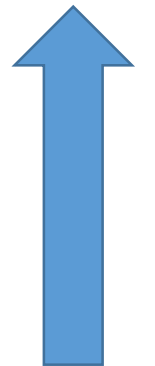
Data source: A Report on fly ash generation, MoP, GoI

# II. POND ASH SCENARIO AND TREND



# II. POWER GENERATION SCENARIO

Category	Installed Generation Capacity (MW)	% of Share in Total
Coal	2,03,900	51.6%
Lignite	6,620	1.7%
Total Installed Capacity (Fossil Fuel & Non-Fossil Fuel)	3,95,075	100%

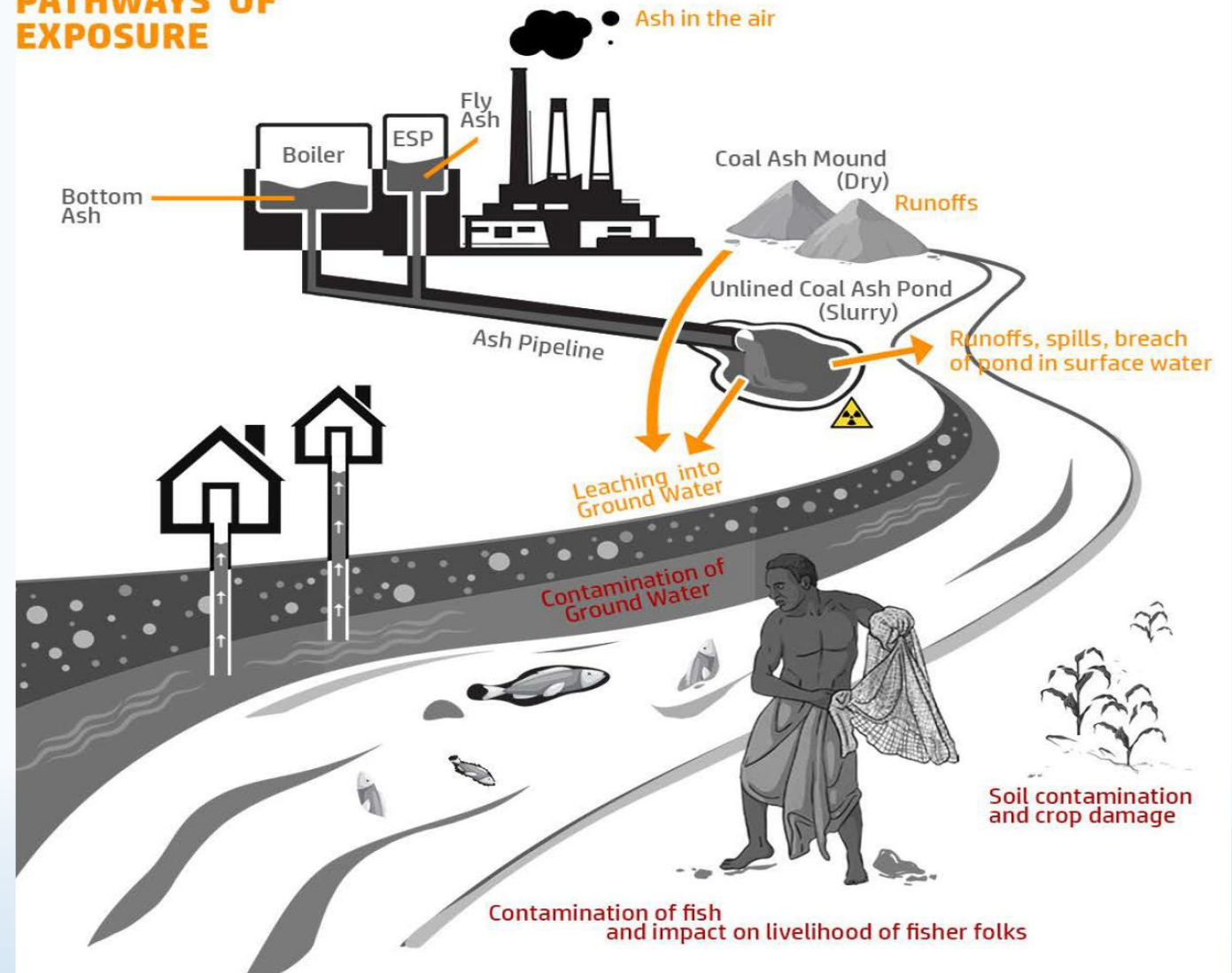


**62.5% Rise in Last 10 Years**

# III. EFFECT OF FLY ASH & POND ASH

- The requirement of a large area for its disposal
- Ecology degradation
- Severe health problems
- Ground water contamination
- Surface water contamination
- Air pollution
- Soil contamination
- Ash dyke breach accidents

## PATHWAYS OF EXPOSURE



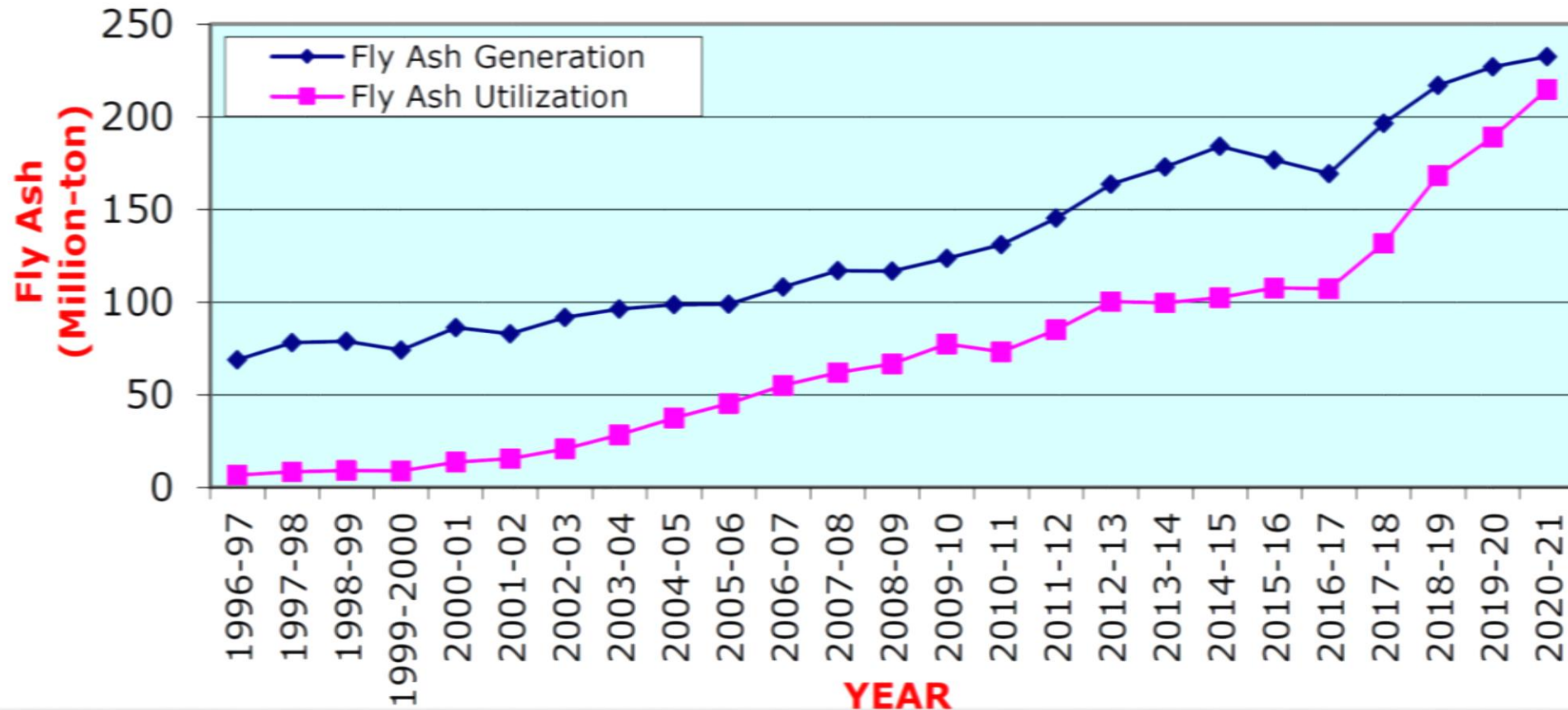
# III. POND ASH & MOUND ASH



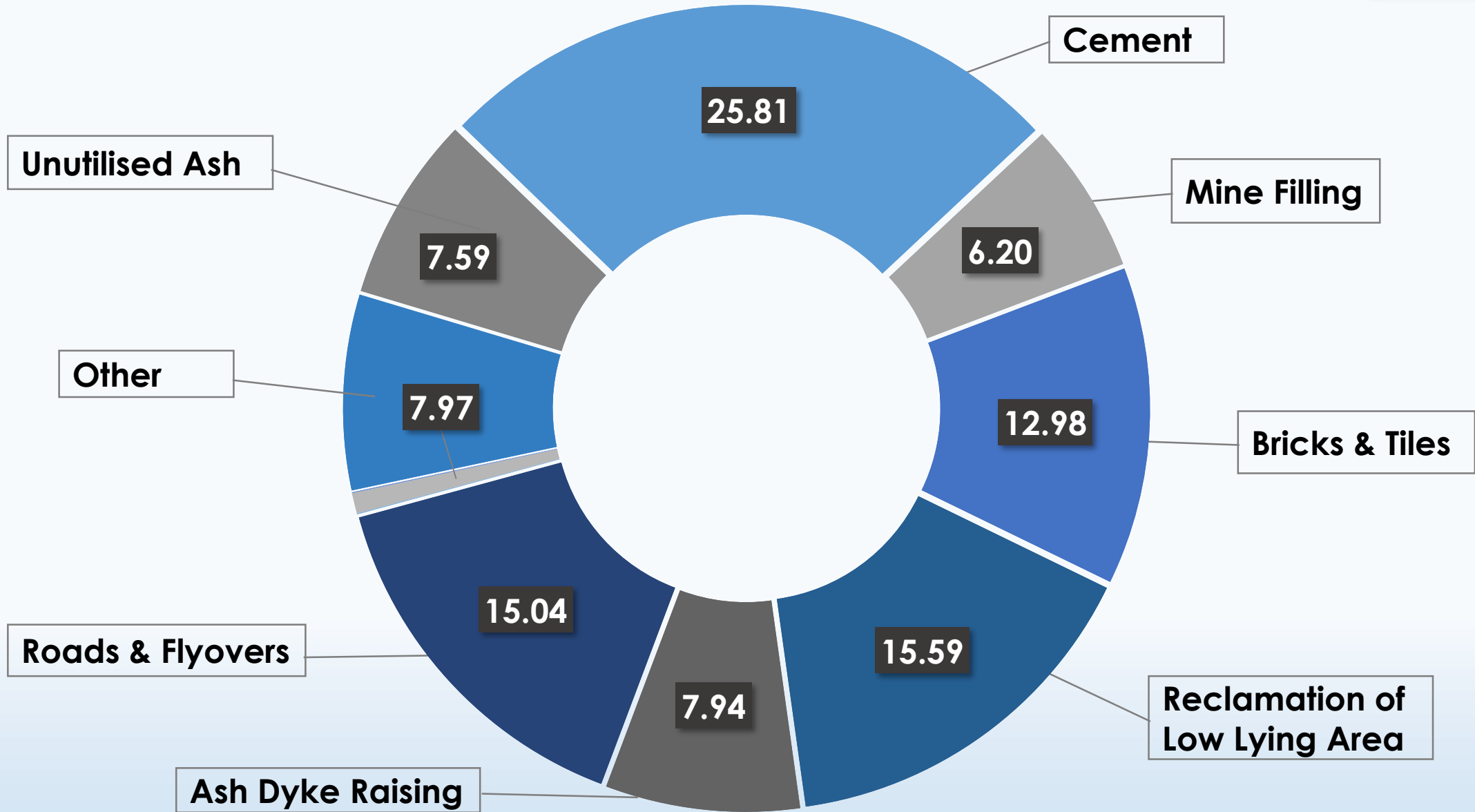


# IV. PROGRESSIVE GENERATION AND UTILIZATION

## PROGRESSIVE GENERATION AND UTILIZATION ON FLY ASH DURING THE PERIOD FROM 1996-97 TO 2020-21



# V. SECTOR WISE FLY ASH UTILIZATION (2020-21)



# VI. CHEMICAL SPEC.: USE AS POZZOLANA (IS 3812)

Sl No.	Characteristic	Requirements		Method of Test, Ref to	
		Siliceous Fly Ash	Calcareous Fly Ash	Annex	IS No.
(1)	(2)	(3)	(4)	(5)	(6)
i)	Silicon dioxide (SiO <sub>2</sub> ) plus aluminium oxide (Al <sub>2</sub> O <sub>3</sub> ) plus iron oxide (Fe <sub>2</sub> O <sub>3</sub> ) in percent by mass, <i>Min</i>	70	50	—	IS 1727
ii)	Silicon dioxide (SiO <sub>2</sub> ) in percent by mass, <i>Min</i>	35	25	—	IS 1727
iii)	Reactive silica in percent by mass <sup>1)</sup> , <i>Min</i>	20	20	B	—
iv)	Magnesium oxide (MgO) in percent by mass, <i>Max</i>	5.0	5.0	—	IS 1727
v)	Total sulphur as sulphur trioxide (SO <sub>3</sub> ) in percent by mass, <i>Max</i>	3.0	3.0	—	IS 1727
vi)	Available alkalis as equivalent sodium oxide (Na <sub>2</sub> O) in percent by mass, <i>Max</i>	1.5	1.5	C	—
vii)	Total chlorides in percent by mass, <i>Max</i>	0.05	0.05	—	IS 4032 <sup>2)</sup>
viii)	Loss on ignition in percent by mass, <i>Max</i>	5.0	5.0	—	IS 1727

<sup>1)</sup> The test may be carried out, if agreed to between the manufacturer/supplier and the user/purchaser with the requirement being as given herein.

<sup>2)</sup> For the purpose of this test, wherever reference to 'cement' has been made in IS 4032, it may be read as 'pulverized fuel ash'.

# VI. PHYSICAL SPEC.: USE AS POZZOLANA (IS 3812)



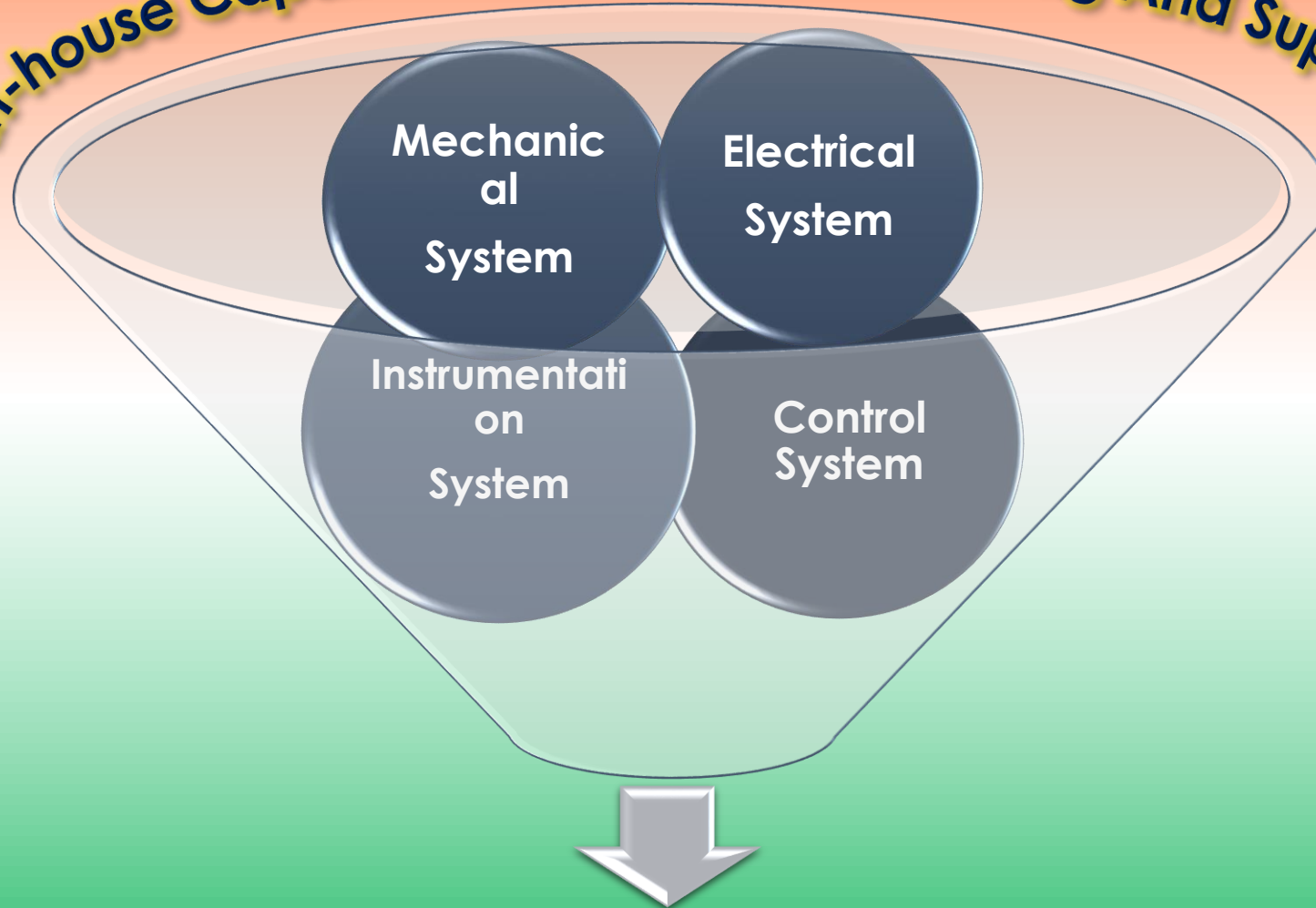
Sl No. (1)	Characteristic (2)	Requirements (3)
i)	Fineness — Specific surface in $\text{m}^2/\text{kg}$ by Blaine's permeability method, <i>Min</i>	320
ii)	Particles retained on 45 micron IS sieve (wet sieving) in percent <sup>1)</sup> , <i>Max</i>	34
iii)	Lime reactivity — Average compressive strength in $\text{N}/\text{mm}^2$ , <i>Min</i>	4.5
iv)	Compressive strength at 28 days in $\text{N}/\text{mm}^2$ , <i>Min</i>	Not less than 80 percent of the strength of corresponding plain cement mortar cubes
v)	Soundness by autoclave test — Expansion of specimen in percent, <i>Max</i>	0.8

NOTE — Fly ash of fineness  $250 \text{ m}^2/\text{kg}$ , *Min* is also permitted to be used in manufacture of Portland pozzolana cement by intergrinding it with Portland cement clinker if the fly ash when ground to fineness of  $320 \text{ m}^2/\text{kg}$  or to the fineness of the resultant Portland pozzolana cement, whichever is lower, conforms to all the requirements specified in **6** and **7**.

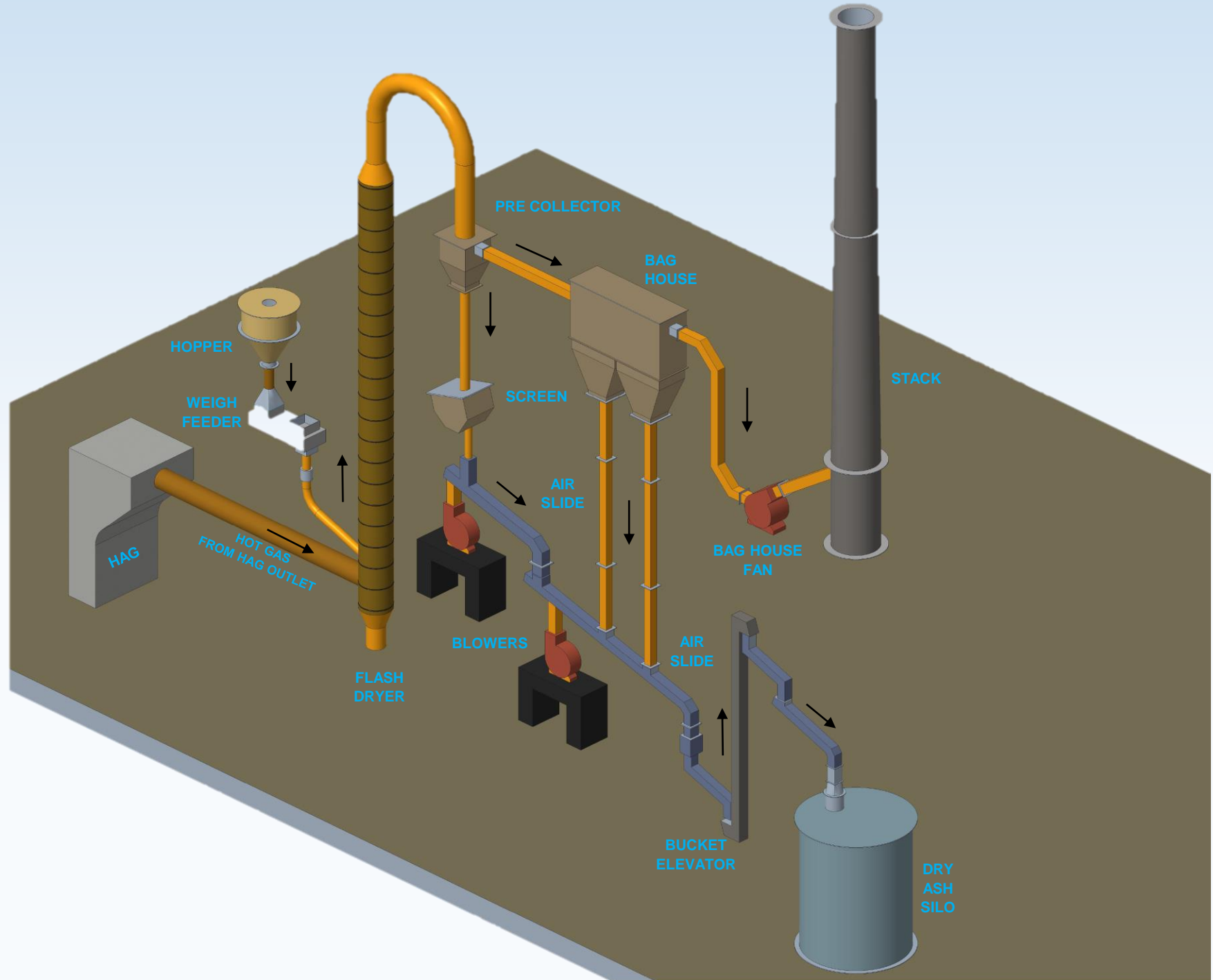
<sup>1)</sup> Optional test.

# VII. POND FLY ASH DRYER PROJECT OVERVIEW

*In-house Capability To Design, Engineering And Supply*



**Fly Ash Dryer Projects on EP Basis**



# VII. TECHNICAL DETAILS OF THE DRYER



- **Type of Dryer: Flash Type**
- **Area Required for the plant: 100-150m W x 200-250m L (5-9 Acres), can be accommodated in existing plant.**
- **Moisture in Pond Ash that can be dried: Up to 30%**
- **Product Moisture: 1% Max.**
- **Hot gas source: FBC type Hot Air Generator**
- **Fuel to be used: 100% Lump Coal / 50% Lump Coal + 50% Biomass / 100% Biomass, reduced dependency on coal**
- **No Cooling Water Requirement**
- **Product Disposal: Bulk Loading, Wagon Loading and Bag Packing**
- **Specific Power Requirement: 12-14 Kwh/t of dry ash**
- **Specific Heat Loading: 325 Kcal/Kg of dry ash (for 25% moisture in pond ash)**
- **Shorter execution period**
- **Quick ROI**
- **Lesser operating cost, due to complete automation for the plant and use of alternative fuels**

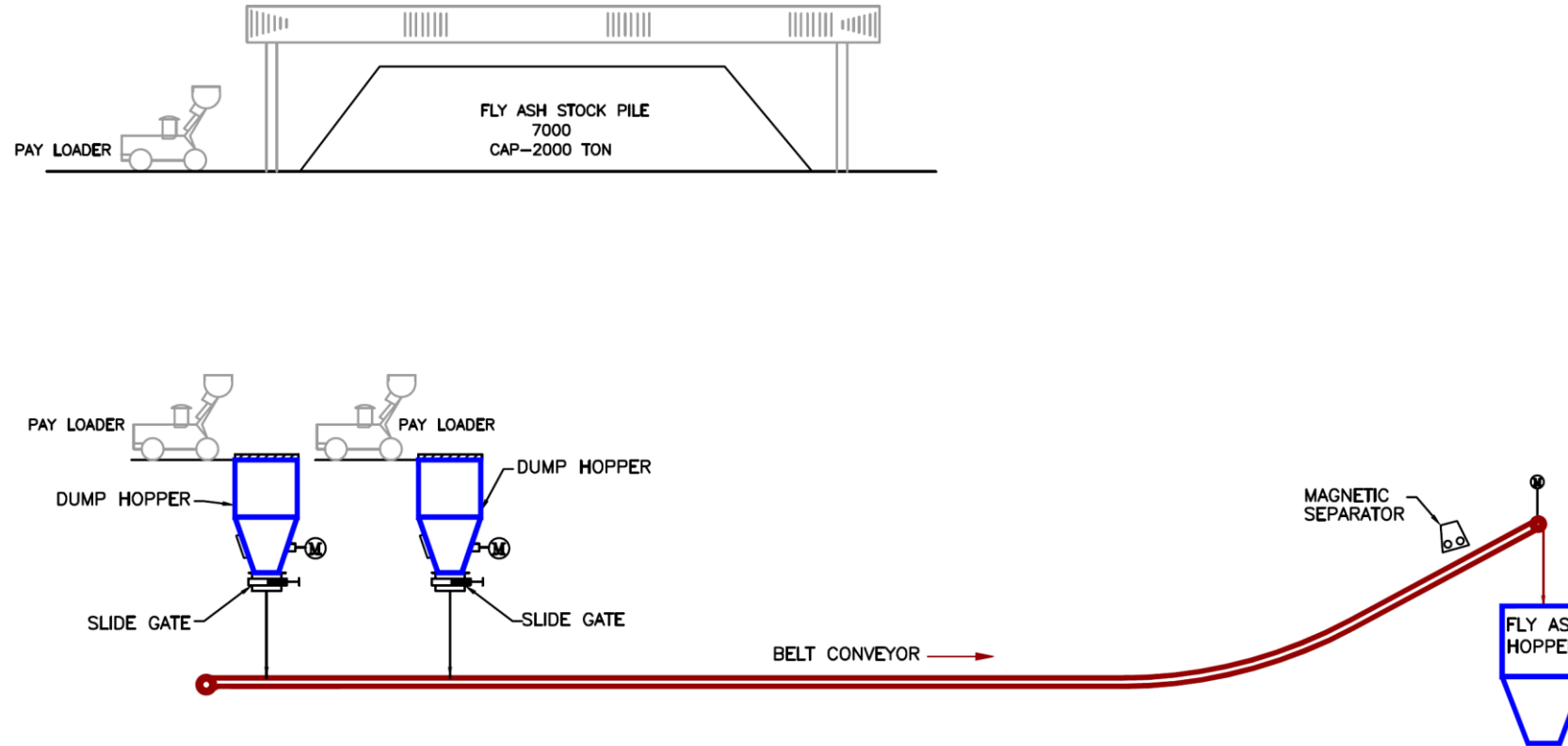
# VIII. TECHNICAL DETAILS OF THE PROJECT (50 TPH)



- **Project:** 50 tph Fly Ash Dryer Project (Using Flash Dryer)
- **Feed Moisture:** 25%
- **Product Moisture:** 1%
- **Flash Dryer Dimensions:** Dia. 2.2m x 25m + Dia.1.8m x 44m
- **Building Height:** 29m
- **Residence Time:** 3 Sec (From Feed Point)
- **Hot Air Temperature at Dryer Inlet:** 500 Deg.C
- **Temperature at Dryer Outlet:** 110 Deg.C
- **Velocity across dryer:** 20 M/sec
- **Bag House:** Volume- 2,00,000 M<sup>3</sup>/hr, Dust Load: 290 gm/M<sup>3</sup>, ACR < 1 m<sup>3</sup>/min/m<sup>2</sup> , Filter Bags: P84, Outlet Dust Emission: 10mgm/Nm<sup>3</sup>
- **Bag House Fan:** Volume- 2,20,000 M<sup>3</sup>/hr, -600mmWG
- **Hot Air Generator:** 100% Lump Coal Fired/ Lump Coal + Rise Husk- 18 M kcal/hr, Pilot Fuel: HSD
- **Cooling Water Requirement:** NIL
- **Dust Emission:** 10mgm/Nm<sup>3</sup>
- **Compressed Air Requirement:** 5.5 M<sup>3</sup>/Min



# WET FLY ASH UNLOADING AND TRANSPORTATION



Fly Ash Receiving  
Hoppers: 1 Nos. with  
Polymer Liners,  
Grizzle, Slide Gate

Belt Conveyor-I: 150  
tph, Width-800mm,  
Length-110m

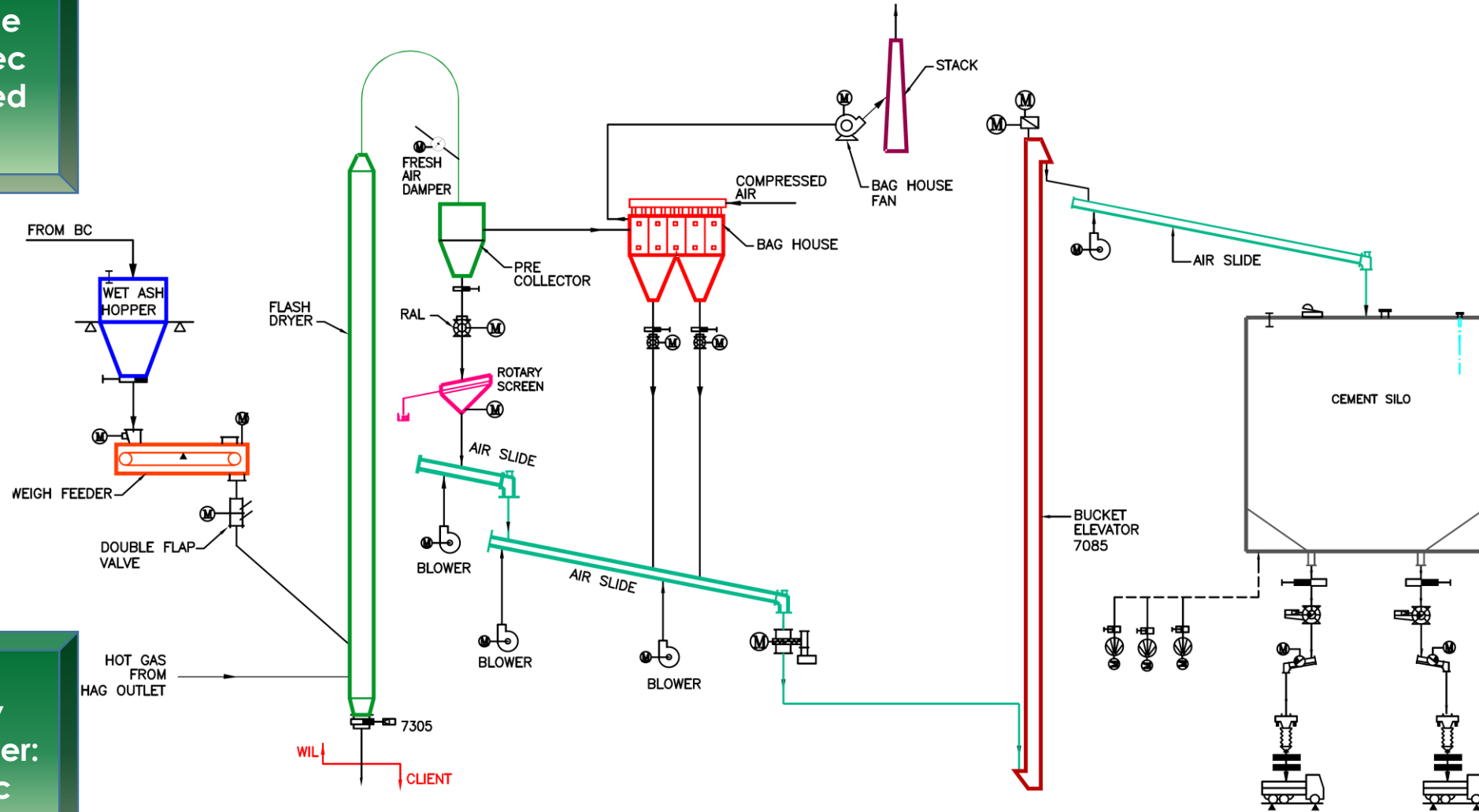
Belt Conveyor-II: 150  
tph, Width-800mm,  
Length-28m

Magnetic Separator

# FLY ASH DRYER SECTION

Residence  
Time: 3 Sec  
(From Feed  
Point)

Hot Air  
Temperature  
at Dryer Inlet:  
500-550 °C

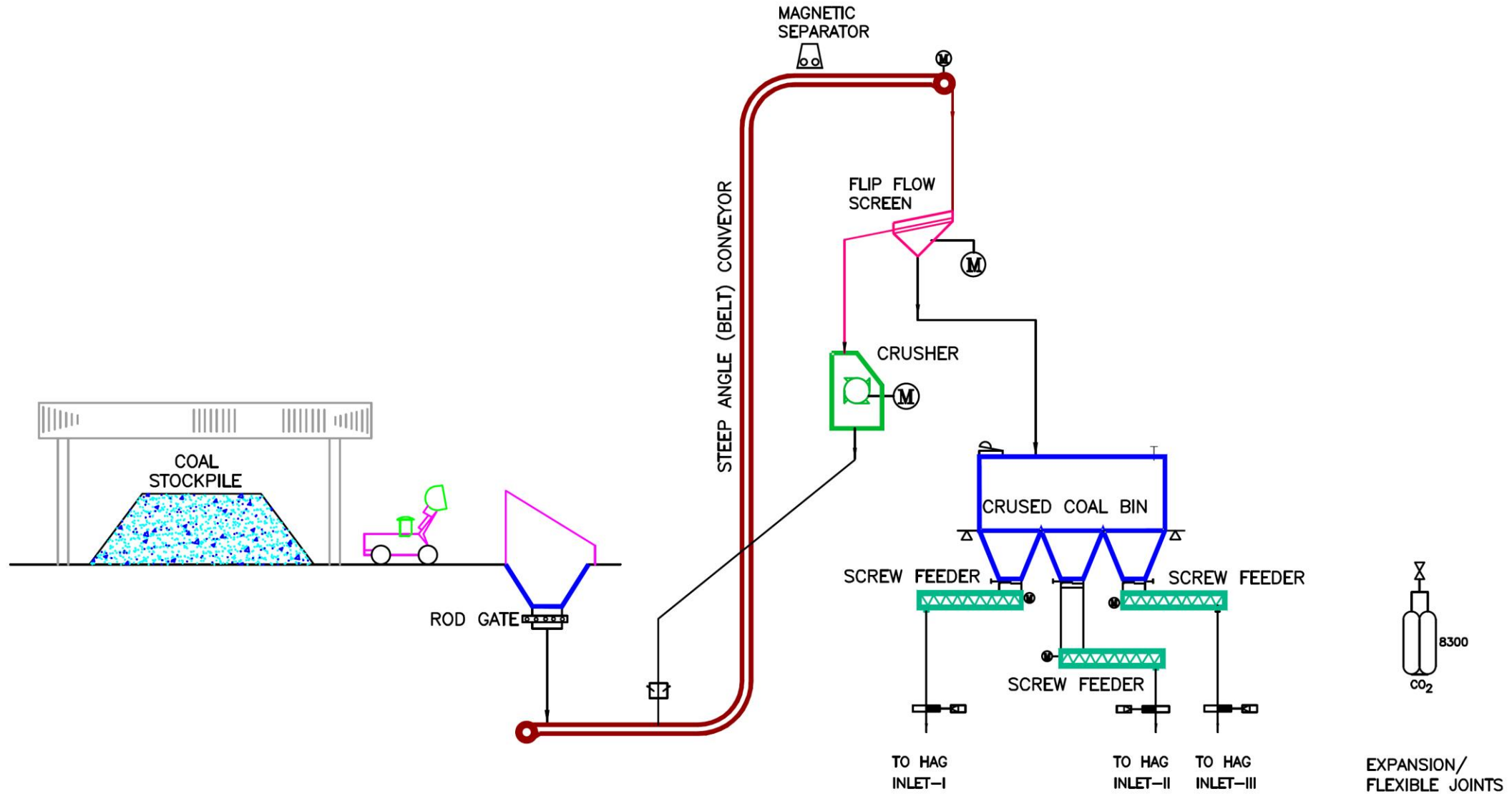


Velocity  
across dryer:  
20 M/sec

Temperature  
at Dryer  
Outlet: 110 °C

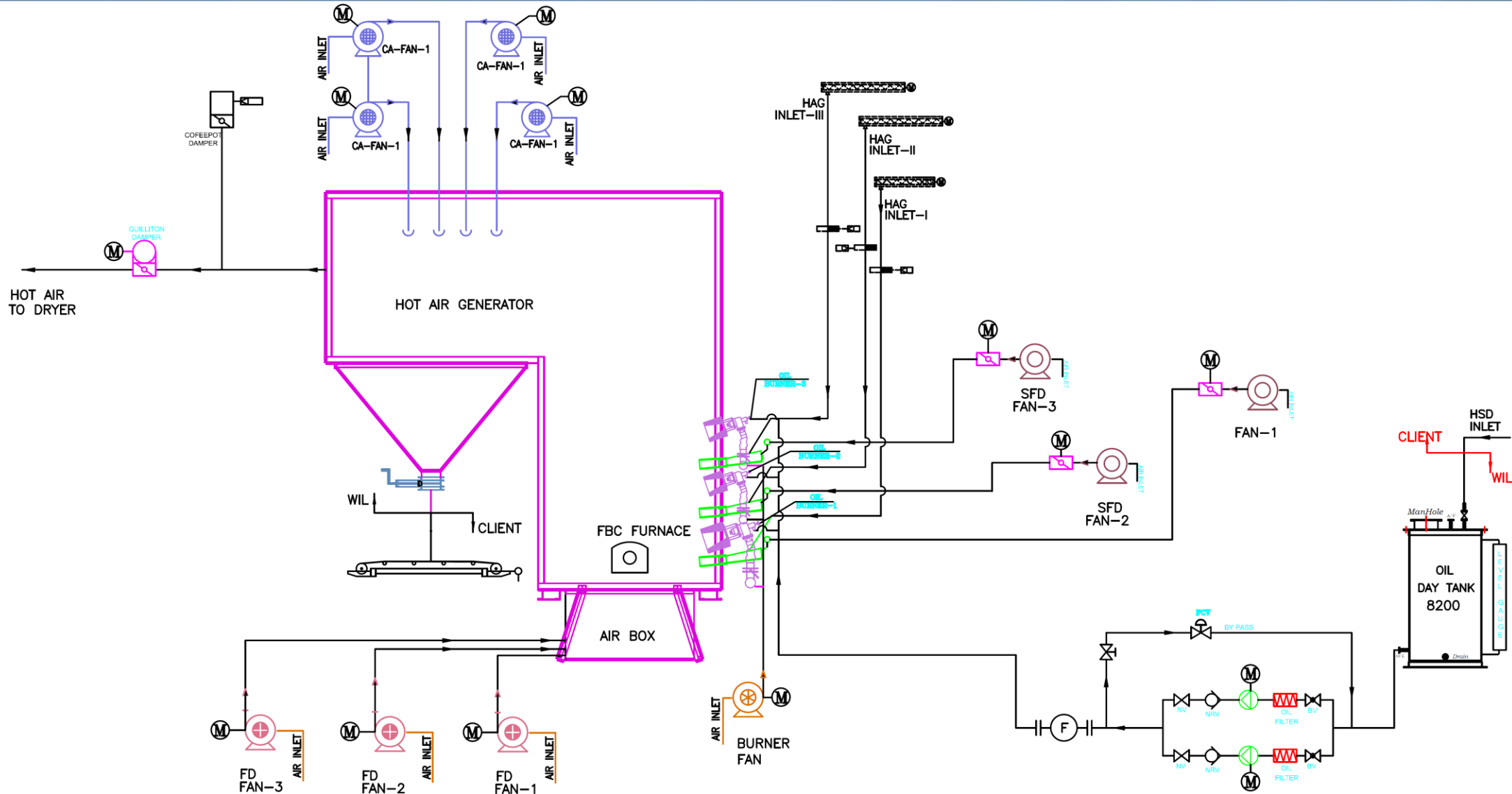
- **Feed Hopper:** 75 T with Polymer Liners, Load Cell, Slide Gate
- **Weight Feeder:** 100 tph + Flap Valve for Feeding to Dryer
- **Flash Dryer :** Diameter-2.2m x 25m H + Dia.1.8m x 44m (MOC-IS 2062)
- **Castable Lining:** Flash Dryer + 10m Duct
- **DRC Lining:** 44m Duct
- **Bag House:** Volume- 2,00,000 M3/hr, Dust Load: 290 gm/M3, ACR < 1 m3/min/m2 , Filter Bags: P84 with PTFE Lamination, Outlet Dust Emission: 10mgm/Nm3
- **Filter Bag:** Dia. 149mm x 8000mm
- **Bag House Fan:** Volume- 2,20,000 M3/hr, -600mmWG, 550 KW, VFD
- **Stack:** Dia.2.45m
- **Dry Fly Ash Silo Feed Bucket Elevator:** 80 tph, Belt Type, C-C- 36m
- **Reject Screen:** 80 tph
- **Bag Filter + Fan for Venting of BE Boot and Feeding Air Slides:** 10000 M3/hr

# HOT AIR GENERATOR SECTION



- **Receiving Hopper:** 5 T with Rod Gate, Feed Size: 0-100mm Max.
- **High Angle Conveyor:** 30 tph, Inclination-90 Deg.
- **Magnetic Separator**
- **Coal Crusher + Screen:** 25 tph, Hammer type, Product Size: < 10mm
- **Crushed Coal Storage Bin:** 1 Nos.- 30 T each, Sailhard Liners and Explosion Vent,  
Load Cell, High Level Switch and Manual Slide Gate
- **Coal Dosing System:** 2 Nos. Screw Feeders (VFD) + Coal Feed Fan
- **CO Analyser for Coal Bin**

# HOT AIR GENERATOR



- **Hot Air Generator:** Lump Coal Fired FBC HAG- 18 Mkal/hr, Hot Gas Temp-500 Deg.C
- **Pressure at HAG Outlet:** +/- 10mmWG
- **Coal Size:** <10mm (CV-4500 Kcal/kg min.)
- **Start-up fuel:** HSD
- **No. of Oil Burners-3**
- **CO+O2 Gas Analyser for HAG**
- **Pilot Gas Fuel:** LPG
- **Total combustion air required:** 51000 Nm<sup>3</sup>/hr
- **Total dilution air required:** 58500 Nm<sup>3</sup>/hr
- **Coal Conveying air volume:** 3900 Nm<sup>3</sup>/hr
- **Turndown ratio:** Coal (1:3) Oil (1:4)





- **Total connected load for the Flash Dryer Unit will be 1100 KW.**
  
- **supply complete electrical power distribution system**
  - MV Switch Board
  - Battery with Battery Charger
  - Distribution Transformer
  - Lighting Transformer
  - MCC
  - LT Bus Trunking
  - APFC Panel
  - LPBS
  - Electrical motors
  - VFD for bag house fan, screw feeders below fuel bins (3 nos.), dilution air fans (4 nos.) and combustion air fans (3 nos.)
  - MV & LV Cables (Aluminum)
  - Plant illumination system
  - Earthing and Lightning Arrestor
  - GI Perforated Cable Trays
  - Air conditioning for VFD and Sub-control system panel room
  - Fire Detection and Alarm System for Control Room

- **Field Instruments along with installation hardware**
- **Plant control system using PLC / DCS**
- **UPS**
- **Signal control cables along with cable connecting hardware  
like Cable trays, Junction boxes, IPDBs etc.**
- **Special instruments like Gas analyzers**

- **Civil works**
- **Fabrication of ducts & chutes, and structural steel**
- **Erection and commissioning (supervision by WIL)**



# XI. PERFORMANCE PARAMETERS



Sr. No.	Description	UOM	Performance Parameters
1	Plant Capacity (Dry basis)	t/h	50 (dry basis)
2	Product Moisture	%	<1%
3	Specific Power Consumption	KWh/ton <sub>(dry Material)</sub>	< 14 KWh/ton <sub>(dry Material)</sub>
4	Specific Fuel Consumption - for 25% feed moisture - for 20% feed moisture - for 15% feed moisture B3 - for 10 % feed moisture (based on input coal and fly ash @ ambient 30 Deg C and dryer outlet gas @ 110 Deg C)	Kcal/Kg <sub>(dry material)</sub>	Maximum 320 Kcal/Kg <sub>(dry material)</sub> - For 25% Moisture Maximum 255 Kcal/Kg <sub>(dry material)</sub> - For 20% Moisture Maximum 199 Kcal/Kg <sub>(dry material)</sub> - For 15% Moisture Maximum 148 Kcal/Kg <sub>(dry material)</sub> - For 10% Moisture
5	Dust emission	mg/Nm <sup>3</sup>	≤ 10 mg/nm <sup>3</sup>
6	Bags life	Month	18 months from date of commissioning or 24 months from date of dispatch, whichever is earlier.

# X. PROJECT VIABILITY

## Who can install such projects?

- ✓ Thermal Power plant with large stock of legacy ash
- ✓ Cement plants who receives wet ash

## Project cost (for 50 TPH capacity):

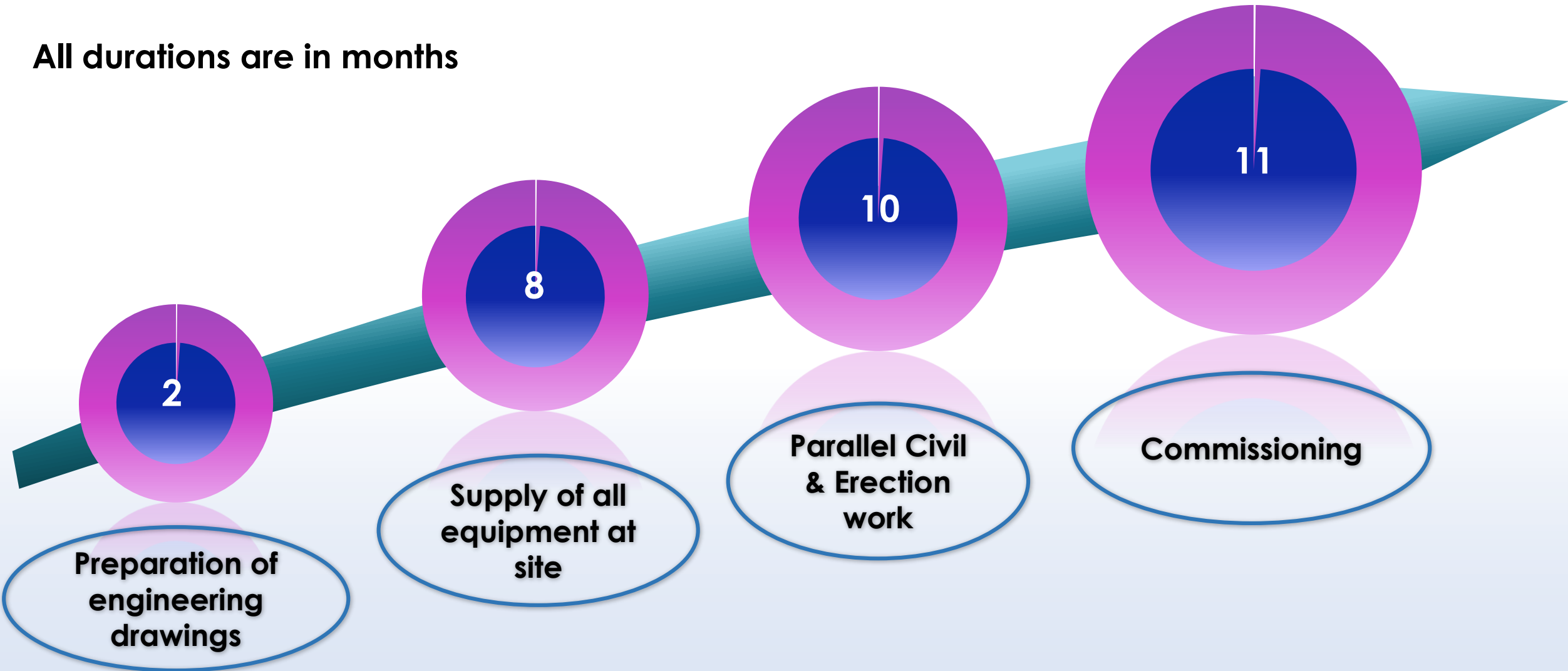
- ✓ **Approximate Capex requirement** – 3500 Lakhs
- ✓ **Operational cost:**

SN	Description	Cost (Rs./T) With 100% coal	Cost (Rs./T) With 50% Rise Husk	Cost (Rs./T) With 100% Rise Husk
1	Fuel	400	200	NIL
2	Power	100	100	100
3	Operating Cost-Approx.	50	50	50
	<b>Total</b>	<b>550</b>	<b>350</b>	<b>150</b>

## Return on Investment: Within 2 to 3 Years

# X. PROJECT LEAD TIME

All durations are in months



# XI. WIL'S OFFERING

**Plant Capacity  
(Dry basis) from  
25 TPH & above**

**Capability to design  
and engineering  
including civil &  
structural**

**Expertise in  
turnkey project  
management**

**Capability to supply of  
all mechanical,  
electrical,  
instrumentation and  
control systems.**



# THANK YOU !!!

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