

CII National Awards for Excellence in Energy Management 2023



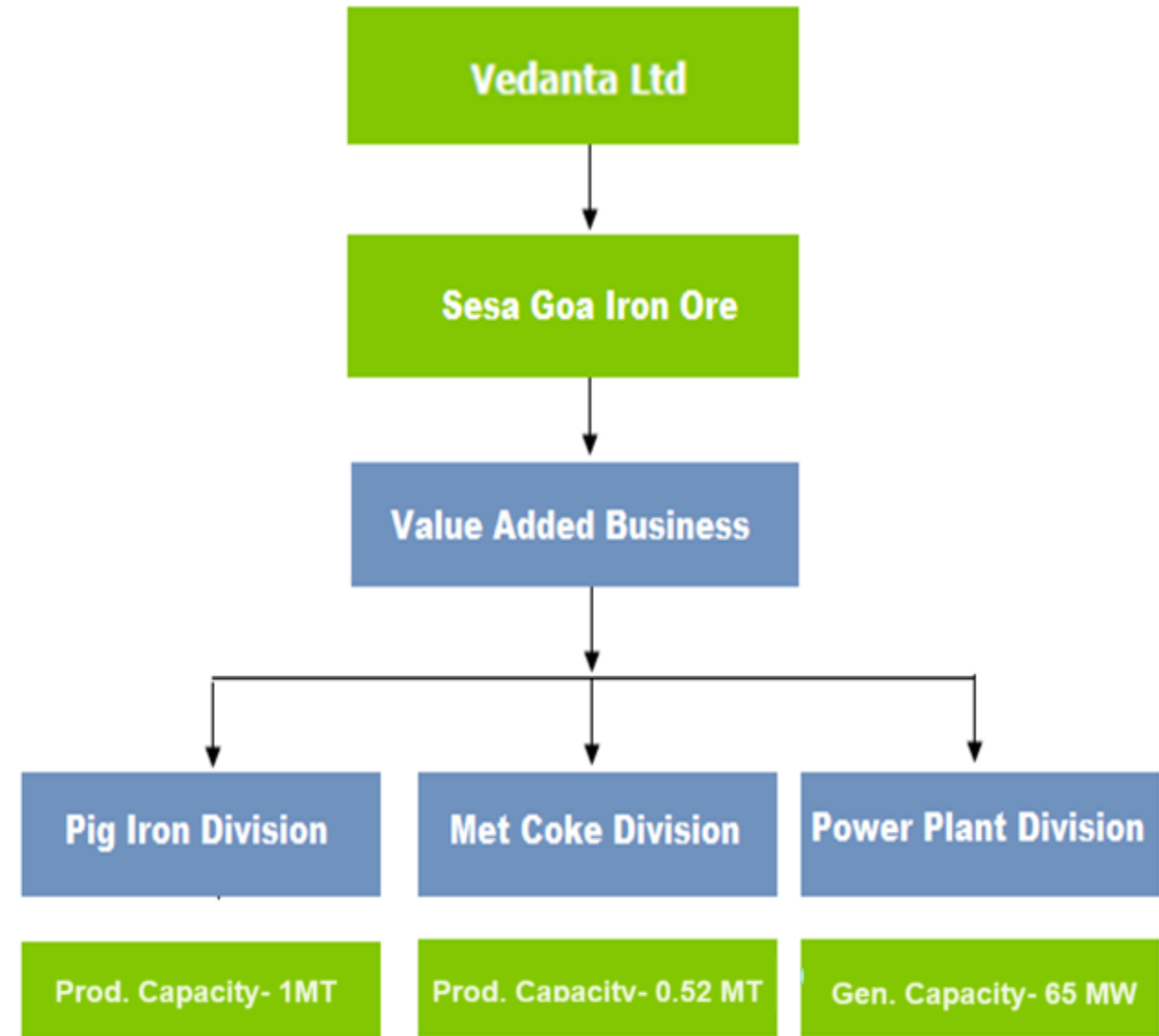
Team Member :

Ashish Dhanopia –Head – Energy & Carbon

Deepak Kumar- Head- PID-1 Operations

Organization Profile

- India's largest merchant pig iron plant with production capacity of 1 MTPA, was first to introduce mini blast furnace concept in India.
- Patented environment friendly heat recovery coke making technology.
- First CDM project in waste heat recovery category.
- First to introduce ultra low S , SG grade pig Iron in India.
- We are ISO 50001:2018, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 certified unit.



VISION

To be the highest value creator in the iron ore industry contributing to the growth of the nation

MISSION

- To continue to maintain our pre-eminent position in safety, environment and quality control management in the respective industry sectors.
- To maximise stakeholder wealth by exploiting core skills of iron ore mining, coke and iron making.
- To constantly seek high levels of productivity and technical efficiency; to maintain technological superiority over competitors.
- To aggressively seek additional resources.
- To maintain costs in the lowest decile globally.
- To be an organization with best-in-class people and a performance driven culture by attracting and retaining quality manpower.
- To contribute to the development of the communities that we operate in or have influence on our business activities.

CORE VALUES



trust

We actively foster a culture of mutual trust in our interactions with our stakeholders and encourage an open dialogue which ensures mutual respect.



care

As we continue to grow, we are committed to the triple bottom line of People, Planet and Prosperity, to create a sustainable future in a zero harm environment for our communities.



integrity

We place utmost importance to engaging ethically and transparently with all our stakeholders, taking accountability of our actions to maintain the highest standards of professionalism and complying with international policies and procedures.



respect

We lay consistent emphasis on human rights, respect the principle of free, prior, informed consent, while our engagements with stakeholders give local communities the opportunity to voice their opinions and concerns.



excellence

Our primary focus is delivering value of the highest standard to our stakeholders. We are constantly motivated on improving our costs and our quality of production in each of our business through a culture of best practice benchmarking.



innovation

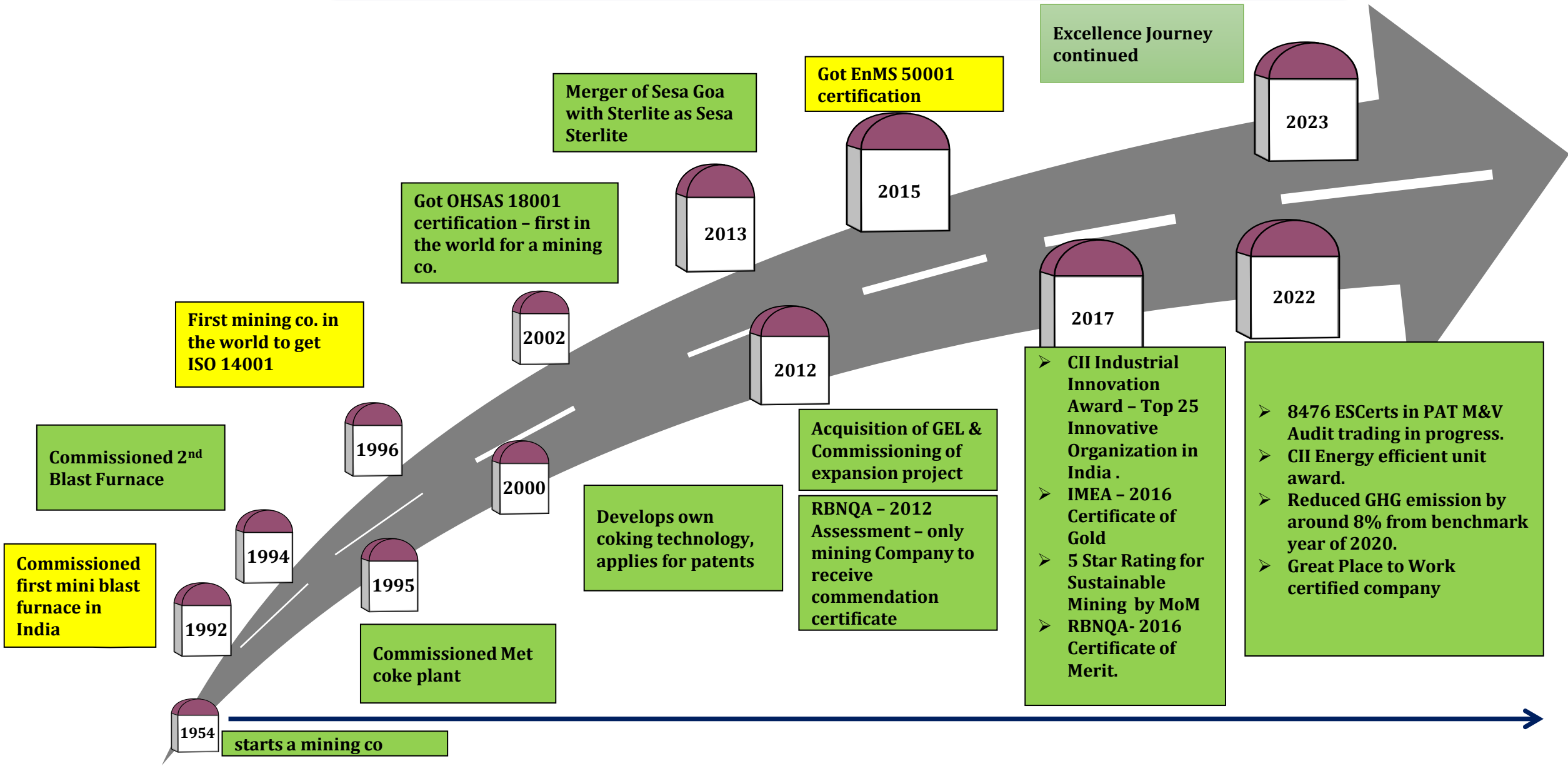
We embrace a conducive environment for encouraging innovation that leads to a Zero harm environment and exemplifying optimal utilization of natural resources, improved efficiencies and recoveries of by-products.

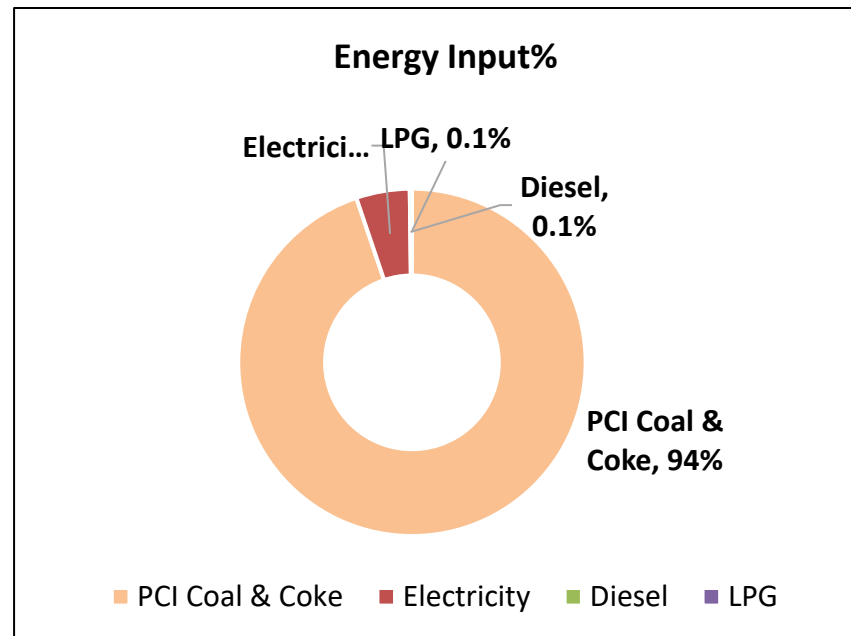
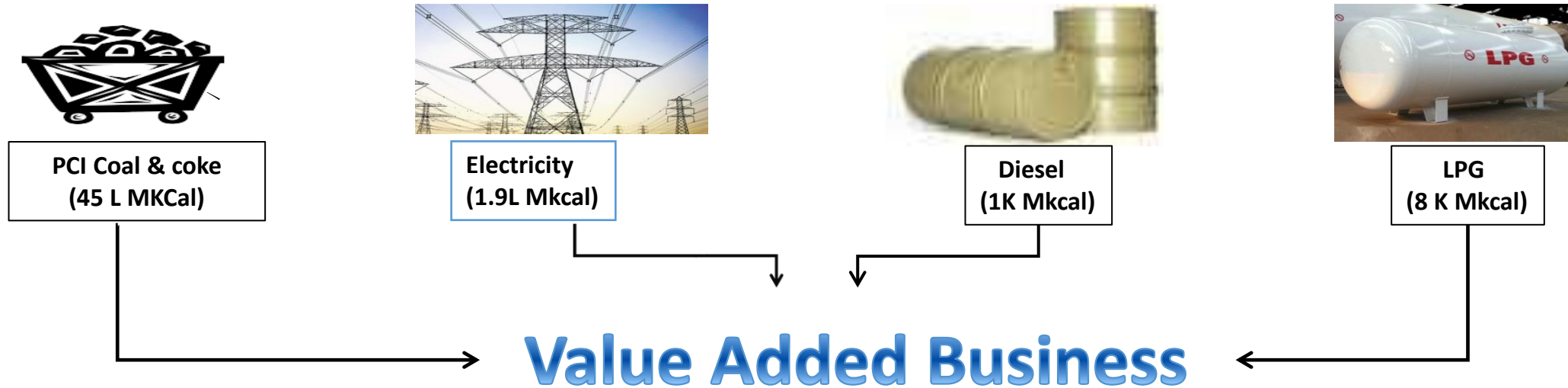


entrepreneurship

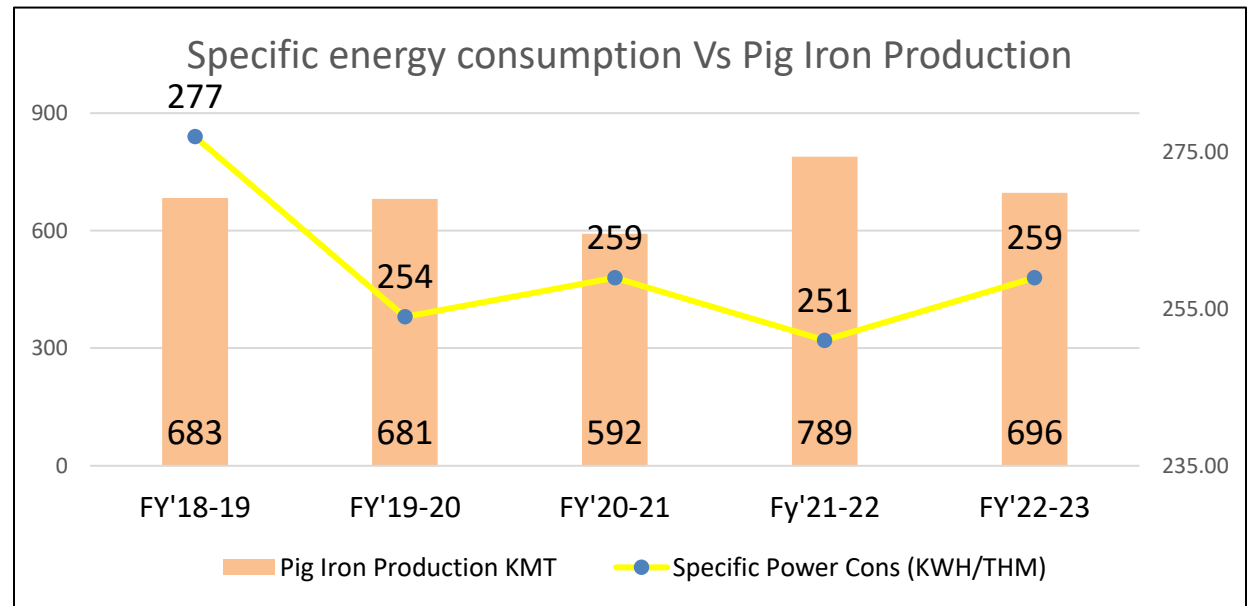
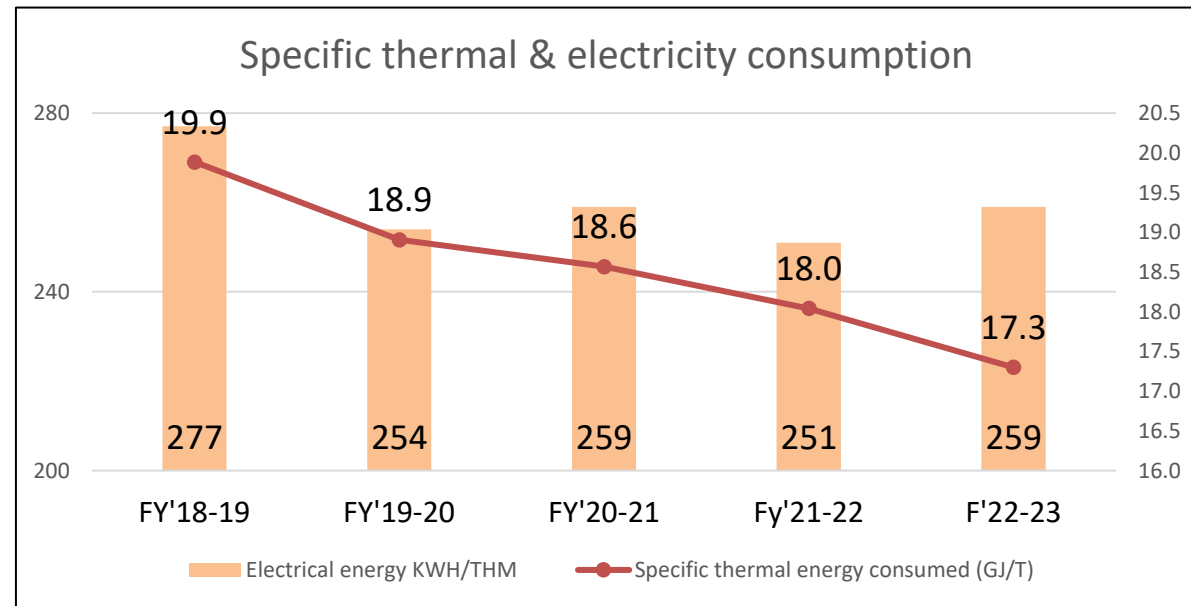
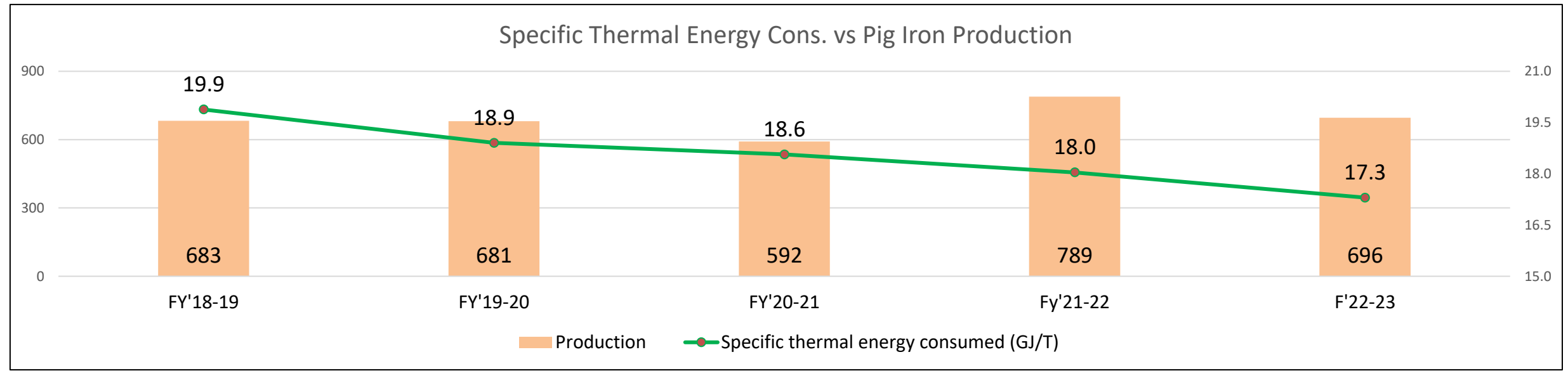
At Vedanta, our people are our most important assets. We actively encourage their development and support them in pursuing their goals.

SESA'S Journey – Key milestones

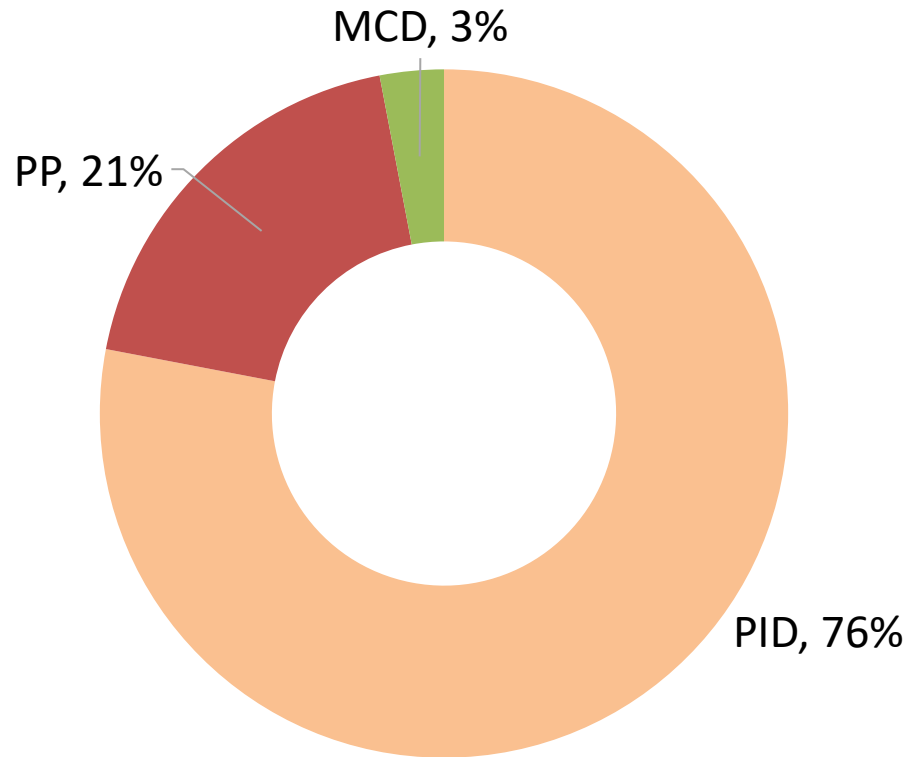




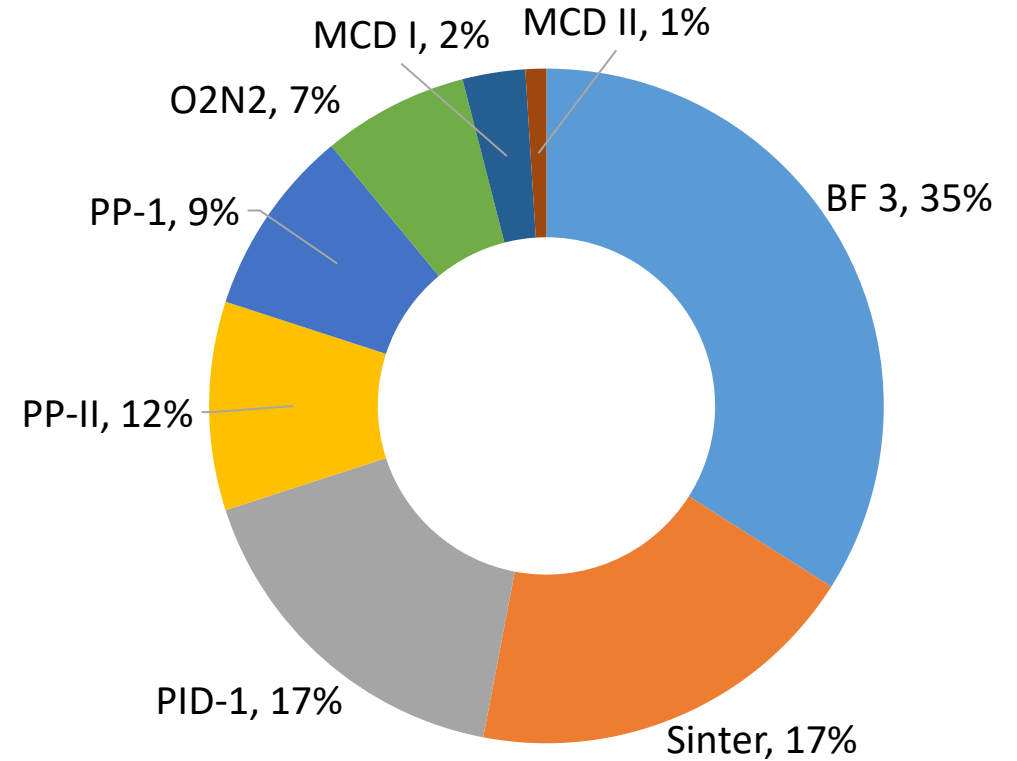
- ✓ The main sources of energy are coke, coal and electricity.
- ✓ The total energy consumption of VAB for the FY 22-23 is around 47 Lakh MKCal.



Division Wise Break Up %

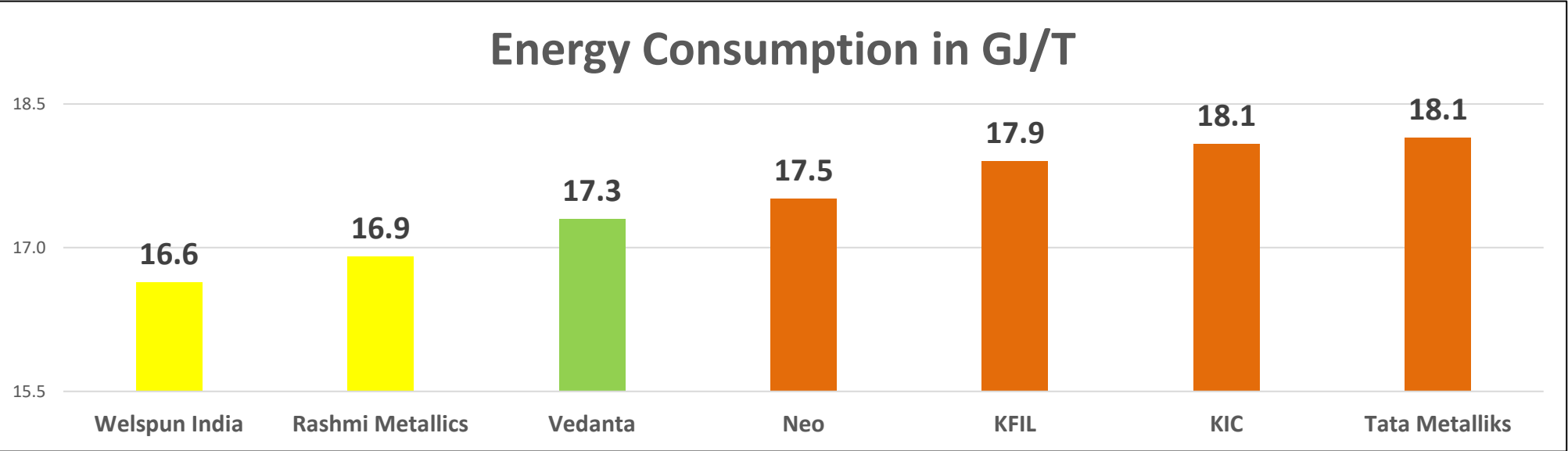
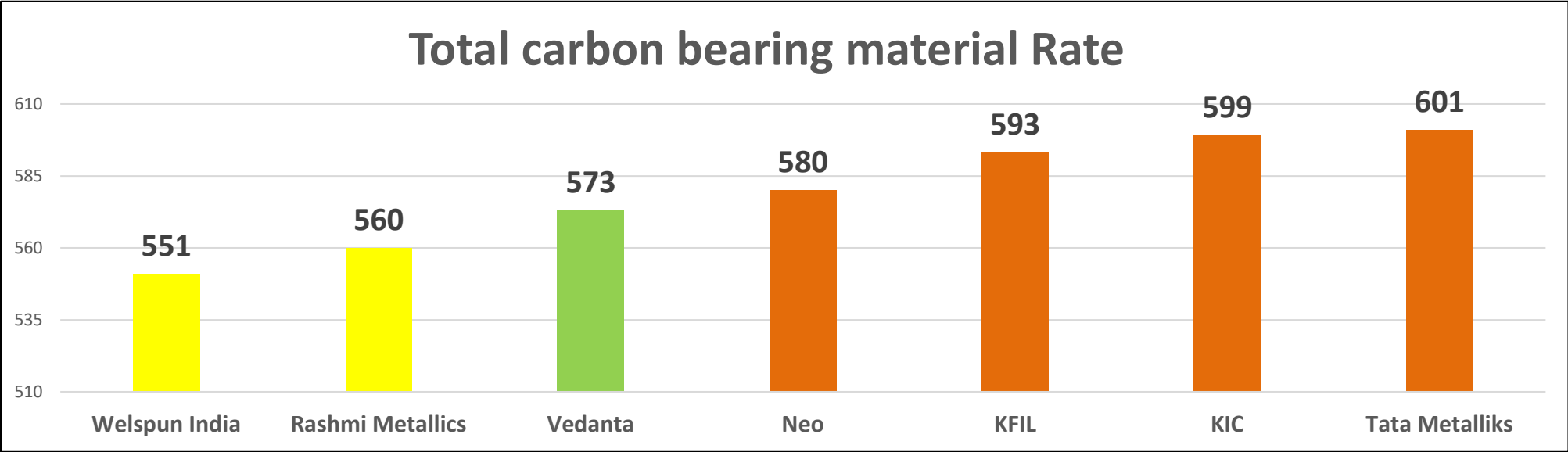


Plant Wise Break Up %



***As per power consumption data of FY' 22-23**

BENCHMARKING



Source: Benchmarking Visits and Internal connects

Energy Conservation Projects



Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings	Investments Made	Payback in Months
			Rs. Millions	Rs Millions	
2022-23		Reduction of total carbon bearing material rate in BF operation from 6Kg/THM through oxygen enrichment	83.2	200	28.8
		Power plant Turbine Upgradation to increase generation by 5 MW	100.8	200	23.8
		Install variable frequency drive (VFD) for air compressor in power plant 1 and 2	0.3	0.8	33.1
		Install VFD for combustion air blower & operate at reduced speed	0.1	0.3	36.0
		Installation of CO analyzer to supply sufficient air to boiler in PP-2	2	0.48	4.8



Zero Investment



Innovation



Replacement



Process Cont.



Automation

IMPLEMENTED ENERGY SAVING PROJECTS

Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings	Investments Made	Payback in Months
			Rs. Millions	Rs Millions	
2022-23		Replacing the old Slag Granulation pumps with energy efficient pumps	0.6	1	20
		Replacing the old furnace Return water pump with energy efficient pump	2.2	2	11
		Replacement of HPSV lamps to LED lamps at PID-2	0.1	2	240
		Connecting under-loaded slag drier motors in star mode.	0.8	0	-
		Replacement of 2 nos. blower motors with IE4 motors	0.5	2	48

IMPLEMENTED ENERGY SAVING PROJECTS

Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings	Investments Made	Payback in Months
			Rs. Millions	Rs Millions	
2021-22		Reduction of total carbon bearing material rate in BF operation from 630 Kg/THM to 614 Kg/THM through furnace relining, design modification & level-2 automation	378	800	25.4
		Replacement of ACW pumps in PP1 with energy efficient pumps	0.30	1.2	47.6
		Install VFD for main cooling water pumps in sinter plant	0.20	0.6	35.7
		Install VFD for combustion air blower & operate at reduced speed	0.1	0.3	36.0
		Replacement of existing motors with IE4 motors	0.24	2.0	100

Zero Investment

Innovation

Replacement

Process Cont.

Automation

Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings	Investments Made	Payback in Months
			Rs. Millions	Rs Millions	
2021-22		Replacement of compressor with energy efficient compressor	0.30	1.5	59.5
		CT shaft material from SS to com. Fiber for 3 fans	0.18	0.20	11
		Replacement of HPSV lamps to LED lamps at PID-2 dispatch high mast tower	0.085	0.5	70
		Connecting under-loaded Runner cooling fan motors in star mode.	0.8	0	-
		Conversion of 20% of conventional lamps with LED lamps	0.5	2	48



Zero Investment



Innovation



Replacement



Process Cont.



Automation

IMPLEMENTED ENERGY SAVING PROJECTS

Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings	Investments Made	Payback in Months
			Rs. Millions	Rs Millions	
2020-21	Innovation	Coke rate reduction of blast furnace operation from 633 Kg/THM to 630 Kg/THM through process optimization	61.44	40	7.87
	Process Cont.	Sinter plant main exhaust fan duct leakage arresting.	2.4	1	6
	Process Cont.	STG overhauling along with condenser chemical cleaning to reduce specific steam consumption by 0.5 TPH.	2.4	0.2	1
	Automation	Reducing run hours of PWD pump for quench tower water by fixing motorized flow control valve at CNO7	0.1	0.1	12
	Automation	All lighting circuits provided with PLC automation/timer to eliminate wastage when not required.	0.4	0.3	9

Zero Investment

Innovation

Replacement

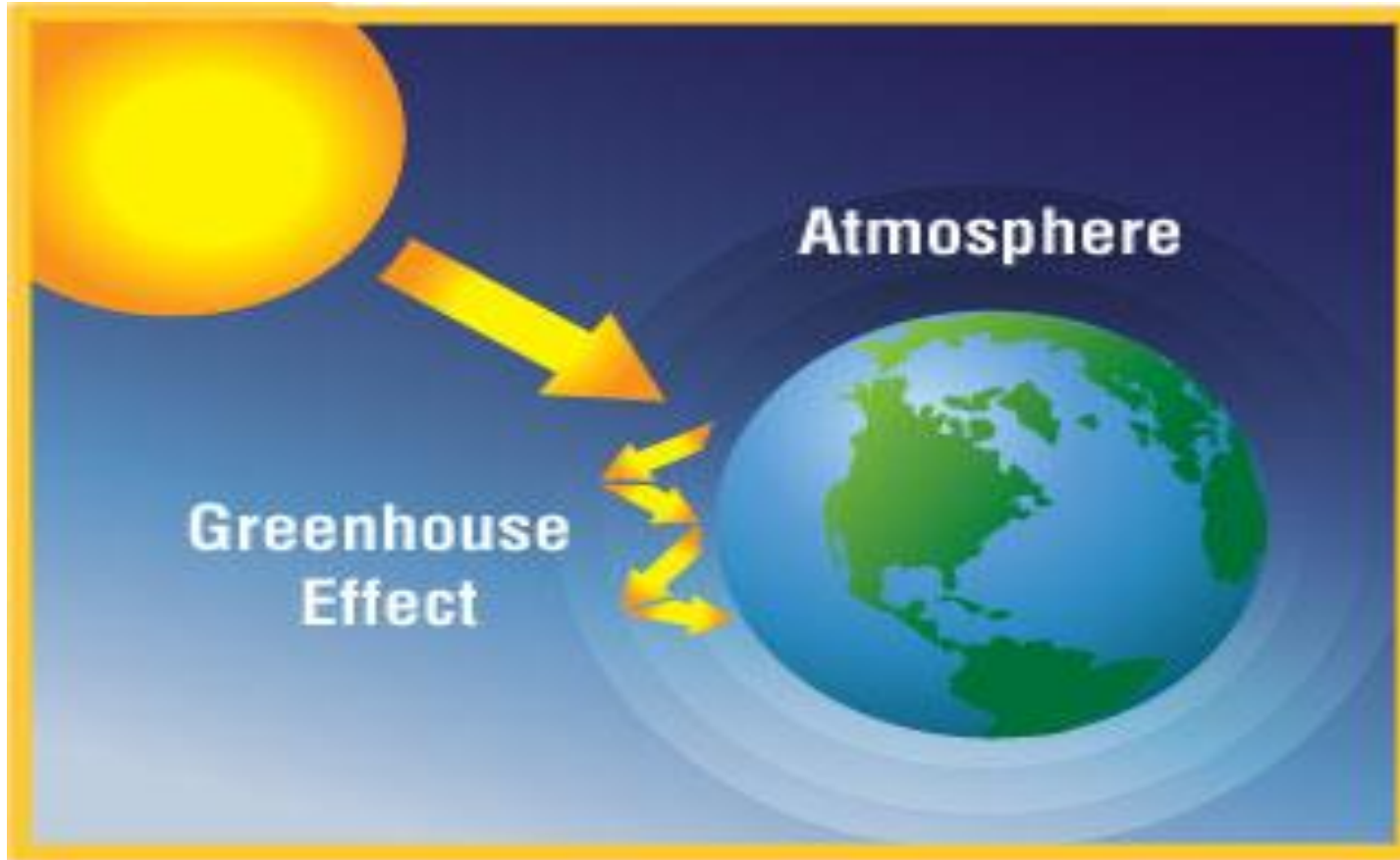
Process Cont.

Automation

IMPLEMENTED ENERGY SAVING PROJECTS

Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings	Investments Made	Payback in Months
			Rs. Millions	Rs Millions	
2020-21		Conducting Compressed air leakage audit and arresting leaking points in MCD and PP	0.4	0.1	3
		Conversion of 20% of conventional lamps with LED lamps	0.5	2	48
		Conducting Compressed air leakage audit and arresting leaking points in PID-2	0.4	0.2	6
		Reduction in coke breeze consumption in sinter plant.	0.75	2.00	32
		Installed voltage controller for high mast tower (5 nos.)	0.02	0.02	10

GHG EMISSION REDUCTION



GHG REDUCTION-ROADMAP

- Relining of BF-3
- Increase in power generation thru. WHRPP turbine upgradation.
- PCI Increase from 62 Kg/T to 125 Kg/T
- Solar PP- 3 MW
- CCUS -10 TPD (Pilot Project)
- Addition of Fe-Si in PID-1
- Using High Grade Ore in BF
- Process Optimization.
- Gunning of BF-2

- Natural Gas usage in BF (R&D)
- Hydrogen in PCI (R & D)

2020

2025

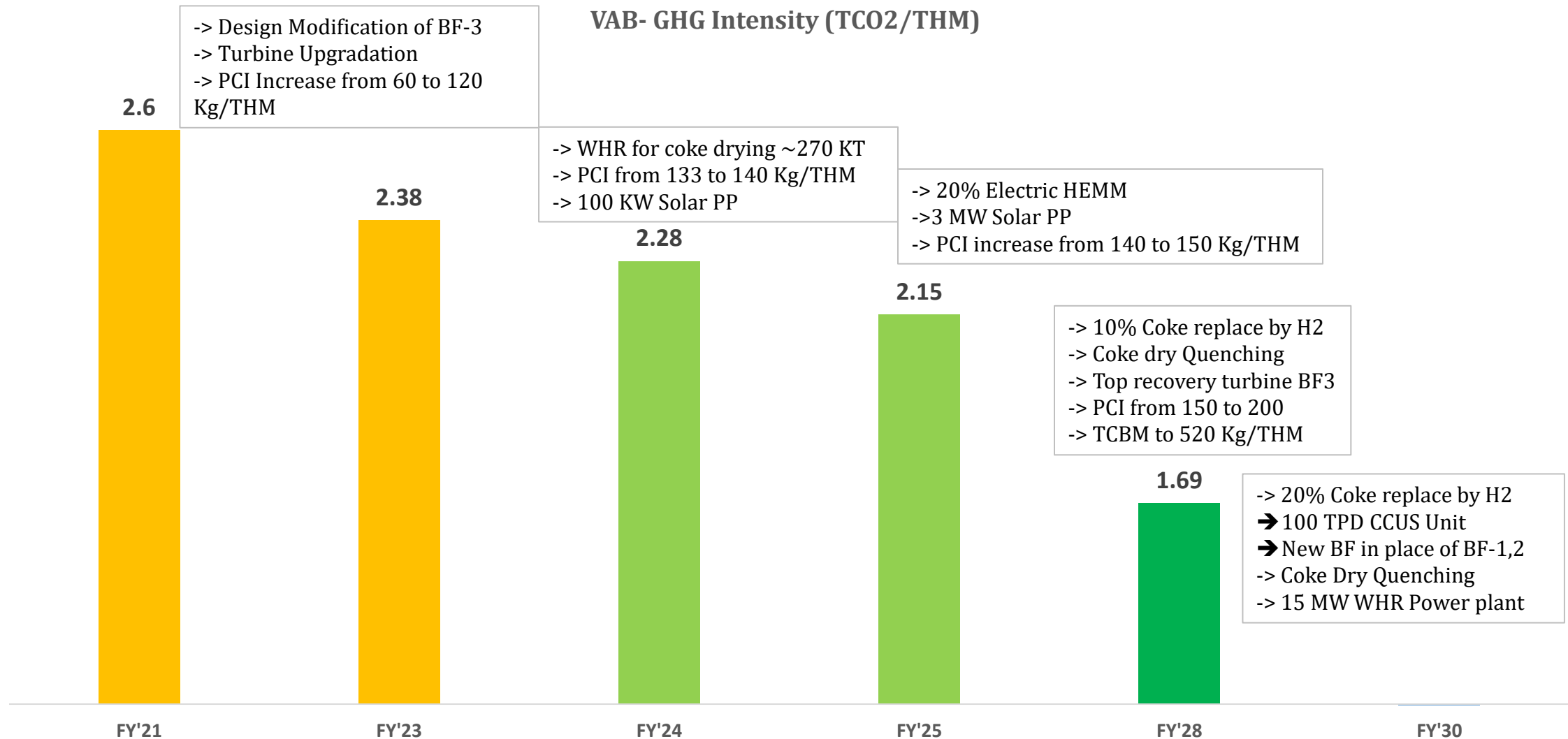
2030

2035

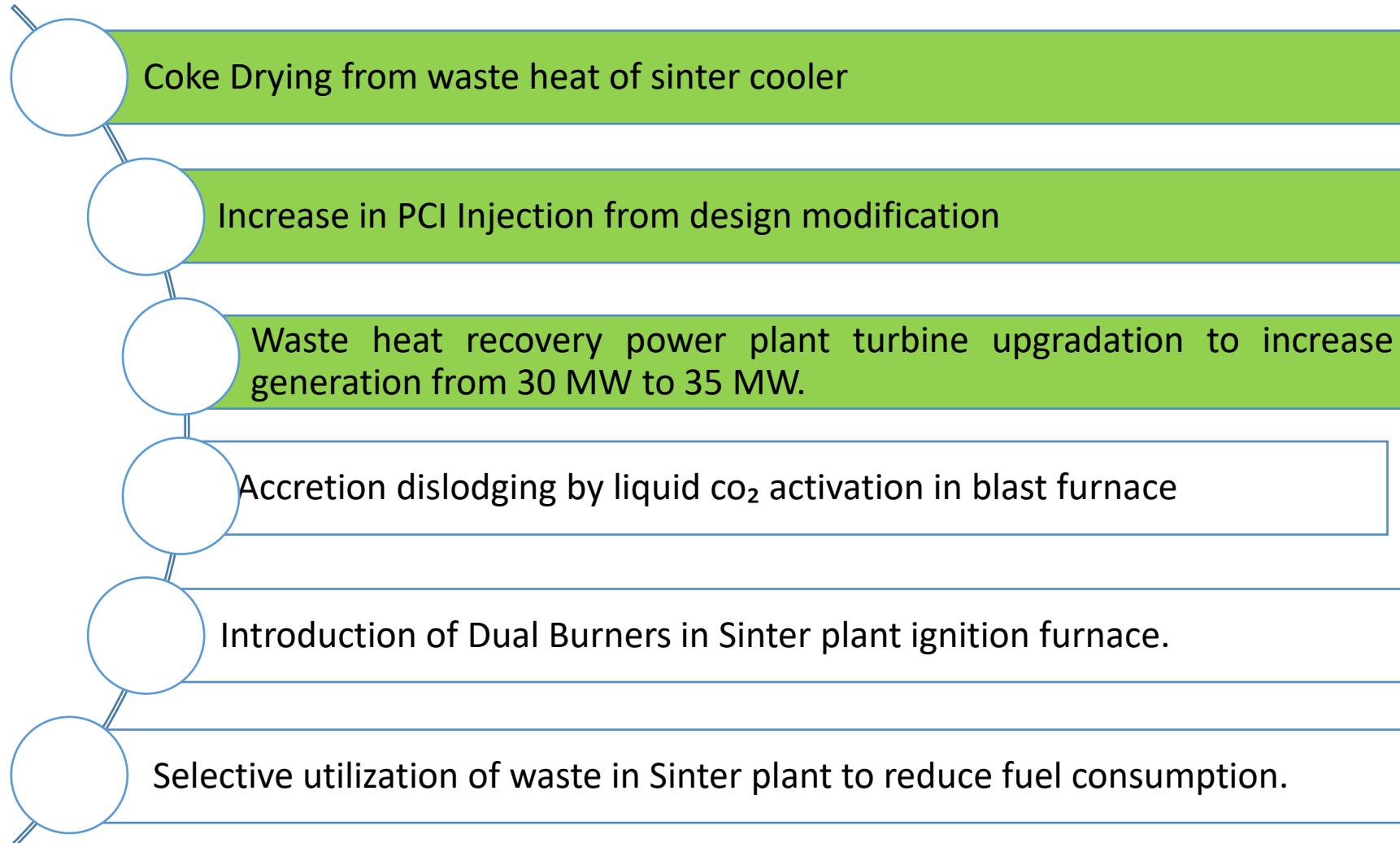
2050

- Coke Dry Quenching
- Top Recovery turbine
- PCI increase from 125Kg/T to 150 Kg/T
- Sinter waste heat recovery- Power Generation.
- CCUS- 50TPD
- Solar Power Plant- 10MW

VAB- GREEN STRATEGY (GHG REDUCTION)





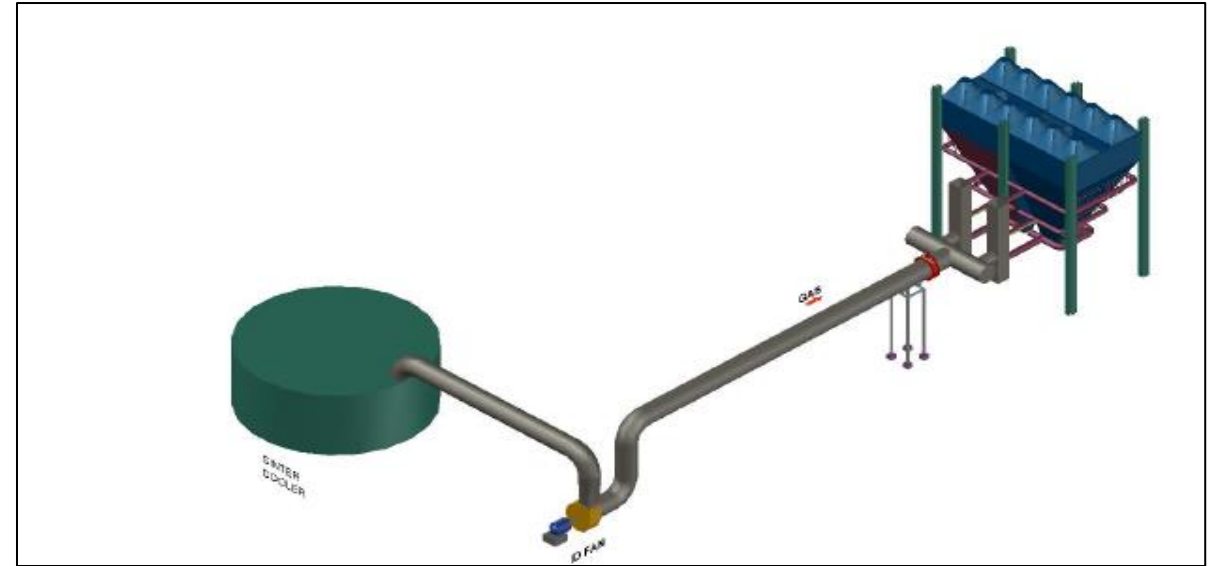


Brief description of system

- Tap the hot air (gas) from sinter cooler waste heat recovery boiler exhaust at high heat zone and passed through duct towards ID Fan. The air at outlet of ID fan passed towards stock house via ducting.
- At stock house the hot air distributed in existing bunkers by our special nozzles evenly. The gas will pass from bottom of charge bed and exit from top. During this process the charge will be dried and its temperature will reach up to 85-90 deg C max

Benefits:

- Reduction in coke rate by **5-10 Kg/THM.**
- Energy saving of approx. **~4000 Mkcal.**
- GHG emission reduction by **9000 Tons of CO₂e.**



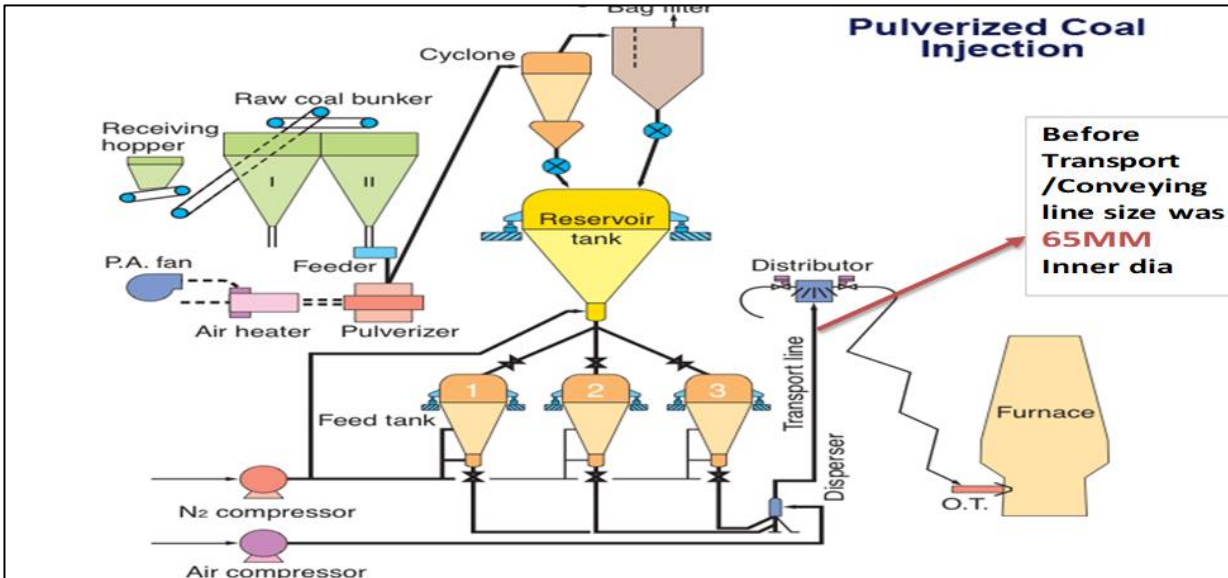
Schematic drawing of heating system from waste heat



Nozzle arrangement at the Bunker

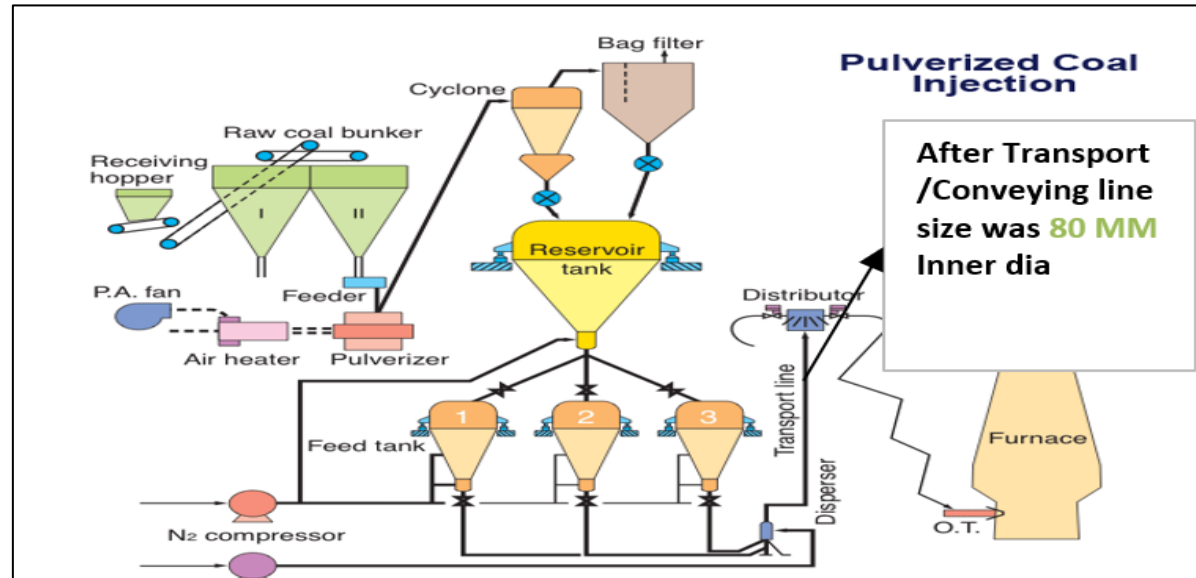
Before

PCI Injection system conveying line size was having pipeline of size of 65 MM Inner dia , due to this PCI injection rate was 8.5 tph only where as furnace acceptance or demand was of 12 tph

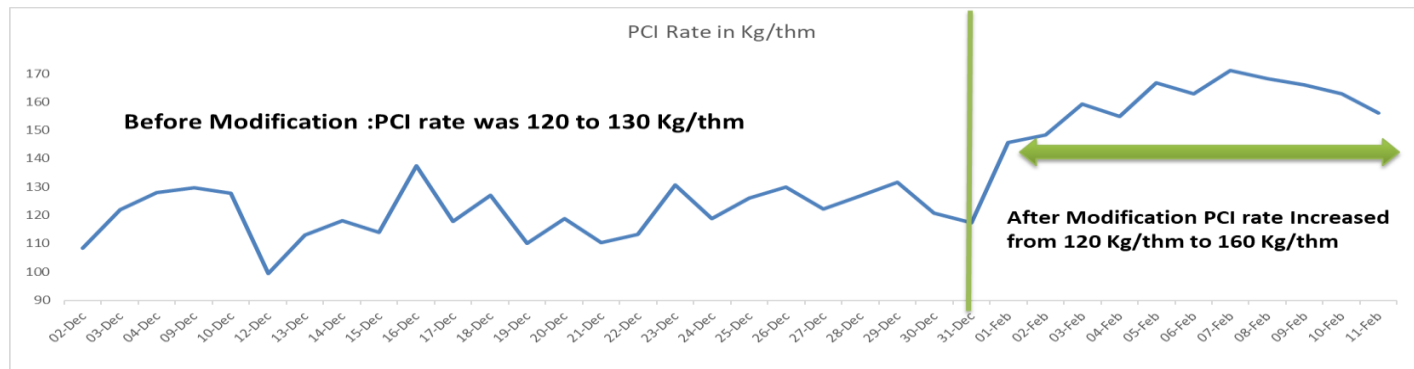


After

Changing the conveying line size dia from 65 MM inner dia to 80 MM inner dia pipeline, PCI injection system injection rate increased from 8.5tph to 12 tph rate



Result



Benefits Achieved

- Production increased by 20 Tons per day.
- Cost of Production reduced by 500 Rs/thm.
- Reduction in GHG emissions by 18021 tons of CO₂e

Basic changes include,

- Turbine rotor upgradation with optimized blade profile
- Replacement of Guide blade carrier
- Replacement of labyrinth

S.No	Parameter	UOM	Normal Operating	Post retrofit Value
1	Maximum power output	MW	30	35.25
2	Steam Flow at Turbine I/L	TPH	123	129
3	Specific steam consumption	Kg/Kwh	4.1	3.67
4	Turbine Heat Rate	Kcal/Kwhr	2600	2412
5	Turbine exhaust pressure	ata	-0.78	-0.88
6	Turbine exhaust temperature	Deg. Celsius	60	48.41
7	Flow at turbine exhaust	TPH	98	106.47
8	Shutdown duration for revamping	Days	-	30 days
9	Generator MVA rating	MVA	37	31.5

Waste heat recovery power plant turbine upgradation to increase generation from 30 MW to 35 MW

1. Increase in generating capacity from 30 MW to 35 MW
2. Additional generation potential of 42 MU's in a year.
3. Improvement in heat rate from 2600 Kcal/KWh to 2412 Kcal/KWh.
4. GHG emission reduction of 29820 TCO₂ in a year



Waste heat recovery Power Plant – Turbine Upgradation

Intangible Benefits

BENEFITS



INDUSTRY BENEFITS

- Domestic Consumption & Better realization of Natural resources
- Low Manufacturing Cost



SOCIETAL BENEFITS

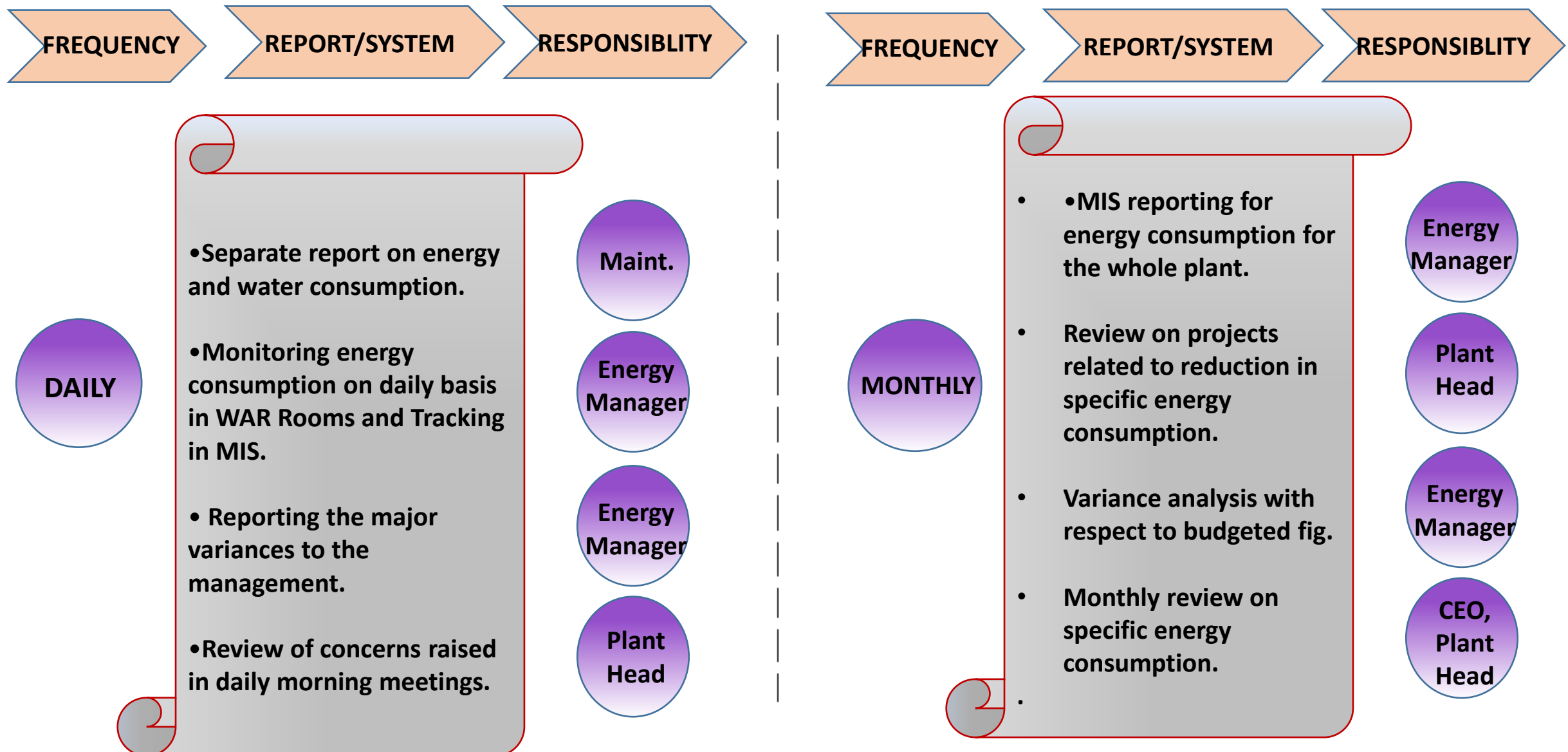
- Improved Contribution to CSR Initiatives
- Customers – Improved Internal and External Customer satisfaction



EMPLOYEE BENEFITS

- Consistency in rewarding employees.
- Project success boosts morale of team and ignite their desire to further excel .
- Innovation – Team takes lead to innovate .

REPORTING & MONITORING SYSTEM



DATE	SPECIFIC POWER CONSUMPTION(KWH/THM)							
	PRODUCTION	BLOWER	STOCK HOUSE	CAST HOUSE	BF ACCESSORIES & HBS	PCI	CWPS & COMPRESSOR	TOTAL
20-07-22	1418	88	8.7	5.0	8.8	3.5	28.0	147
21-07-22	1400	90	8.8	6.2	8.9	3.5	27.4	150
22-07-22	1405	90	8.9	6.2	8.4	3.2	28.1	151
23-07-22	1455	104	8.3	6.0	8.1	3.3	26.5	161
24-07-22	1440	100	9.1	6.6	8.0	3.5	27.1	160
25-07-22	1400	106	9.5	6.3	8.4	3.6	28.0	167
26-07-22	1401	106	8.7	5.3	8.4	3.8	27.7	167
27-07-22	1416	104	8.5	5.3	8.2	3.5	27.1	162

Day Deviations Hours	No Deviation		No Deviation		No Deviation	
Month Deviations Hours	No Deviation		No Deviation		No Deviation	
BENCHMARK RUN HOUR	run hour: 24 hrs/day		run hour: 24 hrs/day		run hour: 24 hrs/day	
Date	BF1 CB5 MOTOR1	BF1 CB5 MOTOR2	BF2 CB5 MOTOR1	BF2 CB5 MOTOR2	BF1 60 HP PUMP-1	BF1 60 HP PUMP-2
01-04-2022	24	0	0	0	24	0
02-04-2022	24	0	0	0	24	0
03-04-2022	24	0	0	0	24	0
04-04-2022	24	0	3	0	24	0
05-04-2022	24	0	23	0	24	0
06-04-2022	24	0	24	0	24	0

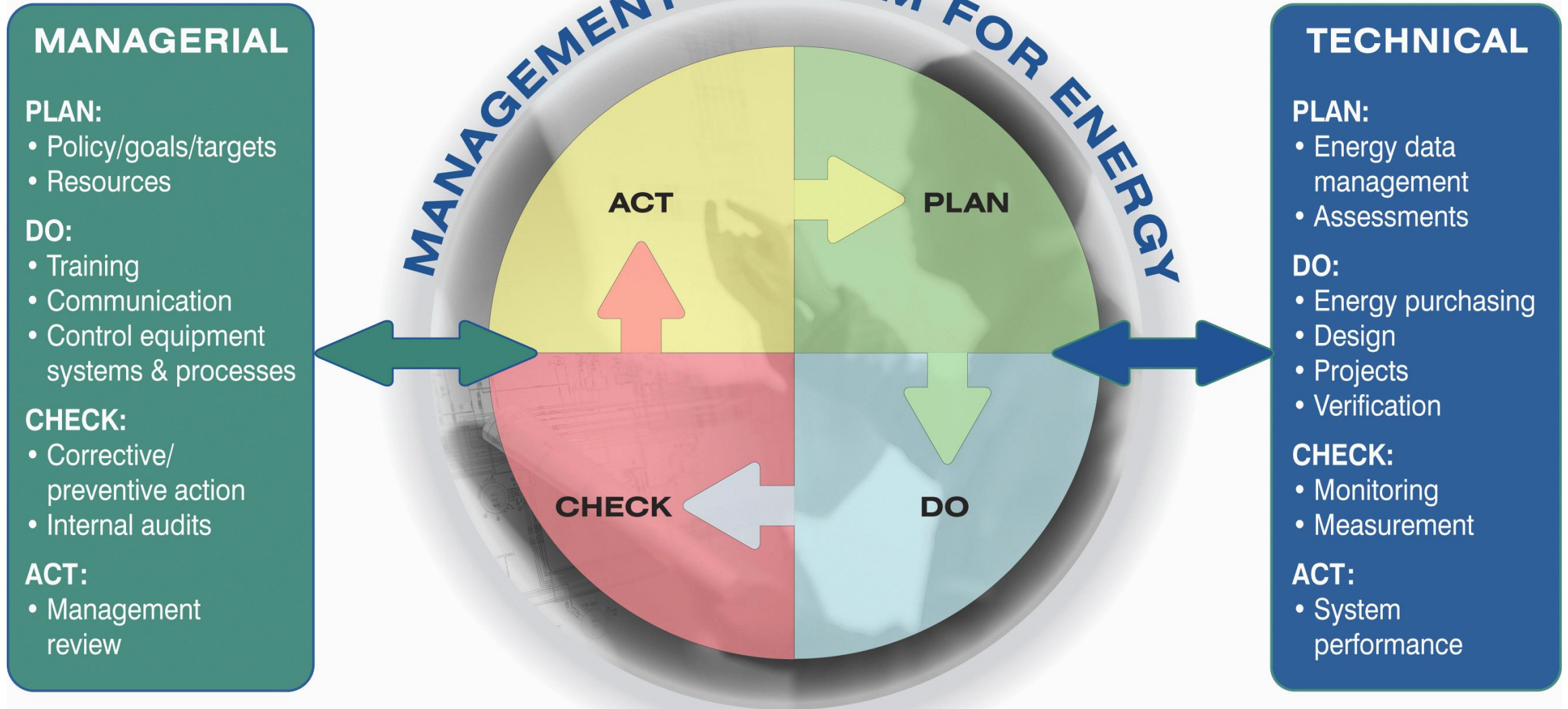
DRIVES	BLOWER	STOCK HOUSE	CAST HOUSE	BF ACCESSORIES & HBS	PCI	CWPS & COMPRESSOR	TOTAL CONSUMPTION
POWER CONSUMPTION KWH	127655.00	11489.00	8060.00	9981.00	3349.00	37851	208962.00
BENCHMARK KWH	129719	10990	7781	11217	3448	37633	207576
SPECIFIC POWER CONSUMPTION KWH/THM	92.99	8.37	5.87	7.27	2.44	28	152
BENCHMARK KWH/THM	88.8487	7.5274	5.3291	7.6827	2.3614	25.7762	142.1752
% Deviation	4.67%	11.19%	10.18%	-5.36%	3.32%	6.97%	7.07%
DEVIATION REMARKS	1) (+)5.6KWH/T IS DUE TO LESS PRODUCTION 2) (-)0.3KWH/T IS DUE TO LESS CONSUMPTION BY BLOWER DUE TO LOW WIND	2) (+)0.3KWH/T IS DUE TO EXCESS CONSUMPTION BY STOCK HOUSE DEDUSTING FAN BENCHMARK IS 5303 AND ACTUAL IS 5790. ALSO JOCKEY PUMP HAS CONSUMED MORE POWER DUE TO EXCESS RUN HOURS	1) (+)0.4KWH/T IS DUE TO LESS PRODUCTION 2) (+)0.42KWH/T IS DUE TO EXCESS CONSUMPTION BY CHDD FAN			1) (+)1.6KWH/T IS DUE TO LESS PRODUCTION 2) (+)0.1KWH/T IS DUE TO EXCESS CONSUMPTION BY COMPRESSORS AND HOT WELL PUMPS	

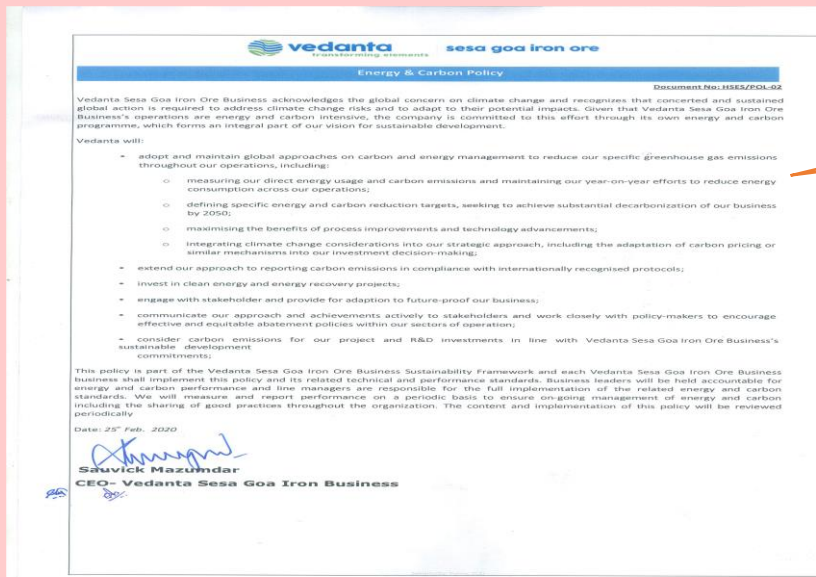
Deviation monitoring

Run Hours monitoring

Reasons for Deviation

Continual Improvement- Energy Management System





Energy & Carbon Policy



ISO 50001:2018



ENCON Cell



ISO 9001:2015
ISO 14001:2015
ISO 45001:2018



WORKMEN AWARENESS



STUDENTS AWARENESS



ENCON DAY CELEBRATION



REWARDS & RECOGNITION



POSTER COMPETITION



ENCON PLEDGE



COKE PLANT



PIG IRON PLANT

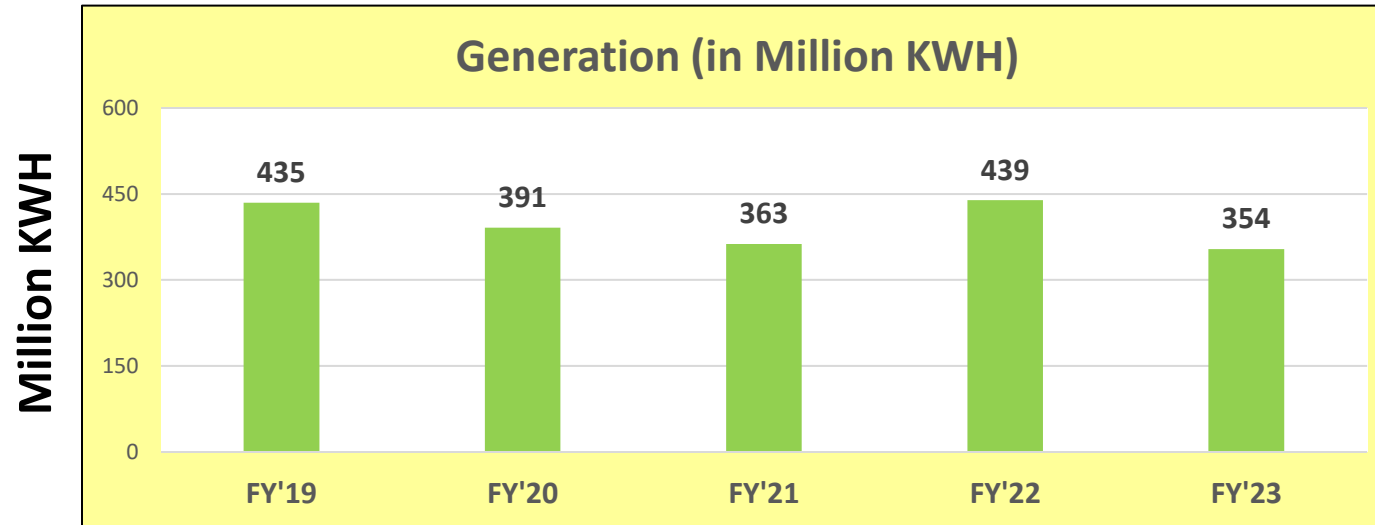


**WASTE HEAT RECOVERY
POWER PLANT**

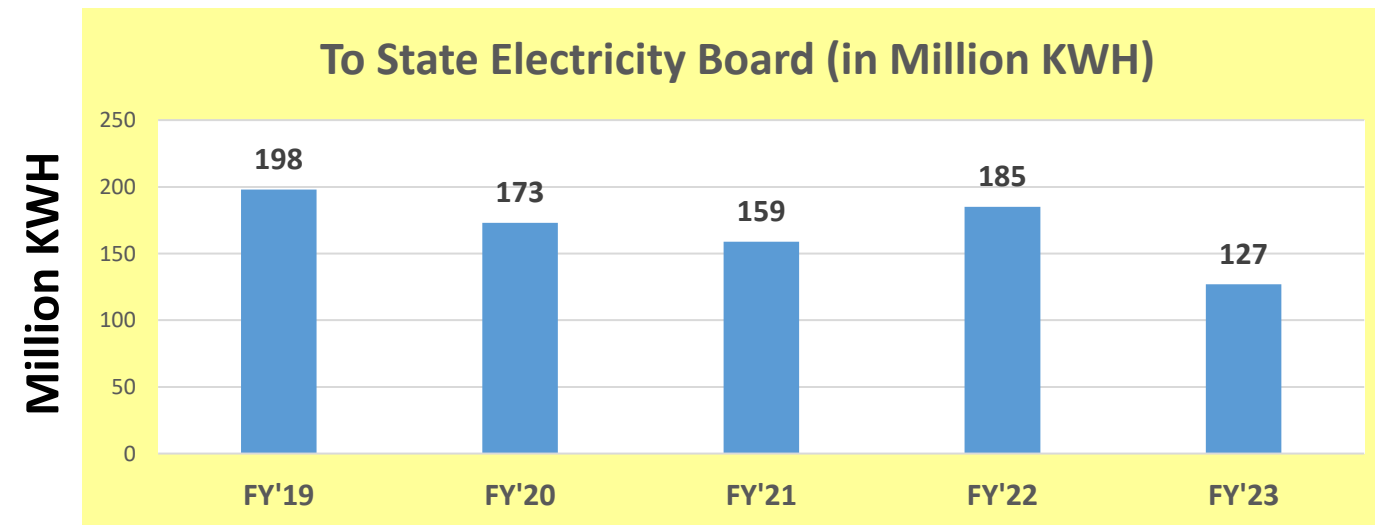




Power Generation –Waste Heat



Clean Energy to State Electricity Grid



- ❑ Around 2000 Million units (KWH) generated in last 5 years
- ❑ Around 900 Million units (KWH) of clean power given to state elec. Board.
- ❑ Eliminated usage of diesel in slag drier plant by waste heat.
- ❑ Waste gases used in Pulverized coal injection plant and sinter plant.
- ❑ Invested around Rs. 20 Crs. to increase clean power generation by 5 MW through turbine upgradation.

WASTE MANAGEMENT

Hazardous wastes		
Sr.no	Type of wastes	Mode of disposal
1	Used / spent oil	Sold to recycler registered with CPCB & having valid authorization of SPCB.
2	Waste residue containing oil	Incinerated in coke oven plant
3	Empty /discarded paint tins	To recycler registered with CPCB and having valid authorization of SPCB

Non Hazardous Wastes		
Sr.no	Type of wastes	Mode of disposal
1	Slag	Used in manufacturing of cement



REDUCE



REUSE



RECYCLE

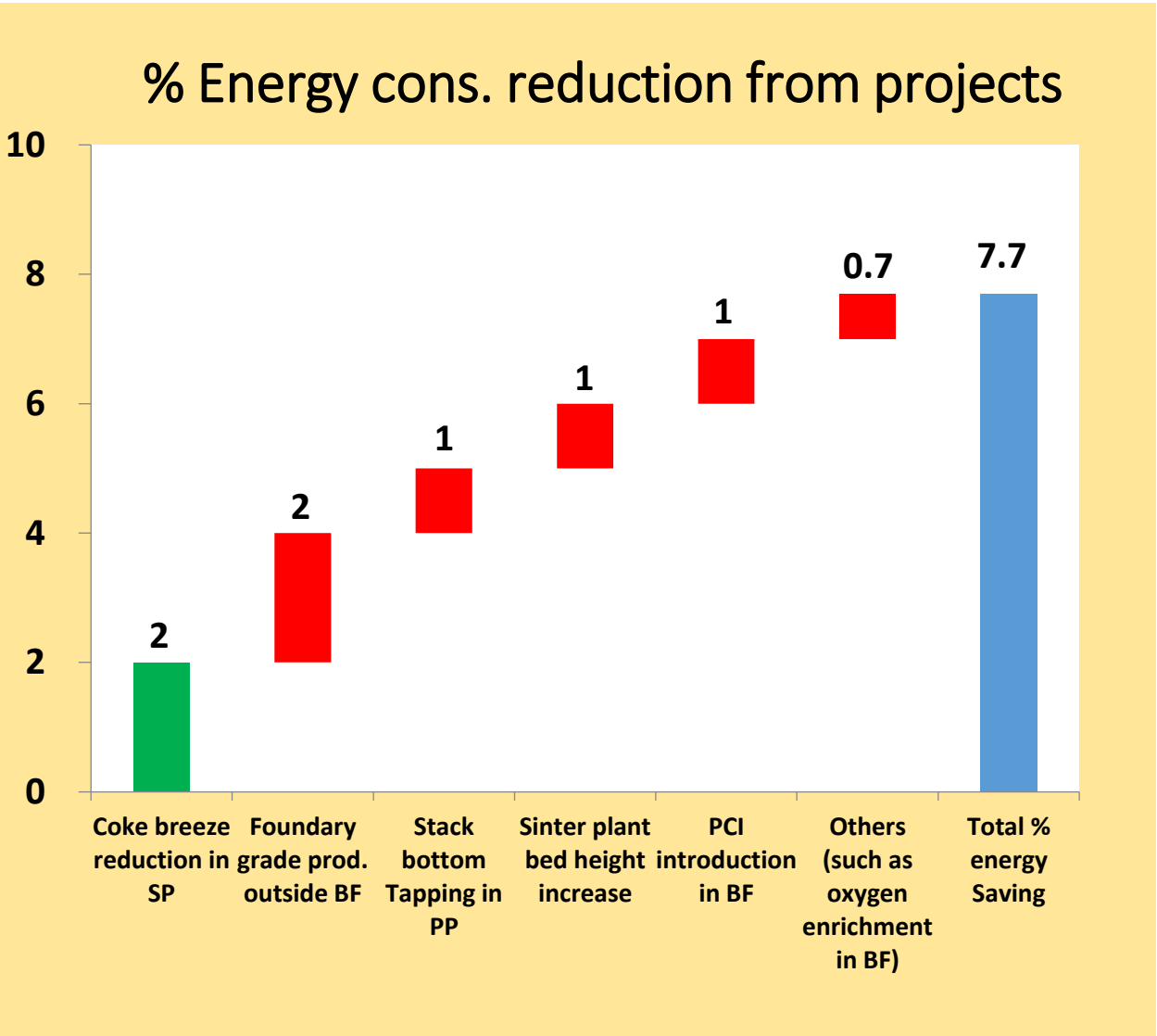


RETHINK!

PAT CYCLE-2 ACHEIVEMENT

- Name of the Unit: Vedanta Limited, Amona, Goa
- Registration No. : INS0073GA

S. No.	Description	UOM	Values
1	Baseline year SEC	(TOE/Ton of Product)	0.7629
2	Baseline year Prod	Tons	610758
3	Target Specific energy consumption	(TOE/Ton of Product)	0.7173
4	Target Reduction	(TOE/Ton of Product)	0.0456
5	Target % Reduction	Percentage	5.98%
6	Achieved SEC	(TOE/Ton of Hot metal)	0.7035
7	Actual % Reduction	Percentage	7.70%
8	ESC'erts Received	Nos.	8428





- Although our entire power consumption is met from waste heat recovery power plant, as a ESG initiative, we are coming up with 100 KW solar PP, installed at rooftop of our admin office and car parking.
- Installing EV fast charging stations at various locations of our plant, to promote sustainable transport.
- Vedanta has rolled out EV incentive policy, through which we are provide financial assistance to our employees of upto Rs. 5L while purchase of EV.

Thank You !

