



Confederation of Indian Industry

25th National Award for Excellence in Energy Management 2024



JSW Energy (Barmer) Limited



Agenda

Introduction on Company

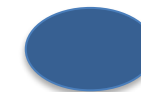
Energy Benchmarking

Innovative Projects implemented

Environment Management-
Ash Utilization

EMS System and other requirements

Any other relevant information



Energy Consumption Overview

Energy Saving projects

Utilisation of Renewable Energy

Best Practices in the Plant

NET ZERO commitment

Reward & Recognition

Introduction on Company



*Most efficient
plant in India
with CFBC
technology*

SALIENT FEATURES OF PLANT

01

Total Capacity 1080 MW (8x135MW)



02

All Units commissioned by March 2013



03

Lignite based CFBC Thermal power plant



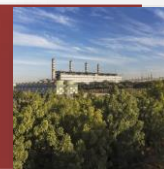
04

Lignite sourced from Jalipa and Kapurdi mines



05

Long Term PPA with State Govt

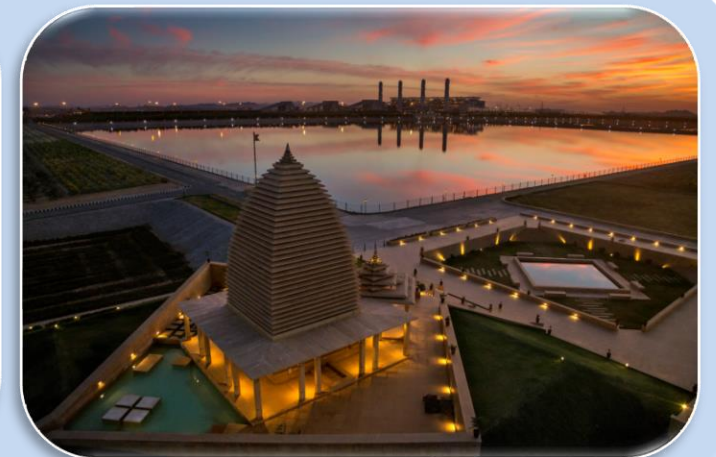


06

Water Sourced from IGNP canal



Introduction on Company



Top in Merit
order in
Rajasthan

Plant Availability
>80%

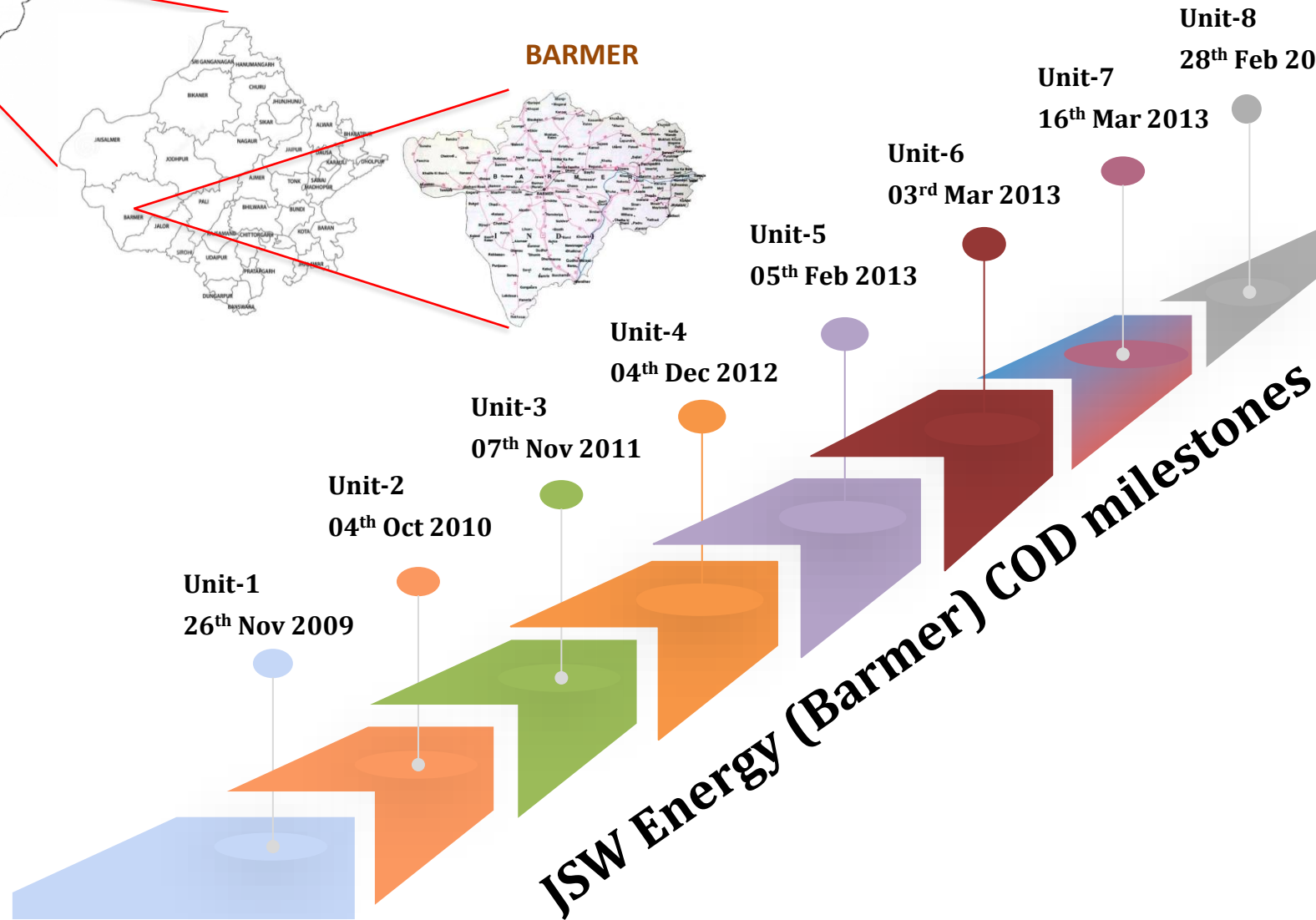
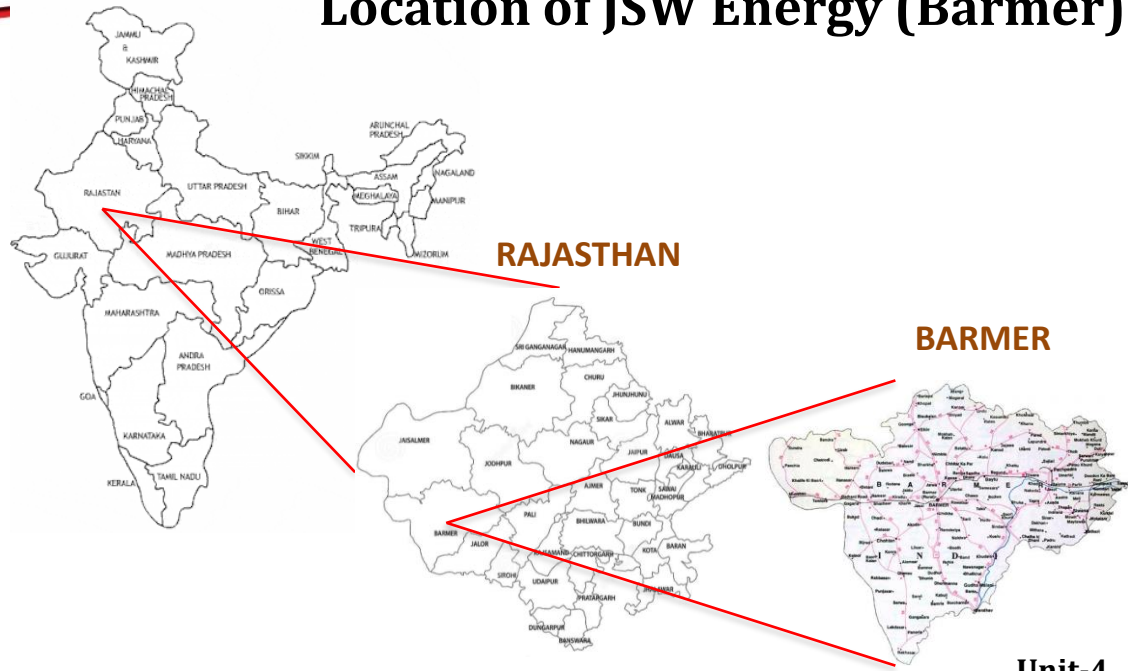
Best Heat Rate in
CFBC in India

Operate with
CFBC Technology
for low grade
coal

- **Lowest Cost of generation** among the thermal power plant in Rajasthan.
- Total Installed Capacity 1080 MW
- JSW Energy (Barmer) Limited certified for **ISO 50001:2018 (Energy Management System, ISO 9001:2015 (QMS), ISO 14001:2015 (EMS), ISO 45001:2018 (OHSAS) & ISO 22301:2019 (BCMS).**

Introduction on Company

Location of JSW Energy (Barmer) Limited



May 2006: Implementation Agreement (IA) executed with Government of Rajasthan (GOR)

Oct 2006: PPA executed with DISCOMs for entire off take

April 2007: Commencement of project implementation

Nov 2009: First Unit achieved COD

March 2013: All units COD (Last 4 units achieved COD within 40 Days)

Energy Consumption Overview FY 24



Power Generation : 7084.25 MU



Gross Heat Rate : 2565.75 Kcal/Kwh



Plant Deemed PLF : 78.36 %



Boiler Efficiency : 80.15%



Plant Availability : 80.93 %



Turbine Heat Rate : 2056.45 Kcal/Kwh



Auxiliary power Consumption : 10.66%



DM Water Consump. : 2.28%

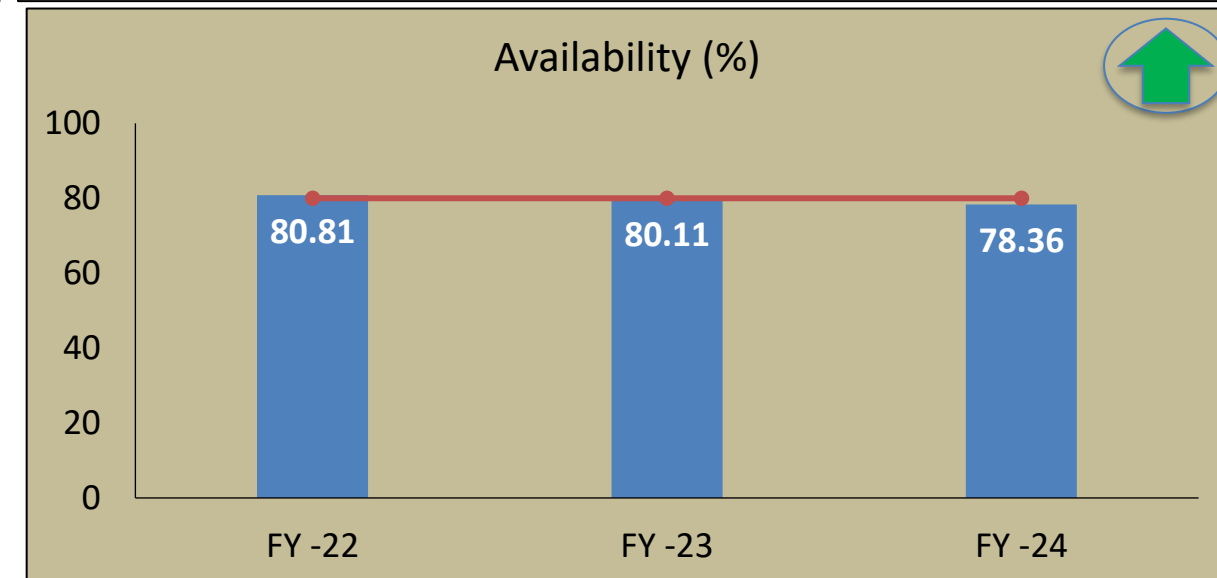
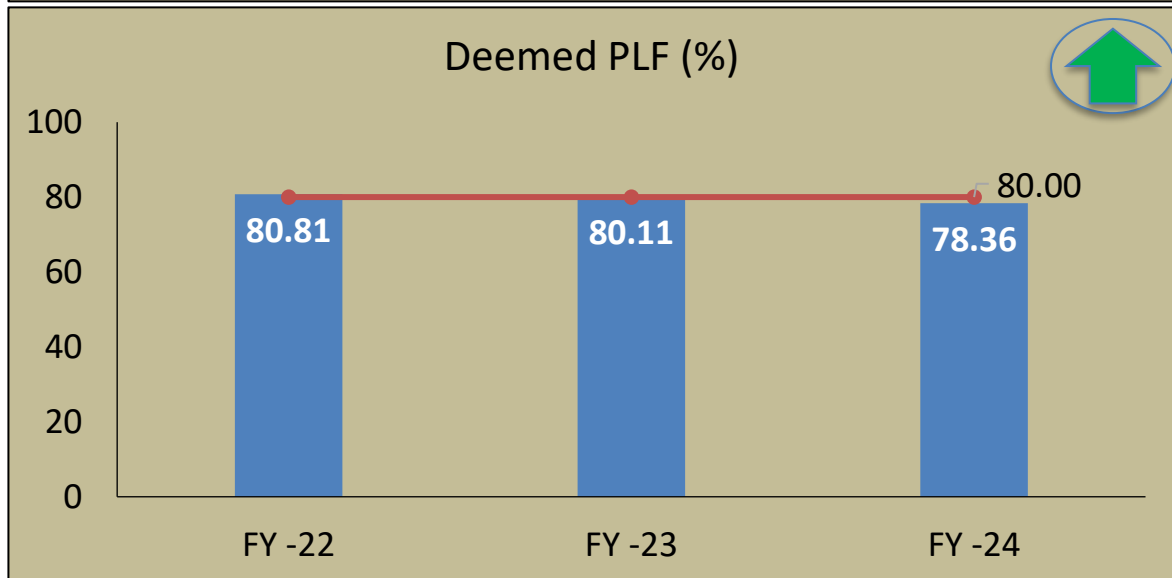
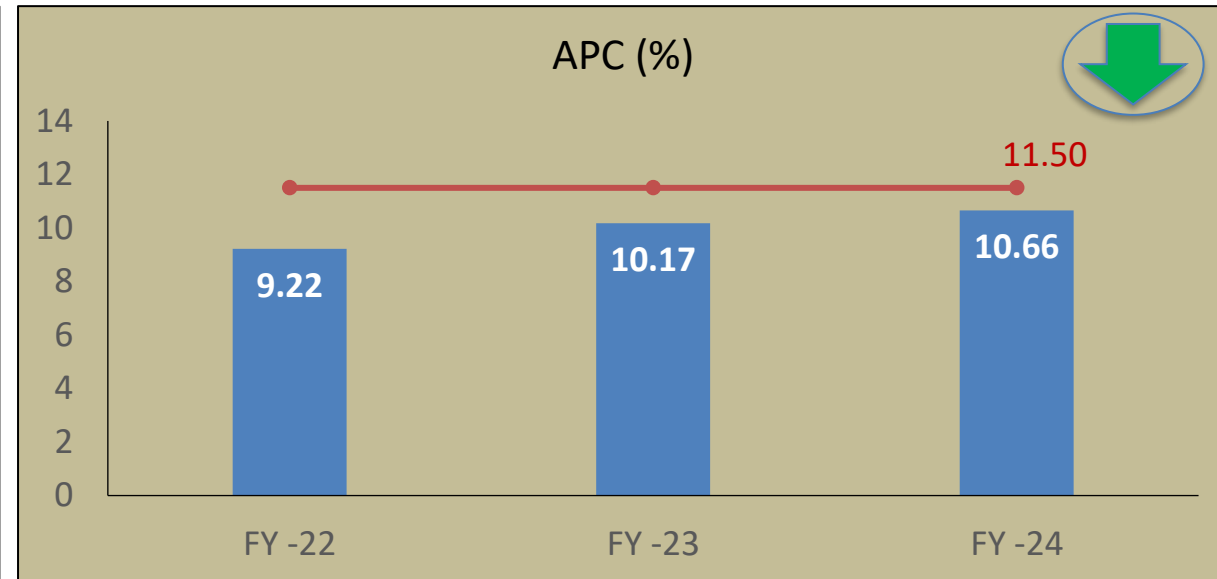
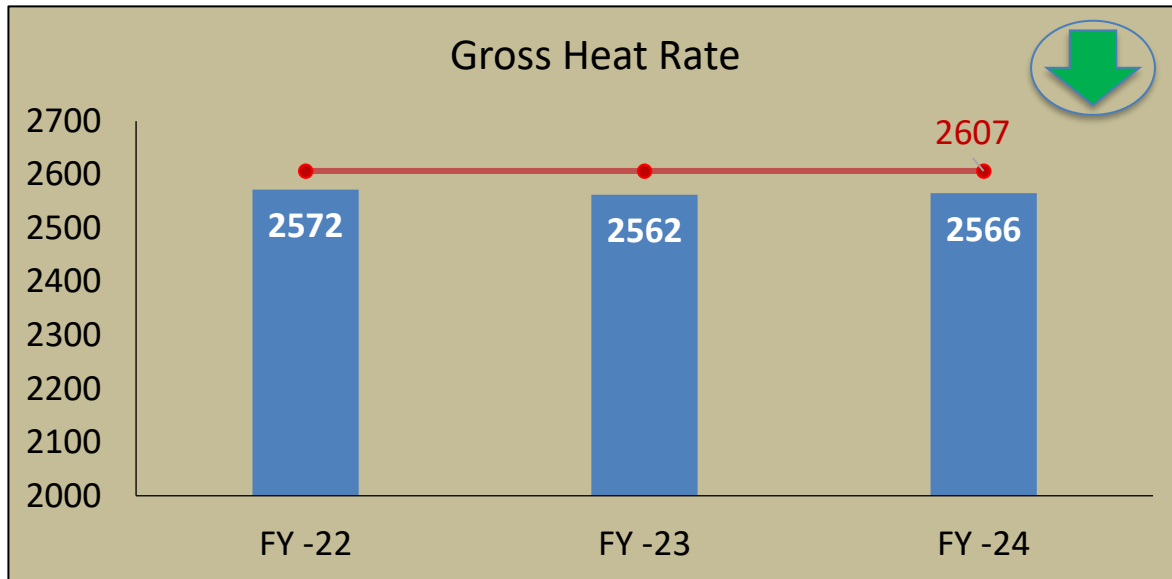


Specific oil Consumption : 0.099 ml/Kwh



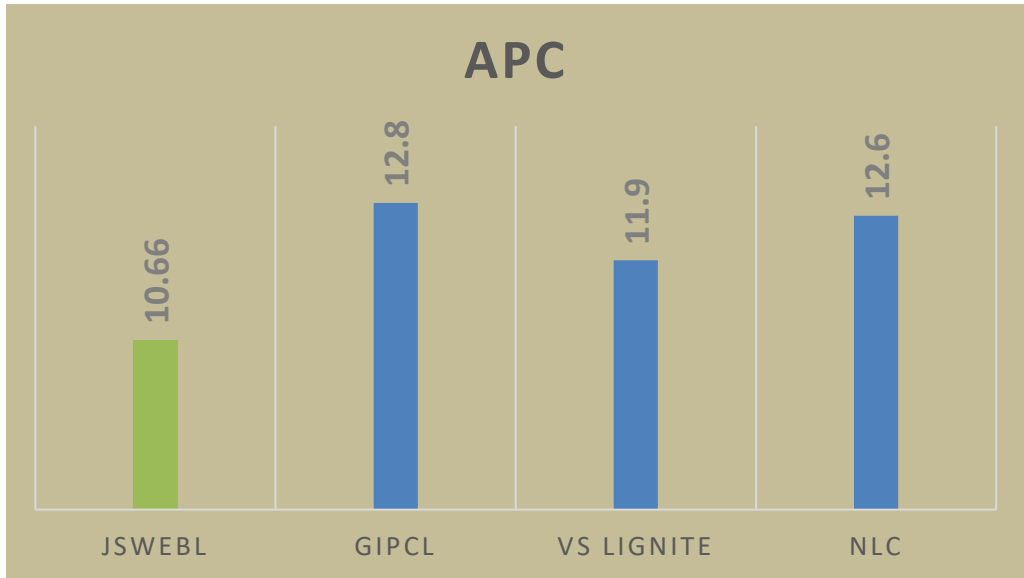
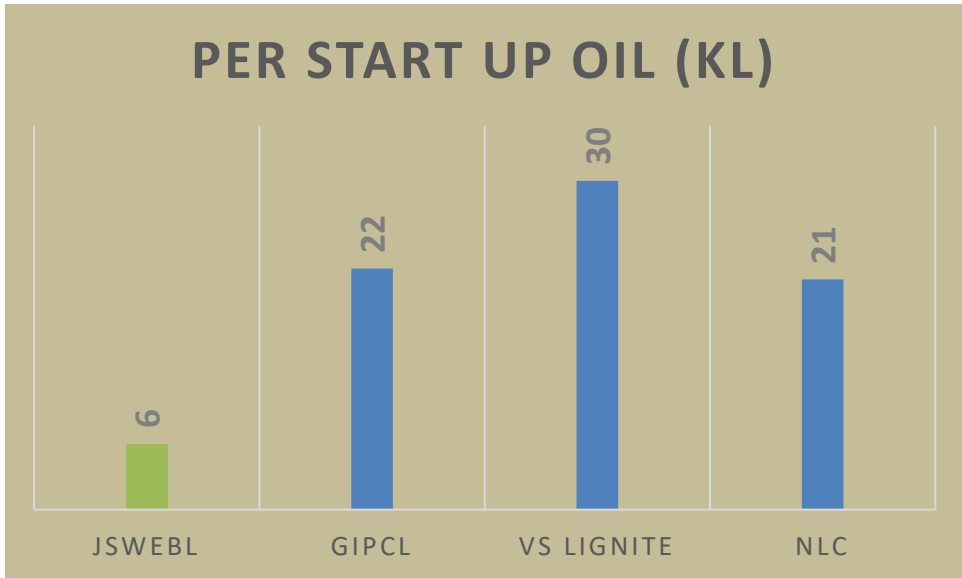
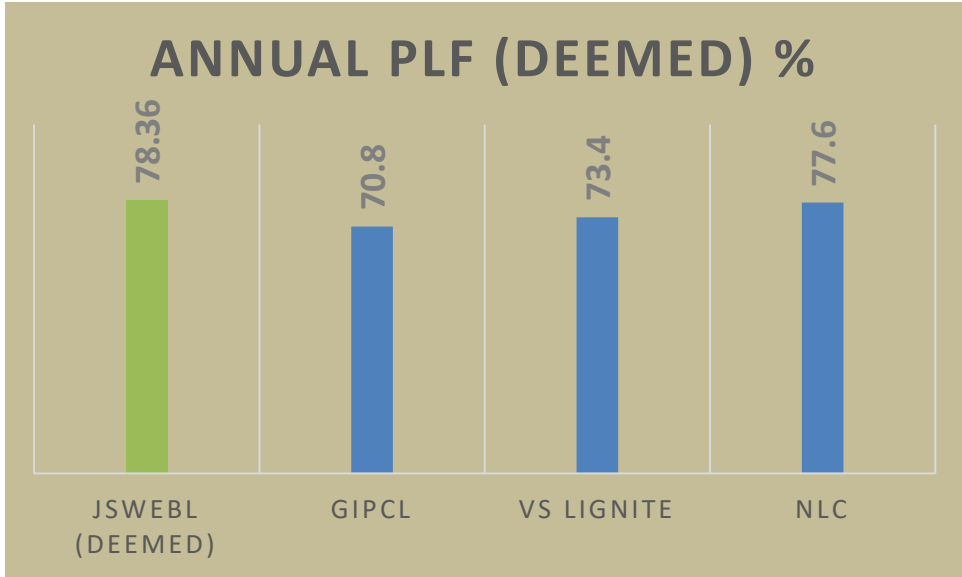
Raw Water Consump. : 2461 m3/MU

Sp. Energy Consumption in last 3 years



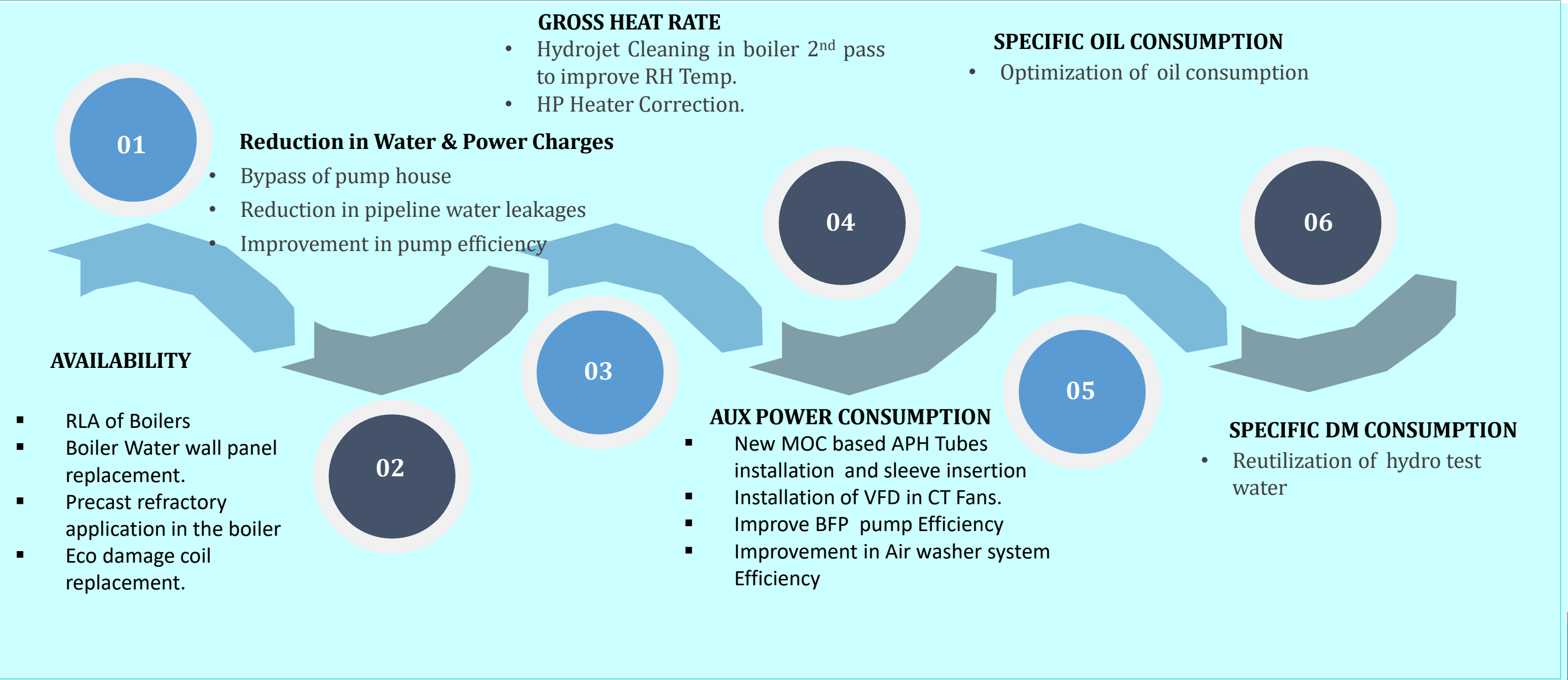
❖ Reason for high APC is due to deterioration of Air pre heater (high sulphur content in coal), we periodically change the APH in every two year, so plan for replacement of APH in FY 25.

Energy Benchmarking



Energy Benchmarking

Roadmap for FY 25



01

Reduction in Water & Power Charges

- Bypass of pump house
- Reduction in pipeline water leakages
- Improvement in pump efficiency

03

GROSS HEAT RATE

- Hydrojet Cleaning in boiler 2nd pass to improve RH Temp.
- HP Heater Correction.

04

SPECIFIC OIL CONSUMPTION

- Optimization of oil consumption

05

AUX POWER CONSUMPTION

- New MOC based APH Tubes installation and sleeve insertion
- Installation of VFD in CT Fans.
- Improve BFP pump Efficiency
- Improvement in Air washer system Efficiency

06

SPECIFIC DM CONSUMPTION

- Reutilization of hydro test water

AVAILABILITY

02

- RLA of Boilers
- Boiler Water wall panel replacement.
- Precast refractory application in the boiler
- Eco damage coil replacement.

Energy Saving projects- FY 2023-24



S No	Title of Project	Annual Electrical Saving (MU)	Annual Thermal Saving (Million Kcal)	Total Annual Saving (Rs Million)	Investment (Rs Million)	Payback (Months)
1	Energy Saving by arresting APH leakages	16.97	0	79.75	42.13	6.34
2	Reduction in power consumption of BFP by optimizing DP across SH spray station	1.72	0	5.16	1.36	3.16
3	Reduction of power consumption of HT Bed ash compressor by optimizing the unloading Hrs.	0.49	0	0.14	0.10	7.91
4	CT makeup pump power consumption optimization	0.18	0	0.83	0.08	1.16
5	ETP Power reduction by installing VFD in Guard pond Pump.	2.96	0	13.38	1.6	1.43

Energy Saving projects



S No	Title of Project	Annual Electrical Saving (MU)	Annual Thermal Saving (Million Kcal)	Total Annual Saving (Rs Million)	Investment (Rs Million)	Payback (Months)
6	Unit-4,Heat rate Improvement(4.2 Kcal/kwh) by HP heater internal rectification	0	3990	3.52	2	6.8
7	Optimization of Compressed Air power consumption	3.35	0	10.05	0.2	0.2
8	Hydro Jet cleaning of boiler 2nd pass	0	1.75	1.61	0.14	1.05
9	Air Seal Application in boiler 2 nd to avoid air ingress resulting in reduction in ID fan power consumption	1.31	0	5.93	10.88	22
Total		26.98	3992	120	58.54	5.83

Energy Saving projects



FY	Nos of Energy projects	Investments (INR Millions)	Electrical Saving (MU)	Thermal Saving (Million Kcal)	Saving (INR Million)
FY 2021-22	9	39.30	27.66	835	123
FY 2022-23	13	60.00	31.44	4218	149
FY 2023-24	9	58.54	26.98	3992	120

1. Reduction of Auxiliary power consumption of Boiler Feed Pump

Before



After



❖ **Opportunity:**

Reduction in auxiliary power consumption of Boiler feed pump.

❖ **Initiatives:**

- Bypass line provided in Super heater de-super heating station.
- Feed water Regulating Station DP reduced to 0.3 MPa from 1.22 MPa .

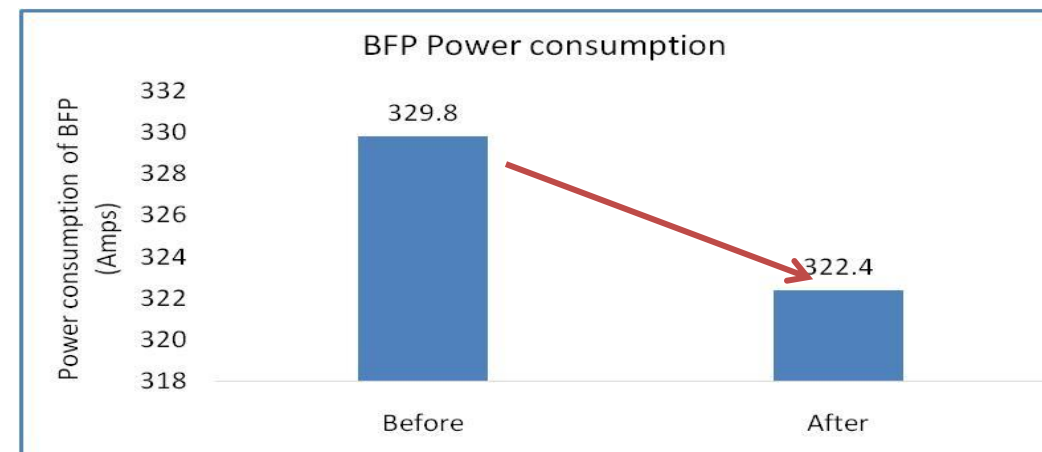
Average Auxiliary Power Consumption of one Boiler feed pump reduced by 74 kW/hr .

❖ **Investment:**

13.6 Lac

❖ **Impact**

Monetary Saving : 51.6 Lac



2. Reduction of Auxiliary power consumption of compressed air system

❖ Opportunity:

Reduction in auxiliary power consumption of compressed air system

❖ Initiatives:

- Service air header inter-connected with LT compressor header.
- Oil gun atomization air tapping taken from Instrument air header.
- Optimized instrument air header pressure at 0.48 MPa instead of 0.60 MPa.

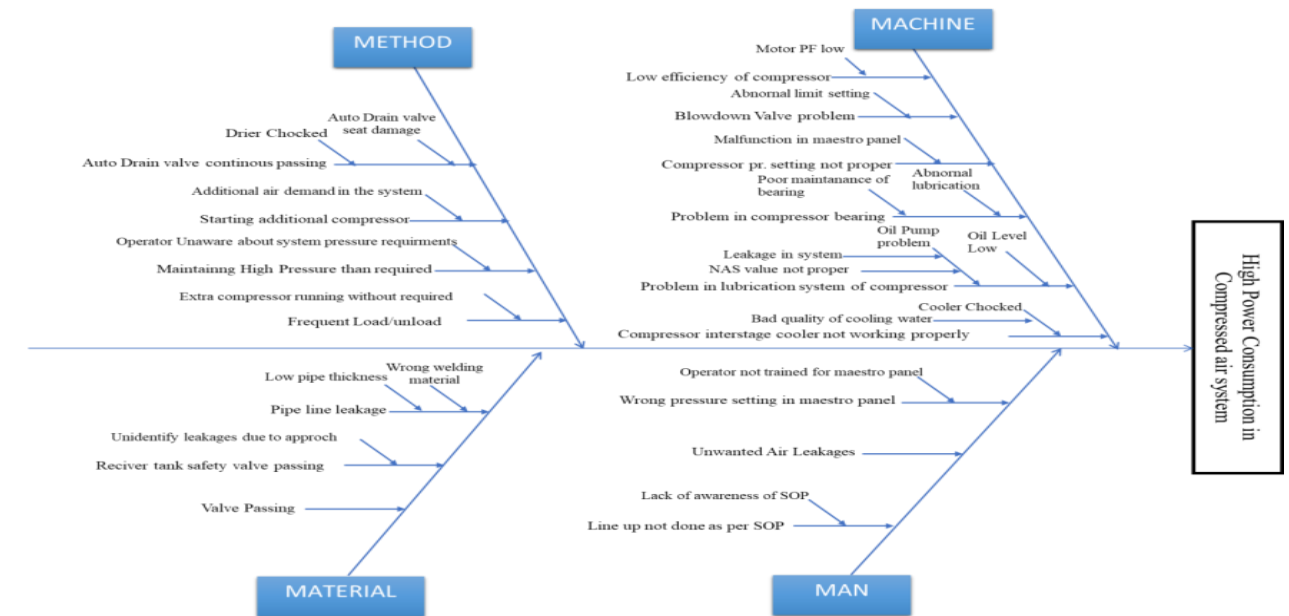
Average Auxiliary Power Consumption of compressed air system reduced by 3.35 MU/Annum.

❖ Benefits :

- 1 compressor stopped and required pressure achieved by 1 compressor only.
- Maintenance cost of compressor reduced.

❖ Impact

Monetary Saving : 1.05 Cr



3. Online Performance Monitoring through PI Vision

Dashboards Categories



Enterprise Dashboards-
Power plant KPI's



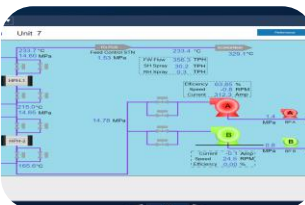
Dashboard
Specific KPI's



Unit Overview Dashboards
Individual Unit wise KPI's



Performance Dashboards
Performance Monitoring of Critical equipments BFP, CEP, APH, Condenser)



System Wise Dashboards
Feed water , Condensate, Extraction system, Flue Gas ,,Electrical System

❖ Benefits :

- Online and real-time performance monitoring.
- Real-time performance comparison with other units.
- Historical data is easily accessible.
- No need to calculate the performance data.

❖ Total investment : 23 Lakhs

Use Cases Identified

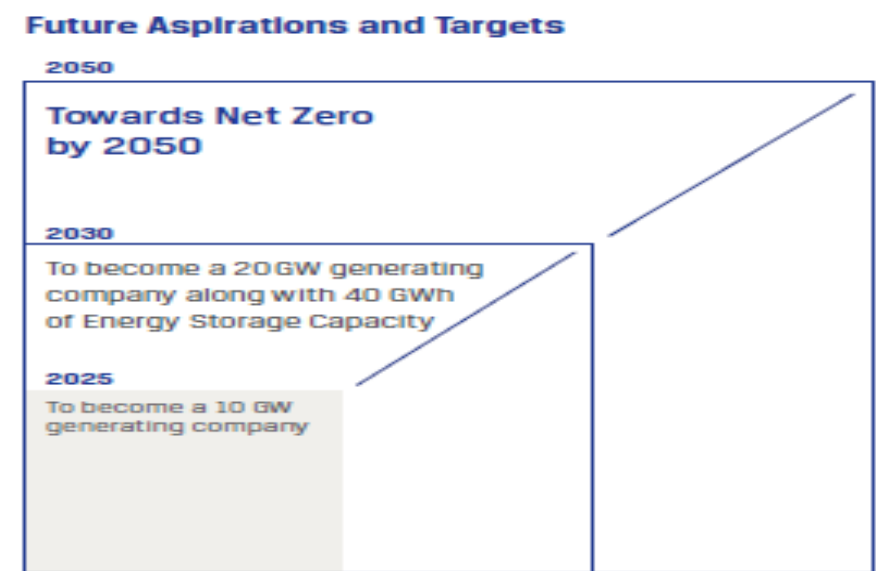
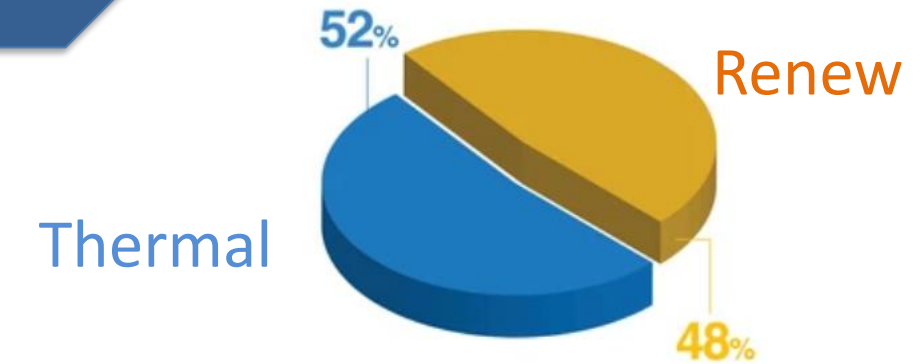
Total 54 Use Cases are identified after First Go-Live

Power Saving of ~ 0.53 Mus achieved through Real time Monitoring

14.18 Lacs monetary savings achieved through Real time Monitoring

Utilisation of Renewable Energy

- Installation of solar rooftop of capacity 450 KW at township roof top.
- Real time monitoring of solar Generation through SOMS portal.
- As a JSW energy
 - ☐ we are adding 40 GWh / 5 GW Energy Storage by FY 2030



Environment Management- Ash Utilization

ASH MANAGEMENT

- Displayed "Best O&M Practices Dry Ash Evacuation System at (CBIP)

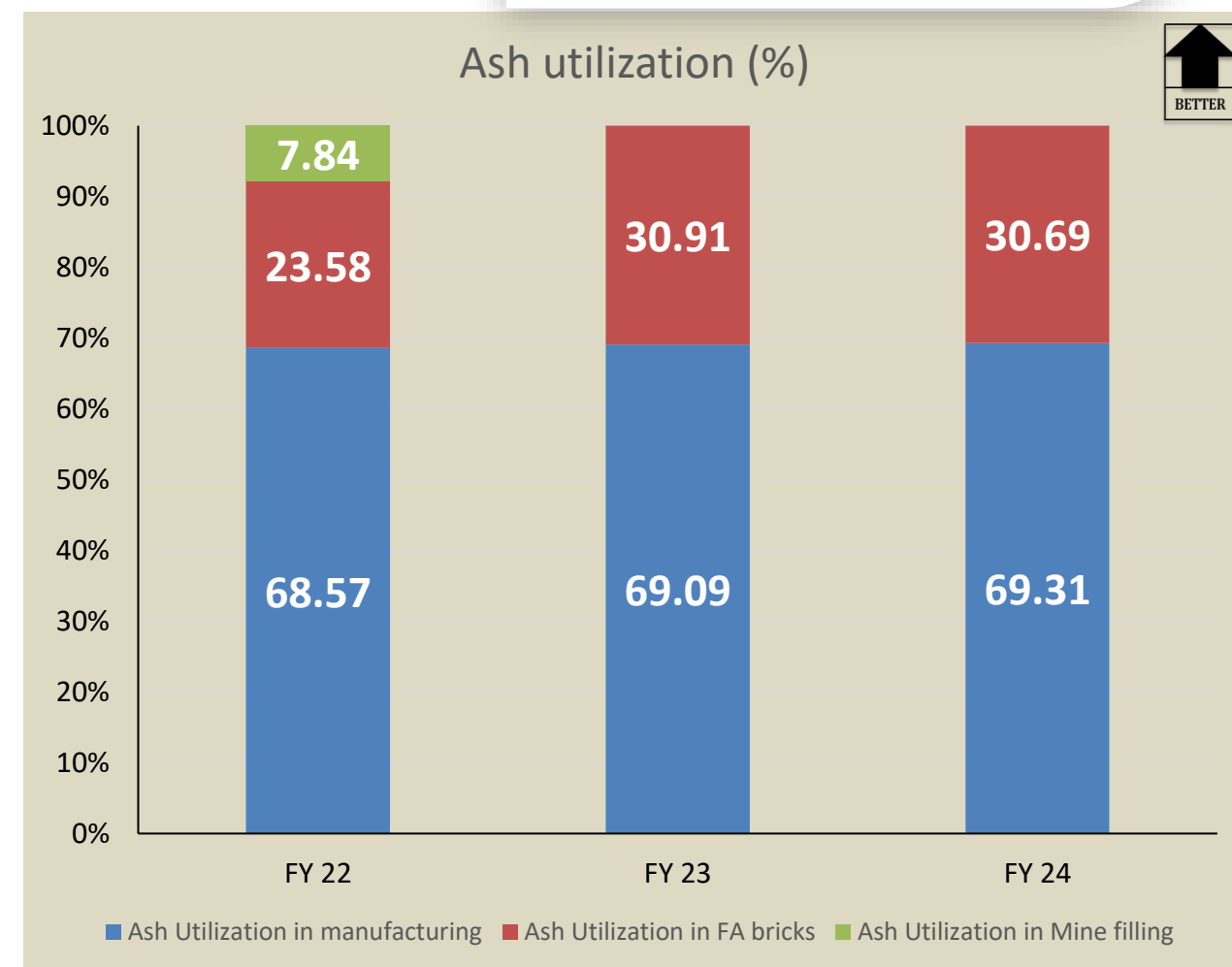


Mode of Transportation of Ash

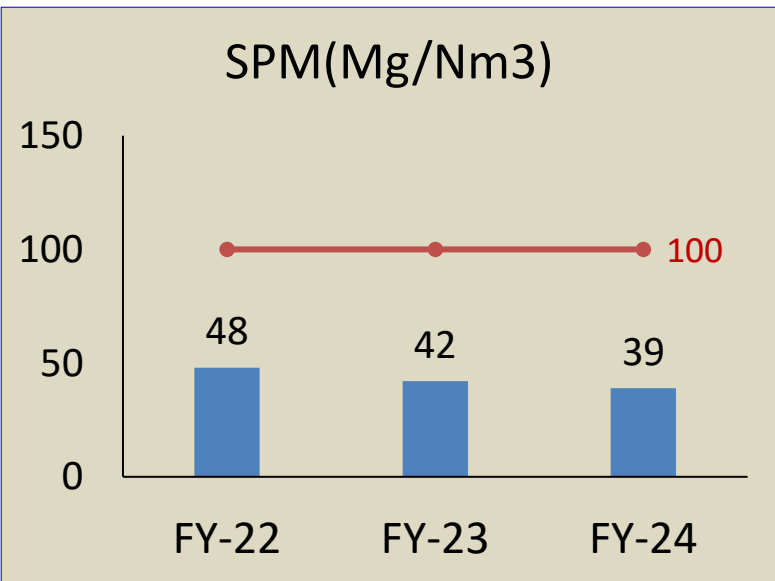
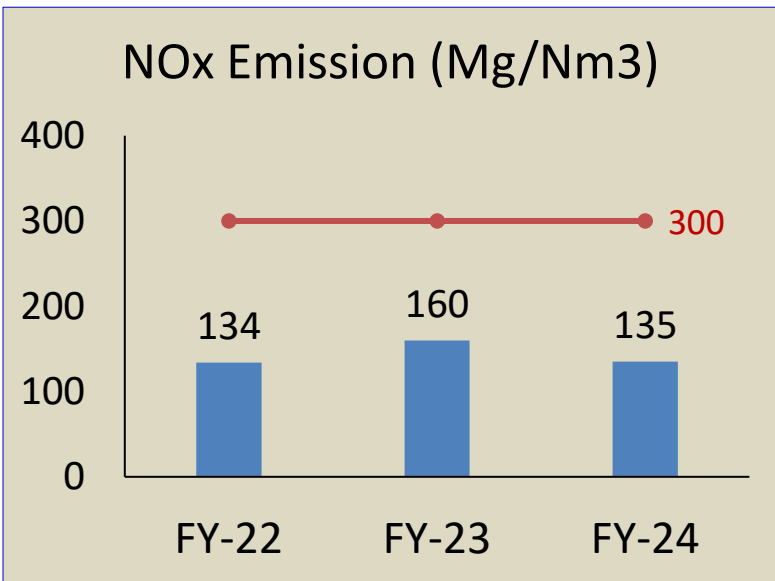
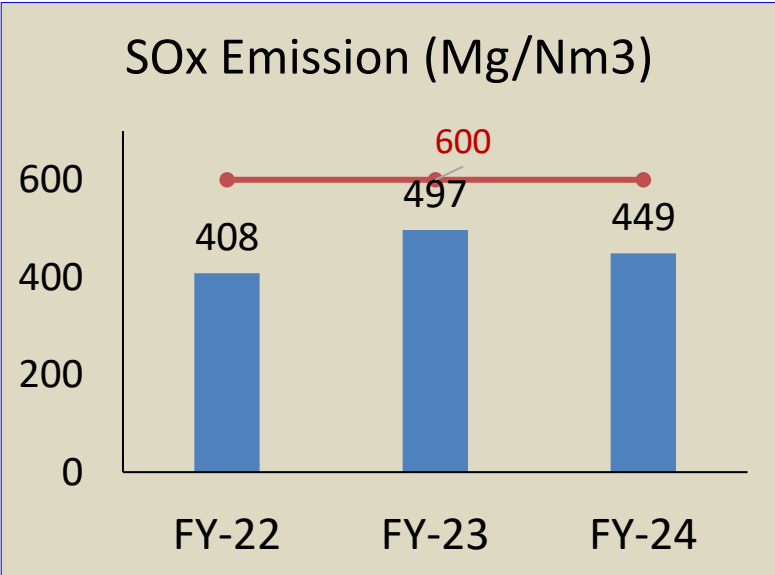
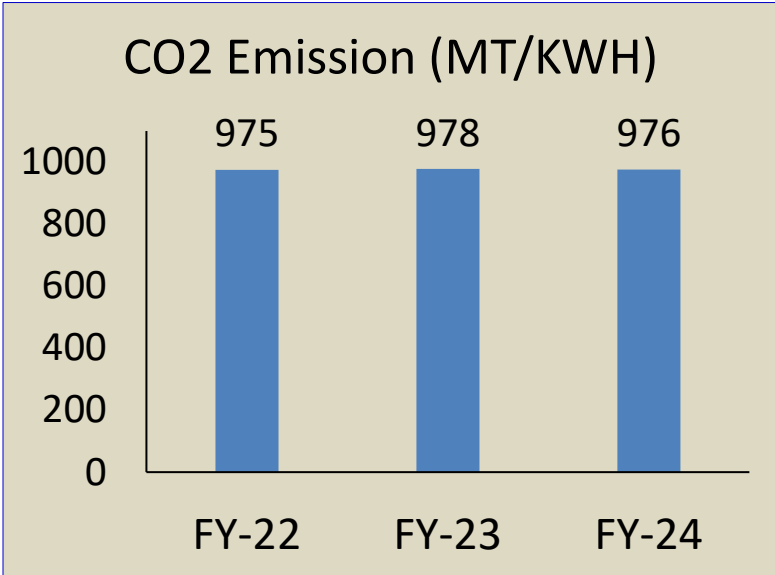


DRY
(Through Bulkers)

	UOM	2021-22	2022-23	2023-24
Ash Stock in Plant (Yard + Pond)	LMT	1.92	1.56	1.56
Ash Generated	LMT	8.97	9.11	8.67
Ash Utilization	%	94.38	103.92	100.53
Ash Utilization in manufacturing	%	68.57	69.09	69.31
Ash Utilization in FA bricks	%	23.58	30.91	30.69
Ash Utilization in Mine filling	%	7.84	0	0

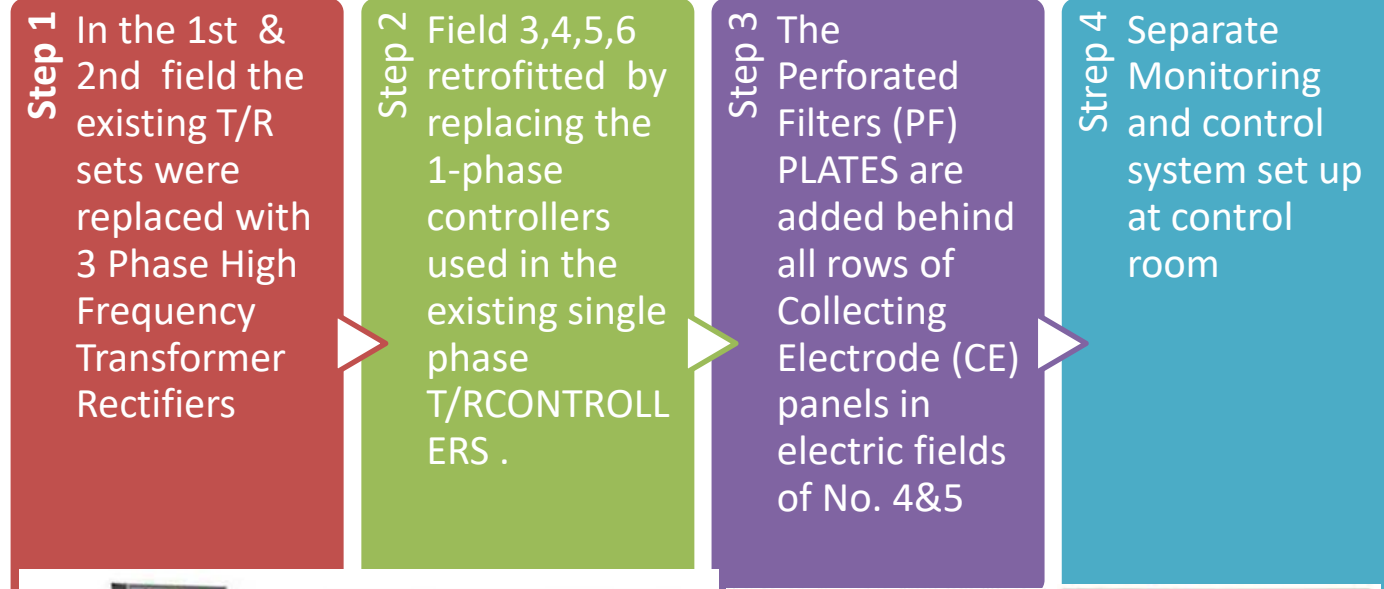


Environment Management- Emission



Action Plan to meet the latest emission norms as per Gazette Notification

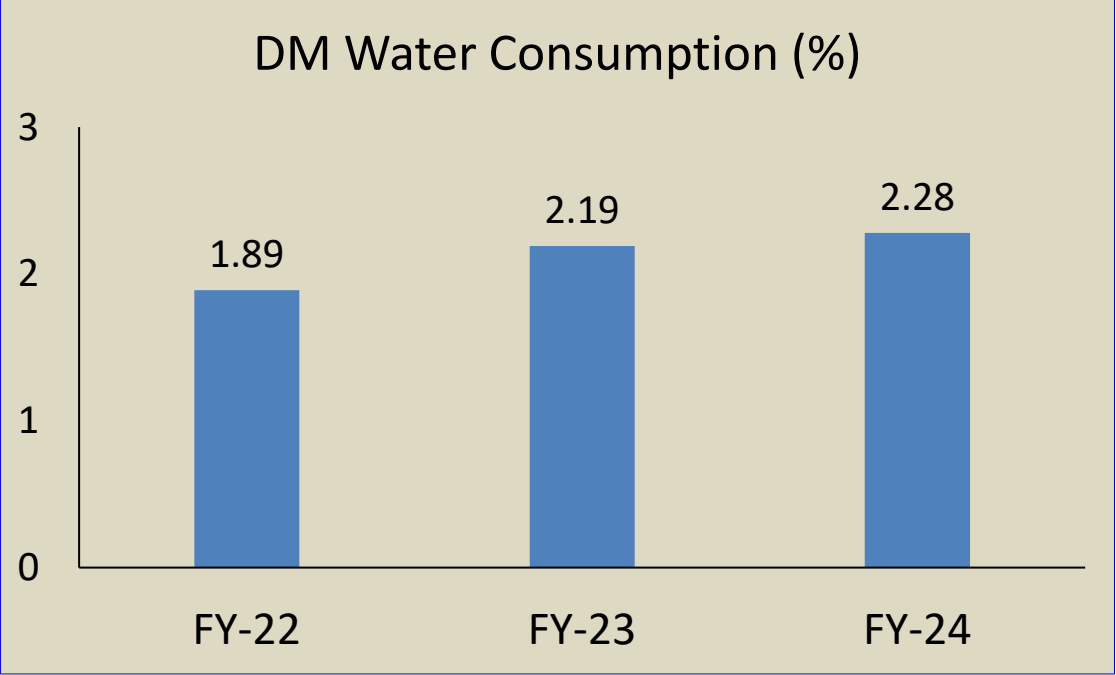
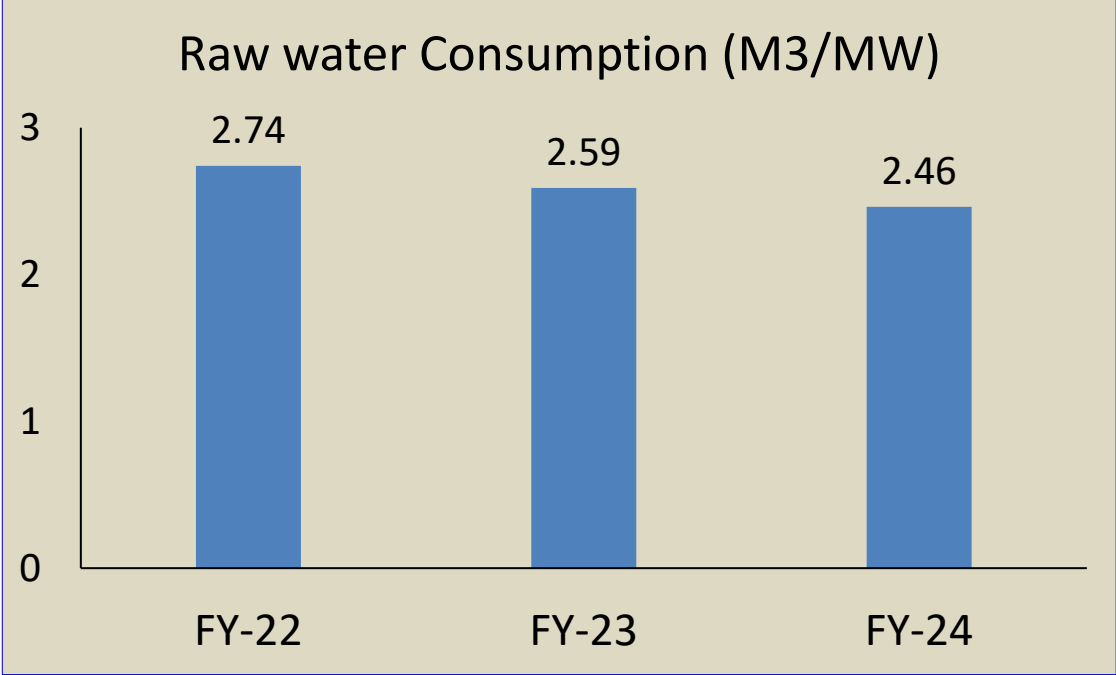
1. Modifications / Up gradation in ESP to reduce SPM level <math>< 50 \text{ mg / Nm}^3</math>



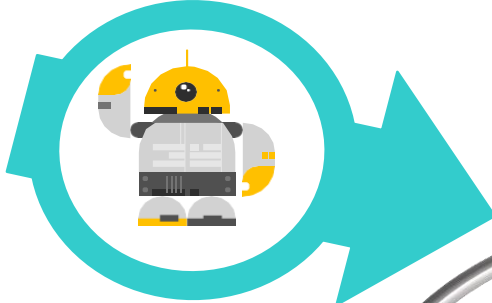
2. Enhance Lime plant capacity to control the Sox Emission

1. GHG data is submitted to Central Electrical Authority (CEA) (Scope-1).
2. The data is also included in BRR (Business Responsibility Report) and available on company website for public interest.
3. Refer link : <https://www.jsw.in/investors/energy/jsw-energy-financial-information-business-responsibility-reports>

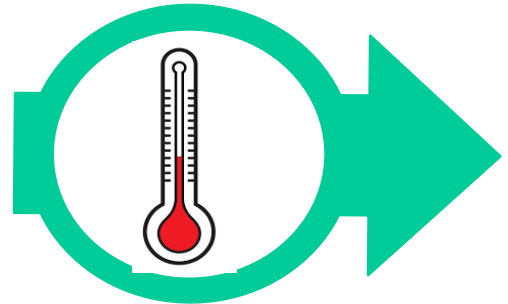
Environment Management- Water



Automation of make up water to all the tanks in plant viz. service water tank, CCW make up tank, Potable water tank, etc. so as to avoid overflowing of water



Installation of RTD in high pressure steam drain line so as to quickly identify passing of valve & attend the same



Drain & Vent temperature survey & thermography on regular intervals. Ensuring proper functioning of steam traps.



Environment Management- Water

Water Conservation & Reduction in Effluent Generation through changing coagulant regime:

Initiative:

- change in coagulant regime

Benefit

- ETP Loading and further chemical treatment cost of Blowdown has been reduced approx. **23 Lac/year.**
- Saving Water Cost **60.98 Lac/year** by decreased CW Blow down to approx. 702 M3/day (9%)



DM Plant

DM Plant OBR improvement- from designed 18 Hrs to **20 Hrs** by installation of Online concentration analyzers & improving supervision & thus reduced regeneration & Backwash wastewater – Water savings **100 m3/Day**

Reusing of Condenser flood test water

- Modification has been carried for reuse of condenser flood test water.
- Total water saving through this modification = **300 m3.**

Rain water Harvesting

- Rain Water Harvesting ponds are constructed inside the plant premises.
- Total Volume of Ponds= 19,200 m3



100% Effluent water Utilization

- ETP RO water is being used for DM water generation
- Cooling water and balance effluent used for plantation at plant.
- Effluent Water Treated in FY24 is 2411425 m3.
- Conducted **Water Audit** to identify the new areas for improving water efficiency
- Reusing of PT Plant Clarifier sludge water – **100% Utilization in Horticulture.**

Best Practices in the Plant-Digitization

IGNITE Portal for logging improvement ideas

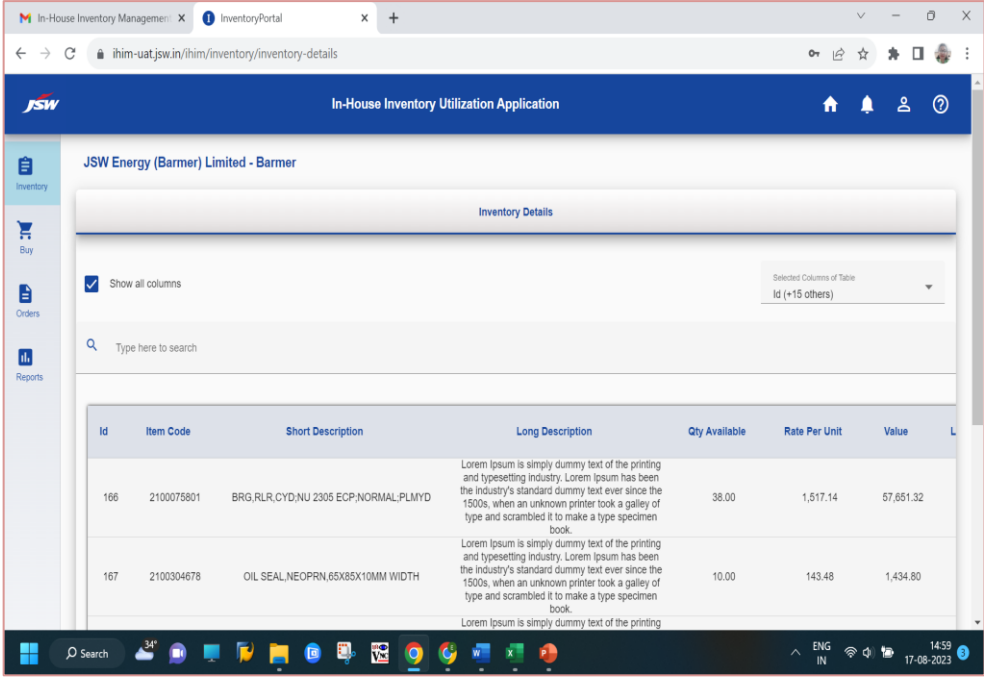
IGNITE portal has been launched for registering the improvement ideas by an individual.



In house Portal for inventory utilization

We set an In-House Inventory Utilization Portal common across each site of JSW Energy group.

1. Overall Non-moving Inventory can be reduced to bare minimum required.
2. Requirement of less resources to store, preserve and maintain the inventory.
3. Reduction in Obsolete Item Inventory.
4. Utilization of the obsolete items before its deterioration.

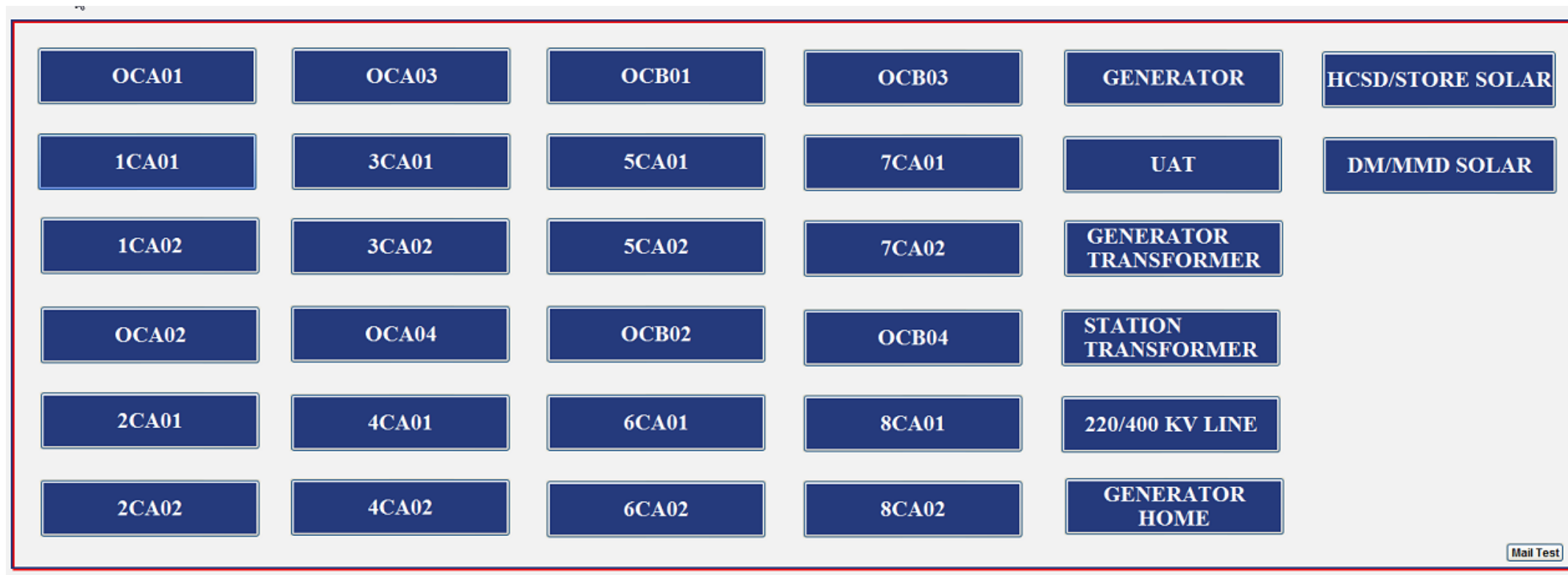


Best Practices in the Plant-Digitization

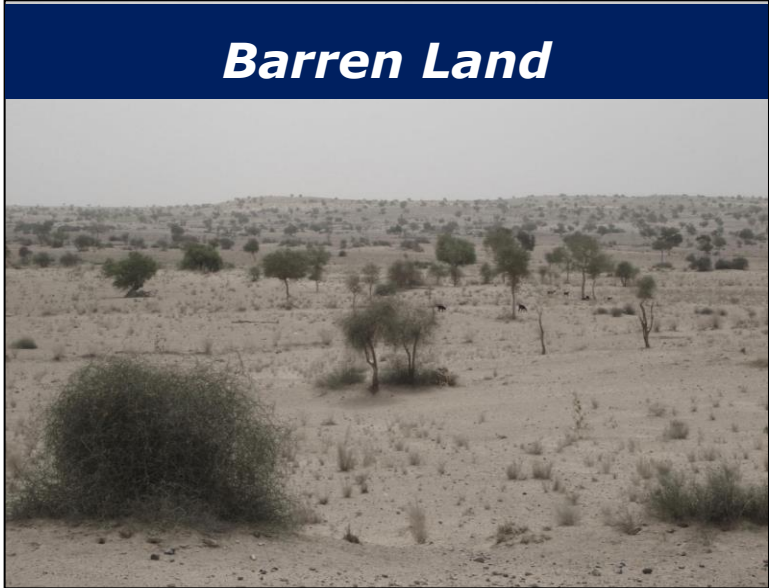
EMS Implementation

With the implementation of EMS system we have achieved following benefits:

- Real Time Comparison of APC.
- Load Monitoring of Transmission Line.
- Identify High consumption area.
- Day wise, monthly basis Report.



Best Practices in the Plant- Afforestation



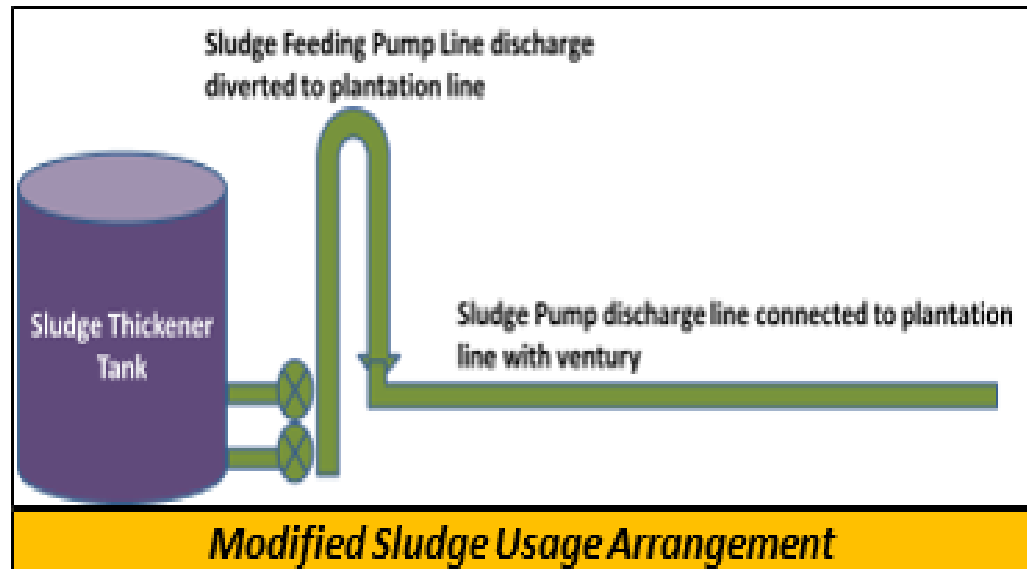
Barren Land



Project Complete

Waste PTP Sludge utilized in Horticulture & Gardening as manure

The sludge generation at pre-treatment plant is approx. 14,000MT/Year. To formation of sludge cake, centrifuge is running continuously which is consuming 37.5 KW/Hr. This waste leads to problem of handle ability while evacuation, transportation and disposal. The disposal of Sludge waste is a costly process. The poly electrolyte chemical dosing (20 Kg / day) for cake formation and transportation through tractor trolley, makes it a costly affair.



Greenbelt Development

- Total area of plant -468 Ha
- Requirement of Greenbelt Development-154 Ha (as Per MOEF) (33% of Plant Area)
- Plantation carried out 173 Ha (MOEF compliance fulfilled) (37% of Plant Area)

Tree	Up to FY-19	FY-21	FY-22	FY-23	FY-24	Total
No of Tree	124454	2567	5878	3811	3946	140656

Overall area covered under green belt =173 Ha

Best Practices in the Plant- Afforestation



Best Practices in the Plant- Afforestation



Best Practices in the Plant- Biodiversity

Floristic diversity

Total of 77 plant species were found during survey:

- Fifty tree species
- Seven grass species
- Eleven shrubs
- Nine Herbs

Faunal diversity

Total sixty three (63) species of birds have been recorded.

Resident – 49 and Mig. - 14

Major Tree/short tree species

- Khejri (Prosopis cineraria)
- Meetha Jaal (Salvadora Persica)
- Khara Jaal (Salvadora oleoides)
- Prosopis juliflora
- Neem (Azadirachta indica)
- Desi babool (Acacia nilotica)

Major shrub and herb species

Shrubs

- Euphorbia caducifolia
- Kheep (Leptadelia pyrotechnica)
- Ziziphus nummularia
- Akda (Calotropis procera)

Herbs

- Choti bui (Aerva javanica)
- Badi bui (Aerva persica)
- Saniya (crotolaria burhia)
- Tephrosia spp.
- Argemone maxicana



Best Practices in the Plant- Maintenance & reliability

Turbine Front pedestal in house correction to improve RH Temp.



Before

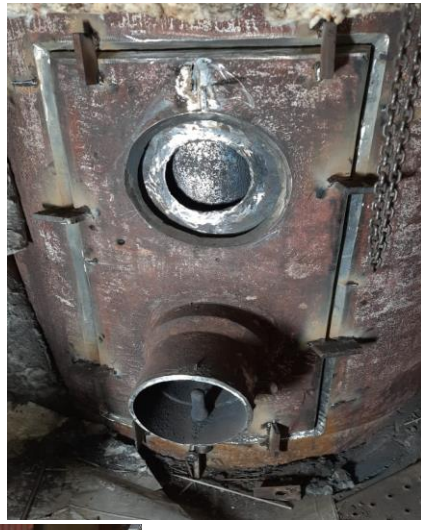


After



HP Heater internal correction to improve FW temp.

After removed bundle of heater and after inspection its observed that many holes found of inside chamber of sub cooling zone. After correction FW temp. raised by 5 deg C resulting in improvement in Heat rates



BFP Booster pump refurbishment to improve pump efficiency

In house refurbishment of booster pump of boiler feed pump to improve the pump efficiency. Power consumption of BFP has reduced by 10 KW.



EMS System and other requirements

EMS Implementation

With the implementation of EMS system we have achieved following benefits:

- Real Time Comparison of APC.
- Load Monitoring of Transmission Line.
- Identify High consumption area.
- Day wise, monthly basis Report.

OCA01	OCA03	OCB01	OCB03	GENERATOR	HCS/STORE SOLAR
1CA01	3CA01	5CA01	7CA01	UAT	DM/MMD SOLAR
1CA02	3CA02	5CA02	7CA02	GENERATOR TRANSFORMER	
OCA02	OCA04	OCB02	OCB04	STATION TRANSFORMER	
2CA01	4CA01	6CA01	8CA01	220/400 KV LINE	
2CA02	4CA02	6CA02	8CA02	GENERATOR HOME	

ISO 50001:2018 Certified

Bureau Veritas Certification

JSW ENERGY (BARMER) LIMITED

VILLAGE/POST: BHADRESH, DIST.: BARMER – 344 001, RAJASTHAN, INDIA.

Bureau Veritas (India) Pvt. Ltd. (Certification Business) certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the Management System Standard detailed below

Standard

ISO 50001:2018

Scope of certification

GENERATION OF ELECTRICITY THROUGH OPERATION OF LIGNITE BASED THERMAL POWER PLANT

Original cycle start date: 10 December 2017
 Recertification cycle start date: 08 December 2023
 Subject to the continued satisfactory operation of the Organisation's Management System, this certificate is valid until: 09 December 2026
 Certificate No. IND.23.7659/EN/N Version: 1 Issue date: 08 December 2023

Certification Authority
Jagdheesh N. MANIAN
Director – CERTIFICATION, South Asia
 Commodities, Industry & Facilities Division

NABCB
EnM 003

Local office: Bureau Veritas (India) Private Limited (Certification Business)
 72 Business Park, Marol Industrial Area, MIDC Cross Road 'C', Andheri (East), Mumbai – 400 003, India.

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
 To check this certificate validity please call + 91 22 6274 2000 OR E-mail: cert.india@bureauveritas.com

Energy Audit

Performance Gap analysis has been conducted by CII Team in FY 23.



NET ZERO commitment- Sustainability

17 Focus Areas with 2030 Targets from 2020 as Base Year

Climate Change:
 Committed to being carbon neutral by 2050
 Reduce our carbon emissions by more than 50%

Biodiversity: No Net Loss for Biodiversity

Waste Water: Zero Liquid Discharge

Waste : 100% Ash (Waste) utilization

Water Resources: Reduce our water consumption per unit of energy produced by 50%



Resources



Employee Wellbeing



Social Sustainability



Local Considerations



Indigenous People



Human Rights



Supply Chain Sustainability



Health & Safety



Air Emissions



Business Ethics



Cultural Heritage



Energy

Sustainability: Framework and Priorities

Governance & Oversight by Sustainability Committee

2 Independent Directors

Mr. Sunil Goyal

Ms. Rupa Devi Singh

1 Executive Director

Mr. Sharad Mahendra

ESG Ratings

MSCI

A

CDP

A- (Leadership Level)

Carbon Neutrality by 2050



Committed to set science based targets to keep global warming to 1.5°C under SBTi

Any other relevant information

Energy Efficiency Training & Awareness Programs

	No. of Participants	Duration (mandays)
Internal	125	3.25
External	75	1.25

Projects Implemented through KAIZENS

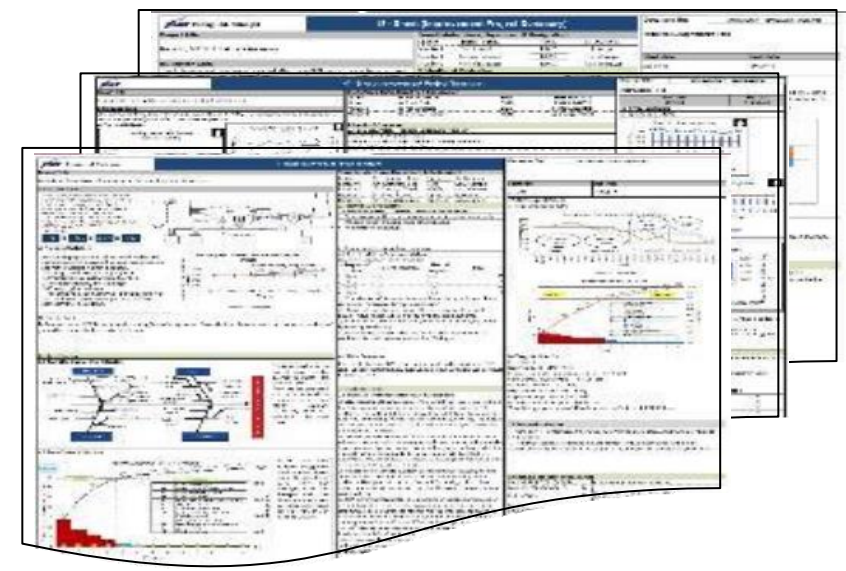
	Raised	Implemented
Supervisors	80	80

- **14 QC teams** for *continuous improvement projects under KAIZEN*.
- **Energy Management Cell** – Core team along with Support team formed with objective of improvement projects for *energy conservation*.

First MoM of Performance Optimization Group		Location:	VC with VINGR / RTNG / HBPC / RWPL	
Date:	3-Aug-20	Time:	10:30 hrs to 11:30 hrs	
Members/Presence: Mr.Gyan Brahad Kumar, Mr.Ashish Agarwal, Mr.Shantharam Patil, Mr.Rakesh Vasudevan, Mr.Sudhakar Mali, Team VINGR leading by Mr.Karthikeya Wani, Team RTNG leading by Mr.Vijay Jadhav, Team HBPC leading by Mr.Ajay Achit, Team RWPL leading by Mr.C.V.Reddy				
Sr. No.	Details of Discussion	Action/ Location	Responsibility	Status
1	Monthly get used to be worked for all the performance metrics which are completed	All Studies	Shelton / Anand / Pradi	
2	Cooling Tower and Condenser performance need to be Ruzhag/ maintain. All factors for reducing issues need to be shared with Vijayenergy/ Corporate along with supporting documents	Barmer	POG Heat Rate Team	
3	Issues related to measuring of Efficiency of CW Pumps / SWP need to be discussed with professors from IIT Mumbai	Barmer/ Vijayenergy/ Barmer	Team Calcutta	
4	Trending of Hydro Turbine performance with parameters like water inlet flow, generation, as per some opening etc. need to be recorded on regular frequency		POG Team	
5	SBU-2, J1 & 2 defects needs to be addressed before taking into service	Vijayenergy	Head O&M VINGR	
6	Protocol for scaffolding need to be shared among the Barmer/ locations	Vijayenergy	POG Heat Rate Team	
7	R1 Conveyor (Vessel discharge) correct load cell instrument something to be ensured and to be taken up with the port for through any deviation		RTNG POG Coal Team	
8	Issues related to performance deteriorates on after COH need to be taken up with Sciences / Alarm	Barmer/ Vijayenergy	POG Heat Rate Team	
9	Part wise usage/ status of performance issues need to be listed out based on their mandatory report	All Studies	POG Team	

POG teams

- **Cross functional teams** formed at plant level to work for improvement in performance parameters viz. GHR, APC, O&M Cost etc
- Review meetings chaired by HoP & HoT



4i-J2 & J3 Projects

- Identified & trained 27-J2 candidates & 8-J3 candidates to work for a cross functional project involving high end statistical tools & analysis
- The projects adopts our unique **4i** improvement methodology (Identify, Ideate, Implement, Institutionalize)

Any other relevant information



- **Energy Conservation Week** is celebrated every year in the form of various competitions and activities with involvement of company employees, associate employees.



Reward & Recognition



“NECA Award 2020 in Energy Conservation”
Organized by Government of India



“9th FICCI Quality Systems Excellence Award” for Quality Organised by Federation of Indian Chambers of Commerce and Industry.



JSWBL achieved **“Five Star grading & sword of Honor in Occupational Health and Safety Audit** conducted by the British Safety Council”



the **“National Award for Excellence in Energy Management 2023”** organized by CII



“Excellence in Biodiversity Award” Organized by the CII (Confederation of Indian Industry)-ITC.



THANK YOU