NPL

Nabha Power Limited

25th National Award for Excellence in Energy Management 2024

10 – 12 September HICC, Hyderabad

2x700 MW Supercritical TPP
Rajpura, Punjab

Agenda

1	About the Company
2	Energy Consumption Overview
3	Performance data Y-o-Y
4	Energy Benchmarking
5	EnCon Projects
6	Innovative Projects
7	Renewable Energy
8	Environment Management
9	Best Practices
10	EnMS System
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12	Awards and Recognition

Company Profile

First Indigenously Manufactured Supercritical Unit based on MHI-Technology

Availability > 85%

since beginning (last 10 years)

One of the best HR in the country (Design: 2205kcal/kWh)

Top of Merit Order in the state Punjab

Super critical technology, Zero Liquid discharge

Certified for **ISO 50001:2018 (Energy Management System), ISO 9001:2015 (QMS), ISO 14001:2015 (EMS), ISO 45001:2018 (OHSAS), ISO 17025:2017 (NABL accreditation for Coal lab) and ISO 27001:2013 (ISMS)**

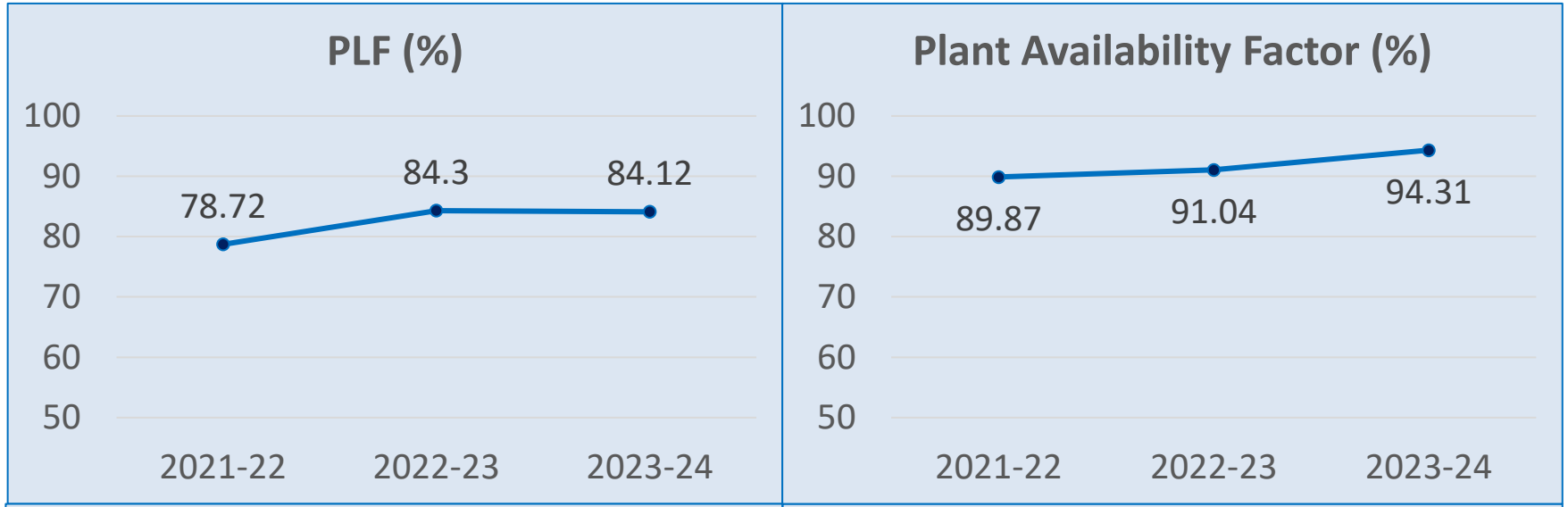
Energy Consumption Overview

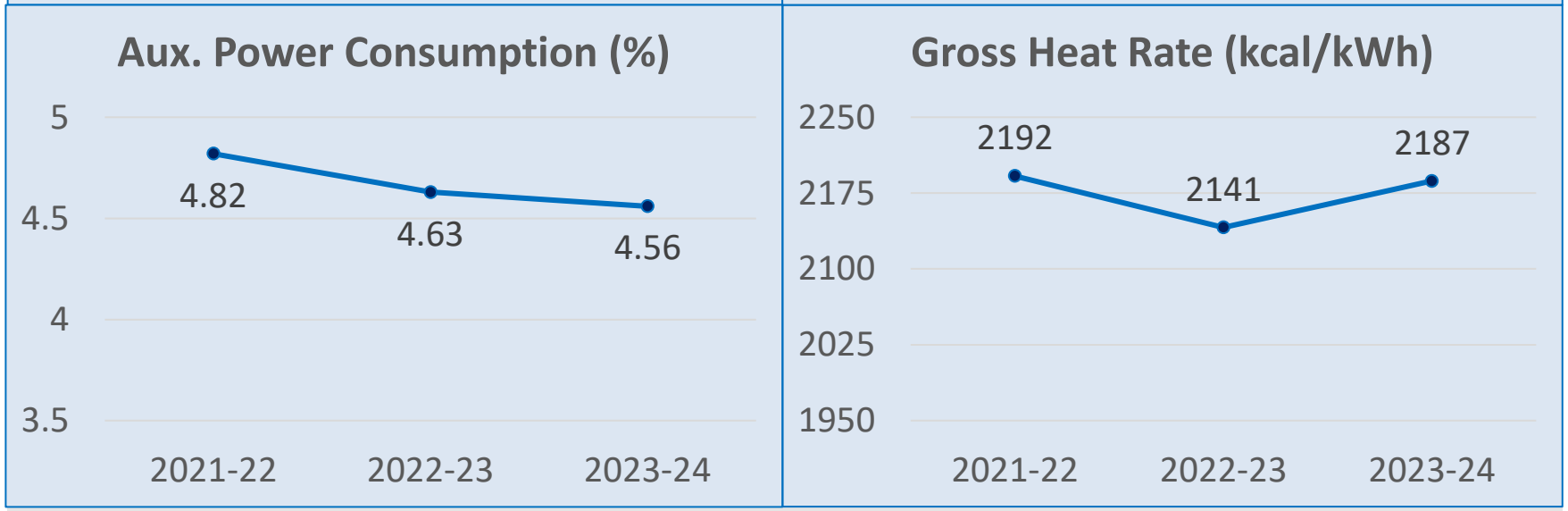
Station Performance FY24

Sr. No.	Description	Unit	Values
1	**PLF**	%	84.12
2	**Availability**	%	94.31
3	**Annual Generation**	MUs	10,345
4	**Gross Heat Rate**	Kcal/kWh	2187
5	**Auxiliary Power**	%	4.56
6	**Boiler Efficiency**	%	87.57
7	**Turbine Heat Rate**	Kcal/kWh	1915
8	**DM Water Make-up**	%	0.31
9	**Sp. Raw Water Cons.**	Cum/MWh	1.73
10	**Sp. Oil Consumption**	ml/kWh	0.08

Performance data (Y-o-Y)

Last 03 years





FY22 - FY24 Comparison

Plant Load Factor:

↑ 5.40 %

Plant Availability Factor:

↑ 4.44 %

Aux Power Consumption:

↓ 0.26 %

Energy Benchmarking

Internal Benchmarking:

Energy KPIs	Target Value FY25 (@ 86% PLF)
Gross Heat Rate (Kcal/kWh)	2165
Aux Power Consumption(%)	4.65
DM Makeup (%)	0.30

Short-Term Plan

Achieve FY25 Internal targets through:

1. Efficient & Reliable Operation
2. Increased Energy Mapping and benchmarking
3. Implementation of identified EnCON Projects

External Benchmarking (Supercritical Technology):

Plant-1	Plant-2	Plant-3
Same OEM	Chinese OEM	Within Punjab
4.66 %	5.86 %	7.06 %
2156 kcal/kWh	2251 kcal/kWh	2235 kcal/kWh

Long-Term Plan

To continually improve the station performance by adopting latest technologies and best O&M Practices

Roadmap FY25

Steps to achieve sustained Performance

Major Initiatives

- PADO upgradation for enhanced performance monitoring
- RCM Implementation
- Equipment health & condition monitoring through ERP system
- Optimization of efficiency during Biomass firing

Projects in Implementation Phase

- SCAPH Modification– 0.53 MUs annual savings
- CCW pump energy reduction by optimizing MDBFP oil cooler water flow – 0.02 MUs annual savings
- Unit cold start up time reduction– 0.5 kcal/kWh annual savings
- Replacement of Conventional lights with LED – 0.4 MUs annual savings

Projects in Feasibility Stage

- Installation of VFD in transport air compressor
- Installation of VFD in CEP
- CW motor speed reduction
- Optimization of Building AHUs & Chiller system running hours
- LDO forwarding pump pressure optimization
- Increased use of Renewable energy

EnCon Projects

Summary FY22 to FY24

Year	FY ‘22	FY ‘23	FY ‘24
No of Energy saving projects	12	10	10
Investment (INR Million)	173	163	3
Electrical savings (Million kWh)	12	1.4	17
Thermal savings (Million Kcal)	1,50,620	1,79,463	65,562
Total Savings (INR Million)	242	262	86

EnCon Projects

Major Projects FY22

Sr. No.	Name of Energy saving projects	Investment (INR Million)	Electrical savings (Million kWh)	Thermal savings (Million Kcal)	Total Savings (INR Million)
1.	RAPH Basket replacement with better design & utilization of available basket height –Unit-2	131.0	-	61,958	84.0
2.	11 Nos. of high energy drain valves replaced with better design valves	6.2	-	41,929	57.0
3.	SCAPH modification (Removal of 01/06 No. of stage)	0.1	0.3	-	0.8
4.	CWP-2B pump impeller replacement & internal coating	0.9	0.8	-	2.4
5.	CWP-2A pump internal coating	0.9	0.2	-	0.7

EnCon Projects

Major Projects FY23

Sr. No.	Name of Energy saving projects	Investment (INR Million)	Electrical savings (Million kWh)	Thermal savings (Million Kcal)	Total Savings (INR Million)
1.	RAPH Basket replacement with better design & utilization of available basket height- Unit-1	137.3	-	58,022	82.1
2.	Replacement of TDBFP Recirculation valve's trim by 3D drag type trim	10.5	-	7,266	10.3
3.	Mill seal air fan IGV remote operation	0.5	0.2	-	0.6
4.	Replacement of Existing Fixtures with LED	2.2	0.3	-	0.9
5.	BAHP-A and BALP-C pump internal coating	0.1	0.1	-	0.3

EnCon Projects

Major Projects FY24

Sr. No.	Name of Energy saving projects	Investment (INR Million)	Electrical savings (Million kWh)	Thermal savings (Million Kcal)	Total Savings (INR Million)
1.	MS and HRH temperature optimization at part load	-	-	20,689	16.2
2.	Isolation of Aux steam common header and optimizing RAPH soot blowing frequency	-	-	10,344	5.2
3.	Unit operation on Single CW, ACW and CCW Pump during winter	-	16.0	-	52.0
4.	Stoppage of MRHS compressor	0.05	0.2	-	0.6
5.	CW reject water utilization for coal dust suppression	0.4	0.04	-	0.1

Innovative Project

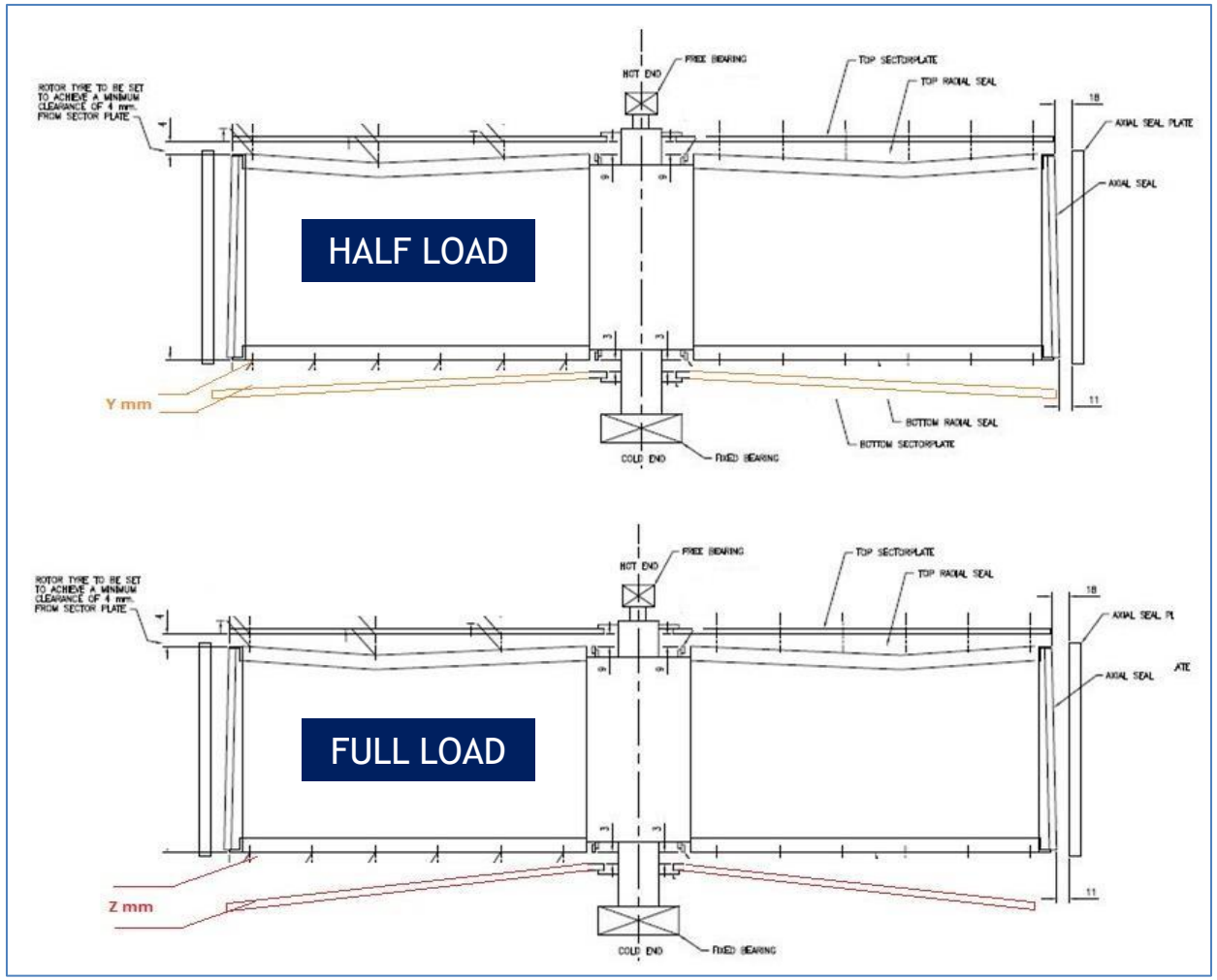
Air Leakage reduction in RAPH with improvised Control of Sector Plate Movement with load variation

Typical System Overview:

- RAPH air leakage is a major concern in TPP.
- Typically, 1% increase in air leakage translates to 0.025% to 0.040% impact on heat rate
- APH leakage is typically in the range of 8% to 12%
- Adjustable Sector plates are provided to prevent unwanted mixing and minimize leakages.

Sector Plate Control Mechanism at NPL:

- PLC based Control through temperature measurement.
- The delay in temperature stabilization during load change resulted in heavy motor current hunting, requires frequent manual interventions and affecting overall efficiency.



Innovative Project

Air Leakage reduction in RAPH with improvised Control of Sector Plate Movement with load variation

Data Collection

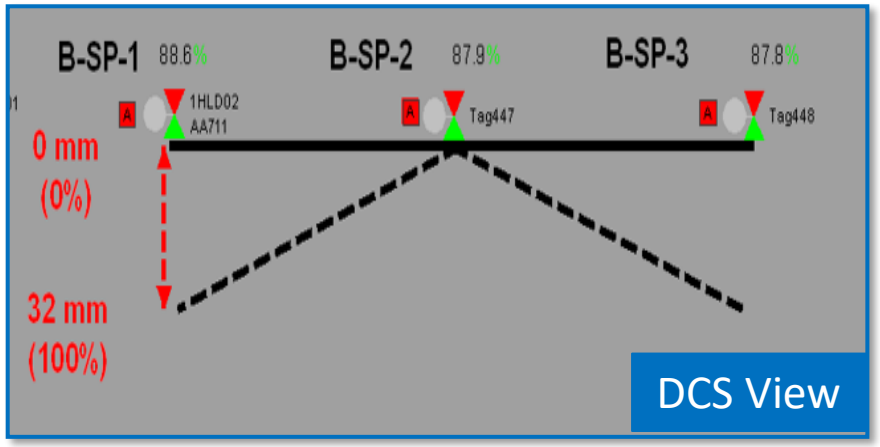
- Reviewed existing PLC logic for sector plate movement setpoint generation
- Collected field data of rotor displacement through manual operations of actuators
- Collected field data at different load condition for rotor displacement and motor current

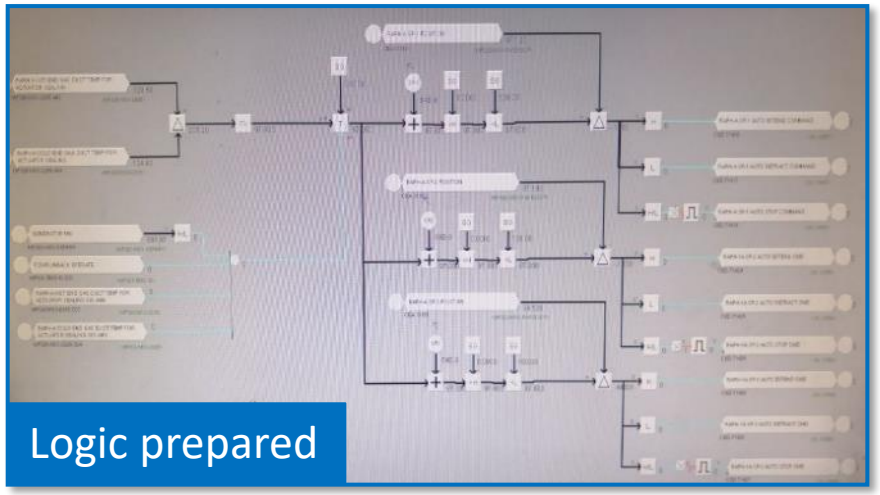
Innovative Project

Air Leakage reduction in RAPH with improvised Control of Sector Plate Movement with load variation

Implementation

- Developed a capping signal to maintain optimal gap control
- Logic developed to take care optimum sector plate movement during all operating conditions including emergencies
- Testing and commissioning for final implementation.





Results:

- **Real-Time Data Integration** and Actuator positions are now visible in DCS
- **Enhanced Protection Mechanisms:**
  - Full retraction of all three actuators in case of load < 280 MW, abnormal inlet/outlet temperatures, or FCB/Runback, or specific actuator abnormalities.
- **Biasing provision for each actuator** enhances operational flexibility.
- **Annunciation alarms** are integrated into the Soft Alarm Screen for better system alerts.

Innovative Project

Air Leakage reduction in RAPH with improvised Control of Sector Plate Movement with load variation

Uniqueness:

- Customized Solution developed in-house
- Integration of Field Data into Control Logic
- Across peer industry adaptability

Air Leakage achieved	Monetary impact (in Rs)	Sustainability impact w.r.t CO2 reductions/plantation
5.2 % (Design = 5.0 %)	1 Lakhs/day	28 Tons/day
0.07 % improvement in APC	2.4 Crore	~9,240 Tons CO2 3.7 Lakh

Project Cost = 10 Lakhs

Renewable Energy

Total Installed Capacity (Solar)

205 kW

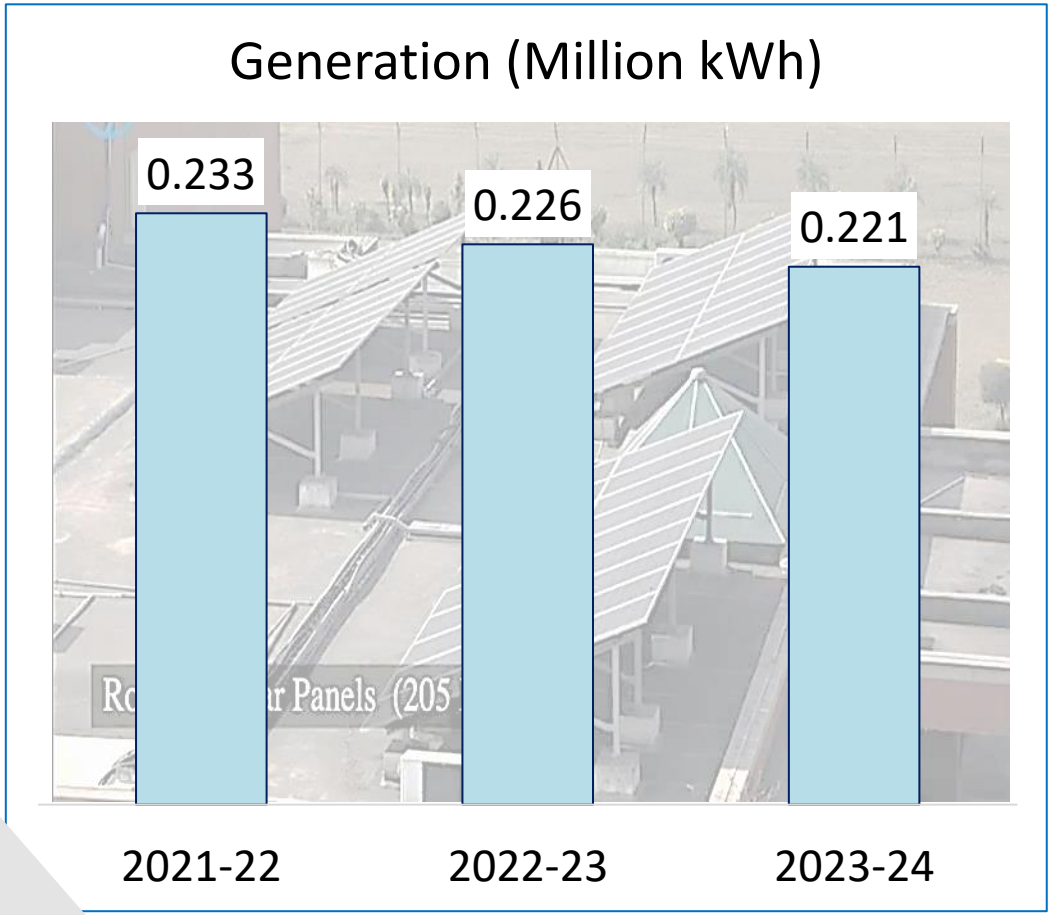
Solar Project in Plan

5 MW

(Under tendering process)

Target date for commissioning

March 2025



Environment Management

Ash utilization

Year	UoM	FY '22	FY '23	FY '24
Ash Stock in Plant (Yard + Pond)	MT	12,665	2,119	0
Ash Generated	MT	19,55,634	21,00,746	26,70,394
Ash Utilization:	%	100	100	100
• Manufacturing	%	80.1	80.3	64.9
• FA bricks	%	4.5	2.9	2.9
• Road Pavements	%	15.5	16.8	32.1

FY 2023-24 **Ash Handled (Wet) : 14.84 %** **Ash Handled (Dry) : 85.16 %**

Environment Management

Best Practices in Ash Management

- **Environment-Friendly Operations**:
  - Fly ash loading is conducted with zero fugitive emissions using automated processes.
  - Windshields are installed along the boundaries as an additional safeguard to prevent spillage into nearby farms.
- **Strategic Partnerships**: Contracts with cement manufacturers, local RMC plants, and brick manufacturers
- **Automated Packaging for Small Buyers**: Produce 45 kg fly ash bags with no leakage, meeting the needs of small-scale buyers and ensuring product integrity.
- **CCTV Coverage** of entire operating area to ensure safe operation

Environment Management

Emission

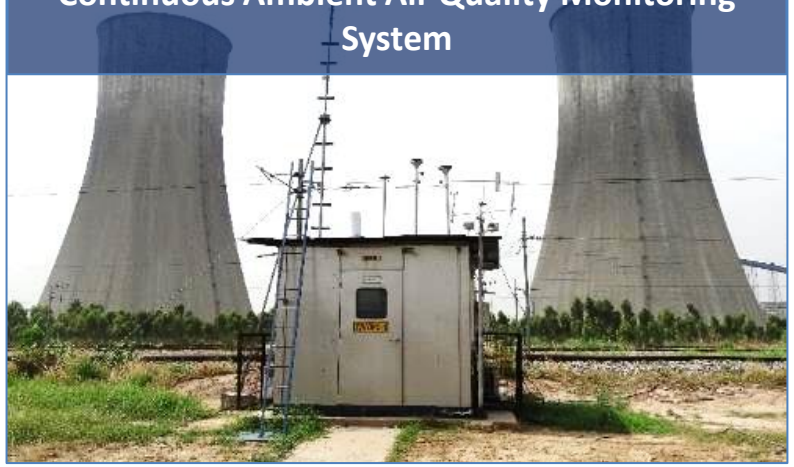
Year	UoM	FY '22	FY '23	FY '24
Generation	MUs	9,654	10,380	10,345
CO2 emission	kg/kWh	0.86	0.85	0.85
SOx	mg/Nm3	1,284	1,150	1,069
NOx	mg/Nm3	219	225	249
Particulate Matter	mg/Nm3	42	43	41
Mercury	mg/Nm3	BLQ	BLQ	BLQ

Environment Management

Best Practices in Emission Control

Continuous Emission Monitoring System

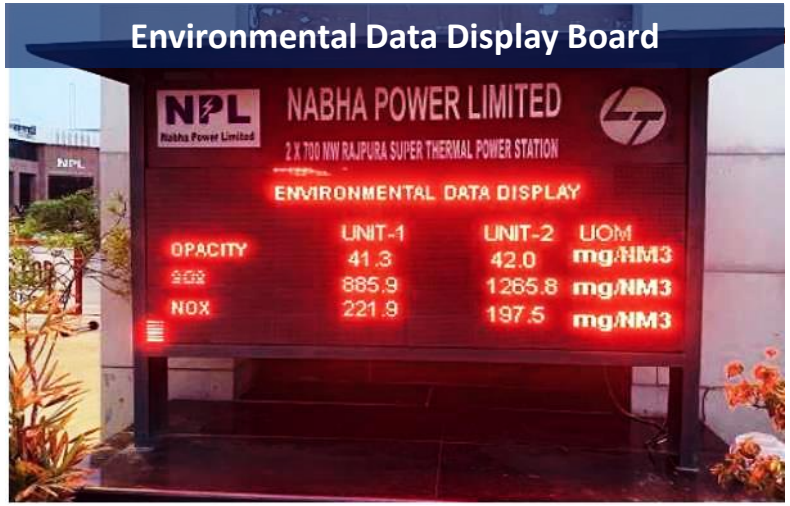
Continuous Ambient Air Quality Monitoring System



Continuous Effluent Quality Monitoring System

Automatic Weather Monitoring Station

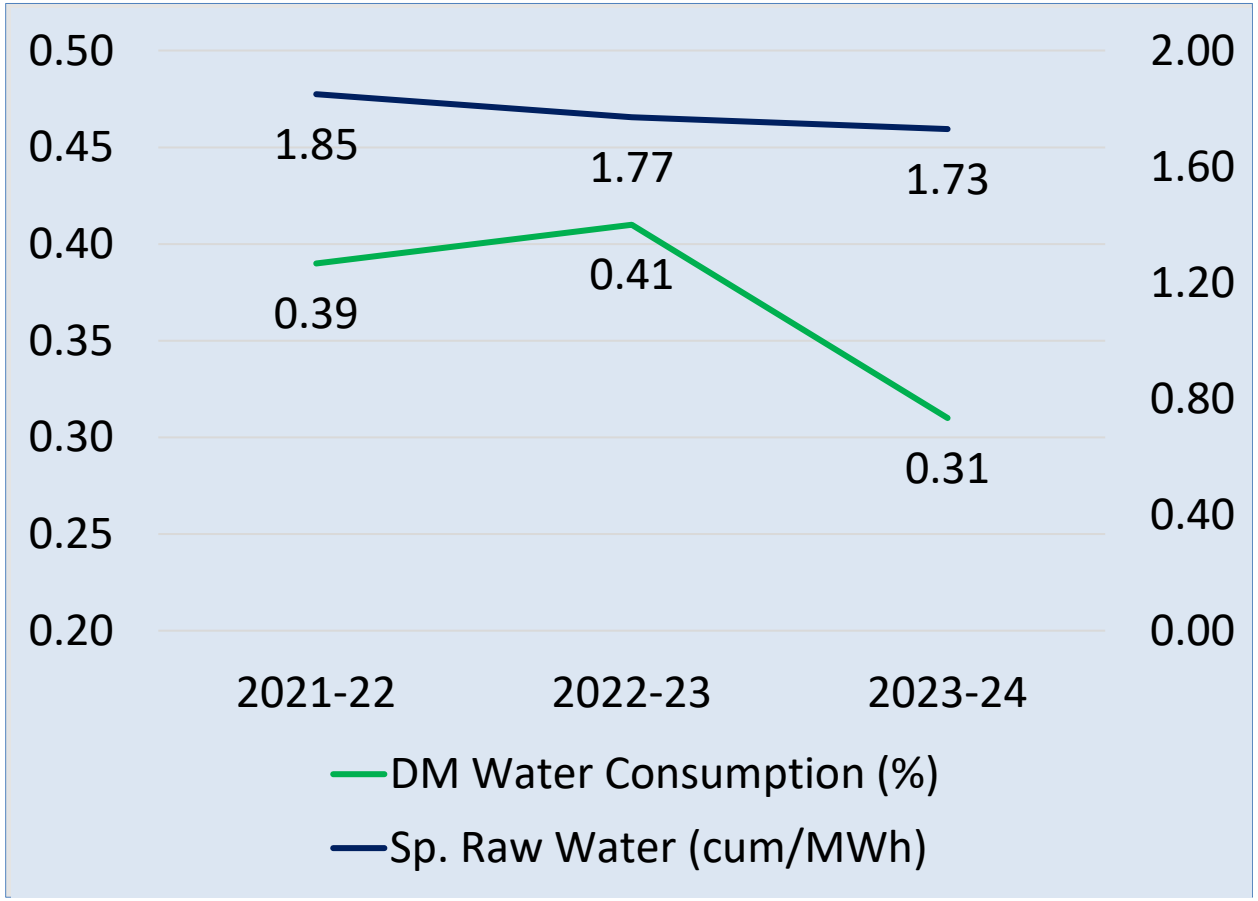
Environmental Data Display Board



Air and Water Lab

Environment Management

Water Conservation and Best Practices



Best Practices in Water Conservation:

- 100 % recycling of wastewater through ETP-RO plant
- Use of RO reject for AHP make up
- Water Consumption Monitored through Dashboard
- AHP vacuum pump open cycle sealing water system substituted with closed cycle clarified water
- Silo Blower cooling water system (Serv. Water) open cycle discharge utilized for CT makeup

Best O&M Practices

Technology Advancement

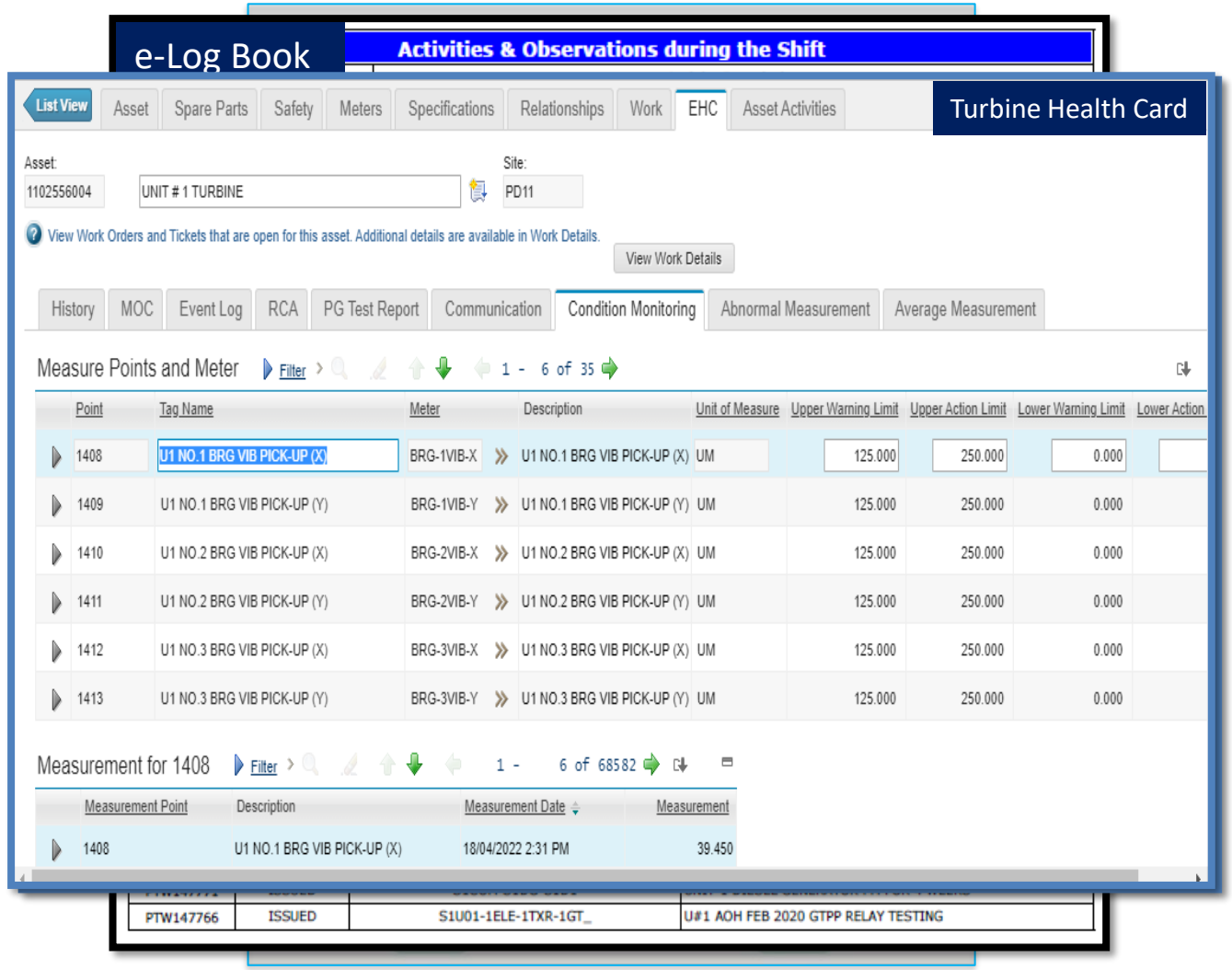
- Upgradation of PADO for enhanced performance monitoring

Reliability enhancement through Asset Management

- E-Log Book for all operational activities
- Health Card for all major equipment

Flexibilization

- Minimum loading achieved 50 %



Best O&M Practices

Digitization

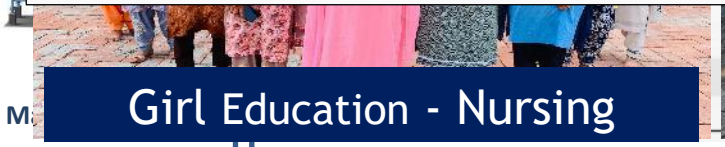
- Automated Bulker Fleet Management
- Dashboard for MTBF and MTTR

- Shakti – Health
- Round R
- Distributed Tablets to Scholars

Biodiversity & A

- Developed Miyawaki forests in nearby villages
- 0,000 trees pl ted within and ding our plant

Post



Girl Education - Nursing

ISO 50001 Certification & Energy Policy

LRQA

Current issue date: 26 May 2022
Expiry date: 24 May 2025
Certificate identity number: 10449139

Original approval(s):
ISO 50001 - 23 Dec 2014

Certificate of Approval

This is to certify that the Management System of:

Nabha Power Limited

Rajpura, Punjab, India.

has been approved by LRQA to the following standards:

ISO 50001:2018

Approval number(s): ISO 50001 – 0060580-001

This certificate forms part of the approval identified by approval number: 0060580

The scope of this approval is applicable to:

Generation, Operation and Maintenance of Power at 2x700 MW Coal based Supercritical Thermal Power Plant.

Luis Cunha

Area Operations Manager - SAMEA

Issued by: LRQA Limited

UKAS

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NPL

NABHA POWER LIMITED

ENERGY POLICY

We, at Nabha Power Limited, Rajpura, are committed to improve energy performance of our 2X700 MW Supercritical Thermal power plant by adopting best practices in operations, procurement and services on continual basis thus ensuring:

- Process optimization and adoption of latest technologies
- Purchase of energy efficient products and services
- Optimization of Heat Rate & Auxiliary power consumption
- Use of Renewable Energy sources
- Awareness at all levels in the organization on conservation of energy

We are also committed to comply with all applicable legal and other requirements related to energy performance, providing information and necessary resources for achievement of objectives and targets, including continual improvements in energy performance and Energy Management System (EnMS).

S K NARANG
CHIEF EXECUTIVE

01 January 2022

Sr. No.	Team Member	EA/EM Registration No.
1.	Vivek Trivedi	EA-18454
2.	Alfurqan Jahagirdar	EA-25886
3.	Ashutosh Kumar Anand	EA-20361
4.	Ankur Kashyap	EA-28245
5.	Amol Ashok Patil	EA-25899
6.	Suresh Pal	EA-16368
7.	Mittarpal Singh Sethi	EM-10785

Employee Training

Energy Monitoring System

Realtime Energy Monitoring System

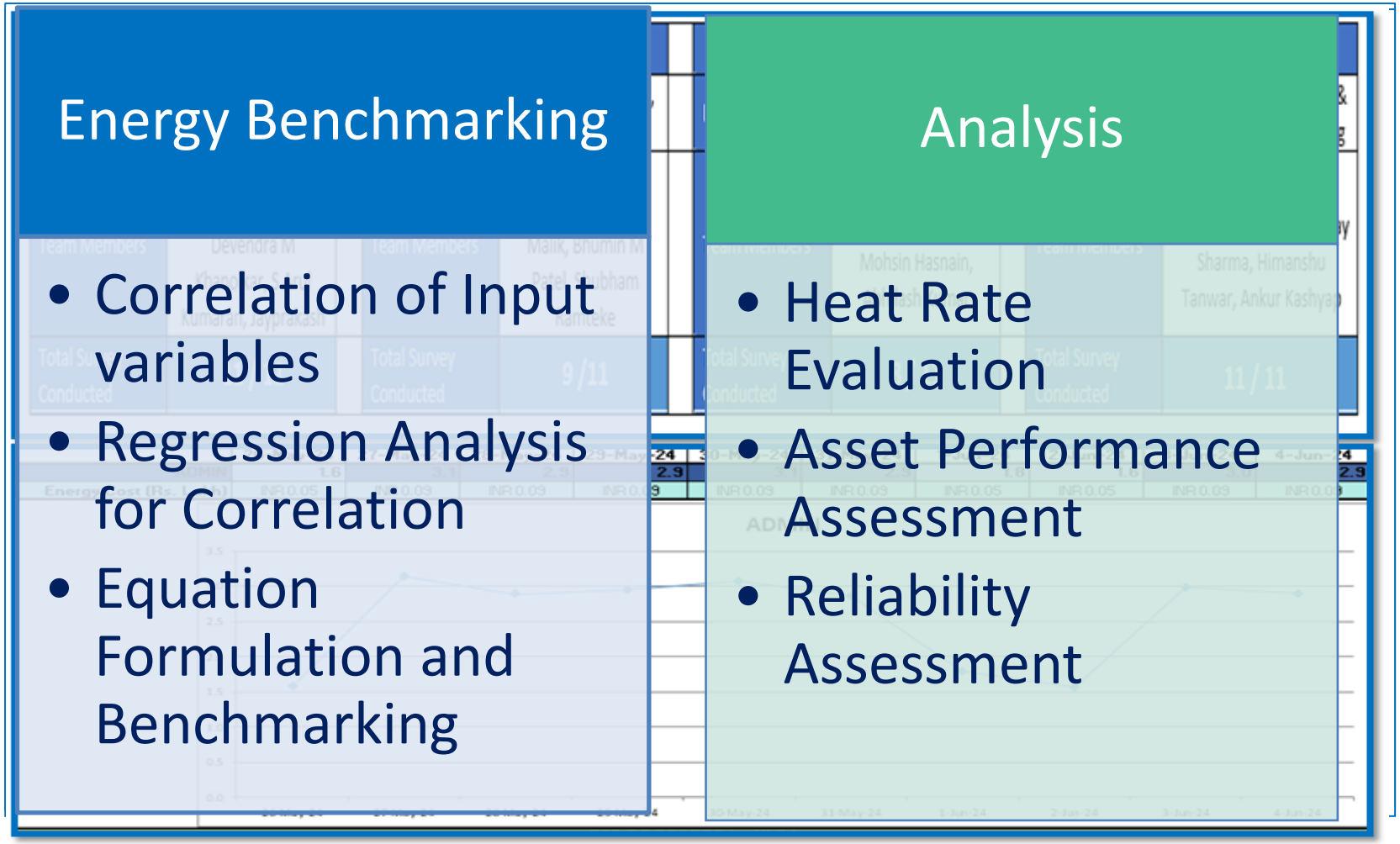
- PADO and Energy Monitoring system
- Power Bi Dashboard for Energy Monitoring Survey

Energy Benchmarking

- Correlation of Input variables
- Regression Analysis for Correlation
- Equation Formulation and Benchmarking

Analysis

- Heat Rate Evaluation
- Asset Performance Assessment
- Reliability Assessment



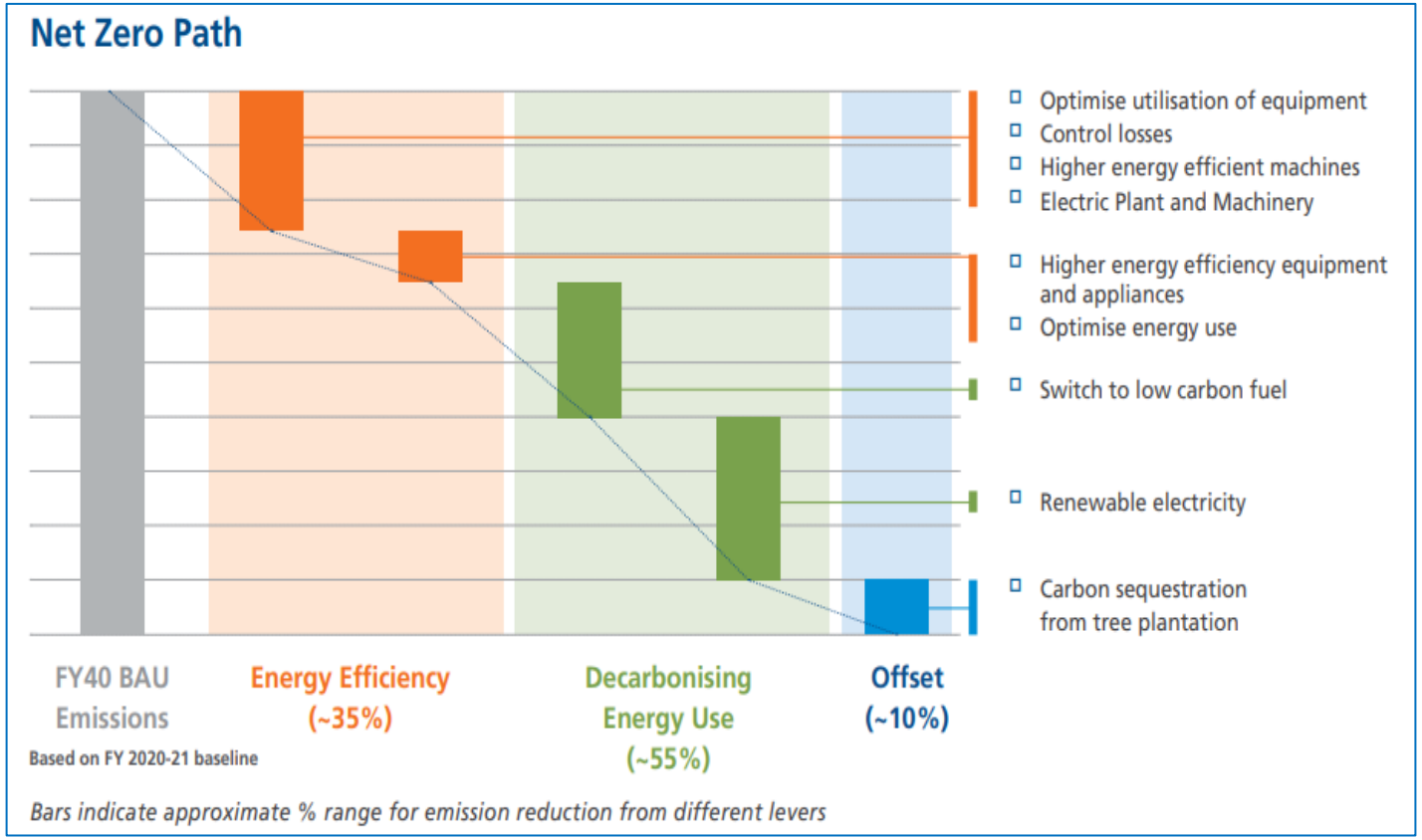
NET ZERO Commitment

L&T's Net Zero Commitment:

Considering Carbon footprint (Scope 1+2) of diesel and electricity consumption.

Carbon Neutrality by 2040

- Focus on energy efficiency and decarbonization
- Shift to renewable electricity and fuels
- Large-scale tree plantation for carbon offsets (1.5-2 million saplings annually)
- Task forces driving renewable energy sourcing and diesel reduction initiatives



Journey towards Excellence

Certificate Of Merit in NECA 2023

CII Energy Circle Competition 2024:

1. **Winner-** Effective Implementation of ISO 50001: Energy Management System
2. **Winner -** Innovations in Energy Efficiency
3. **Appreciation -** Best Energy Efficient Case Study

Winner – Sustainable Performance by CEE

Winner –Best Thermal Power Generator by IPPAI

Appreciation – Excellence in Quality System by FICCI

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