TATA

TATA POWER

MPL

MAITHON POWER LIMITED

दाघानि

DVC

# CII Energy Excellence Awards 2023-24

## Maithon Power Limited

**(A Joint Venture Company of Tata Power & Damodar Valley Corporation)**

Lighting up Lives!

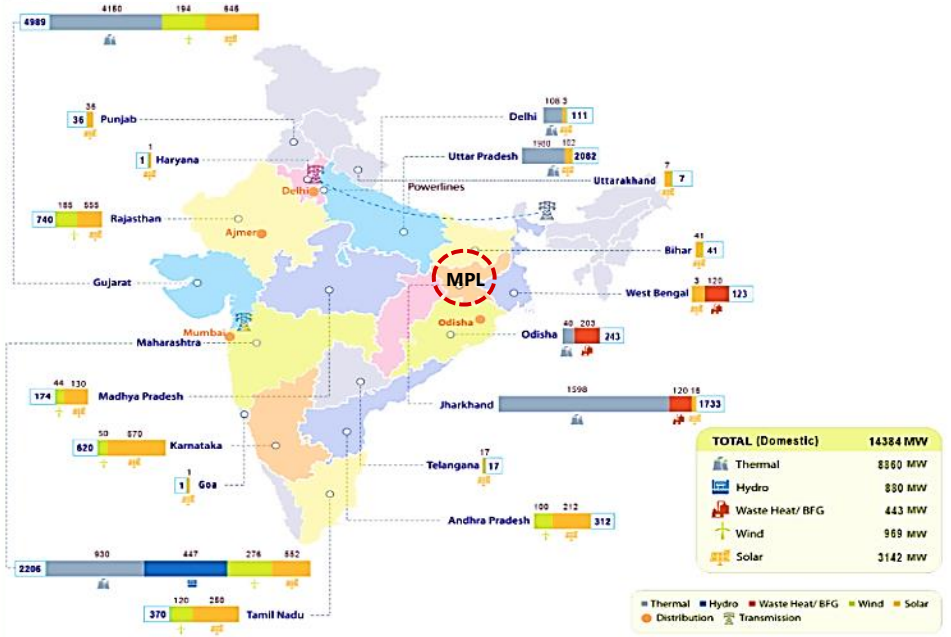
# Brief Introduction

## About Us: TATA Power

***Empower A Billion Lives Through Sustainable, Affordable & Innovative Energy Solutions***


- 40% Green Energy
- Carbon Net Zero by 2045
- 100% Water neutral by 2030
- 1st utility with approved SBTi
- 19 consecutive Quarter PAT growth

- Conventional Energy
- Renewable Energy (Hydro/Solar/Wind/Waste Heat)
- Transmission
- Distribution
- Power Trading
- EZ Charging & EZ Home




***A history that is shaping the future***

- *India's 1st 500 MW Unit*
- *India's 1st 800 MW Supercritical unit*
- *India's 2nd , 3rd & 4th hydro powerplant*
- *India's 1st Public-Private Partnership venture plant (With DVC)*
- *1st Indian company to ship over 1 GW solar modules.*
- *India's 1st transmission project executed with PPP financing*

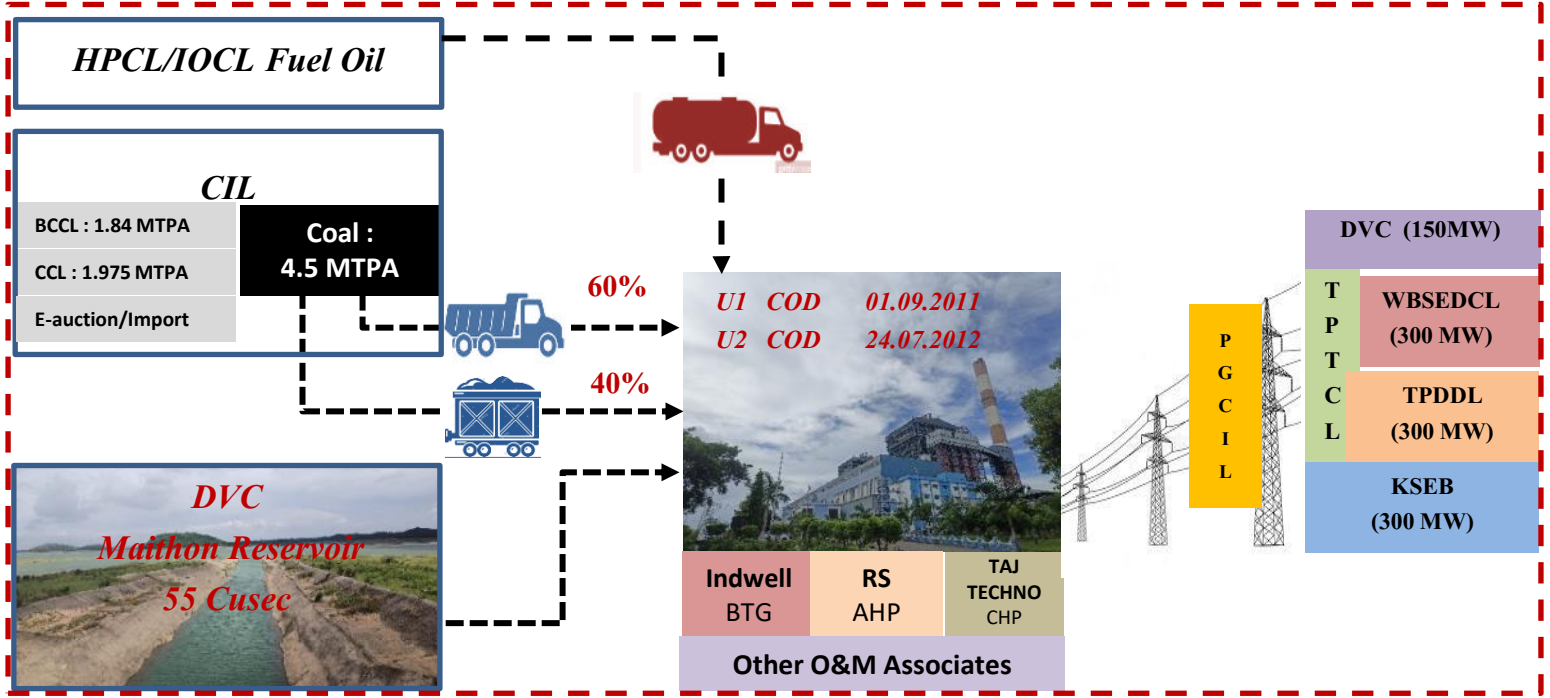
# Brief Introduction

## About Us: Maithon Power Limited

### Maithon Power Limited (2x525 MW) JV of Tata Power (74%) & DVC (26%)

**ISO Certifications**

| | |
|---|---|
| ISO 9001: 2015 | 13.01.2014 09.01.2026 |
| ISO 14001:2015 | 13.01.2014 09.01.2026 |
| ISO 45001:2018 | 13.01.2014 09.01.2026 |
| ISO 22301:2019 | 31.08.2018 30.08.2024 |
| ISO 50001:2018 | 11.03.2019 09.03.2025 |
| ISO 27001:2013 | 10.11.20121 09.11.2024 |
| ISO Standard Inception Validity | |




**Regulatory & Governing Bodies**

- Central Electricity Authority
- Central Electricity Regulatory Commission
- Ministry of Power
- Ministry of Coal
- Ministry of Environment & Forests
- Central Pollution Control Board
- Jharkhand State Pollution Control Board
- Govt Of Jharkhand
- National LDC
- Eastern Region load Dispatch Centre
- Indian Railways

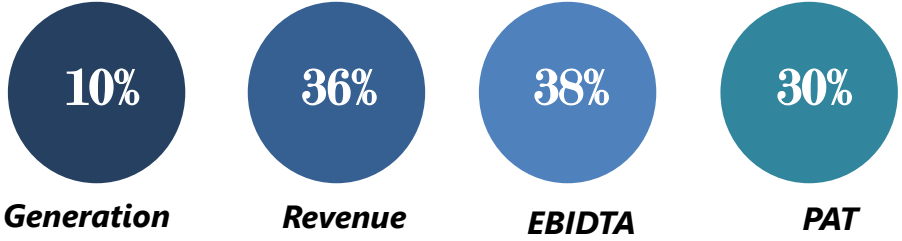
| 4 Rs/kwh | 3000 Cr | 300 Cr+ | 2500 + | 104 Ha | 65K+ |
|---|---|---|---|---|---|
| Tariff | Revenue | PAT | Allied Workforce | Afforestation | Individuals |

# Energy Consumption Overview

## Current Year Performance

| Energy Data | UoM | FY24 | w.r.t FY23 |
|---|---|---|---|
| Annual Generation | MUs | 8179 | 8.3% ↑ |
| PLF | % | 88.7 | 6.5% ↑ |
| PAF | % | 95.6 | 4.7% ↑ |
| Station APC | % | 5.42 | 3.8% ↑ |
| Station GHR | kcal/kwh | 2339 | 0.4% ↑ |
| Boiler Efficiency * | % | 85.4 | |
| Turbine Cycle Heat Rate * | kcal/kwh | 1998 | |
| Specific Oil Consumption | ml/kwh | 0.11 | 20% ↑ |
| Raw Water Consumption | M3/Mwh | 2.21 | 5% ↑ |
| DM Water Consumption | % | 0.74 | 11% ↑ |

** Station*

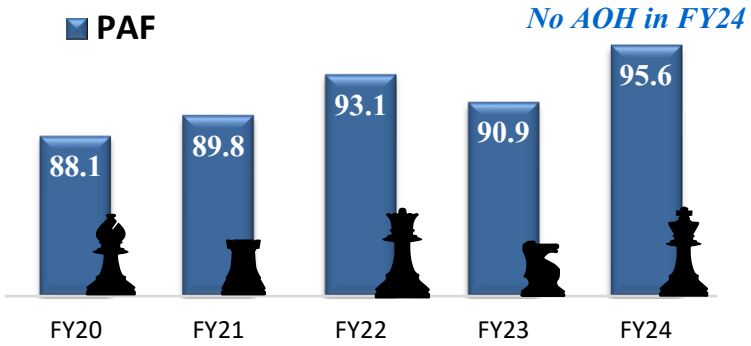


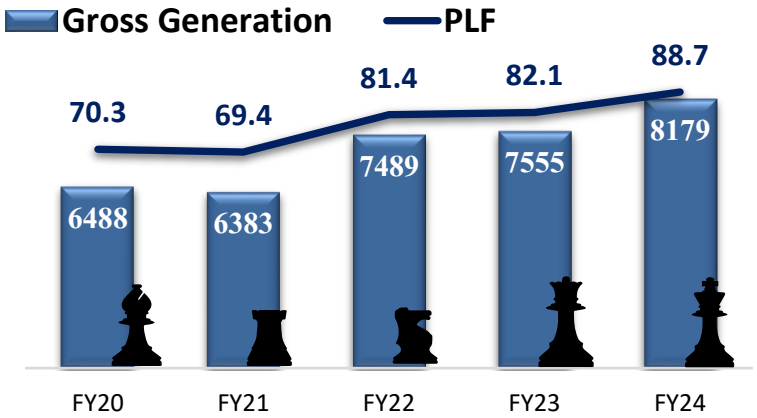

## Highlights for FY24:

- *MPL featured amongst the **top 10 IPP** power stations across India based on PLF rankings.*
- ***5 Golden Star** recommendation by National Safety Council*
- ***Gold Recognition** by World Safety Organization for Safety & Environment.*
- ***385 days of continuous operation of Unit 1** without Boiler Tube leakage*
- *Effective ash utilization of **105% in FY24** including **59% gainful ash utilization.***
- *CRISIL has revised rating to **"CRISIL AA/Positive"** rating for long-term borrowing.*

# Specific Energy Consumption

## Journey towards Operational Excellence




**Poor Coal Quality & Cyclic Stress**

- Historical data analysis of zone-wise boiler pressure parts based on previous failure trends & RCA of such failures
- Customized action plan to mitigate the RCA of each area

**Tubes Overheating**

- In-house developed modified binders for HRH & CRH coils to prevent failures & misalignment
- Upgradation of HRH & CRH tube material to **TP347H**

**BTL accounts for 90% FO**

- Provision of 270° shields in vulnerable hangers of Economizer & LTSH

**2.81** Rs/kwh
**FY24 Energy Charge Rate**

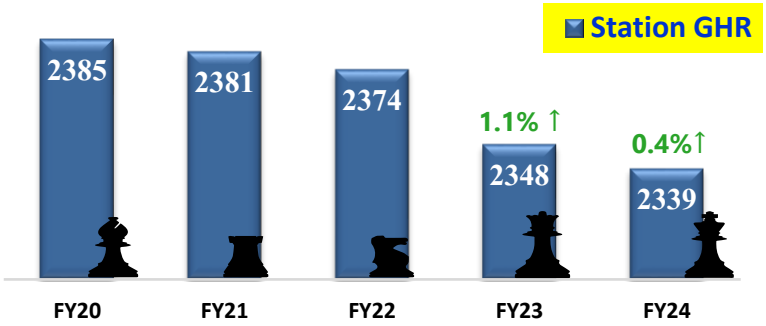
**›10** Lakhs
**Above FSA Coal**

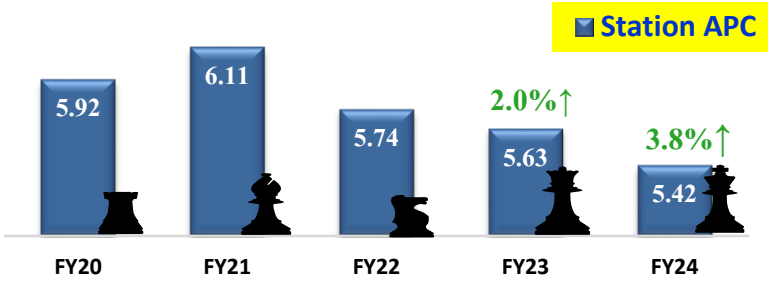
**2%** ↓
**LT Beneficiary Forego**

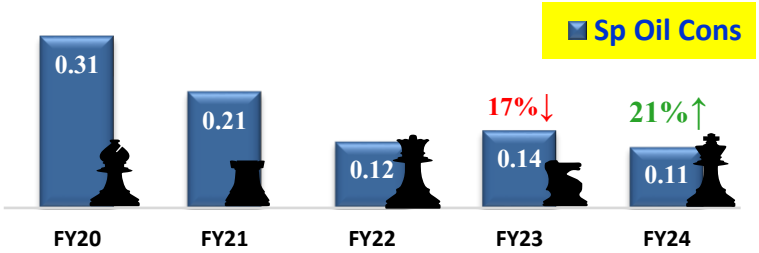
**5%** ↓
**Ancillary Scheme**

# Specific Energy Consumption

## Journey towards Operational Excellence




- **Six Sigma :**
  - ***Sustenance of U1 1st stage Pressure in FY23***
  - ***1) Platinum Award in CII National 6σ Competition***
  - ***2) Silver Award in ASQ SATEA Quality Competition***
  - ***3) 1st in generation cluster 6σ Competition***
- **Innovation through Digitalization :**
  - ***1) TCS IP2- Digital Twin : Dare to Try***
  - ***2) Combustion Optimization Tool (In-house)***

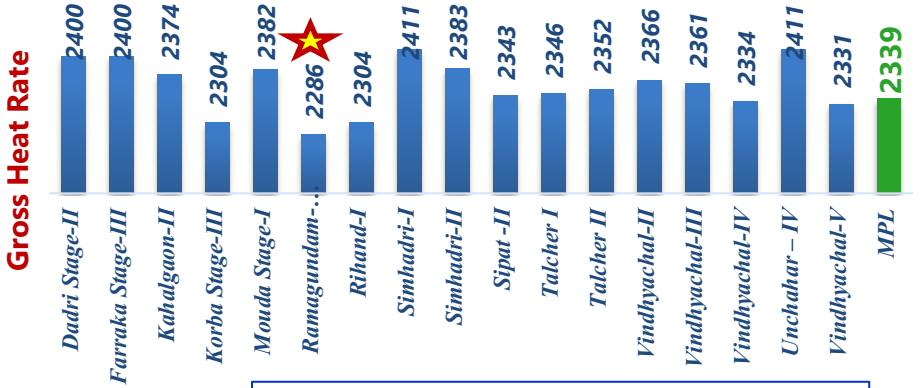
- ***Six Sigma : Improvement of Station APC in FY22***
- ***Digitalization : ENMS Dashboard***
- ***Innovation : APC Optimizer Tool (In-house)***

- ***Digitalization : Start-up Oil Tool Kit***
- **Best Practice (Delta) :**
  - ***1) Judicious charging of HPH6 after HP-LPBP charging***
  - ***2) Coal Feeder minimum loading reduced from 15 tph to 9 tph during startup***

**17 kcal/kwh Net Heat Rate** improvement in FY24 w.r.t FY23

# Competitors, National & Global benchmark

## Benchmarking

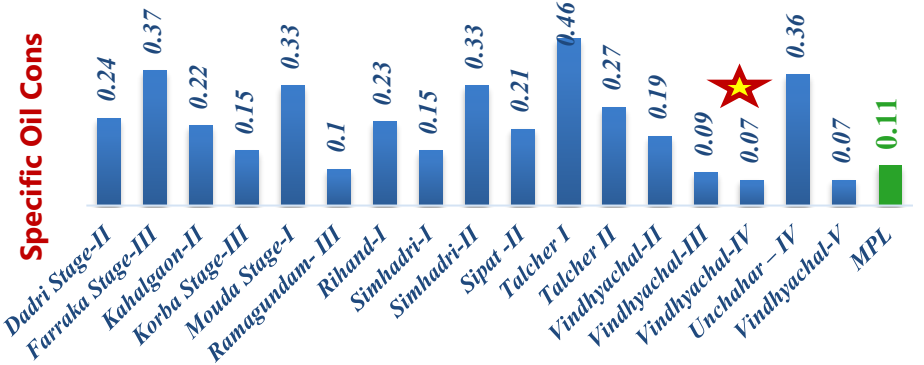



**Short Term Action Plan**

- U2 Turbine module Overhauling
- CT Fills replacement
- Data Analytics : Soot Blowing Optimization Tool

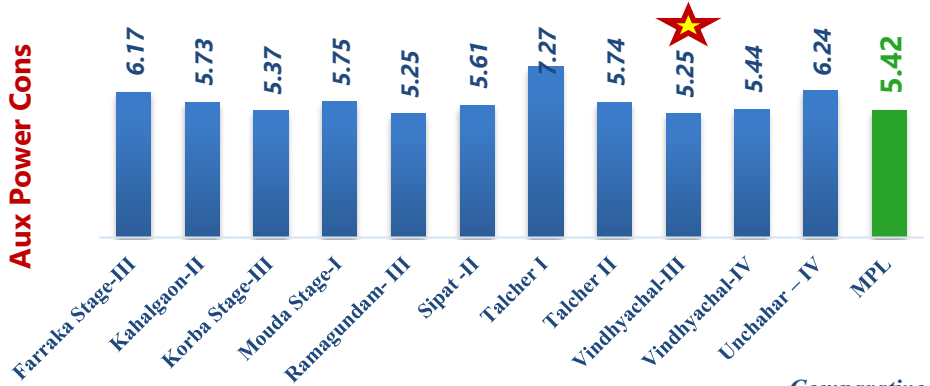
**Long Term Action Plan**

- Data Analytics : AI/ML integration
- Upgradation of Combustion Optimization Tool




**Action Plan :**

- HFO to LDO Conversion
- Start-up oil press optimization




**Short Term Action Plan**

- Upgradation of ID Fan VFD LCI

**Long Term Action Plan**

- Replacement of existing CT fans FRP blades with high efficiency energy saving E-glass Epoxy FRP blades
- Coro-coating of CW Pumps

*Comparative Best of Last 5 years data*

# Road Map To Achieve National/Global Benchmark

## Major ENCON Project Planned In FY 2024-25

- Target Setting for Lead & Lag indicators
- Detailed Energy Audit
- Gap Analysis
- Project Effectiveness Study
- Budget Allocation for EC projects
- Encon Projects Implementation
- Best O&M Practices
- Quality Initiatives
- Training & Awareness
- Bootcamp for Energy Conservation Ideas
- Reviews at various levels
- Action Plan Modification
- Rewards & Recognition for motivation

*FY25 ABP*
*GHR : 2335 kcal/kw*
*APC: 5.62%*
*SOC: 0.1 ml/kwh*

***ENCON PROJECTS FY25***

***(1) Replacement of CT fan FRP blades by efficient E glass Epoxy FRP blades***

***(2) U2 Drive Turbine Overhauling***

***(3) U2 Main Turbine Overhauling***

***(4) U2 APH basket & seal replacement***

***(5) CT Fills replacement in 8 cells***

**64.6** Million Rs
*FY25 Investment*

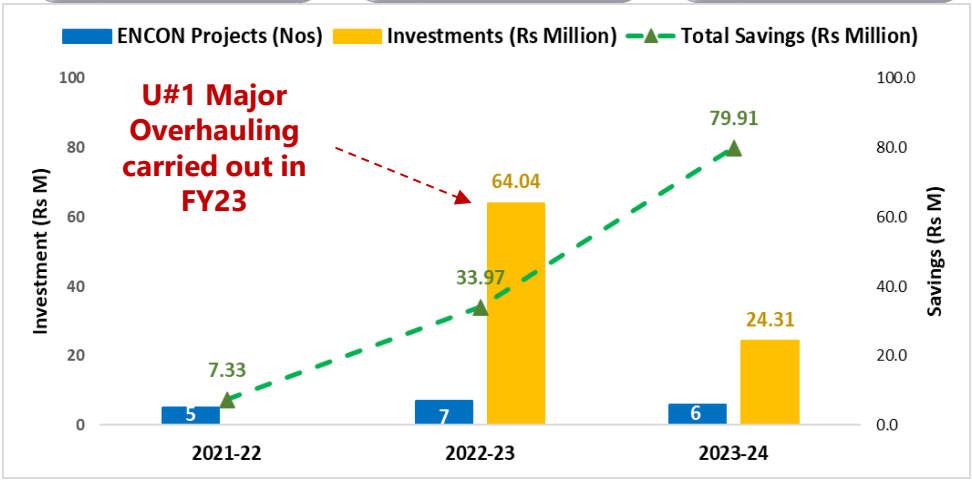
**26820** Mkcal
*Thermal Savings*

**11.5** MUs
*Electrical Savings*

# Energy Savings Projects Summary for Last 3 Years

| Year | ENCON Projects (Nos) | Investments (Rs Million) | Electrical Savings (Million kWH) | Thermal Savings (Million kCal) | Total Savings (Rs Million) |
|---|---|---|---|---|---|
| 2021-22 | 5 | 0.00 | 2.90 | 6882 | 7.33 |
| 2022-23 | 7 | 64.04 | 12.64 | 29674 | 33.97 |
| 2023-24 | 6 | 24.31 | 29.29 | 68526 | 79.91 |

| Total Major ENCON Projects Implemented | Total Investments in 3 years | Total Savings in last 3 years |
|---|---|---|
| 18 Nos | 8.84 Rs Crs | 12.12 Rs Crs |



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# Energy Saving Projects Implemented In 2021-22

MPL

***FY22 all ENCON projects implemented without any investment. All were process improvement carried out through brainstorming and adoption of best practices.***

| Title of Project | Annual Electrical Saving (kWh) | Annual thermal Saving - million kCal | Total Annual Savings (Rs million) | Investment Made (Rs million) | Comments/ Project details |
|---|---|---|---|---|---|
| *Optimization of Coal Mill Operation based on PLF* | *1000000* | *2374* | ***2.51*** | *0.00* | *1419 hrs 4 mills operation @ <65% MLF & 2487 hrs 5 mills operation @ >85% MLF by increasing mill capacity utilization.* |
| *Stopping of Hot-well make up pump for 20 hours per day to optimize the power consumption by gravity filling in both units* | *231000* | *548* | ***0.58*** | *0.00* | *Auto stopping & standby of both hotwell make up pump by logic changes has been implemented in both unit & gavity filling line for hotwell make up is lined up in both units resulting in stopping of hotwell makeup pump for 20 hrs per day.* |
| *Main plant air compressor power consumption optimization through reduction of header press set point.* | *348000* | *826* | ***0.88*** | *0.00* | *3 nos of compressors were in service with header set point reduced from 6.4 ksc to 6.1 ksc. Receiver drain timer setpoint optimized.* |
| *Primary Air header pressure optimization to reduce the PA fan power consumption* | *956000* | *2270* | ***2.45*** | *0.00* | *PA header pressure optimized from 765 to 750 mmwc, resulting in reduction of 5 amps PA Fan motor current for individual unit.* |
| *Air handling Unit ( AHU) power consumption optimization* | *364000* | *864* | ***0.91*** | *0.00* | *8 out of 16 Air washery blowers' operation stopped (for TG1/TG2/compressor house/DG house) during low ambient temp (for 2 months during winter)* |

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# Energy Saving Projects Implemented In 2022-23

MPL

| Title of Project | Annual Electrical Saving (kWh) | Annual thermal Saving - million kCal | Total Annual Savings (Rs million) | Investment Made (Rs million) | Payback (Months) | Comments/ Project details |
|---|---|---|---|---|---|---|
| *Arresting air infiltration in Unit#1 Boiler flue gas path & Air Pre-Heater (APH). Energy saving due to reduction in gas load for ID Fan, FD Fan & PA Fan.* | *1295700* | *3042.3* | ***3.67*** | *1.82* | *6.0* | *Arresting air infiltration in U#1 Boiler's flue gas path and Air Preheater (APH) can indeed result in significant energy savings due to the reduction in (flue gas+air) load. The project was planned during U#1 annual shutdown in Q4 FY23.* |
| *Unit#1 APH basket & seal replacement. Energy saving due to reduction in Boiler flue gas exit temperature.* | *1523412* | *3577.0* | ***4.07*** | *16.27* | *48.0* | *Energy savings primarily by reducing the boiler flue gas exit temperature. It has Improved the Heat Transfer Efficiency and better environmental compliance by lowering emissions of pollutants such as NOx.* |
| *Overhauling of Unit#1 Turbine modules. Energy saving due to reduction in 1st stage steam pressure.* | *5980868* | *14043.1* | ***15.97*** | *21.69* | *16.3* | *Overhauling Unit#1 Turbine modules and reducing the 1st stage steam pressure can result in energy savings through improved efficiency, reduced steam consumption.* |
| *Unit-1 TDBFP Cartridge replacement. Energy saving due to reduction in live steam flow in TDBFP.* | *1013295* | *2379.2* | ***2.71*** | *4.23* | *18.7* | *It results in significant energy savings due to the reduction in live steam flow required for pump operation.* |
| *Condenser Cleaning & CT fills replacement of Unit-1 to improve Condenser vacuum* | *1882577* | *4420.3* | ***5.03*** | *10.19* | *24.3* | *Condenser cleaning & CT fill replacement for Unit-1 can lead to significant improvements in condenser vacuum, energy savings, and overall plant efficiency.* |
| *CT fills replacement to improve Condenser vacuum in Unit#2* | *711388* | *1670.3* | ***1.90*** | *9.84* | *62.2* | *Improvement in condenser vacuum, energy savings, and enhancement of overall plant efficiency.* |
| *Unit#1 HP Heater Overhauling. Energy saving due to FW Temp improvement at Economizer inlet* | *230767* | *541.8* | ***0.62*** | *0.00* | *0.0* | *Energy savings by improving the FW temp at the economizer inlet. This results in reduced fuel consumption, optimized boiler operation.* |

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# Energy Saving Projects Implemented In 2023-24

MPL

| Title of Project | Annual Electrical Saving (kWh) | Annual thermal Saving - million kCal | Total Annual Savings (Rs million) | Investment Made (Rs million) | Payback (Months) | Comments/ Project details |
|---|---|---|---|---|---|---|
| Unit# 2 ID Fans power consumption reduction by boiler APH water washing and arresting of flue gas duct air ingress | 6927107 | 16203.9 | **19.39** | 4.10 | 2.5 | APC Reduction : (1) Reduction of APH DP and (2) Rectification of flue gas duct air in leakages. |
| Stopping of Unit# 1&2 Cooling Tower ID fans w.r.t. Condenser Vacuum | 755526 | 1767.3 | **2.11** | 0.00 | 0.0 | Reduction in APC due to strategic stopping of IDCT fans during low load & winter season. |
| Reduction of DM Water Make up by Optimization of APRDS Steam Consumption | 7608432 | 17797.6 | **19.47** | 0.00 | 0.0 | APRDS Flow optimized from 12 TPH to 9 TPH by decreasing press Set point from 12 to 10 kg/cm2. |
| Unit# 1&2 CT fills replacement (total 12 Nos) to improve the Condenser Vacuum | 13221833 | 30928.5 | **36.75** | 20.21 | 6.6 | Improvement in heat rate by 4.57 kcal/kwh. |
| Optimization of Air washery blowers running hours during winter season when ambient temp below 30 degC | 553093 | 1293.8 | **1.55** | 0.00 | 0.0 | Revision of air washery blower running SOP based on brainstorming & past data. |
| AHP Stage-2 Conveying Air Compressor running hours optimization during MTL operation of units | 228741 | 535.1 | **0.64** | 0.00 | 0.0 | Process improvement |

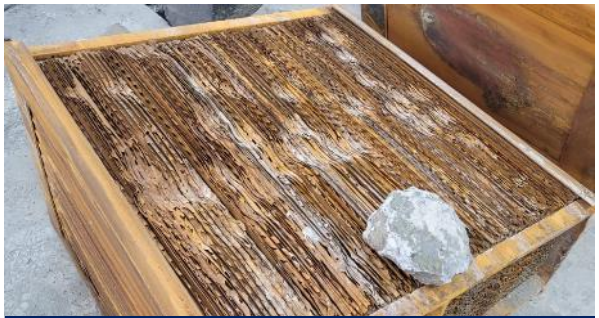
# Few Glimpses of Improvement Carried Out

Condenser tubes after cleaning

PHE after cleaning

Old CT Fills after removal

RAPH basket replacement work U/P



RAPH Basket after cleaning

New CT Fills (after replacement) & new water distribution channel with spray nozzles

# Innovative Projects Implemented



## (1) Boiler Combustion & (2) APC Optimization Tool

### *In House Development of Excel Based Data Analytics*

- Higher Cycle time for real time data analysis
- Limited data set for comparison.
- Limited feasibility for Multivariate exploratory data analysis

| | Range | |
|---|---|---|
| | Max | Min |
| Load | 525 | 515 |
| Specific Coal Consumptio | 0.65 | 0.63 |
| RH metal temp. Limit | 575 | |
| Mill Combination (as required) | | |
| Mill 2A | 0 | Standby |
| Mill 2B | 1 | Running |
| Mill 2C | 1 | Running |
| Mill 2D | 1 | Running |
| Mill 2E | 1 | Running |
| Mill 2F | 1 | Running |
| Mill 2G | 1 | Running |
| Mill 2H | 0 | Standby |

Set range for Load, SCC and RH metal temp. and select "1" for running mills

| Best Combination as per Load/SCC range and RH MTL Temp. Limit | | | |
|---|---|---|---|
| Max. RH Metal temp. | 567.0 | | |
| Load/SCC | 523.07 | 0.632 | |
| Burner Tilt Position | 38.6 | | |
| OFA UPPER/LOWER Position | 100 | 100 | |
| Mill 2A Loadin | 54.4 | CAD 2A | 1.1 |
| Mill 2B Loadin | 56.5 | CAD 2B | 9.6 |
| Mill 2C Loadin | 56.2 | CAD 2C | 4.4 |
| Mill 2D Loadin | Mill Stopped | CAD 2D | CAD closed |
| Mill 2E Loading | 54.5 | CAD 2E | 23.3 |
| Mill 2F Loading | 53.4 | CAD 2F | 38.1 |
| Mill 2G Loadin | 55.2 | CAD 2G | 9.8 |
| Mill 2G Loadin | Mill Stopped | CAD 2H | CAD closed |

| Expected RH MTM | 573.1 | 574.0 | 569.7 | 569.1 | 567.5 | 571.6 | 572.3 |
|---|---|---|---|---|---|---|---|
| Feeder Loading | Combination 1 | Combination 2 | Combination 3 | Combination 4 | Combination 5 | Combination 6 | Combination 7 |
| Coal Feeder 2A | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Coal Feeder 2B | 57.0 | 57.0 | 55.8 | 54.2 | 54.6 | 56.7 | 56.7 |
| Coal Feeder 2C | 55.2 | 56.8 | 54.6 | 55.1 | 55.6 | 57.6 | 57.8 |
| Coal Feeder 2D | 57.0 | 55.1 | 52.7 | 56.1 | 56.3 | 55.0 | 55.2 |
| Coal Feeder 2E | 53.0 | 56.1 | 55.1 | 53.9 | 54.3 | 53.1 | 53.0 |
| Coal Feeder 2F | 55.8 | 57.1 | 55.4 | 54.8 | 55.3 | 54.1 | 54.0 |
| Coal Feeder 2G | 51.9 | 53.3 | 52.5 | 53.7 | 54.1 | 48.5 | 48.5 |
| Coal Feeder 2H | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Burner tilt | 21 | 20 | 20 | 20.0 | 20.0 | 20.0 | 20.0 |
| OFA LOWER DMD | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| OFA UPPER DMD | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

- **Python based machine learning model integrated with PI historian for the influencing operational child KPIs**
- Historical trend analysis through the web application for better visualization and review.
- Compare real time data w.r.t the benchmark data at similar operational conditions for all the operator control parameters to identify the opportunity for improvement and guide the operation team for data driven decision making.

### Process Summary

- Data Aggregation
- Data Filtration: Extracted Tags relevant to Boiler & Significant Energy Users (SEUs)
- Feature Selection : Benchmark data with operational constraints such as RH MTM excursion limit, Mill Combination, AOH Before/After

*"Innovation is taking two things that exist and putting them together in a new way"* - **Tom Freston**

# Innovative Projects Implemented

Real-time Inputs: Load, Coal Flow, Mills non-availability, Before/After AOH & No. of Mill combinations suggested

Comparative Parameters:

Mill Loading & Burner Tilt, Coal SADC & Furnace to Windbox DP, Mills CAD position, RH MTM temperature

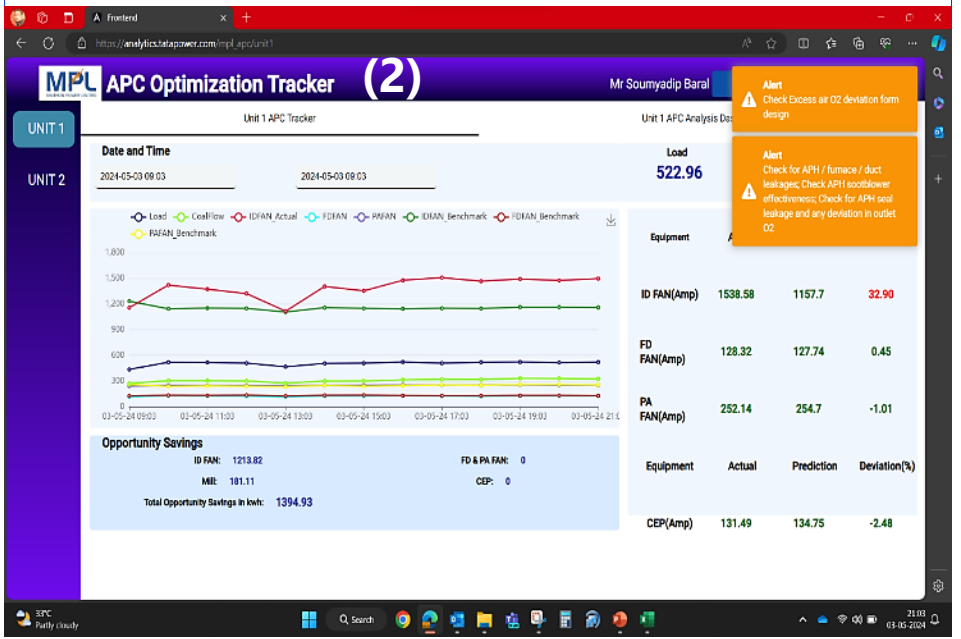

Load dependent Significant Energy Users

ID Fan, FD Fan, PA Fan, Mill, CEP

Operating conditions influencing the individual SEU performance

APH FG DP, Duct leakage, Air Flow

Enables prioritize Maintenance activities




***Won Platinum Award in 9th CII National Competition on Low-Cost Automation (LCA)***

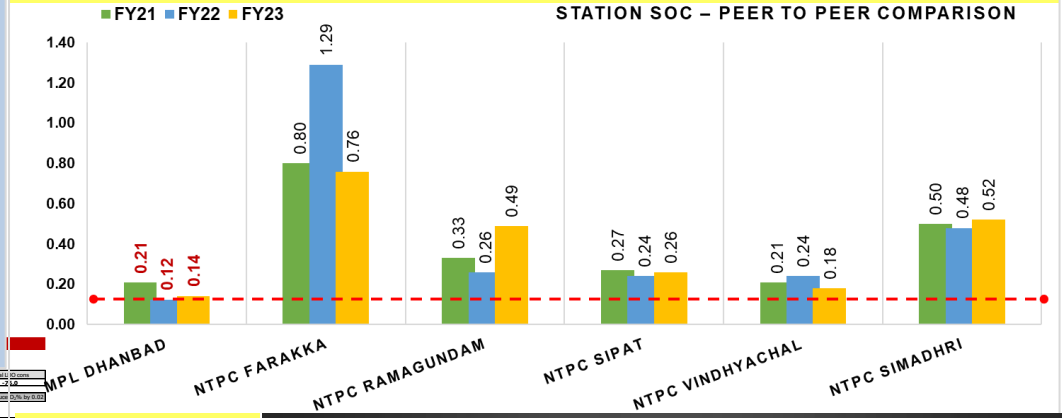
# Innovative Projects Implemented

## (3) Optimization of Specific Fuel Oil Consumption

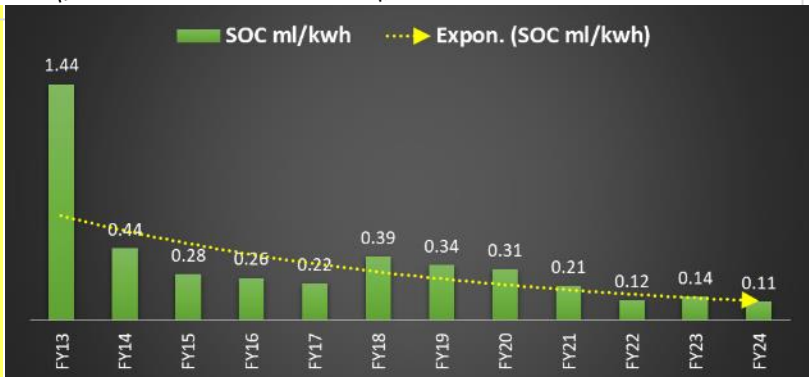
Consumption of oil mainly during boiler start-up activity. Hence, the scope of oil consumption reduction is under Cold/Warm/Hot start-up processes. Sp oil consumption (SOC in ml/kwh) has been reduced year on year [please refer below trend]. Best achieved SOC is 0.11 ml/kwh achieved in 2023-24. This has been achieved through various process improvement initiatives –

1. *Reduction of furnace oil press up to 5.5 kg/cm2 during start-up to minimize the SOC.*
2. *Hot flushing the boiler with elevated temperature feed water decreases the heat required during start-up, leading to a reduction in oil consumption.*
3. *Steam dumping during start-up is carried out with two adjacent coal feeders (A&B) & oil gun in single elevation (AB) only.*
4. ***In house development of boiler start-up toolkit to optimize the fuel oil consumption & improve the performance.***

**Based on last 3 years peer to peer comparison, MPL SOC (ml/kwh) is better than others**




**Year on Year MPL Specific Oil Consumption (ml/kwh) trend. In FY24, we have achieved best SOC of 0.11 ml/kwh (Industry Benchmark).**




**SOC Optimization Toolkit**

Private and Confidential

# Utilization of RE Sources (Onsite/Offsite)

| RENEWABLE ENERGY - ONSITE | Rooftop solar | Ground mounted solar |
|---|---|---|
| Source | Solar | Solar |
| Year of installation (FY22, FY23, FY24) | FY24 | FY24 |
| Installed capacity (MW) | 0.0502 | 0.012 |
| Generation (in Million kWh) | 0.0140 | 0.000044 |
| Consumption from On-site RE (in Million kWh) | 0.0140 | 0.000044 |
| Rooftop panel rated efficiency | 15.23 | 14 |

| RENEWABLE ENERGY - SOLAR THERMAL | Concentrated solar thermal water heater |
|---|---|
| Source | Solar |
| Rate capacity (kW or kcal/hr) | 1.37 |
| Hot Water capacity (kLPD) | 24.94 |

- ***MPL has successfully commissioned a grid-connected solar rooftop project with a capacity of 50.22 KW in Feb'2024.***
- ***The solar project is designed to cater to the entire lighting load of our technical building.***
- ***Anticipate 1500 T of $CO_2$ emission reduction over the lifespan.***
- ***Combined with several other ongoing efforts, it underscores our commitment to playing our part in the initiative of "Duniya Apne Hawale."***

# Environment Management

## Ash Utilization

| Particulars | UOM | 2021-22 | 2022-23 | 2023-24 |
|---|---|---|---|---|
| **Ash Stock in Plant ( yard+ pond)** | Tons | 283436 | 346397 | 238884 |
| **Ash Generated** | Tons | 1851817 | 1811336 | 2066001 |
| **Ash Utilization** | % | **90** | **97** | **105** |
| *Ash Utilized in manufacturing of cement* | % | *23.1* | *32.7* | *25.5* |
| *Ash Utilized in Fly Ash Bricks* | % | *5.8* | *4.7* | *1.2* |
| *Ash Utilized in Mine fillings* | % | *57.5* | *54.6* | *52.2* |
| *As Utilized for Roads pavement (NHAI)* | % | *0.0* | *1.3* | *6.0* |
| **Ash Utilized in Other Areas - Please mention below** | | | | |
| *Captive mines of SAIL and Tata Steel* | % | *2.4* | *3.1* | *2.2* |
| *Internal Lowland development* | % | *0.7* | *0.0* | *17.3* |
| *Embankment creation* | % | *0.0* | *0.0* | *1.1* |
| *Expenditure on Ash Utilization ( Annual)* | Lakhs | *3042* | *4398* | *5946* |
| | | | | |
| **Ash Handling done through various methods** | | | | |
| **Ash Handled (Wet Method) - (Through Slurry Pumps)** | % | 25 | 25 | 26 |
| **Ash Handled (Dry Method) - (Through Bulkers)** | % | 23 | 23 | 21 |
| **Ash Handled (Semi Method) - (Through Ash Conditioners and dumpers and Rail)** | % | 52 | 52 | 53 |

Freedom Square (made by ash bricks & scrap materials)

**96**

***Ash rakes***

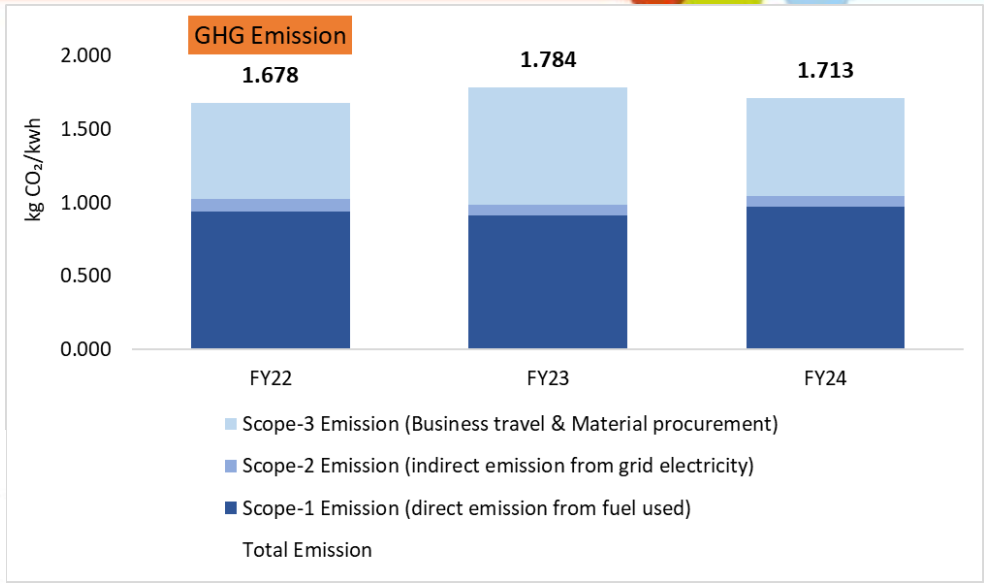
**4047 MT**

***CO2 emissions reduced***

# Environment Management - Emissions

Tata Power –MPL is aligned with UNSGD goal. MPL is committed towards fostering a world of sustainable development by focusing on energy efficiency, resource conservation, and empowering communities by –

1. 40% clean and green energy portfolio
2. Become carbon net zero by 2045
3. Zero waste to landfill before 2030
4. 100% water neutral by 2030




## Real Time Data Acquisition And Monitoring

**Site Name: MAITHAN POWER LIMITED**

**Report: Real Time Report**

**From Date: 2024-07-01 00:00 To Date: 2024-07-31 23:30**

| Description | STACK_1_TPP_UNIT1-NOx(mg/Nm3) | STACK_1_TPP_UNIT1-PM(mg/Nm3) | STACK_1_TPP_UNIT1-SO2(mg/Nm3) |
|---|---|---|---|
| Prescribed Standards | 0 - | 0 - 50 | 0 - |
| Maximum Data | 1138.04 | 187.47 | 2130.09 |
| Minimum Data | 0.0 | 13.12 | 0.0 |
| Geometric Mean | 590.74 | 27.06 | 784.5 |
| Median | 617.96 | 26.88 | 789.36 |
| Standard Deviation | 123.36 | 8.33 | 133.43 |
| Maximum Value At Time | 2024-07-16 15:45:00 | 2024-07-16 06:00:00 | 2024-07-16 15:15:00 |
| Minimum Value At Time | 2024-07-01 20:45:00 | 2024-07-27 12:15:00 | 2024-07-01 20:45:00 |
| Valid Data Points | 2975 | 2975 | 2975 |
| Total Data Points | 2975 | 2975 | 2975 |
| Data Availability % | 100.0% | 100.0% | 100.0% |

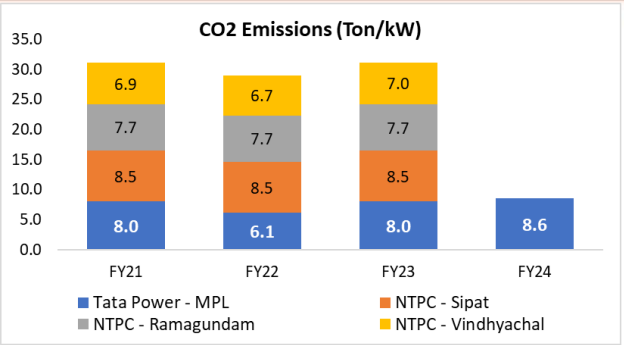
**Short Term Goal**

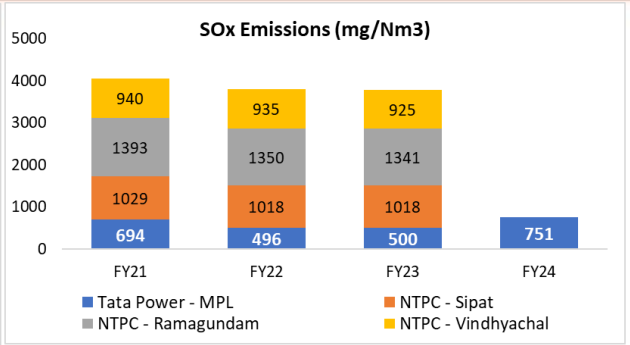
Enhancement of green power through solar, wind & hydro (pump storage) for reduction of intensity YoY basis

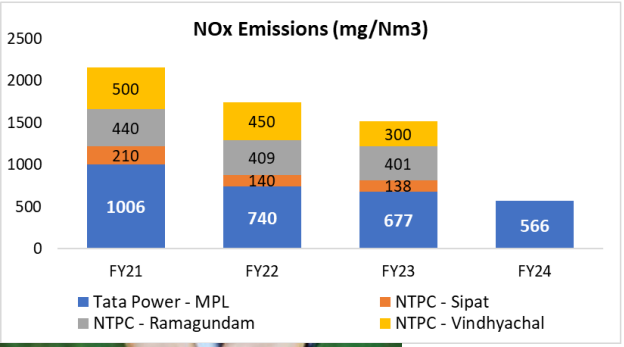
**Long Term Goal**

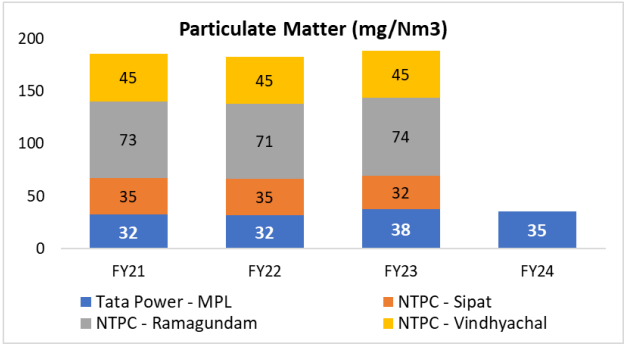
Zero carbon neutrality by the year 2045

# Environment Management - Emissions




| Mercury (mg/Nm3) | FY21 | FY22 | FY23 | FY24 |
|---|---|---|---|---|
| Tata Power - MPL | NT * | NT | NT | NT |
| NTPC - Sipat | 0.0010 | 0.0010 | 0.0010 | |
| NTPC - Ramagundam | 0.0000 | 0.0000 | 0.0000 | |
| NTPC - Vindhyachal | 0.0078 | 0.0075 | 0.0078 | |

* NT - Not Traceable

*GHG Emission Intensity (Kg CO2 / Ton of Product) – Comparison with peers/ competitors.*

- *Tata Power – MPL is continuously improving its operational performance to reduce the $CO_2$ emissions.*
- *SOx emissions – FGD projects is under progress.*
- *NOx emissions – Low NOx burner installation is planned in upcoming AOH.*
- *SPM level within specified limit & better w.r.t peers.*

# Environment Management - Emissions

| ENVIRONMENT MANAGEMENT - EMISSIONS MONITORING | UoM | FY21 | FY22 | FY23 | FY24 |
|---|---|---|---|---|---|
| Total CO2 Emissions/kW of Generation | Ton/kW | 8.0 | 6.1 | 8.0 | 8.6 |
| Current SOx Emissions at Full Load * | mg/Nm3 | 694 | 496 | 500 | 751 |
| Current NOx Emissions at Full Load * | mg/Nm3 | 1006 | 740 | 677 | 566 |
| Particulate Matter * | mg/Nm3 | 32.3 | 31.8 | 37.6 | 35.5 |
| Mercury * | mg/Nm3 | Non traceable | Non traceable | Non traceable | Non traceable |

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

- *Installation of Flue-Gas Desulfurization (FGD) w.r.t CEA/MoEF notification to meet the SOx target as per new regulation/ norms.*
- *Wet limestone based FGD is a set of technologies used to remove sulfur dioxide (SOx) from boiler exit flue gases of fossil-fuel power plants.*
- ***The FGD project work is under progress in MPL for both the units. Same will be completed by 31.12.2026.***
- *Installation of low NOx burners w.r.t CEA/MoEF notification to meet the NOx target as per new regulation/norms.*
- *The project is taken under Capex for installation of low NOx burner.* ***Same will be completed by 31.03.2026.***

# Environment Management - Water

Best Practices in Water Management

ZLD Compliant

| Water Consumption | Unit | 2021-22 | 2022-23 | 2023-24 |
|---|---|---|---|---|
| DM Water # | % | 0.76 | 0.79 | 0.79 |
| Raw Water | $m^3$/Mwh | 2.27 | 2.32 * | 2.21 * |

# includes Start-up DM water loss; * includes FGD project construction

Plant Water Dashboard

PI integrated 13 meters installed at strategic locations

Real-time Monitoring

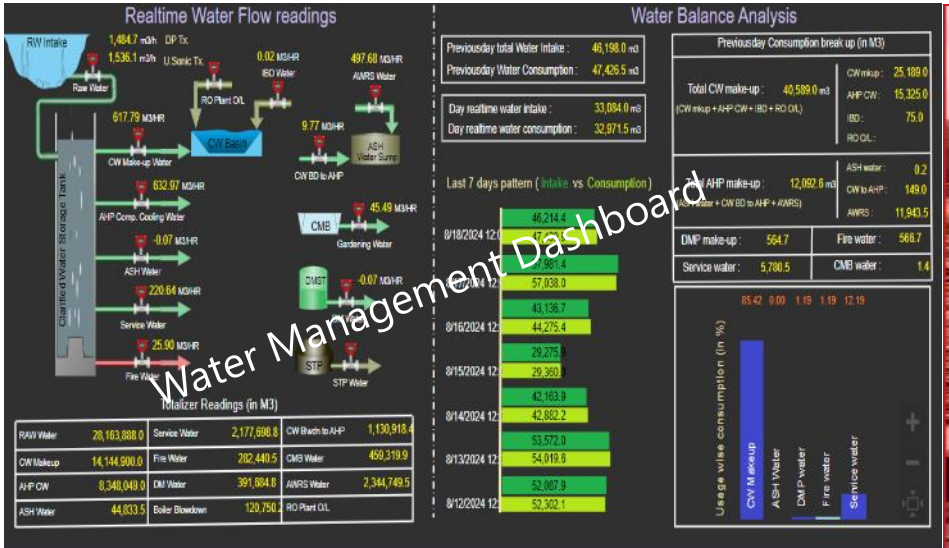
Automated Alert-mail triggered

Plant Storm Water Recovery System

R-R-R

Lower Operating Cost

Sustainability




# Sustainability – Net Zero Commitment


## TATA POWER Commitment: Leadership with Care

- ***Carbon Net Zero by 2045***
- ***Water Neutrality by 2030***
- ***Zero waste to landfill before 2030***
- ***No net loss of biodiversity***

## Our Thrust Areas in MPL:

- ***Resource Conservation***
  - *Optimize Raw water consumption*
  - *Rain-water harvesting*
  - *Re-use of generated Waste-water*
  - *Utilization of Biodegradable waste*
  - *Scrap utilization from metal scrap*
- ***Habitat Protection***
  - *Absolute CO2 generation*
  - *Afforestation*
  - *Tree sapling survival rate*
- ***Energy Efficiency***
  - *Optimization of SHR, APC to Benchmark values*
  - *Ash Utilization*
- ***Promotion of Clean Energy***
  - *Providing EV charging station in plant to encourage use of EV.*
  - *Battery operated Company vehicles*

# Sustainability – Net Zero Commitment

## *MPL Initiatives*

### Water Neutrality by 2030

***2024-25***

Recovery of Rainwater @ 10 KLH in rainy season

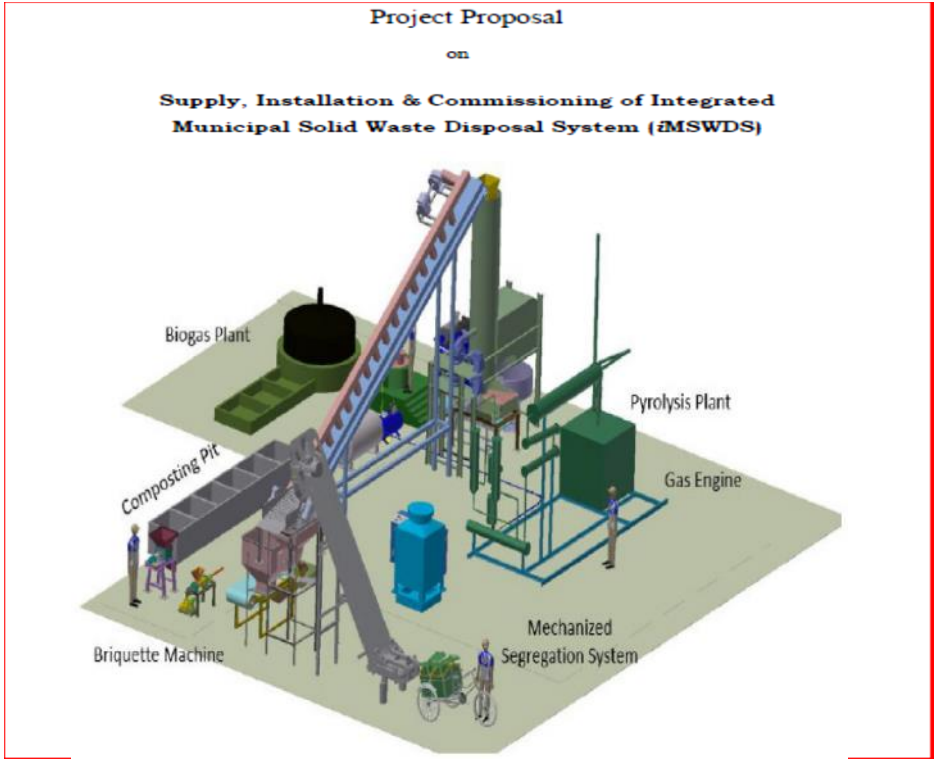
***2026-27***

Use of Sewage water @ 20-50 MLD

***2028-29***

- Maximize use of FGD wastewater
- Use of residual ash recovery water

### Zero waste to Landfill by 2030



# Flexibilization
## Being Ready for Flexi Operation

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TATA

### Flexibilization Journey

**FY18**
- Station MTL (Ex-bus): 680 MW
- 69% Machine Loading

**FY19**
- Station MTL (Ex-bus): 600 MW
- 61% Machine Loading

**FY20**
- Station MTL (Ex-bus): 541 MW
- 55% Machine Loading
- Participation in RRAS & SCED

**FY21**
- 50% Machine Loading achieved
- 1% Ramp compliance

**FY22**
- U2 achieved 36% during IGEF trial.
- U1 achieved 34% during inhouse trial.
- Participation in AGC - quantum 60

### Auto Sequence Operation of Coal Mill & Feeder

#### OLCS Logic
New Logic Developed under OLCS for Sequential Start/Stop of Coal Mill & Feeder and its associated drives ( like operation of Mill & Feeder Seal air valves, Cold air gate, Hot air gate, Feeder outlet gate).

#### CLSC Logic
New Logic developed in CLCS like Mill PA flow control for HAD & Mill o/l temp control for CAD to automatically enable the loops to throw into auto mode with variable set points to PID increment/decrement to achieve desired process variables based on start/stop sequence respectively

#### Protection
Additional protection logics incorporated to throw the system (HAD/CAD) into manual mode during any trouble or interruptions in auto sequence mode, to ensure process and system safety

#### Process Stabilization
PA Flow set point is increased in steps of 10 at a definite rate starting from 10. The SP will increase only when actual air flow is established, so SP will increase from 40 to 50 TPH if actual air flow is >49TPH. In the entire process, if PA header pressure drops <=730mmWC, OUT BLOCK acts and increment of PA Flow output is blocked further and will be in action till PA header pressure is recovered.

#### Safe Shut Down
During shut down sequence, after feeder stop, HAD will become zero as per interlock and PA flow is maintained by CAD by override increment & decrement block with definite rate. CAD opens/closes to maintain air flow of 35-42 TPH

#### Graphical Interface
New graphical configuration developed which enables desk engineers to carry out and monitor auto sequence steps

## Challenges during Implementation

- Integration of Schneider System into TATA Power Server (Cyber Security Threat).
- Standalone system with PI integration & no remote access to Schneider.
- Compare real time data w.r.t the benchmark data at similar operating conditions

ISO 50001

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: Maithon Power Limited

Address: Village - Dambhui, P. O. Barbindla, PS: Nirsa Dhanbad - 828 205, Jharkhand

has been assessed and found conforming to the following requirement

Standard: ISO 50001:2018

Scope: Generation of Coal based Thermal Power

Certificate No.: IRQS/221000080

Original Certification Date: 11/03/2019
(ANAB)
Granting of NABCB Certificate: 10/07/2019

Current Date of Granting: 15/01/2022

Expiry Date: 09/03/2025

Shashi Nath Mishra
Head IRQS

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


Energy Efficiency

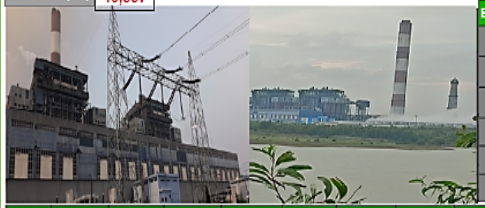
EcoStruxure Life Is On Schneider Electric

Maithon Power Limited, Dhanbad

Server Reports

TATA
TATA POWER

STN POWER (kW) 46,537



| Equipment | Station (kW) |
|---|---|
| CHP | 209 |
| AHP | 4,716 |
| RWPH | 0 |
| PWS | 11,233 |
| RO | 693 |
| SWYD | 1,931 |

| kW | COAL MILL | PA FAN | FD FAN | ID FAN | DMCW PUMP | BCW PUMP | CW PUMP | CEP PUMP | ACW PUMP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| U1 | 2,317 | 2,257 | 1,250 | 5,061 | 397 | 448 | 3,775 | 1,334 | 351 | 17,191 |
| U2 | 2,313 | 2,378 | 1,133 | 4,899 | 437 | 459 | 1,564 | 1,285 | 318 | 14,785 |
| TOTAL | 4,630 | 4,635 | 2,383 | 9,959 | 834 | 907 | 5,339 | 2,619 | 669 | 31,976 |

| Equipment Name | U1 (KW) | U2 (KW) |
|---|---|---|
| Mill-A | 375.0 | 0.0 |
| Mill-B | 409.5 | 419.0 |
| Mill-C | 448.7 | 278.5 |
| Mill-D | 336.2 | 460.7 |
| Mill-E | 391.3 | 429.1 |
| Mill-F | 0.0 | 0.0 |
| Mill-G | 0.0 | 437.8 |
| Mill-H | 336.4 | 290.6 |
| FD FAN-A | 583.1 | 584.7 |
| FD FAN-B | 667.4 | 551.3 |
| PA FAN-A | 1,112.7 | 1,122.5 |
| PA FAN-B | 1,144.1 | 1,259.9 |

| Equipment Name | U1 (KW) | U2 (KW) |
|---|---|---|
| VFD TRF (ID Fan-A Ch-1) | 1,246.6 | 1,268.4 |
| VFD TRF (ID Fan-A Ch-2) | 1,239.2 | 1,221.7 |
| VFD TRF (ID Fan-B Ch-1) | 1,287.9 | 1,218.0 |
| VFD TRF (ID Fan-B Ch-2) | 1,275.4 | 1,190.8 |
| CEP-A | 673.4 | 643.8 |
| CEP-B | 0.0 | 0.0 |
| CEP-C | 660.9 | 641.4 |
| ACW Pump-A | 331.1 | 317.7 |
| ACW Pump-B | 20.3 | 0.0 |
| BFP-A | 0.0 | 0.0 |
| TIE-CA Board | 0.0 | 0.0 |
| TIE-CB Board | 0.0 | 0.0 |

| Equipment Name | U1 (KW) | U2 (KW) |
|---|---|---|
| UAT-A | 9,765.6 | 10,300.2 |
| UAT-B | 7,644.4 | 6,724.1 |
| ST | 18,059.2 | 15,016.1 |
| UST DAT01 | 441.4 | 428.5 |
| UST DAT02 | 242.4 | 275.3 |
| SST-1 | 91.2 | 537.1 |
| SST-2 | 460.4 | 127.6 |
| CW Pump-A | 1,214.1 | 0.0 |
| CW Pump-B | 1,484.9 | 1,563.7 |
| CW Pump-C | 1,076.2 | 0.0 |
| DMCW Pump-A | 0.0 | 224.6 |
| DMCW Pump-B | 214.1 | 0.0 |
| DMCW Pump-C | 183.2 | 211.9 |
| BCW Pump-A | 223.0 | 229.7 |
| BCW Pump-B | 0.0 | 0.0 |
| BCW Pump-C | 224.8 | 229.6 |
| ESPT-DBT-01 | 139.9 | 144.9 |
| ESPT-DCT-01 | 122.3 | 55.3 |
| ESPT-DDT-01 | 115.7 | 87.6 |
| ESPT-DET-01 | 55.0 | 146.8 |
| ESPT-DBT-02 | 139.6 | 112.3 |
| ESPT-DCT-02 | 155.8 | 100.3 |
| ESPT-DDT-02 | 112.0 | 74.2 |
| ESPT-DET-02 | 130.2 | 107.3 |

Energy Management System – Developed By Schneider Electric

# New Initiatives

## Integration of DSM in ABT System

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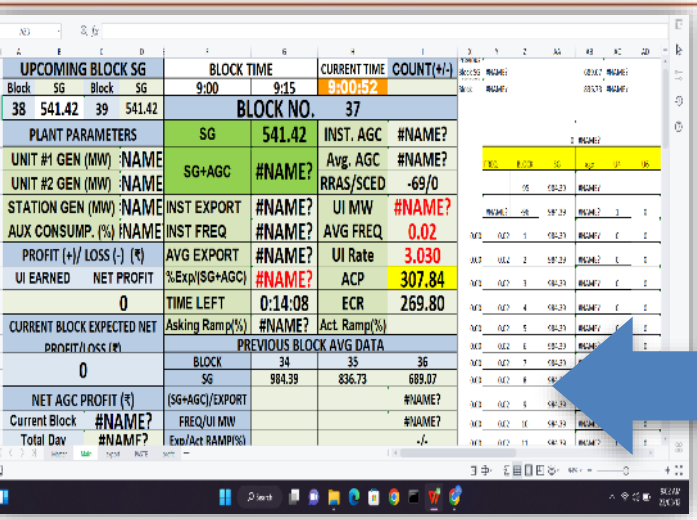
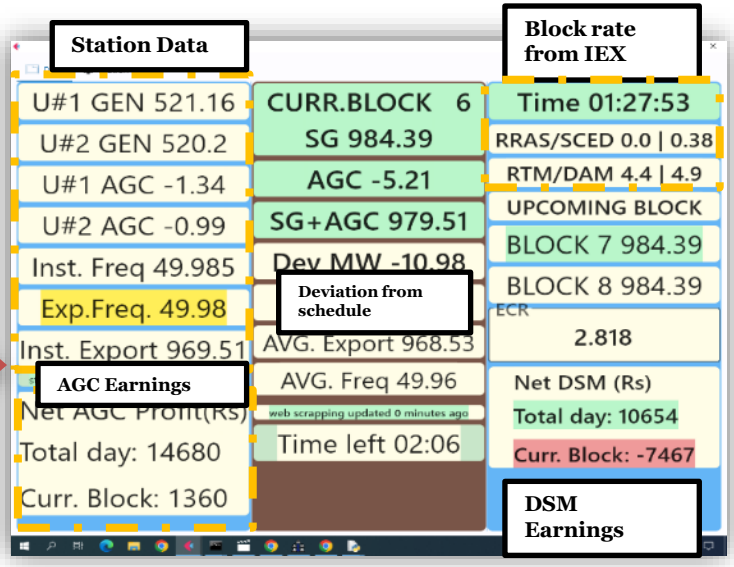



**Won Silver Award in 9th CII National Competition on Low-Cost Automation (LCA) Category**

- ***Programming web scrapping loop in Python has minimized the risk of malice data entry.***
- ***Alarm provided for Schedule variation, over & under injection opportunities & Deviation .***
- ***Ever evolving DSM norms & regulatory updates can be incorporated without any 3rd party assistance.***




- ***Time delay to update recent data & system freezing issue with bulk data handling.***
- ***Unable to fetch data after Captcha introduction in ERLDC site.***
- ***Macro-enabled Excel & PI integrated system creates cyber security concern.***
- ***i-Macros security threat :Malware breach probabilities in PI system***

# Technology Advancement/Digitization

## Innovation : Project Drishti

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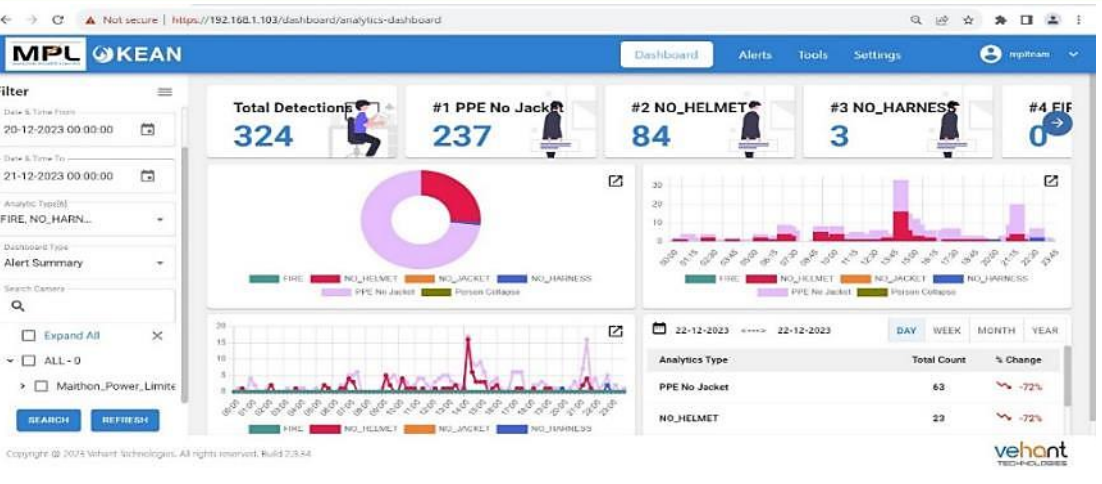
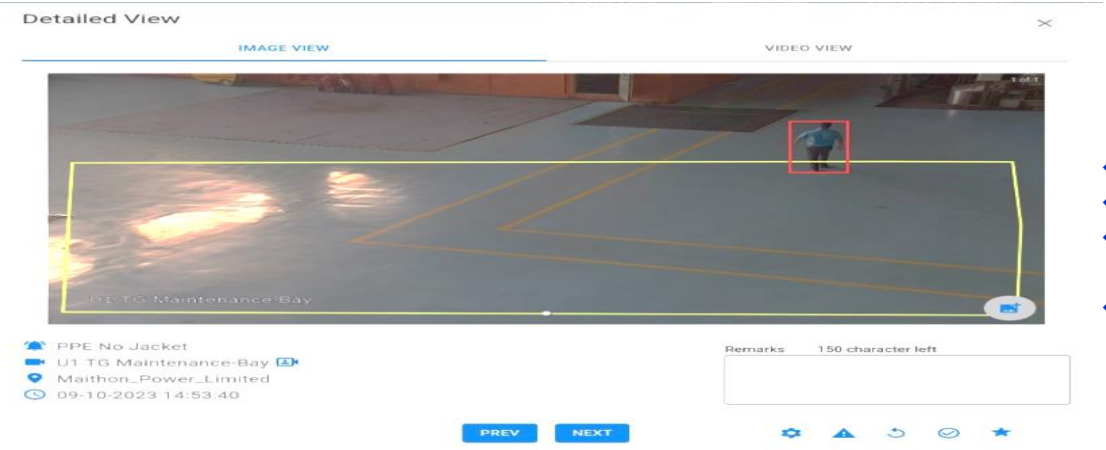



01 FIRE & SMOKE ALERT

02 UNAUTHORIZED ENTRY ALERT

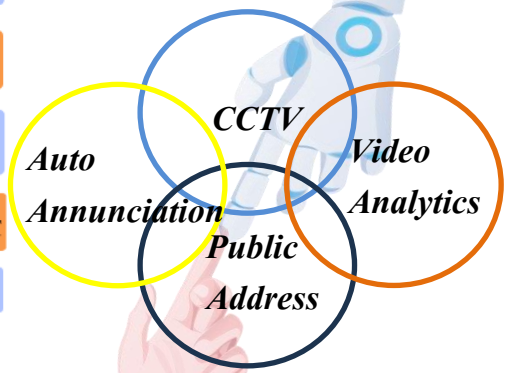
03 NO HELMET VIOLATION

04 PERSON INSIDE CONFINED SPACE

05 NO HARNESS VIOLATION

06 PERSON COLLAPSE ALERT

07 NO JACKET VIOLATION




- ***Integration of AI and Video Analytics in 24 CCTVs***
- ***Early detection of violations.***
- ***The system triggers pop-up notifications and voice alarms in the operator room.***
- ***Designated speakers broadcast pre-recorded messages, while the operator can manually announce through a microphone to specific areas or the entire premises with a single click.***

TATA POWER

# Awards & Achievements

TATA

5 Golden Star for Safety by NSCI


ICC Environmental Awards


CII TCM Award for Cost Management


Best Division Award 2023

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# Thank You!