CII National Awards for Excellence in Energy Management 2022




vedanta
transforming elements
sesa goa iron ore

VALUE ADDED BUSINESS

Team Member :

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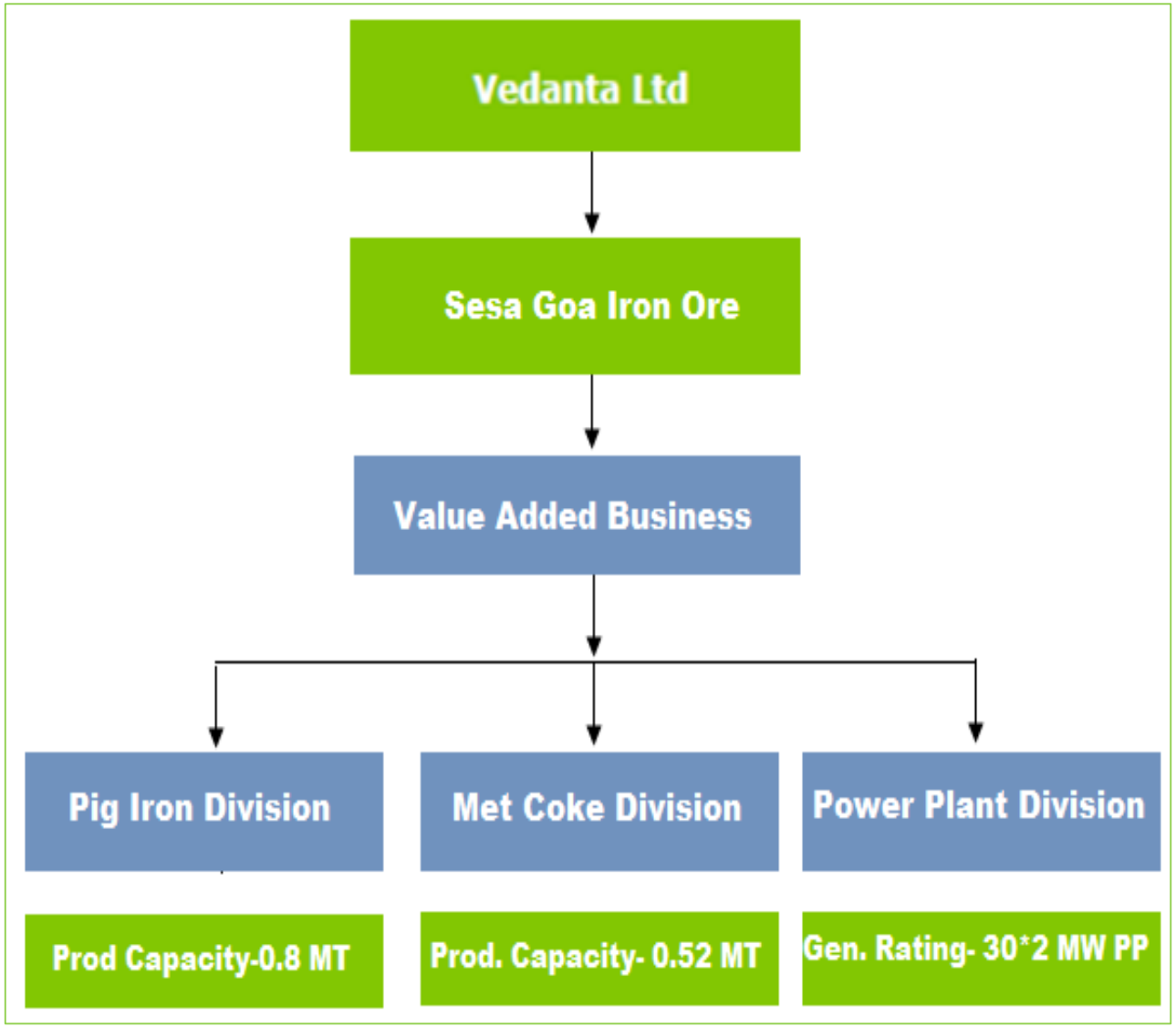
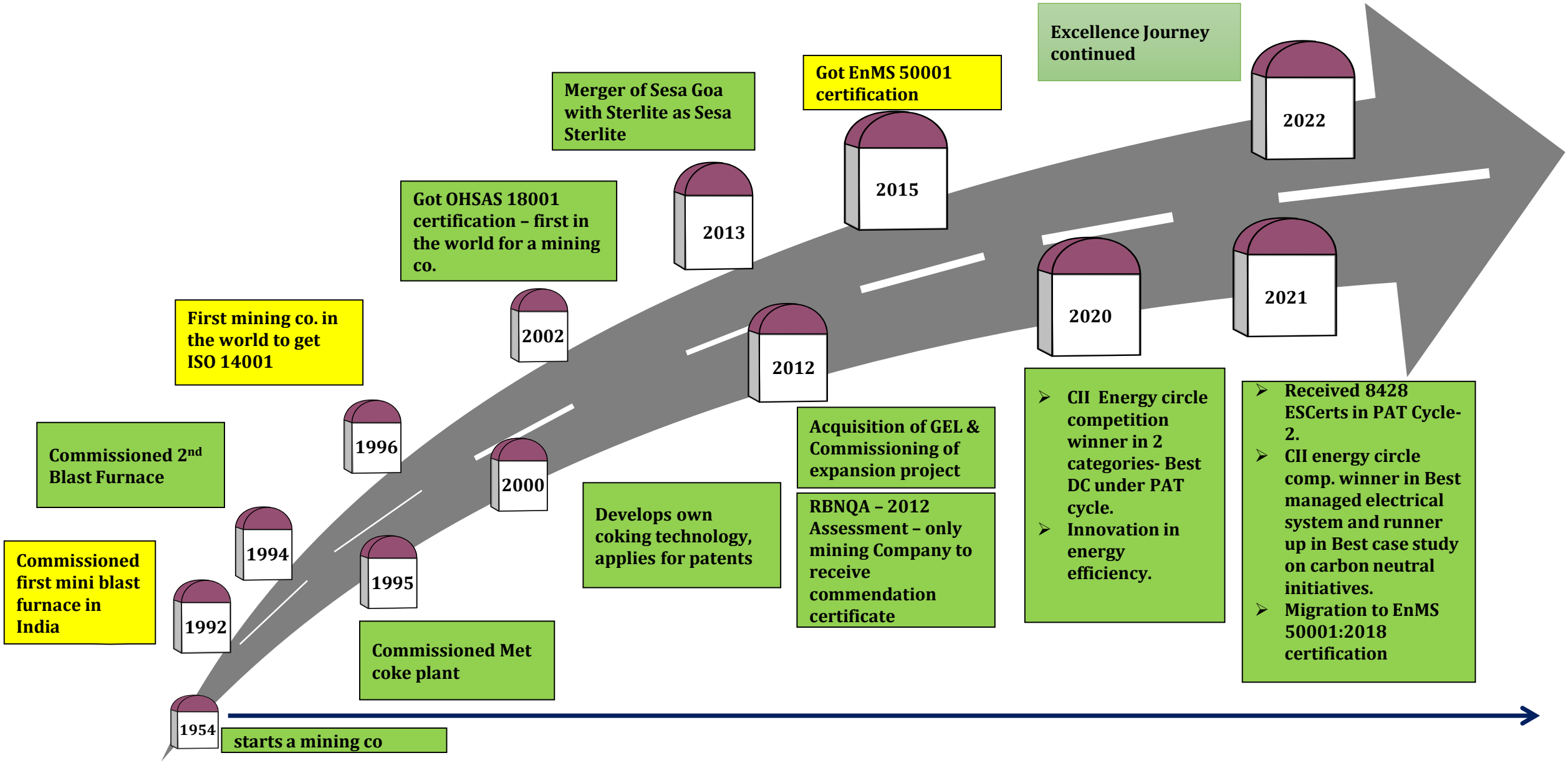
Organization Profile

- India's largest merchant pig iron plant with production capacity of 0.8 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 50001:2011, ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 certified unit.



SESA'S Journey – Key milestones



INNOVATIONS & UNIQUE FEATURES

Highlights.

- ❑ India's largest merchant pig iron plant with production capacity of 0.7 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, Development of special SG grade ultra low Mn & low Ti material for wind mills & special

TOTAL ENERGY INPUT

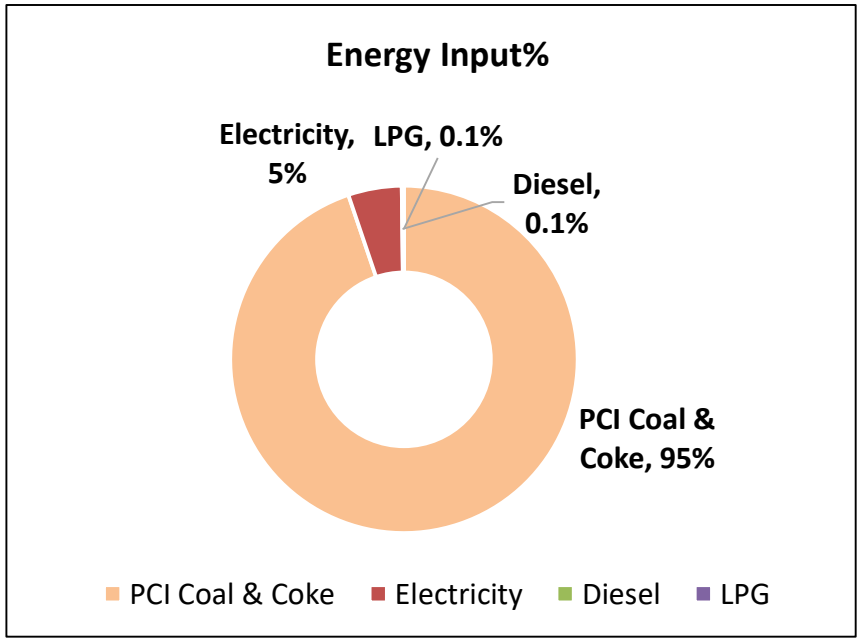
PCI Coal & coke
(47 L MKCal)

Electricity
(2.2 L Mkcal)

Diesel
(1K Mkcal)

LPG
(8 K Mkcal)

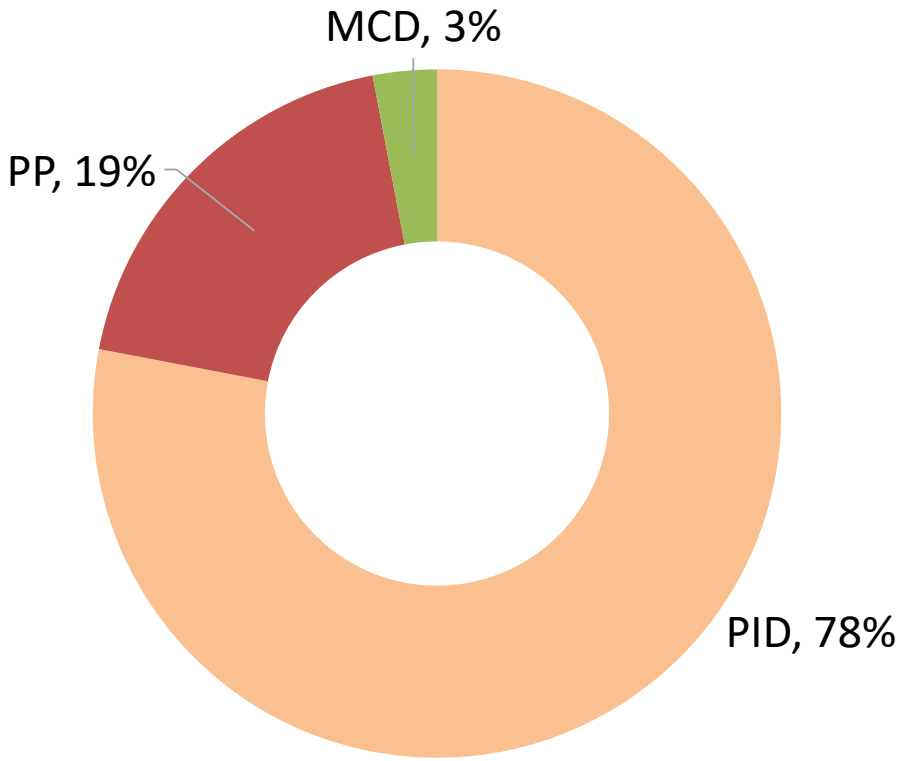
Value Added Business



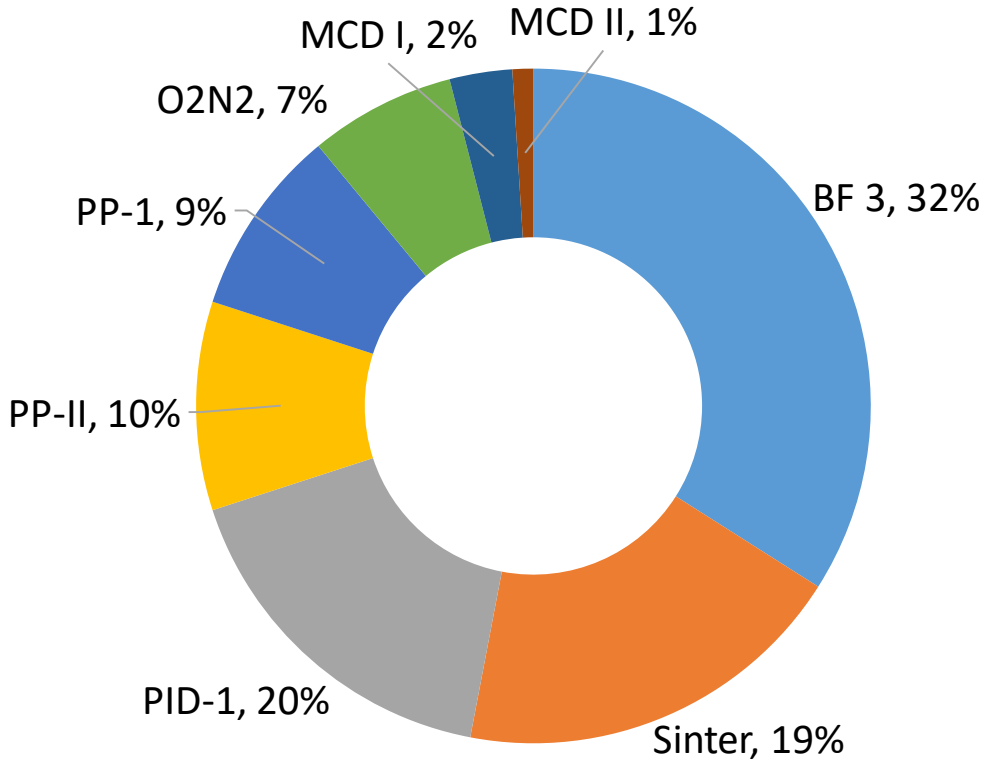
- ✓ The main sources of energy are coke, coal and electricity.
- ✓ The total energy consumption of VAB for the FY 21-22 is around 50 Lakh MKCal.

Electricity Consumption at a Glance

Division Wise Break Up %

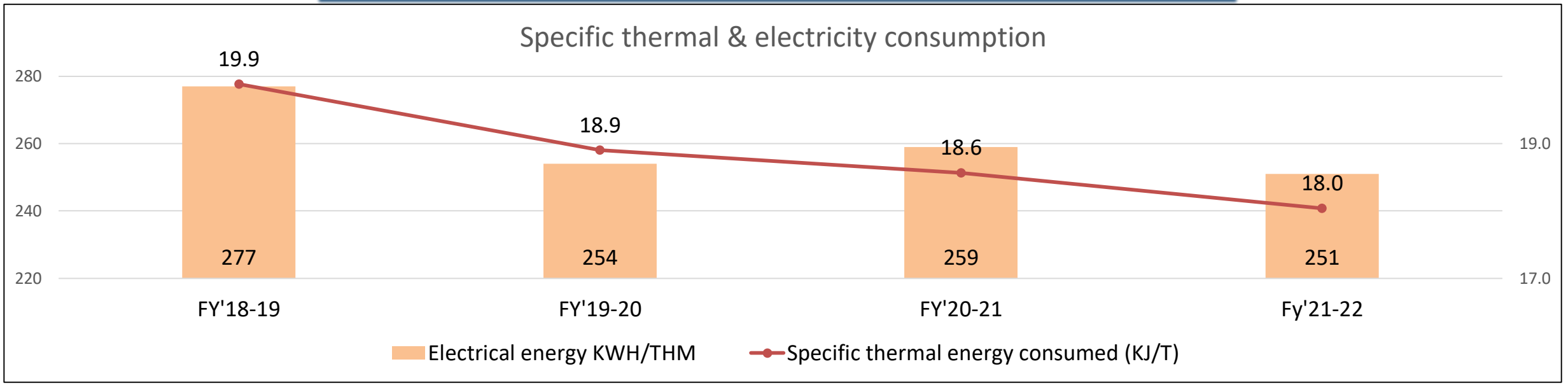


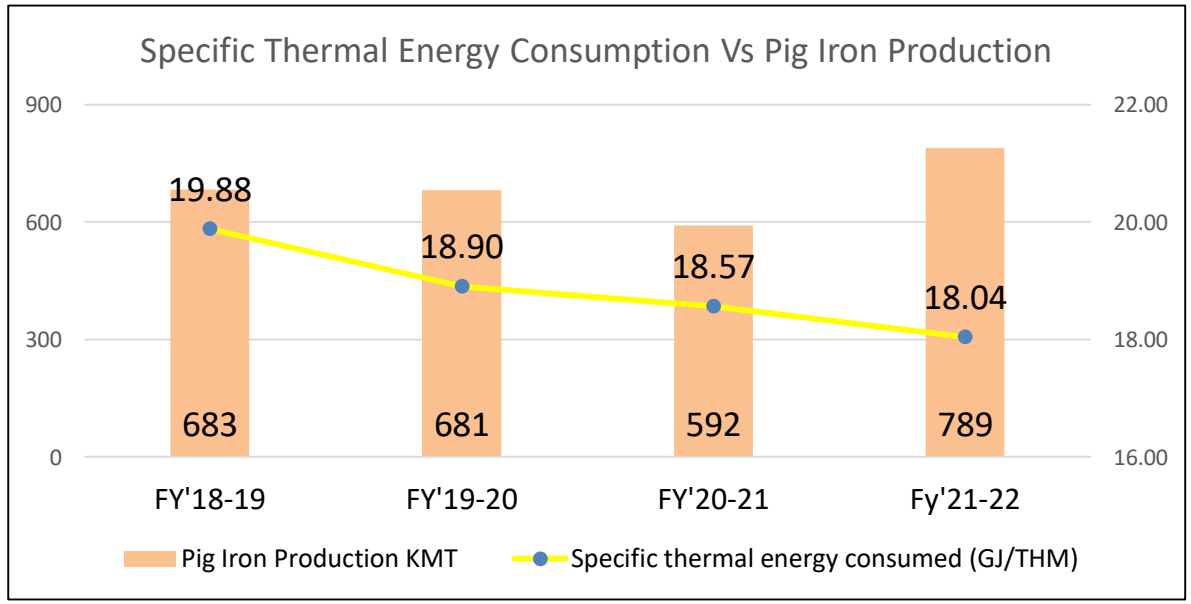
Plant Wise Break Up %

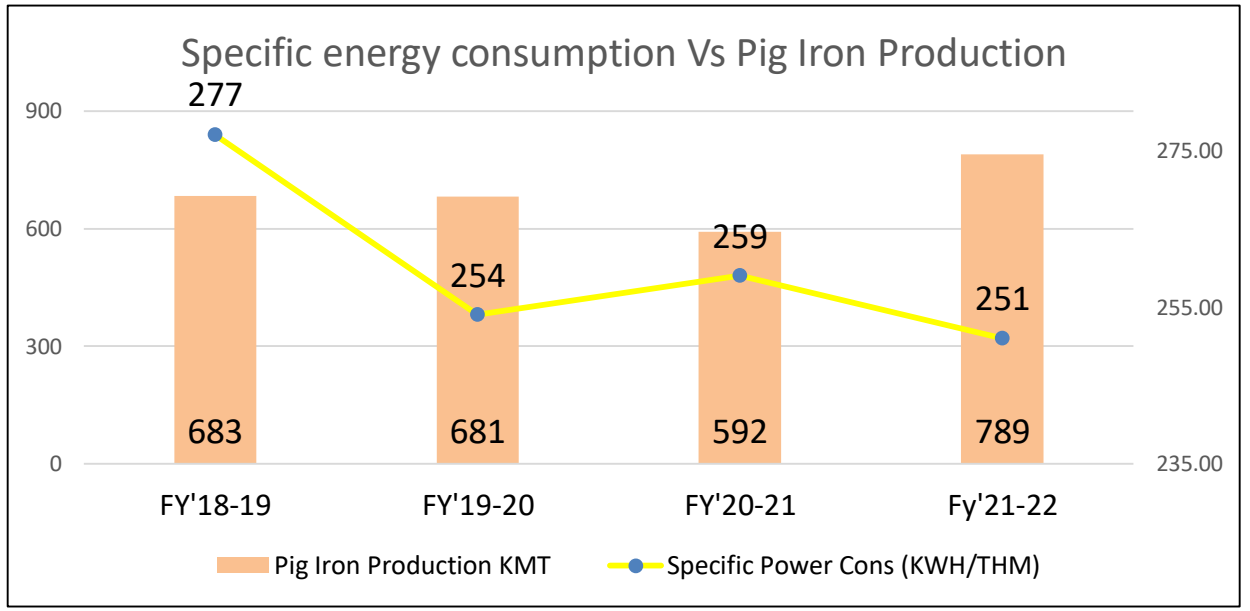


***As per power consumption data of FY' 21-22**

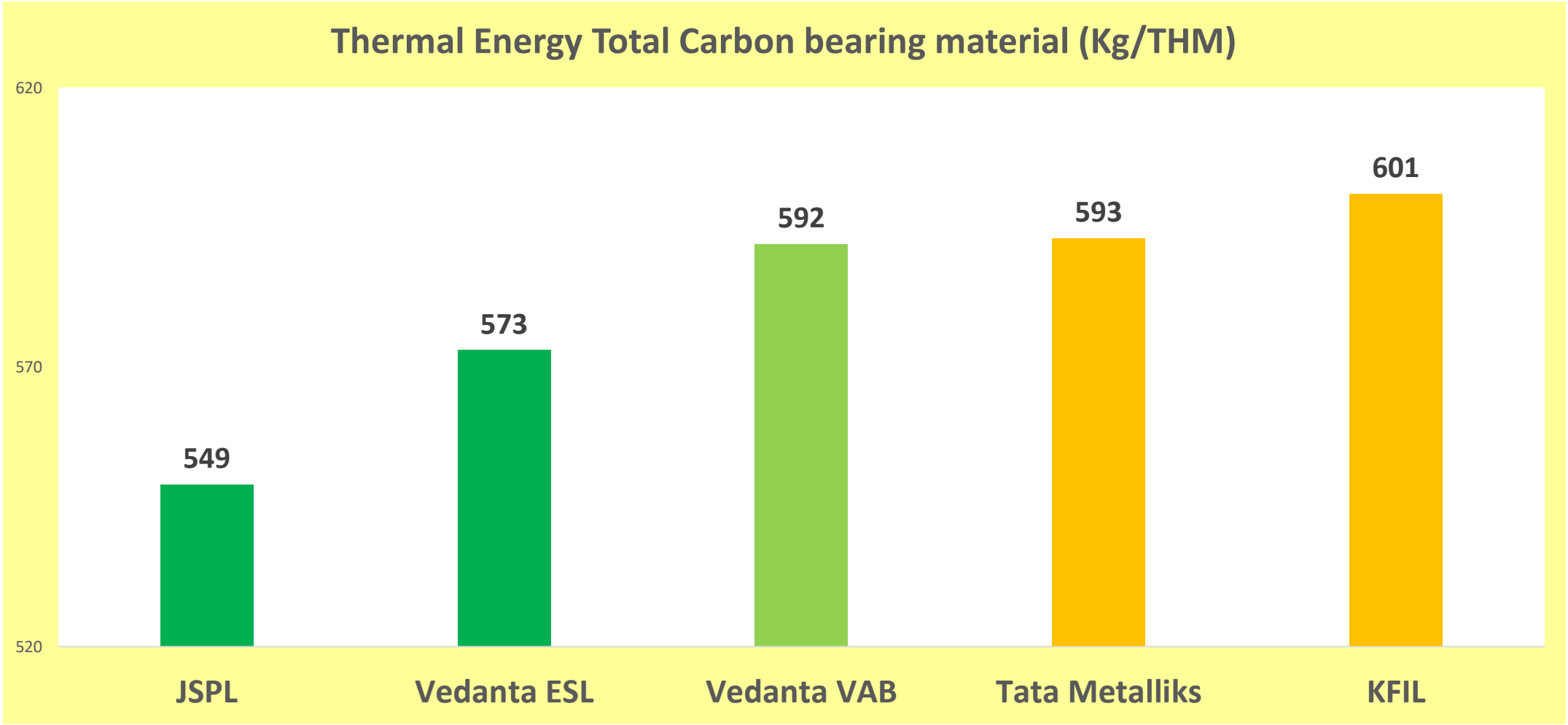
ENERGY CONSUMPTION







Benchmarking with Industry Leaders



Source: Benchmarking Visits and Contacts

Energy Conservation Projects

IMPLEMENTED ENERGY SAVING PROJECTS

Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings Rs. Millions	Investments Made Rs Millions	Payback in Months
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

IMPLEMENTED ENERGY SAVING PROJECTS

Year of Implementation	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings Rs. Millions	Investments Made Rs Millions	Payback in Months
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		Coke rate reduction of blast furnace operation from 633 Kg/THM to 630 Kg/THM through process optimization	61.44	40	7.87
		Sinter plant main exhaust fan duct leakage arresting.	2.4	1	6
		STG overhauling along with condenser chemical cleaning to reduce specific steam consumption by 0.5 TPH.	2.4	0.2	1
		Reducing run hours of PWD pump for quench tower water by fixing motorized flow control valve at CNO7	0.1	0.1	12
		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

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	
2019-20		Coke rate reduction in blast furnace operation from 652 Kg/THM to 633 Kg/THM	389	12	0.3
		Replacement of existing motors with energy efficient motors IE4	0.40	0.8	-
		Retrofitting of compressor with energy efficient compressor in Blast furnace-3	0.30	1.5	-
		Installation of lighting automation boxes (10 Nos.) in PID-1	0.17	0.5	
		Elimination of 7 roll distributor in SP	0.14	0.2	-

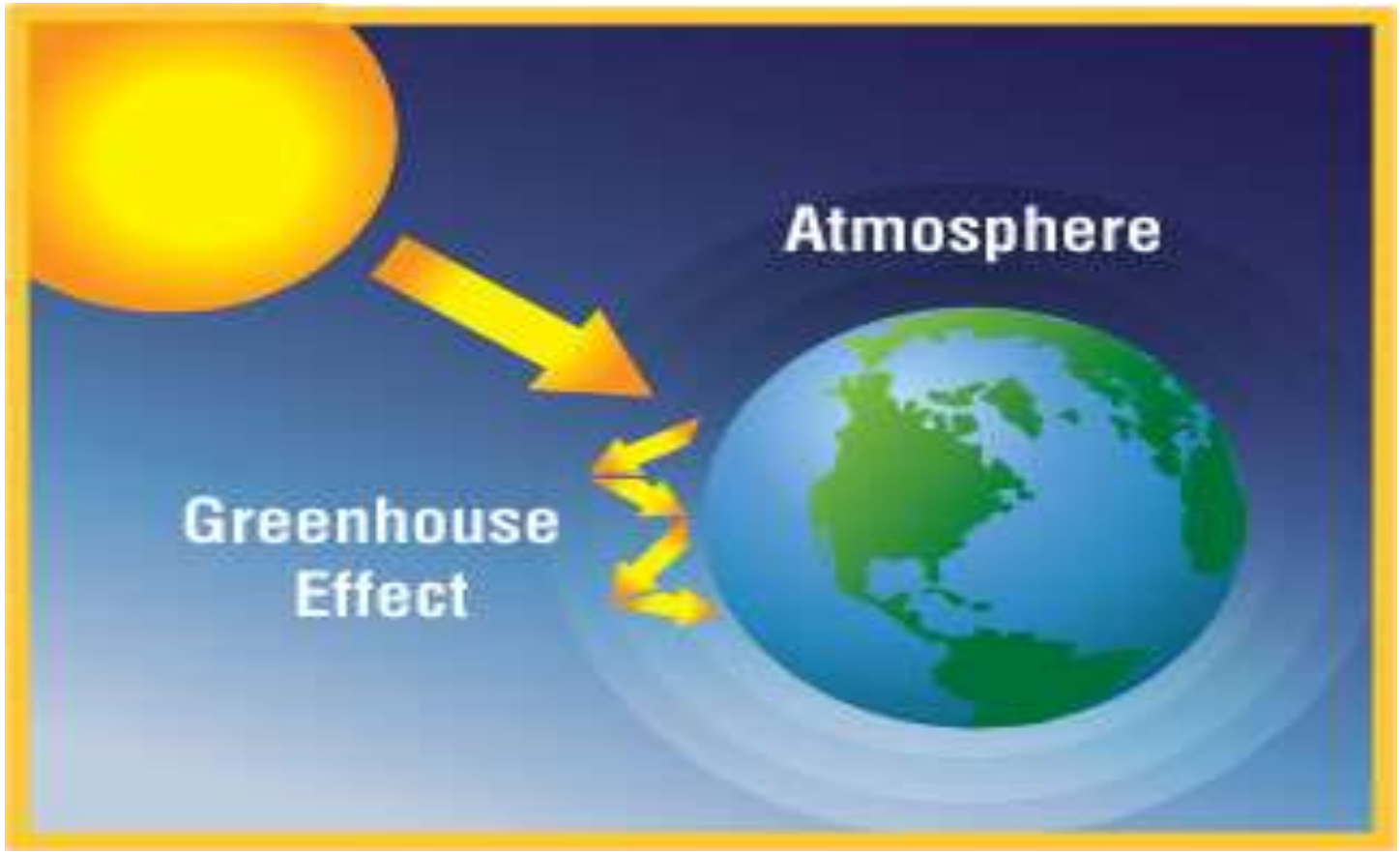
Zero Investment Innovation Replacement Process Cont. Automation

IMPLEMENTED ENERGY SAVING PROJECTS

	CATEGORY	Title of Energy saving Project Implemented	Total Annual Savings	Investments Made	Payback in Months
			Rs. Millions	Rs Millions	
2019-20		Elimination of P8 conveyor in sinter plant	0.1	0.1	
		Compressed air leakage audit for PID	1.2	0.2	-
		Minimizing unload run hours of compressor by reducing the setting of idle runtime.	0.19	-	-
		Automation of C4 conveyor to start/Stop through gate valve logic automation.	0.09	-	-
		Conversion of 20% of conventional lamps with LED lamps	0.5	2	48

Zero Investment Innovation Replacement Process Cont. Automation

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

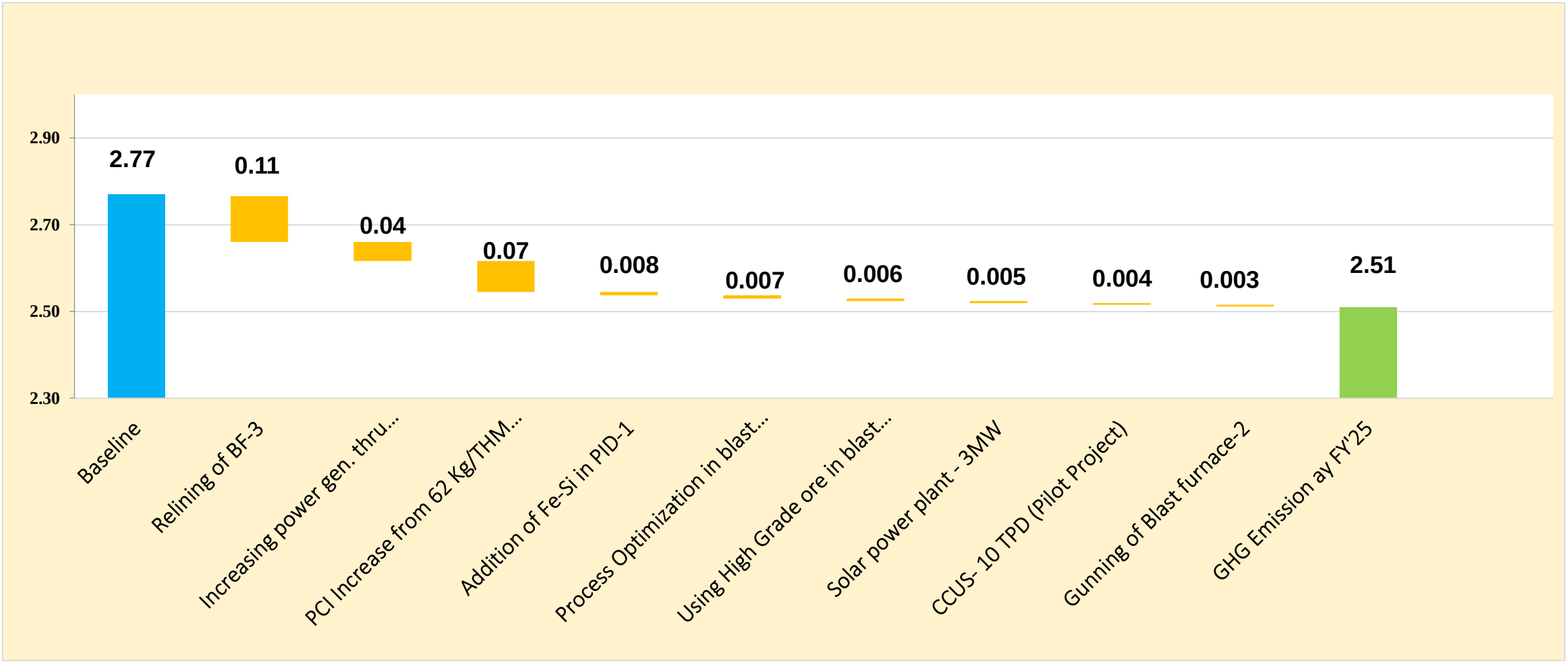
2020 — 2025 — 2030 — 2035 — 2050

- 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

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

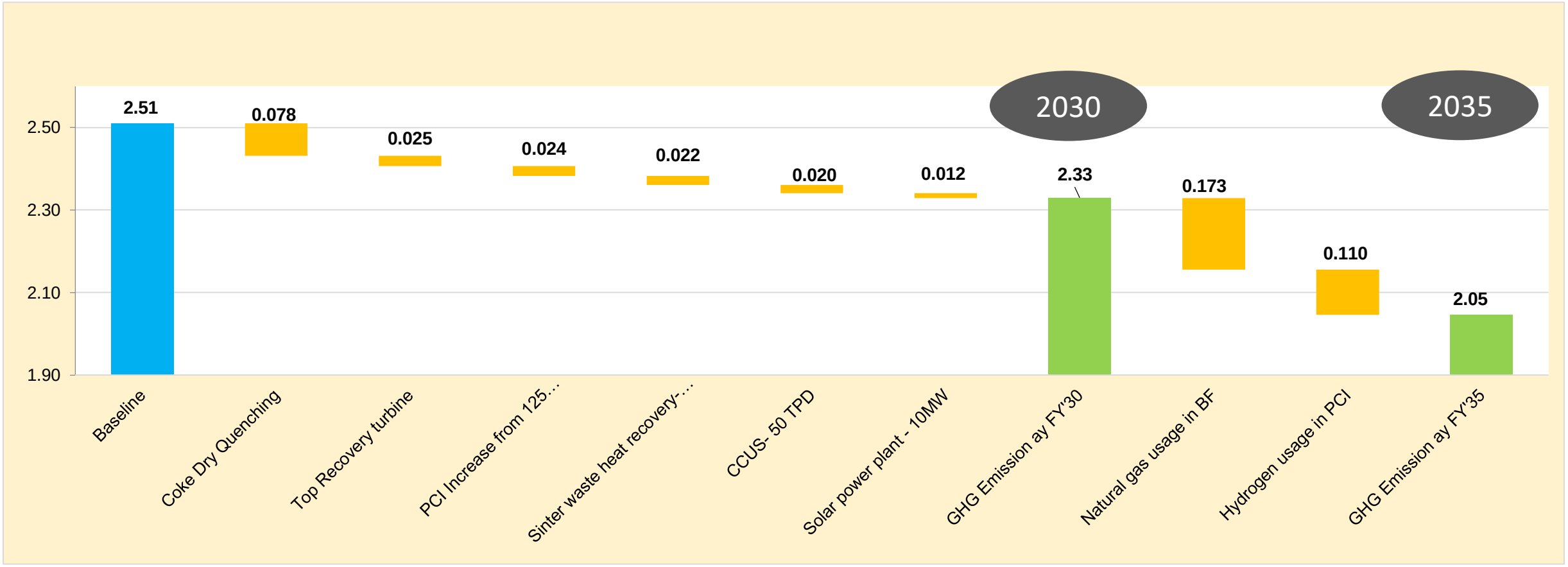
GHG EMISSION REDUCTION FY 20-25

GHG EMISSIONS IN TCO2/THM



GHG EMISSION REDUCTION FY 25-35

GHG EMISSIONS IN TCO2/THM



FROM FY 20-35 (30% Emission Reduction)

GHG EMISSION REDUCTION PROJECTS

S. No.	Project Description	Impact (in TCO2)	Impact (in TCO2/THM)	Expected Timeline
PROJECTS TILL FY25				
1	Relining of BF-3	96378	0.106	FY'22
2	PCI Increase from 62 Kg/THM to 125 Kg/THM	64150	0.071	FY'25
3	Increasing power gen. thru turbine upgradation	40131	0.044	FY'22
4	Addition of Fe-Si in PID-1	7455	0.008	FY'24
5	Process Optimization in blast furnace	6451	0.007	FY'23
6	Using High Grade ore in blast furnaces	5317	0.006	FY'23
7	Solar power plant - 3MW	4783	0.005	FY'24
8	CCUS- 10 TPD (Pilot Project)	3650	0.004	FY'25
9	Gunning of Blast furnace-2	2401	0.003	FY'22
PROJECTS TILL FY30				
10	Coke Dry Quenching	71253	0.078	FY'26-30
13	Top Recovery turbine	22932	0.025	FY'26-30
14	PCI Increase from 125 Kg/THM to 150 Kg/THM	20736	0.023	FY'26-30
15	Sinter waste heat recovery- Power Generation	20111	0.022	FY'26-30
16	CCUS- 50 TPD	18250	0.020	FY'26-30
17	Solar power plant - 10MW	11160	0.012	FY'26-30
PROJECTS TILL FY35				
18	Natural gas usage in BF	171637	0.173	FY'30-35
19	Hydrogen usage in PCI	100000	0.110	FY'30-35


INNOVATION

Innovations Approach

Leadership

"Innovation is All About Doing things differently"

Experiment

- Create platform to generate idea and develop innovations.
- Running theme base Campaign across organization
- Allow to take Risk and remove Fear of failure trough Encouragement.

Collaborate

- Work as a team.
- Enhance skill.
- Technology Benchmark.
- Engage /Outsource

Team Work

- ASPIRE
- SHIKHAR
- FIP
- KAIZEN
- 5S

Measure

- Measure the Achievements.
- Celebrate the Success

Communicate

- Communicate the success Stories.
- Reward The Inventors.
- Protect the rights.

IDEA Generation to Implementation

Innovative Projects

- Upgradation of waste heat recovery power plant turbine to increase generation by 5MW.
- Accretion dislodging by liquid co_2 activation in blast furnace
- Introduction of Dual Burners in Sinter plant ignition furnace.
- Low basicity sinter for optimizing low grade sinter for optimizing low grade local Ore
- Savings in coke due to Iron Ore addition in Ladle.
- Selective utilization of waste in Sinter plant to reduce fuel consumption.

PP- Turbine Capacity Upgradation

- **Capacity improvement from name plate capacity of 30 MW to 35.25 MW**
- **Basic changes include,**
  - Turbine rotor upgradation with optimized blade profile
  - Replacement of Guide blade carrier
  - Replacement of labyrinth

Sl.No	Parameter	UOM	Design Value	Normal Operating	Post retrofit Value
1	Maximum power output	MW	30	30	35.25
2	Steam Flow at Turbine I/L	TPH	113.45	123	129
3	Specific steam consumption	Kg/Kwh	3.78	4.1	3.67
4	Turbine Heat Rate	Kcal/Kwhr	2498	2600	2412
5	Turbine exhaust pressure	ata	-0.89	-0.78	-0.88
6	Turbine exhaust temperature	Deg. Celsius	46.5	60	48.41
7	Flow at turbine exhaust	TPH	92.66	98	106.47
8	Shutdown duration for revamping (Breaker in to breaker out)	Days	-	-	30 days
9	Generator MVA rating	MVA	37	37	31.5
10	Power Factor		0.8	0.89	0.96

- **By incremental generation capacity of 5.25 MW, extra 46 MU's generated from waste heat recovery can be exported to grid.**
- **This will reduce the total GHG emission by 2.3%.**
- **Cost of this upgradation is around 18 Crs.**

24

Accretion dislodging by co_2 Diffusion

ACCRETION DISLODGING BY LIQUID CO_2 ACTIVATION IN BLAST FURNACE

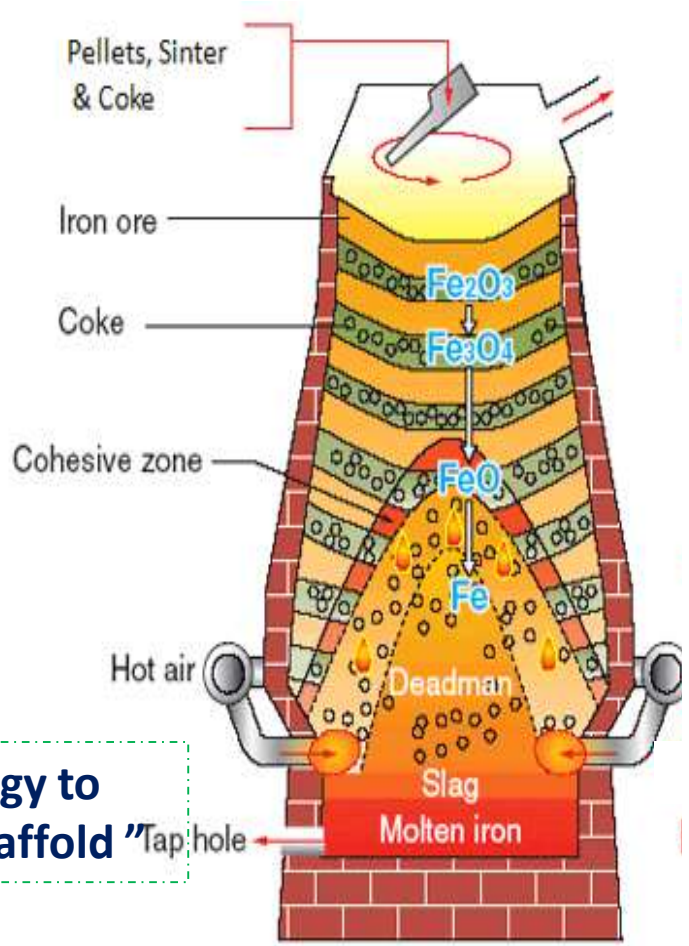
New Technology to improve furnace Productivity and Fuel Efficiency

Hanging, self-slipping and low blast acceptance.

173 M3 BF
Productivity
2.4-2.6
T/M3/Day

Coke rate
640 to 670
kg/thm

"New Technology to Dislodging the Scaffold "



CO_2 ACTIVATION

1. Higher Productivity
2. Higher PCI Rate
3. Energy Efficient
4. Improved Availability
5. Low Maintenance
6. Improved Quality

- With 2 diffusions the accretion in the stack area got dislodged. When furnace was started after this exercise furnace movement got stabilized with improved production and lower fuel rate. The productivity increased back to 2.47 t/m3/day.
- Fuel rate to less than 640 kgs/THM with PCI of 45-50 kgs/THM. Total cost of the project with production loss was around 19 lacs and savings was 2.5 lacs/day. So we got the payback in 8 days. Similar activity was done in BF2 successfully.

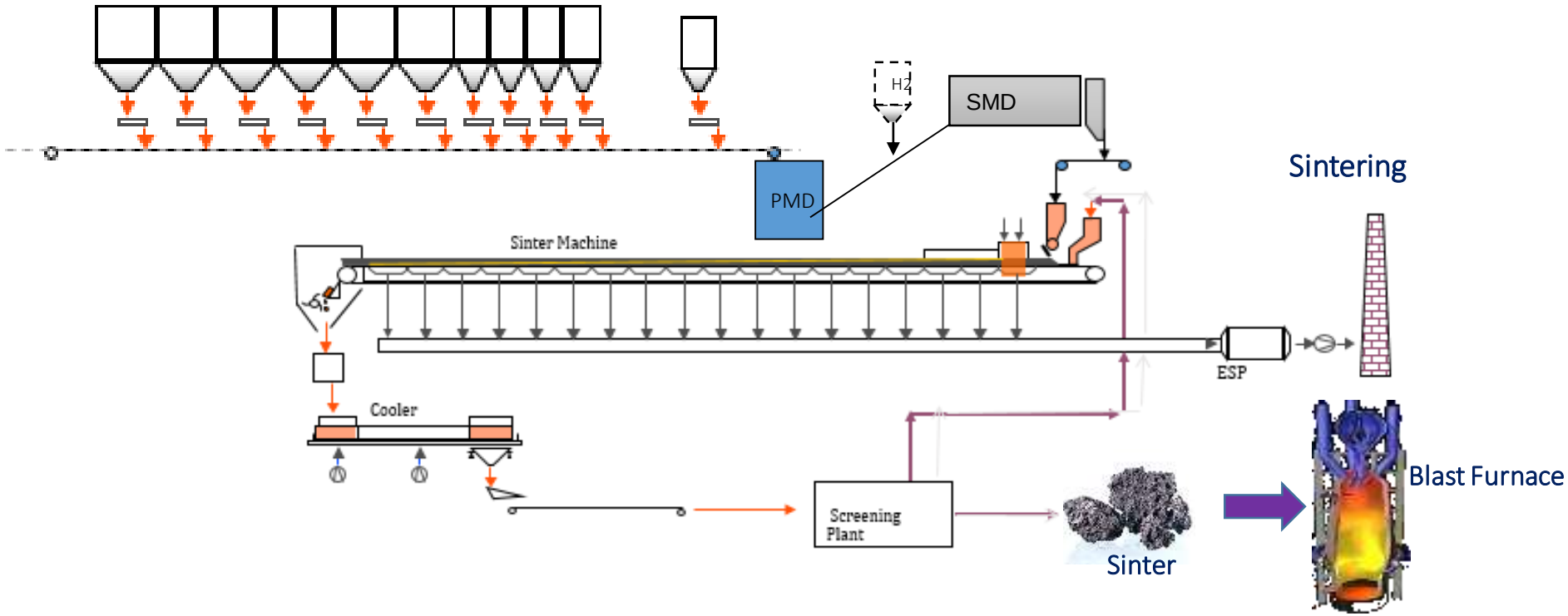
Sinter Plant Process

Raw Material

Proportioning

Sintering /Sinter Machine

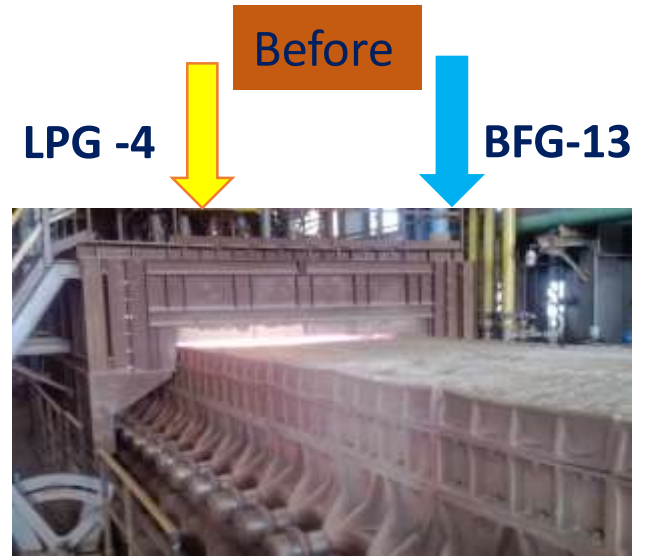
Sinter to Blast furnace

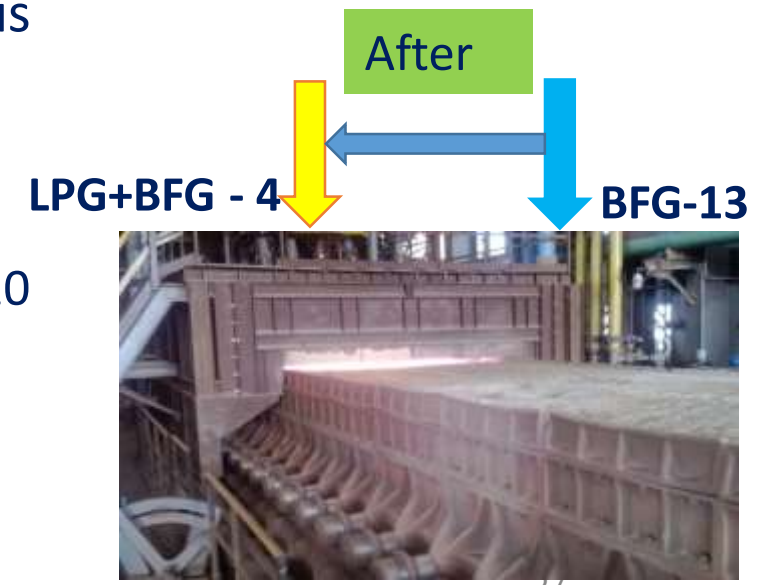


Dual Burners in Sinter plant ignition furnace

Project Description:

- Introduced dual burners in sinter plant ignition furnace which has helped in increasing sinter production by 5 to 7%. Earlier sinter machine was running with 13 burners of BF gas & 4 burners were of LPG for initial firing. Team has brainstormed and came to conclusion that if we Convert 4 nos. of LPG burners into dual burners (LPG+BFG) then total 17 burners will come into normal operation and will result in increase in ignition furnace temperature (by around 100 degree Celsius) and thus sinter production will increase.





Project Benefits :

Sinter production has increased by 5%. (4000 T/month) Monthly savings is 20 lakh. Incremental Production 40000 Ton , Savings 2.0 Cr.

Low basicity sinter

LOW BASICITY SINTER FOR OPTIMIZING LOW GRADE LOCAL ORE

Customized low basicity sinter for Blast furnace as input material

Input

High silica content Irone Ore

Less Fe % In Sinter

Innovative Process

In Order to upgrade the Fe content of sinter & productivity of blast furnace.
Initiative was taken to reduce basicity of sinter to 1.30-1.40 without impacting the physical qualities of sinter such tumbler Index, RI & AI.

customized low basicity sinter for Blast furnace as input material

Our Benefits

Reduced Basisity

BF Demand

Improved Fe

Fuel Saving

- **Increase In Fe 1.5%**
- **Reduction in Basicity- 1.3 to 1.4**
- **Improved Quality**
- **Monthly Cost Saving = 0.20 Crs**
- **Savings due to Fuel Rate - 0.69 Crs**
- **Total Savings - Rs10.7 Crs**

Key Enablers				
	Process Control	Extensive Research	Automation	Internal customer Satisfaction
	Process Improvement	Changing Demands	Motivation	Inhouse Experties

Intangible 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 .

Article Acknowledgement- Steel Metals & Mineral International

Index terms: Coke breeze, High Carbon Blast Furnace Gas Dust & Sintering Process

Industry Marvel – Innovation of Waste to Wealth

Selective utilization of waste to reduce fuel consumption

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The coke breeze is the most common solid fuel for iron sintering plants. The high consumption of coke breeze leads to depletion of the fossil fuels and increase in the cost of production of sintering process. Several researches, nowadays are concentrating on finding different alternatives for coke breeze that can either partially or completely replace it. In this study, high carbon blast furnace gas dust was used as a supplementary fuel in the iron ore sintering process. Coke breeze was partially replaced in sinter charge. The results of this work show that the replacement of coke breeze with high carbon blast furnace gas dust helps in a sintering process as it increases the vertical velocity of the sintering process.

Introduction

Sintering is a process of heating of mass of the fine particles to the stage of Incipient fusion (temperature little below the melting or softening point) through the amalgamation process to agglomerating them into lumps and the heat required for making sinter is usually provided by the combustion of coke breeze.

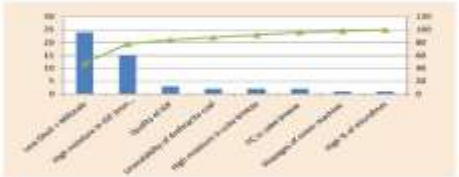
Coke breeze being the costlier material in sintering process, iron-making industry is working on how to replace coke breeze with cheaper solid fuels like Anthracite coal, Charcoal etc. to bring down the overall cost of iron-making.

The main objective of this work is selective utilization of blast furnace waste material for reduction in the cost of production of sintering process without compromising the quality of product.

Experimental Work

After a series of brainstorming sessions within the team, reasons for higher specific coke breeze consumption were analysed.

Pareto analysis of factors influencing coke breeze consumption



From the above analysis, the major reason resulting in higher coke breeze consumption was identified as non-availability of costly Mill scale & -10 mm Fe chips (Gholi) and we realized that some of the measures cannot be implemented due to techno-commercial aspects. Therefore, we checked all waste material available having carbon content. We came up with the solution of selective use of the high carbon dust of a blast furnace. Earlier, it was mixed with other fines and available carbon of blast furnace were diluted in the system.

The raw material used in this work are iron ore fines, limestone, coke breeze and blast furnace gas dust. Their chemical analyses of Iron ore fines & Flux fines are shown in Table 1.

Table 1: Chemical Analysis of Iron Ore Fines & Flux

Components	IOF	Dolomite	Limestone
Fe	58.80	–	–
Mn	0.73	–	–
SiO_2	4.83	5.80	6.02
Al_2O_3	2.47	0.86	0.93
P	0.05	0.03	0.044
LOI	6.17	40.15	42.13
CaO	–	29.02	48.50
MgO	–	19.23	1.76

In addition, the physio-chemical characteristics of coke breeze & High carbon blast furnace gas dust are listed in Tables 2 & 3.

Table 2: Chemical Analysis of Coke Breeze

Components	Coke Breeze
VM	3.38
ASH	22.05
FC	73.04
H_2O	11.84

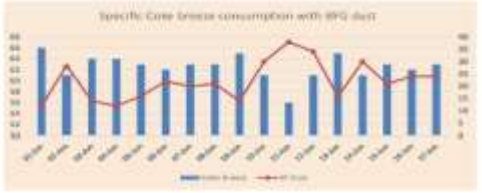
Table 3: Chemical Analysis of Blast Furnace Gas Dust

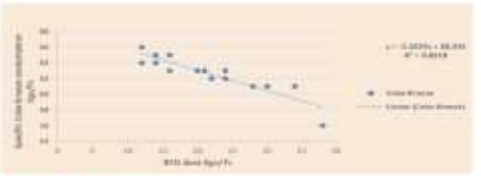
Components	GCP (Gas cleaning plant) dust	Blast Furnace Dust catcher dust
Fe	30.90	38.35
SiO_2	9.48	8.06
Al_2O_3	5.90	3.52
MnO	0.80	0.82
CaO	6.36	4.78
MgO	3.32	2.32
F	0.07	0.05
CARBON	23.58	30.32

Blast furnace gas dust added in a quantitate manner in sinter feed mix to see the effect on specific coke breeze consumption, sintering process sintering rate & sinter product quality.

In the below graph explained the impact of Blast furnace gas dust quantity on coke breeze consumption (duration: 1st June'17 to 17th June'17).

Co-relation between specific Coke breeze consumption and BFG dust.



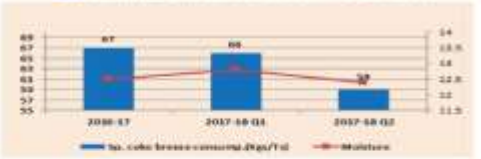


Result & Discussion

Effect of Coke breeze consumption rate:

From the below tables, it can be seen that with an increase in moisture content of iron ore fines, the specific coke breeze consumption increases.

In the month of June'17 by using 30 to 35 kg/ts blast furnace gas dust, it can be seen that coke breeze consumption has reduced by 4 Kgs/ts even with the increase in iron ore fines moisture.



Effect of sintering process & sintering rate:

There is no negative impact on the sintering process like (permeability of bed, VSS).

Effect of sinter product quality:

Same sinter product quality maintained like TI more than 72, Mean size 22.

Thus, our objective of reduction in fuel consumption (coke breeze) in sintering process by selective utilization of blast furnace waste material was successfully achieved. Selective utilization and innovative use waste material gave us the fruitful results of reduction in the fuel consumption and saving cost, thereby decreasing the overall cost of production. ■

REPORTING & MONITORING SYSTEM

FREQUENCY	REPORT/SYSTEM	RESPONSIBLITY
DAILY	•Separate report on energy and water consumption. •Monitoring energy consumption on daily basis in WAR Rooms and Tracking in MIS. • Reporting the major variances to the management. •Review of concerns raised in daily morning meetings.	Maint. Energy Manager Energy Manager Plant Head

FREQUENCY	REPORT/SYSTEM	RESPONSIBLITY
MONTHLY	• •MIS reporting for energy consumption for the whole plant. • Review on projects related to reduction in specific energy consumption. • Variance analysis with respect to budgeted fig. • Monthly review on specific energy consumption. .	Energy Manager Plant Head Energy Manager CEO, Plant Head

DAILY SEC DEVIATION- ANALYSIS

DATE	SPECIFIC POWER CONSUMPTION(KWH/THM)							
	PRODUCTION	BLOWER	STOCK HOUSE	CAST HOUSE	BF ACCESSORIES & HBS	PCI	CWPS & COMPRESSO	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

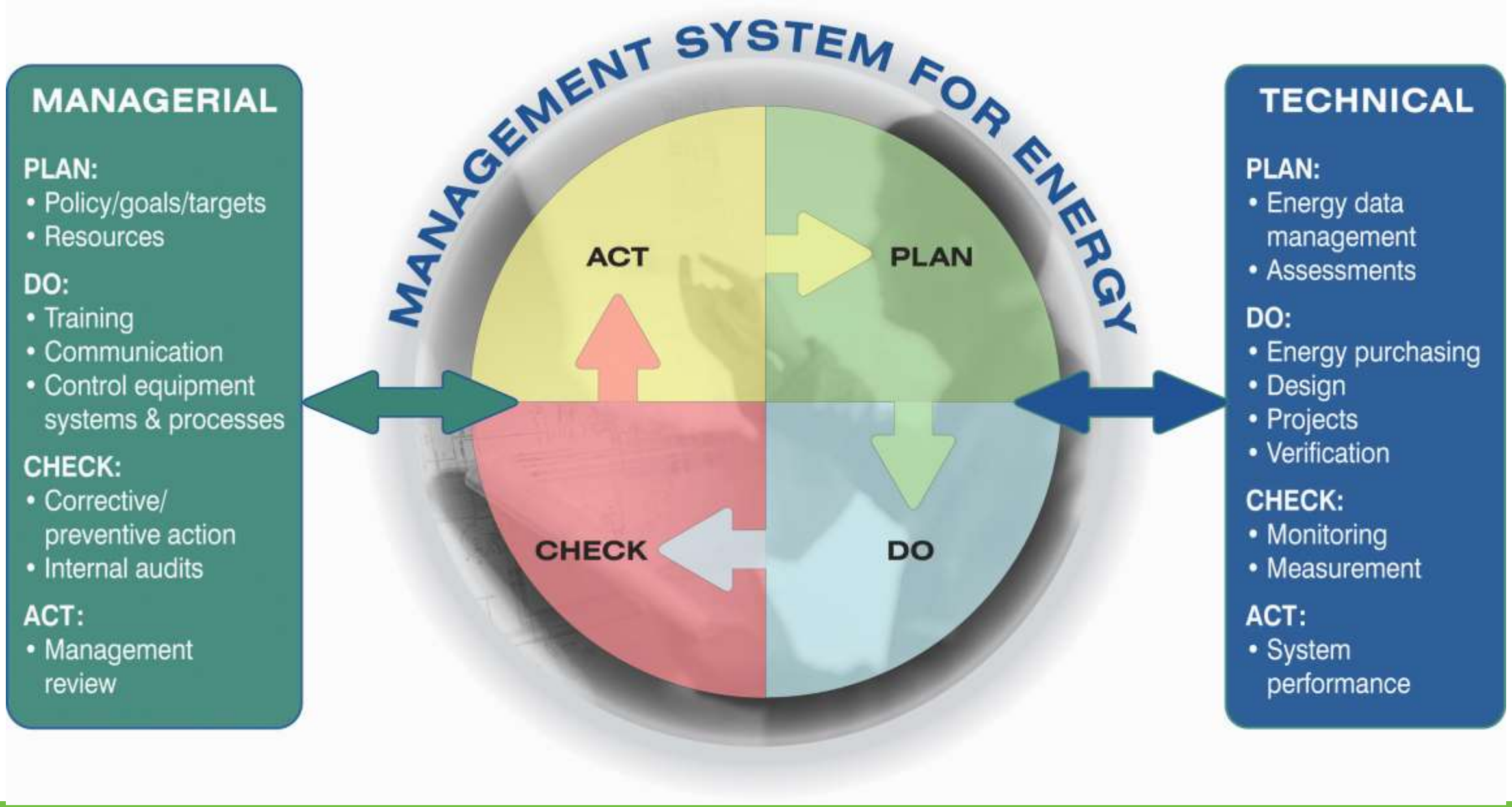
Run Hours monitoring

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 CONSUMSED 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

Reasons for Deviation

Continual Improvement- Energy Management System



ENERGY POLICY, ENCON CELL & ISO IMPLEMENTATION

Energy & Carbon Policy

vedanta — sesa goa iron ore

Energy & Carbon Policy

Saswich Mazumdar
CEO- Vedanta Sesa Goa Iron Business

IRCLASS
SYSTEMS AND SOLUTIONS PRIVATE LIMITED

CERTIFICATE OF APPROVAL
Issued by Indian Register Quality Systems
(A Division of IRCLASS Systems and Solutions Private Limited)

This is to certify that the Energy Management Systems of

Organisation: Vedanta Limited (Sesa Goa Iron Ore - Pig Iron Division)
Address: Pig Iron Plant I: At Amona, Bicholim Taluka, Goa - 403 107
Pig Iron Plant II: At Navelim, Bicholim Taluka, Goa - 403 505

has been assessed and found conforming to the following requirement

Standard: ISO 50001:2011
Scope: Manufacture and Despatch of Pig Iron
Certificate No.: IRQS/1810027
Original Certification Date : 03/01/2015
Current Date of Granting : 18/01/2018
Expiry Date : 01/01/2021

Shashi Nath Mishra
Head IRQS

Head Office: 52A, Adi Shankaracharya Marg, Opp. Powai Lake, Powai, Mumbai - 400 072, India.

ISO 50001:2018

ENCON Cell

vedanta — sesa goa iron ore

ENERGY CONSERVATION CELL

Date: 22.04.2017

To enhance the energy performance & to generate and implement innovative ideas in the field of energy conservation, a core team has been formed for Value added business. Main aim of the ENCON cell is to set-up the monitoring systems to reduce the energy cost and nurture consciousness and enhance awareness on energy conservation. The newly organized group will have the monthly meeting to discuss and seek new ideas/suggestion on this field, chaired by Head Engineering-VAB.

Rajendra Agrawal	Member- Team Head
Nitesh Shesta	Member- Head Prod.
Ashish Dhuriagra	Coordinator- Energy Manager
Premanand Bare	Member- Head I & II
Alok Kumar	Member- Prod(BF#3)
Ramjeet Tiwari	Member- Prod(Sinter)
Deepak Kumar	Member- Prod(PID-1)
Sunil Rane	Member- Prod (SCD)
Satyanarayan	Member- Operation (PP)
Anand Dhatrigaonkar	Member- Elect (BF#3)
Pritesh Naik	Member- Elect(Sinter)
Sandhaya Kamale	Member- Elect(PID-1)
Sajit Sukumaran	Member- Elect (PP)
Nitin Gadewad	Member- Elect(MCD)
Pramod Chari	Member- Inst.(BF#3)
Shrigopal Naik	Member- Inst.(Sinter)
Suresh Kumar	Member- Inst.(PID-1)
Gaurang Kamat	Member - Mechanical(PID-1)
Dheraj Gupta	Member - Mechanical(BF#3)
Gajanan Salgaocar	Member - Mechanical(Sinter)
Kamal B. Rathod	Member - Mechanical(PID-1)
Jayapal V	Member - Mechanical(MCD)
Deepak Rudolkar	Member - Mechanical(MCD)
Rajesh Amonkar	Member - Prod (BF#3)
Premanand Sawaval	Member - Prod (SP)
Anand Naik	Member - Elect (MCD)
Amaranth Gaonkar	Member - Elect(PID-2)
Nagappa	Member - Elect (PID-1)

Bhatia N L
Head - VAB

IRCLASS
SYSTEMS AND SOLUTIONS PRIVATE LIMITED

CERTIFICATE OF APPROVAL
Issued by Indian Register Quality Systems
(A Division of IRCLASS Systems and Solutions Private Limited)

This is to certify that the Integrated Management Systems of

Organisation : Vedanta Limited - Sesa Goa Iron Ore (Value Added Business)
Address : Pig Iron Division I:Via Mareela, Amona, Goa - 403 107, India
Pig Iron Division II:Navelim, Taluka-Bicholim, Goa - 403 505, India
Metcoke Division & Power Plants: Navelim, P. O. Sanquelim, Goa - 403 505, India

has been assessed and found conforming to the following requirement

Standards : ISO 9001:2015
ISO 14001:2015
OHSAS 18001:2007

Scope :
- Manufacture and Dispatch of Pig Iron
- Manufacture and Dispatch of Metallurgical Coke
- Generation of Power through Waste Heat Recovery and Supply

Certificate No.: IRQS/1712056I
Original Certification Date : 22/02/2007
Current Date of Granting : 12/06/2017
Expiry Date : 11/06/2020

Shashi Nath Mishra
Head IRQS

Head Office: 52A, Adi Shankaracharya Marg,Opp.Powai Lake, Powai, Mumbai - 400 072, India.

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

OUR APPROACH TO GREEN SUPPLY CHAIN

Sustainable Development

- Stake Holders are Encouraged toward Green Energy.

Reward& Recognition

- Organizing Energy idea mela and energy conservation day and rewarding employees, workmen and contractors.

Training & Awareness

- Regular Training and Awareness on Sustainable Energy Conservation
- Progress monitoring, reporting & Help to Improve

Policy

- Making Policy for Energy Efficiency Product purchase.
- Priority to the Energy Efficient Products in the negotiations

Vendor Partnership

- Clear and agreed scope on Energy Policy during vendor registration Process.
- Involve in energy reduction programs.

Implementing Projects

- Organizing Projects on Energy
- Result Tracking and Sustain the KPIs

Green Supply Chain

PR to Payment – Paperless office

Raw material transport- By Conveyors

Procurement of equipment of highest efficiency

Clean Energy to state electricity board

STACK HOLDER ENGAGEMENT

WORKMEN AWARENESS

STUDENTS AWARENESS

ENCON DAY CELEBRATION

REWARDS & RECOGNITION

POSTER COMPETITION

ENCON PLEDGE

NATIONAL ENERGY CONSERVATION DAY - 2021

vedanta

sesa goa iron ore

NATIONAL ENERGY CONSERVATION DAY

14th December 2021

Vedanta Limited

Value Added Business

Cleaner Planet

NATIONAL ENERGY CONSERVATION DAY - 2021

Waste Heat Utilization

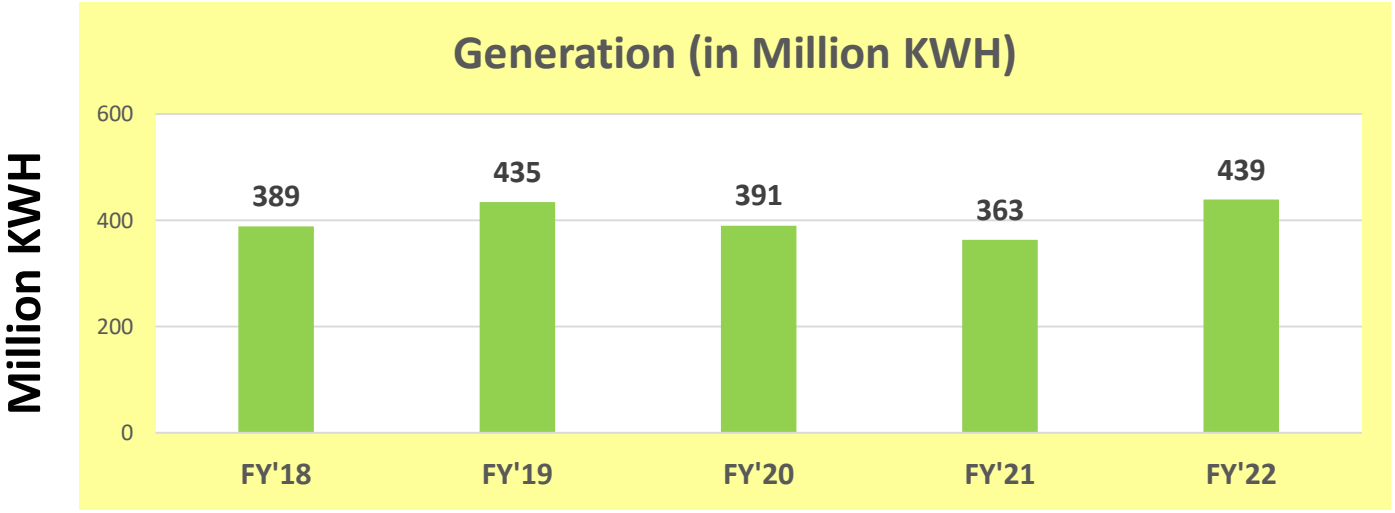
COKE PLANT

WASTE HEAT RECOVERY POWER PLANT

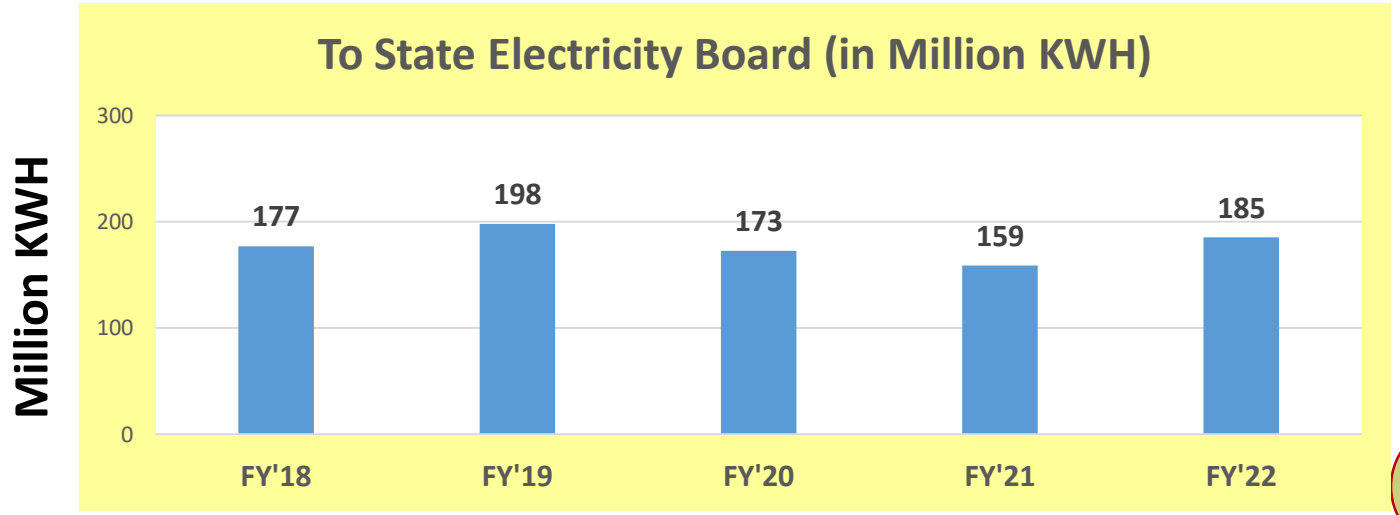
PIG IRON PLANT

Waste heat Utilization

Power Generation –Waste Heat



Clean Energy to State Electricity Grid



- Over 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

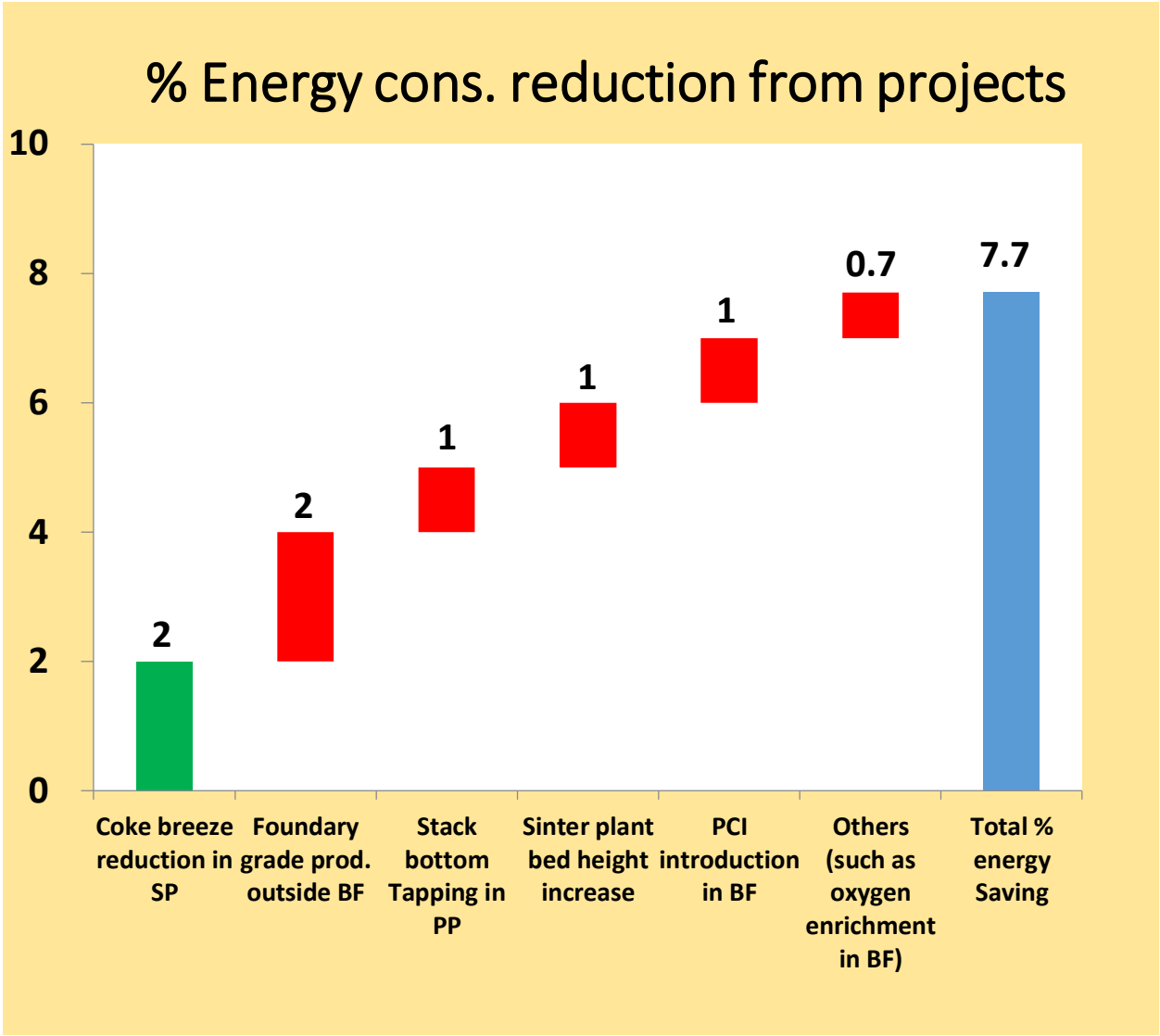
Hazardous wastes		
Sr.no	**Type of wastes**	**Mode of disposal**
1	Used / spent oil	Sold to recycler registered with CPCB & having valid authorization of SPCB.
2	Waste residue containing oil	Incinerated in coke oven plant
3	Empty /discarded paint tins	To recycler registered with CPCB and having valid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

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

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%**



Utilization of Renewable Energy Sources

Daylight utilization using transparent Roof sheets

Usage of Turbo Ventilator

- Conducted RE feasibility study at VAB, identified potential of 1.5 MW solar PP. Offers received under technical evaluation.
- Supplied 200 MU's/ annum clean power to state electricity board.

Thank You