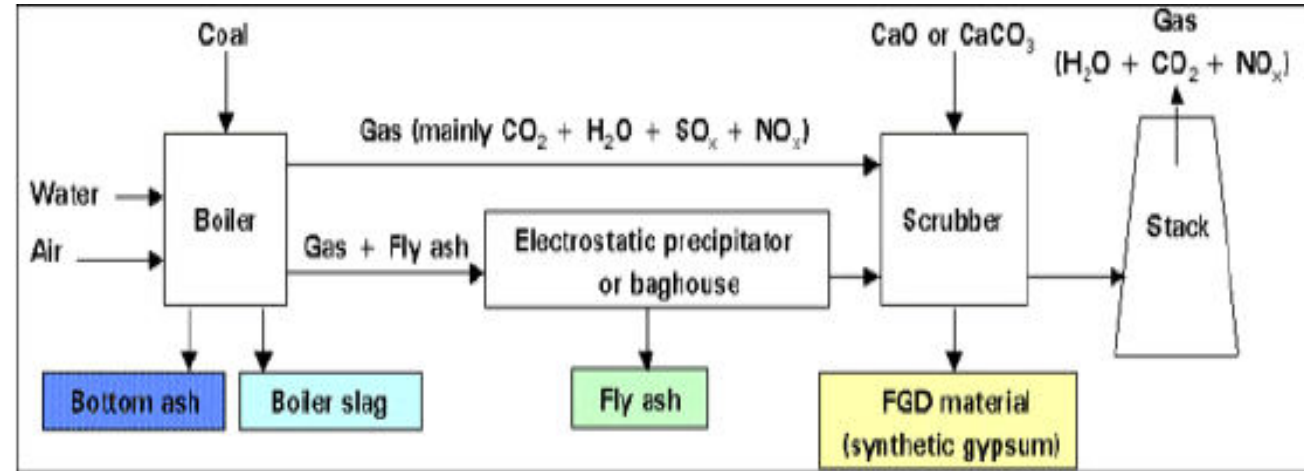


# WORKING

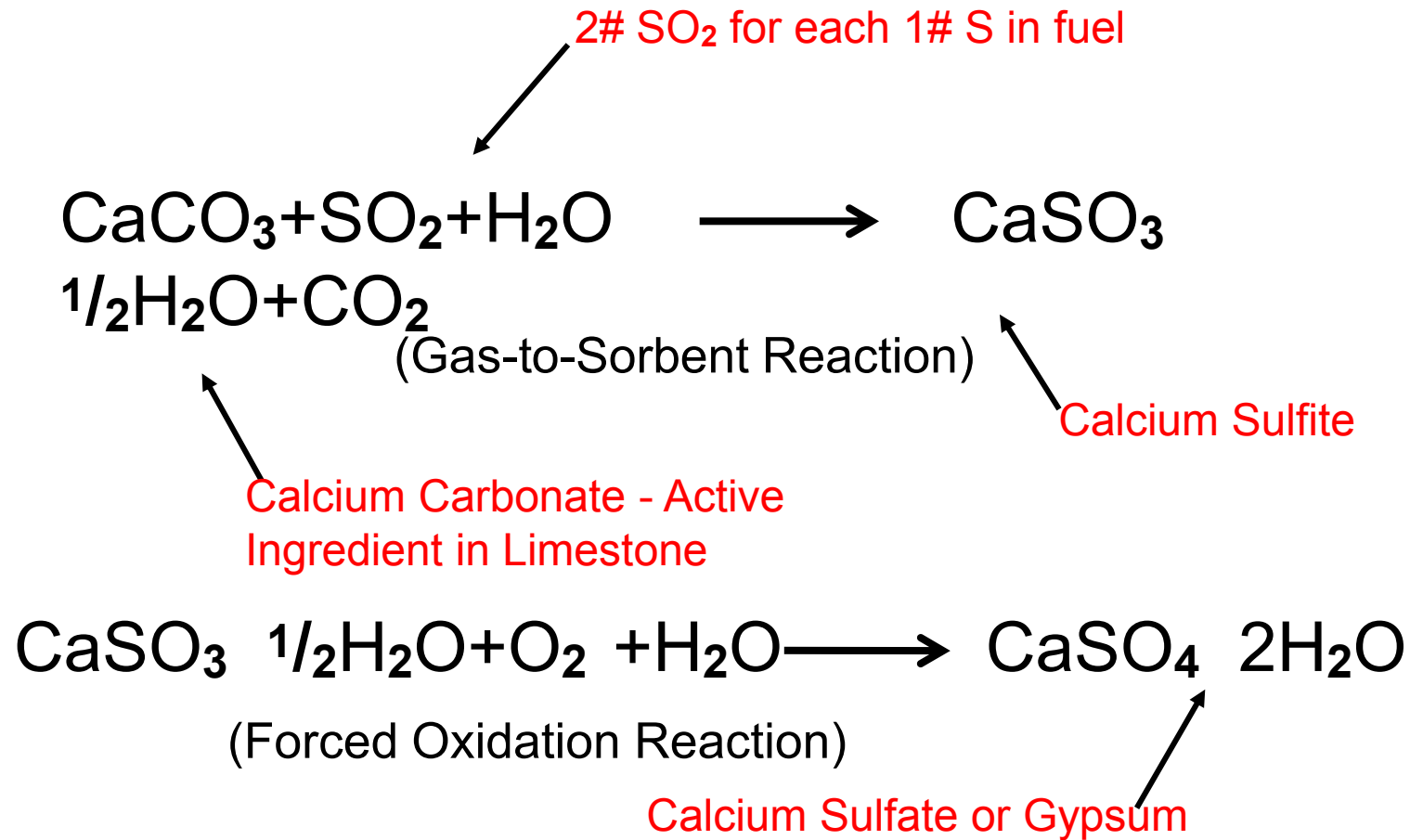
- Flue gas enters the absorber module and contacts the atomized slurry.
- SO<sub>2</sub> is absorbed.
- Reacts with the calcium in the slurry.
- Proper operation yields a dry and free-flowing by-product.
- Un-reacted lime is recycled to improve reagent use.
- The balance goes to storage and ultimate disposal.



(WFGD) System :

1. Limestone Preparation Area
2. Absorber Area
3. Dewatering Area

## Wet FGD Chemistry - Limestone



Customer		Location	Fuel	%S	MW		Inlet Gas Volume ACFM (000)	Scrubbing Agent	Absorber Type	
Wuhan Iron & Steel Group Minerals Co. Ltd., Daye Iron Mine Pelletizing Plant	Huangshi City, Hubei Province, PR China						267	Limestone	Thermax Spray Tower	
Wuhan Iron & Steel Group Minerals Co. Ltd., E'Zhou Pelletizing Plant	E'Zhou City, Hubei Province, PR China						1,187	Limestone	Spray Tower	
Zaklady Chemiczne Police S.A.,	Police, Poland		Coal	1.6	1	x	360	440	Ammonia	Spray Tower
Linyi Hengyuan Thermal Energy Limited Company Xianghetun Heat Source Plant	Linyi City, Shandong Province, PR China		Coal	2	2	x	70	278	Limestone	Spray Tower
Shandong Heze Electric Power Co., Ltd., Power Plant Phase 1	Heze City, Shandong Province, PR China		Coal	1.8	2	x	125	1,150	Limestone	Spray Tower
Huaneng Linyi Power Co., Ltd.	Linyi City, Shandong province, PR China		Coal	2.7	3	x	140	560	Limestone	Spray Tower
Israel Electric Corporation, Rutenberg	Ashkelon, Israel		Oil	1.2	2	x	550	1,672	Limestone	Spray Tower
Zibo Qixiang Tengda Chemical Co., Ltd	Zibo City, Shandong Province, PR China		Coal	2.5	2	x	50	700	Limestone	Spray Tower
Shandong Wendeng Thermal Power Co., Ltd	Wendeng City, Shandong Province, PR China		Coal	2.5	1	x	50	247	Limestone	Spray Tower
Huaneng Xinjiang Energy Company	Xinjiang Province, PR China		Coal	2	2	x	600	2,231	Limestone	Spray Tower
Shandong Zibo Tianyuan Power	Zibo, Shandong Province, PR China		Coal	2.0	1	x	300	1,150	Limestone	Spray Tower
Shaoguan Power Plant	Guangdong Province, PR China		Coal	1.2	2	x	600	2,031	Limestone	Spray Tower
Yangzi Petrochemical Company	Nanjiang Province, PR China		Coal	TBD	4	x	50	451	Ammonia	Spray Tower
Shijiazhuang Luhua Power Plant	Shijiazhuang, Hebei Province, PR China		Coal	1.73	2	x	300	1,347	Limestone	Spray Tower
Tangzhai Power Plant	Qingzhen, Guizhou Province, PR China		Coal	3.3	2	x	600	2,085	Limestone	Spray Tower
Israel Electric Corporation, Orot Rabin Units 5 & 6	Hedera, Israel		Oil	1.2	2	x	575	1,718	Limestone	Spray Tower
Zaklady Azotowe Pulawy S.A.,	Pulawy, Poland		Coal	1.2	1	x	300	1,375	Ammonia	Spray Tower
Guizhou Huadian Tongzhi	Zunyi City, Guizhou Province, PR China		Coal	3.8	2	x	600	1,279	Limestone	Spray Tower
Harbin Unit 3	Heilongjiang Province, PR China		Coal	0.32	2	x	600	The 2,425 Limit	Limestone	Rate Spray Tower

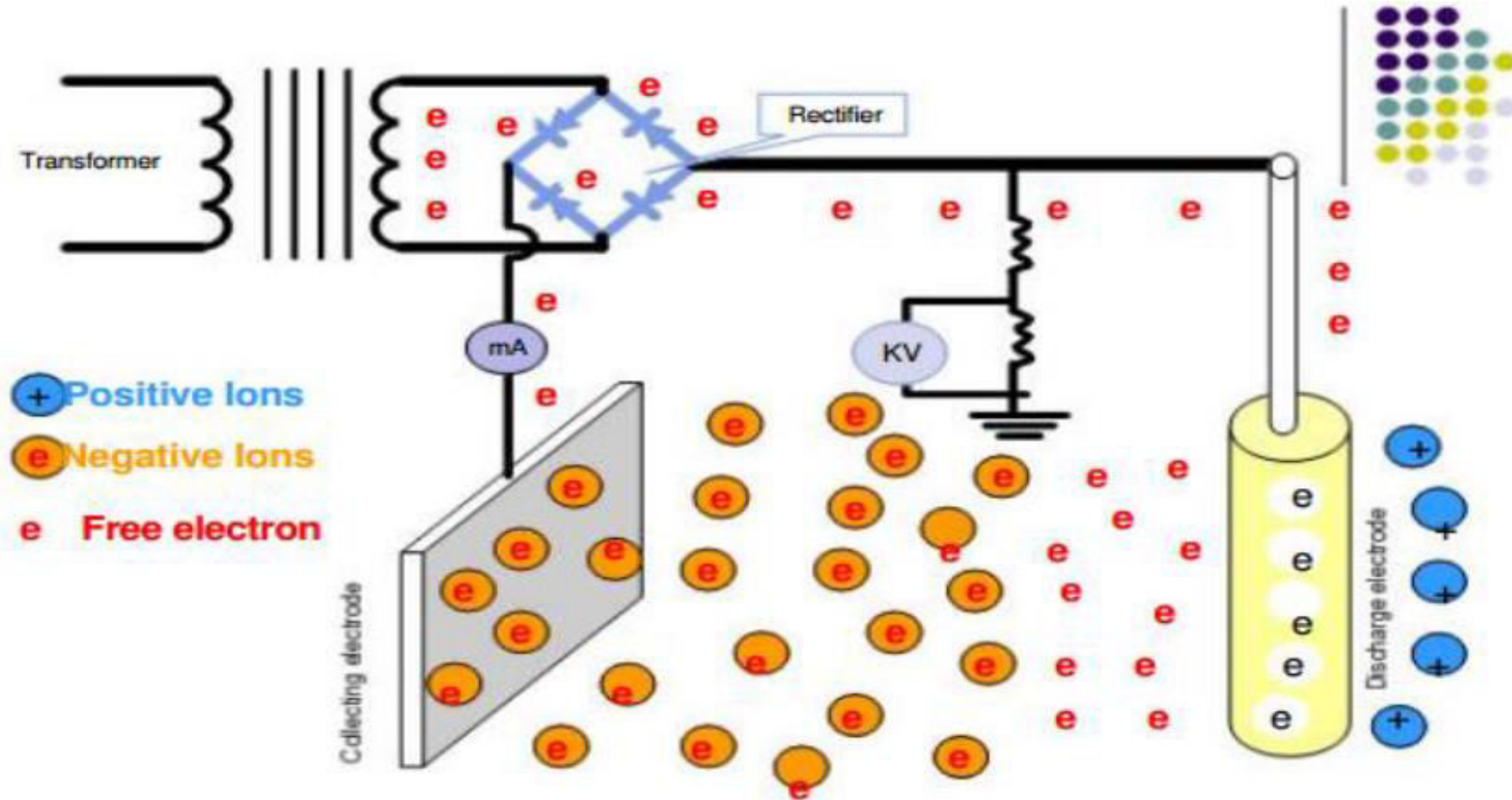
Customer/Unit	City	State	Country	Fuel	%S	MW			Inlet Gas Volume ACFM (000)	Scrubbing Agent	Absorber Type	Absorber SO <sub>2</sub> Efficiency (%)	Start-Up Date	Total MW
Minnkota Power Coop MRY Unit 1	Center	ND	USA	Lignite	1.3	1	x	250	1,363	Lime	Spray Tower	97	2011	250
Lower Colorado River Authority Fayette Units 1&2	Fayette	TX	USA	Coal	0.8	2	x	600	2,548	Limestone	Spray Tower	97	2011	1200
Virginia Power Company Mt. Storm Units 1 & 2	Mt. Storm	WV	USA	Coal	2.2	2	x	535	2,200	Limestone	Spray Tower	95	Feb 2002	1070
Dakota Gasification Co Great Plains Synfuels Plant	Beulah	ND	USA	Heavy Resid.	5	1	x	350	1,187	Ammonia	Spray Tower	93	Jan 1997	350
Virginia Power Company Mt. Storm Unit 3	Mt. Storm	WV	USA	Coal	2	1	x	530	2,600	Limestone	Spray Tower	98	Jan 1995	530
Santee Cooper Cross No. 1	Pineville	SC	USA	Coal	2.3	1	x	520	2,088	Limestone	Spray Tower	90	Dec 1994	520
Allegheny Power System Harrison Unit No. 1, 2 & 3	Haywood	WV	USA	Coal	3.5	3	x	640	2,260	Mg Lime	Spray Tower	98	Dec 1994	1920
Atlantic Electric B.L. England Unit 2	Beesley's Point	NJ	USA	Coal	3.2	1	x	170	530	Limestone	Spray Tower	93+	Dec 1994	170
Weyerhaeuser Paper Plymouth Mill	Plymouth	NC	USA	Coal	1.0-3.0	1	x	60	246	Sodium Hydroxide	Spray Tower	91	Dec 1994	60
Indianapolis Power & Light Unit 1	Indianapolis	IN	USA	Coal	4.5	1	x	232	1,225	Limestone	Spray Tower	95+	Sep 1994	232
Indianapolis Power & Light Unit 2	Indianapolis	IN	USA	Coal	4.5	1	x	405	2,240	Limestone	Spray Tower	95+	Sep 1994	405
Exeter Energy	Sterling	CT	USA	Waste Tires	1.6	1	x	30	198	Lime	Spray Tower	96	1990	30
Modesto Energy	Westley	CA	USA	Waste Tires	1.6	1	x	21	108	Lime	Spray Tower	96	1988	21
Intermountain Power Agency IPP No. 2	Delta	UT	USA	Coal	1.1	1	x	820	3,750	Limestone	Spray Tower	93	May 1987	820
Central & Southwest Services Oklaunion No. 1	Vernon	TX	USA	Coal	0.64	1	x	720	2,840	Limestone	Spray Tower	87	Dec 1986	720
Intermountain Power Agency IPP No. 1	Delta	UT	USA	Coal	1.1	1	x	820	3,750	Limestone	Spray Tower	93	Jun 1986	820
PacifiCorp Hunter No. 3	Castledale	UT	USA	Coal	0.55	1	x	400	1,727	Lime	Spray Tower	90	Jun 1983	400
TVA Paradise No. 1	Paradise	KY	USA	Coal	3.2	1	x	750	2,308	Limestone	Venturi/ Spray Tower	84.2	Jan 1983	750
TVA Paradise No. 2	Paradise	KY	USA	Coal	3.2	1	x	750	2,308	Limestone	Venturi/ Spray Tower	84.2	Jan 1983	750

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# Reduction in Particulate Matter Emission




# ESP



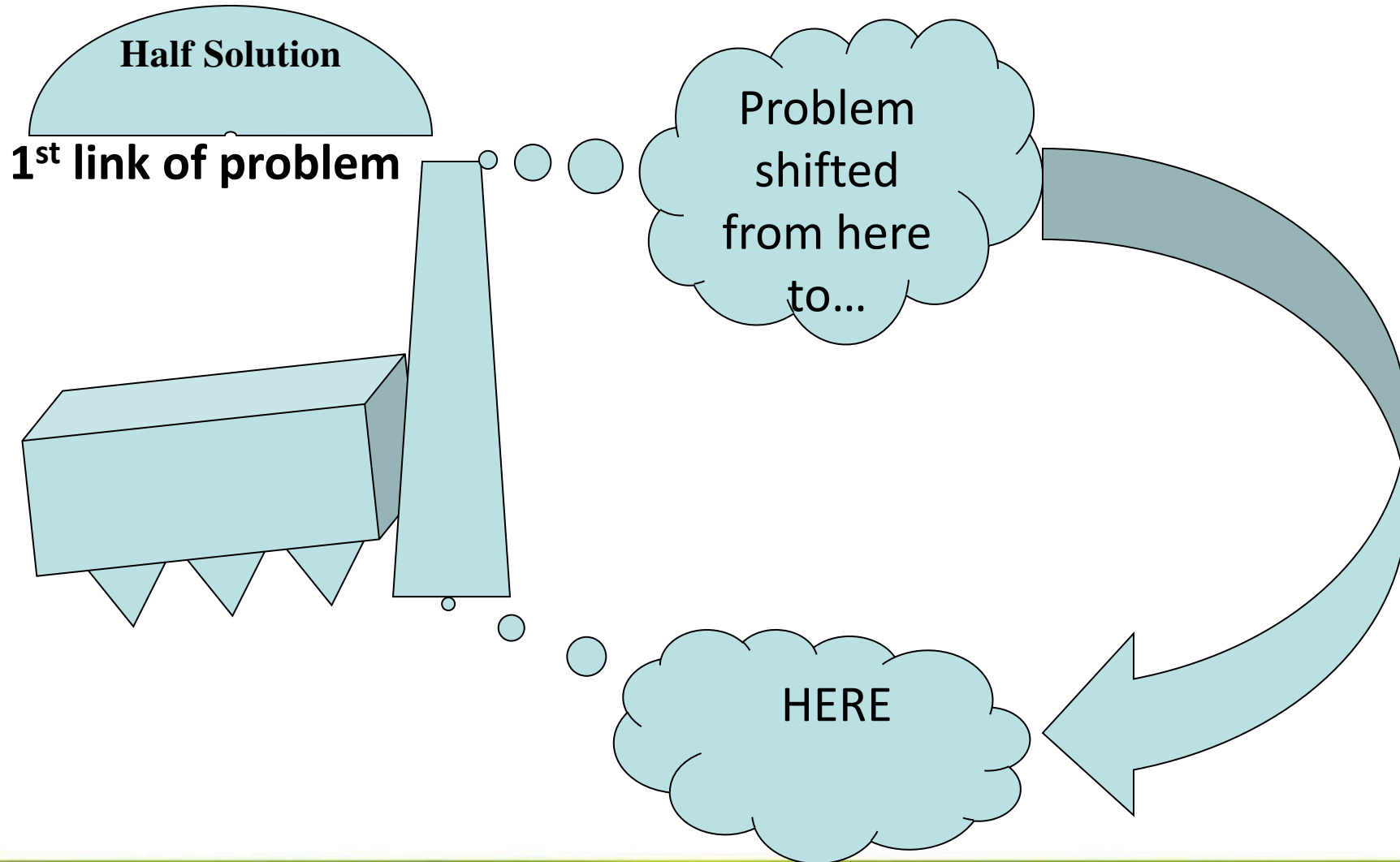
Ammonia helps to reduce resistivity of fly ash resulting in better ionization of the particles and increase in collection efficiency of ESP fields.

# References : ESP in accordance with new SPM norms

AX

<b>REFERENCE LIST FOR 30 mg/Nm<sup>3</sup> OUTLET EMISSION WITH 4 FIELD ESP</b> 					
Sl. No.:	Customer Name	Number of field	Application	Inlet Dust Load (gm/Nm <sup>3</sup> )	Outlet Emission (mg/Nm <sup>3</sup> )
1	ACC CHANDA	4	ESP FOR 110 TPH CFBC BOILER	72	30
2	MCL RR NAGAR	4	ESP FOR 110 TPH AFBC BOILER	58.5	30
3	SFI, MALAYSIA	4	ESP FOR 75 TPH AFBC BOILER	22	33
4	Vidarbha Energy	4	ESP on 12 MW Biomass plant	63.69	30
5	Dangote, Zambia	4	ESP for 65 TPH AFBC BOILER	24	30
6	JK Cement Mangrol	4	ESP for 110 TPH CFBC BOILER	58	30
7	ISGEC A/c. Deify Infrastructure	4	ESP for 500 TPD WHRB	50	30
8	ISGEC A/c. Deify Infrastructure	4	ESP for 500 TPD WHRB	50	30
9	Dr. Reddys Laboratories Ltd	4	ESP for 40 TPH AFBC Boiler	12.5	30
10	Cheema Boiler Ltd., A/c. Apollo Tyres Ltd, Kerala	4	ESP for 18.5 TPH AFBC Boiler	71.5	30

# Neutralising Dust Problem





# Options...

## Potential uses of Fly Ash :-

- **Fly Ash Bricks**
- **Classified Ash for Concrete**
- **Concrete blocks & Pavers**
- **AAC Blocks**
- **Pre-Stressed Concrete**
- **Ready Mix Mortar**
- **Rendering Material**
- **Light Weight Aggregates**
- **Special Cement Admixture**



# Fly Ash Utilization & Revenue Pyramid

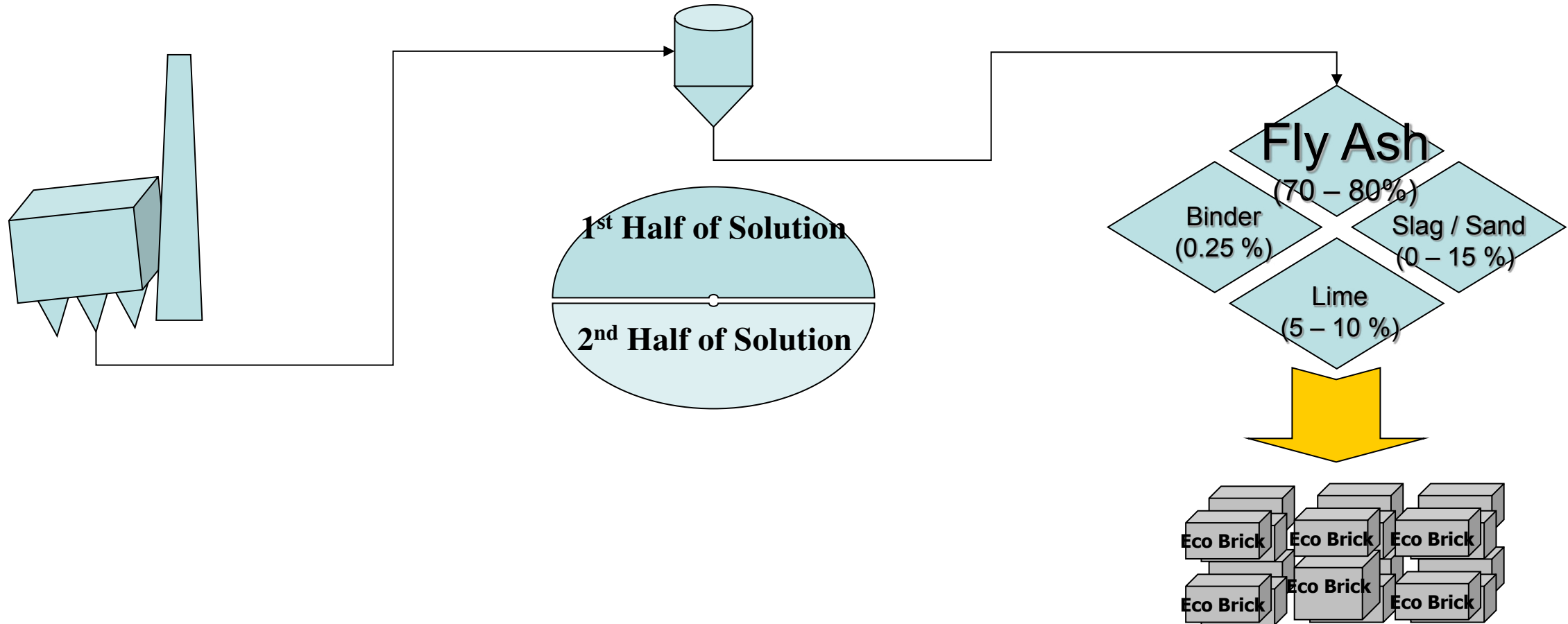


Fly Ash Utilization Pyramid

Revenue Pyramid



# A Complete Solution



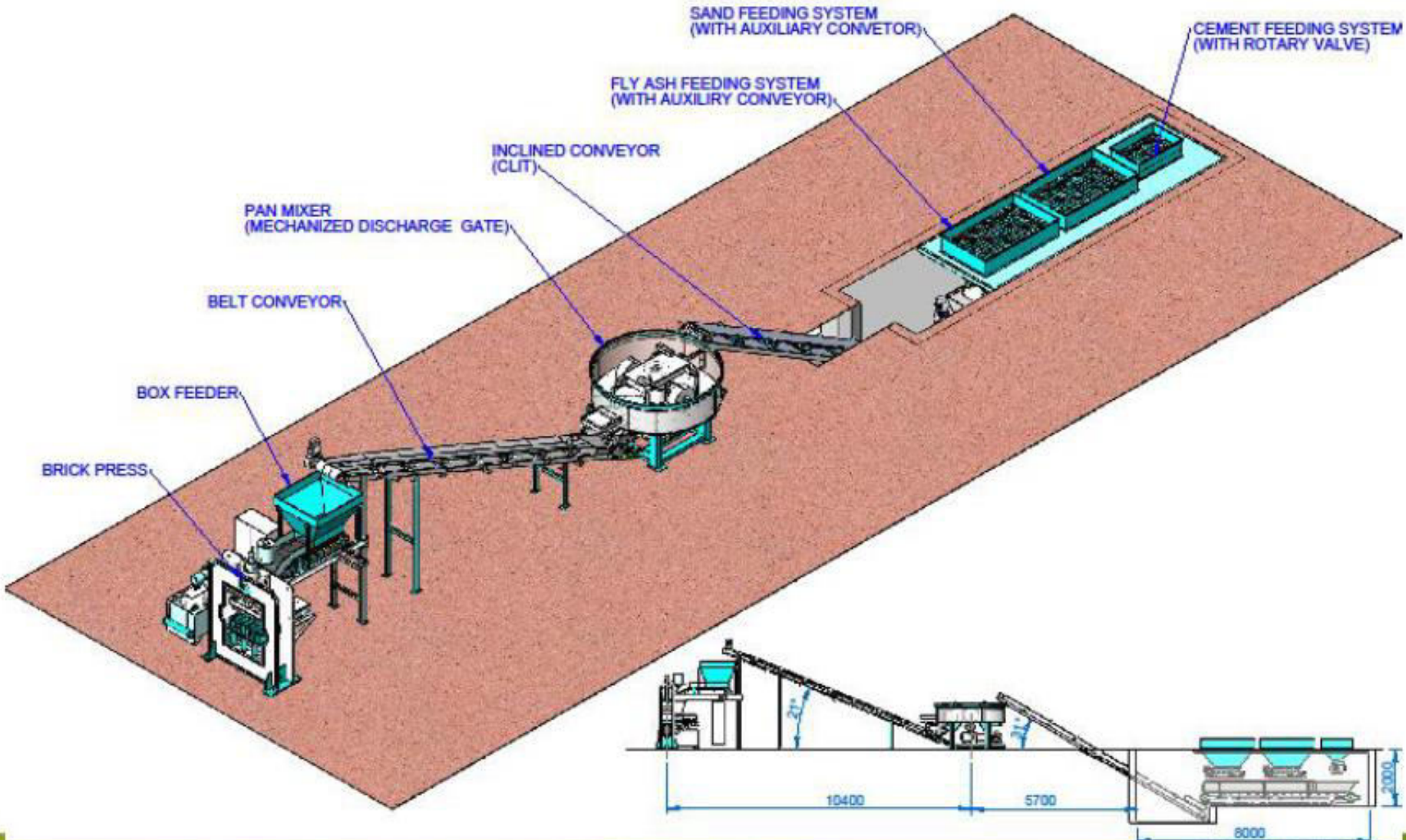
Myths	Facts
<p>1. I have no problem. I can sell it at a high price to Cement Manufacturers</p>	<ul style="list-style-type: none"> <li>- It is not always true for every one.</li> <li>- Quality of fly ash is an issue.</li> </ul> <p><b>Power:</b> 160,000 MW (Present Thermal Power Generation Capacity)= 480,000 TPA Fly Ash</p> <p><b>Cement:</b> 332 Million TPA Capacity = 70 Million TPA (utilization@25% of total Cement Production Capacity)</p> <p><b>Therefore, shortfall is much more and growing at very high rate.</b></p>
<p>2. Installation of Brick making Plant – Very Expensive and Big Headache</p>	<ul style="list-style-type: none"> <li>- 300 TPD Fly Ash Utilization Plant costs approx. 25 - 30 Cr. (This is app 4 % of capital cost of 100 MW Plant</li> <li>- Additional cost of raw material is app 3 % of fuel cost</li> <li>- AND it will generate value added product of an equivalent value of 10 Cr. (app 4% of total revenue of power plant – @3 Rs / Unit)</li> </ul>



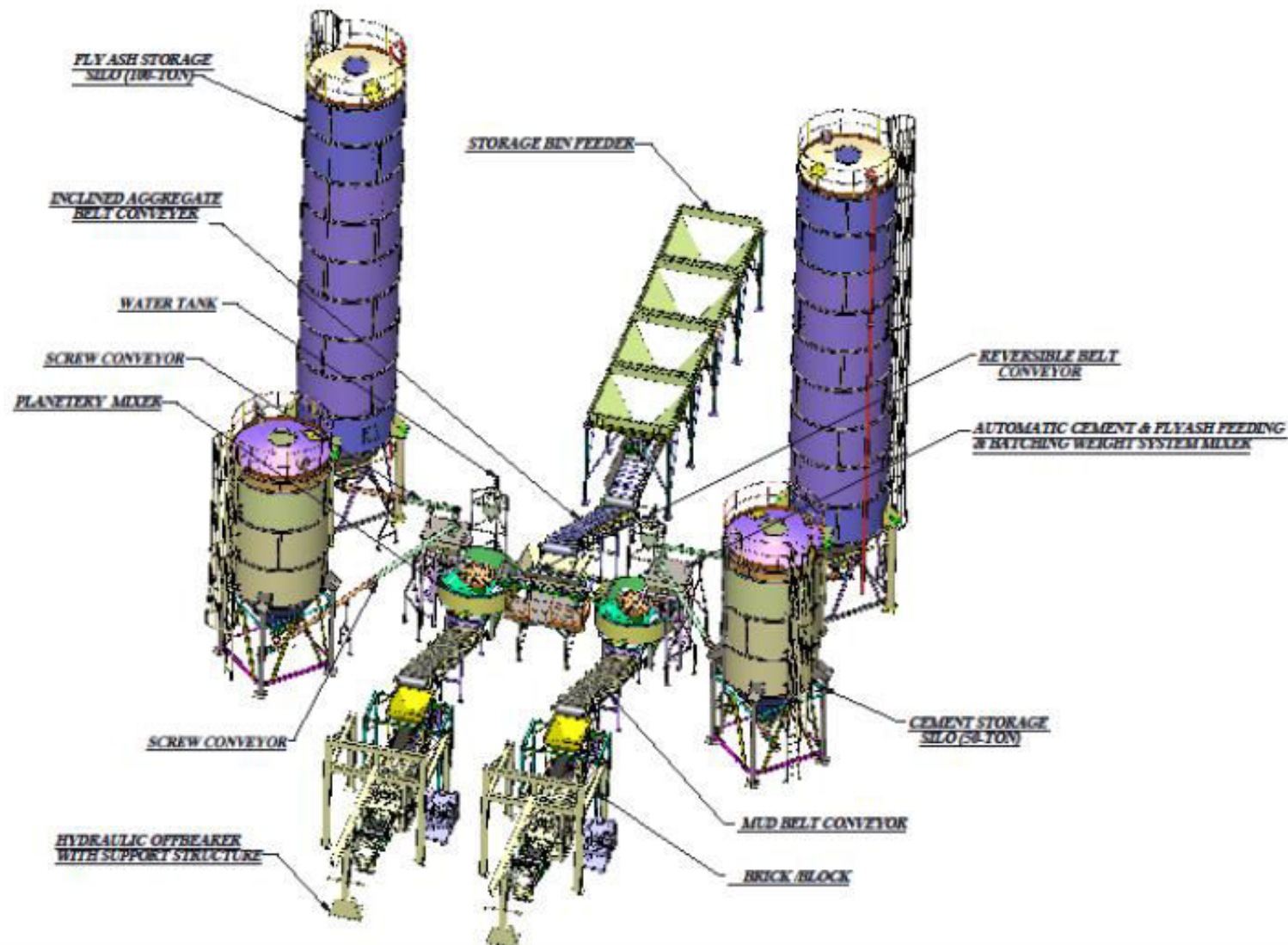
Myths	Facts
3. We can not/should not/ideally not be selling the Bricks	But, we do sell Fly Ash.
4. No Market of Bricks in near by area.	<p>a. Brick Market Size = 1000 Bricks/Person/Year. Therefore, 3 Cr bricks serves 30,000 Population.</p> <p>b. Bricks can be used in Colonies , Guest Houses, Floorings</p> <p>c. Corporate Social Responsibility            - Re-habitation Program            - Small Village Basic Infrastructure like:            Water Pump Room, PHU Building (Public Health Unit), School etc</p>






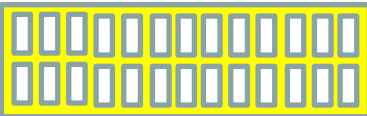
# General Arrangement of Fly Ash Brick Plant with Auto Batch Weighing system



# Fully Automatic Vibro Compacting Technology for Concrete Product



# Details

Brick / hr	1,000	1,500	2,000	7,000
Working hr/day	10	10	10	21
Brick / day	10,000	15,000	20,000	147,000
Working Day/year	200	200	200	350
Brick / Year	2,000,000	3,000,000	4,000,000	51,450,000
Mode <sup>l</sup>	Neptune Plus 1000HEY	Neptune Plus 1500HEY	Neptune Plus 2000HEY	NHF1100C
Hyd.Press - Ton	60	75	100	1100
No. of Bricks/mould				
No. of Strokes/ min	4.5	5	5.5	5
Tonnage per Brick	15	15	17	42
<b>Specific compacting pressure(kg/cm<sup>2</sup>) 230 X 110 X 70</b>	59	59	66	167
Raw Materials Storage	-	-	-	~ 200 cu.m
Auto Batch Weighing, Feeding	-	-	-	Batching
<b>Basic Plant</b>	<b>Advance Powder Compacting Technology, Hyd.Brick Press</b>			





# Details ...



Brick Transfer on Pallet	Automatic	Automatic	Automatic	Automatic
Pallet Transfer on Trolley	Manually	Manually	Manually	Automatic
Trolley move on curing area	Manually	Manually	Manually	Automatic Car movement
Product Curing	Manual Curing System	Manual Curing System	Manual Curing System	Autoclave
Finish product handling system	Manually	Manually	Manually	Goliath Crane
Considered min life in years	5	5	5	10
Total production during considered min life	10,000,000	15,000,000	20,000,000	514,500,000
Total investment	1,550,000	2,150,000	2,850,000	200,000,000
specific Investment per 1000 brick on the basis of considered life (Total investmnet / total bricks produced in years) in Rs/1000 Brick	<b>155</b>	<b>143.33</b>	<b>142.5</b>	<b>388.73</b>



# Fully Automatic Plant – Capacity 2,00,000 Brick/day

