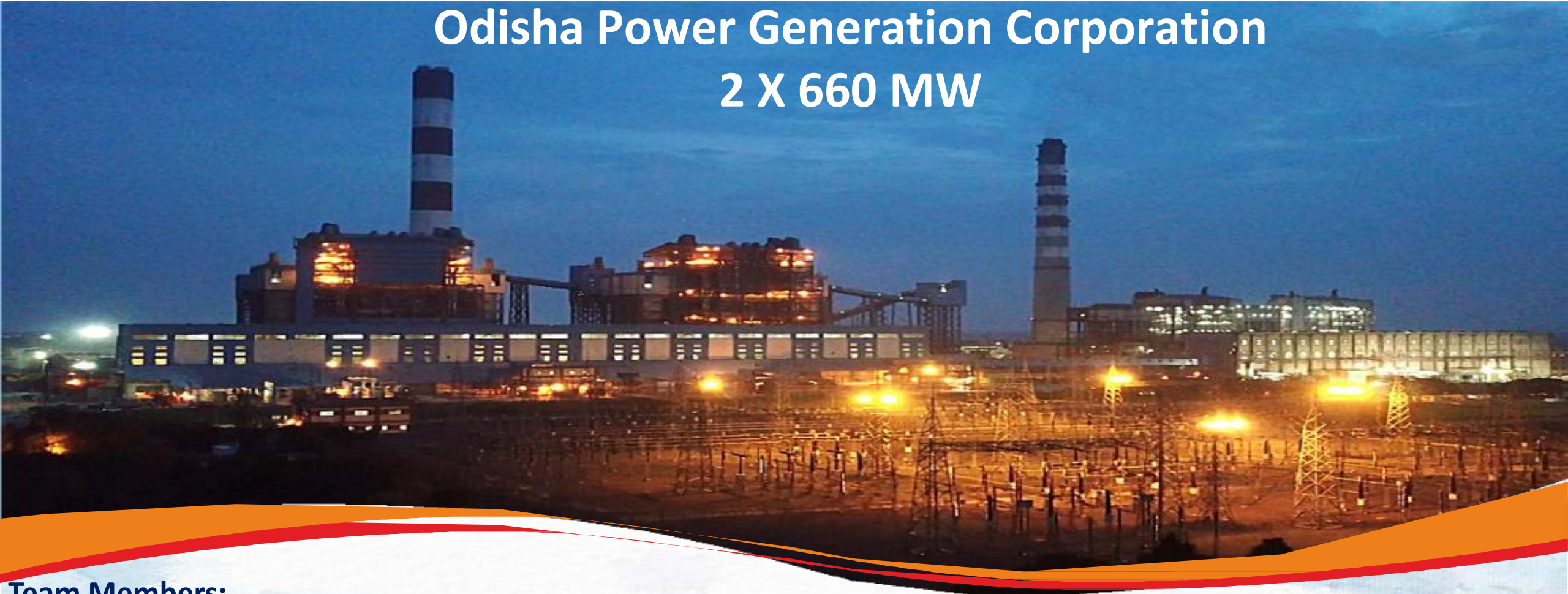


Odisha Power Generation Corporation

2 X 660 MW

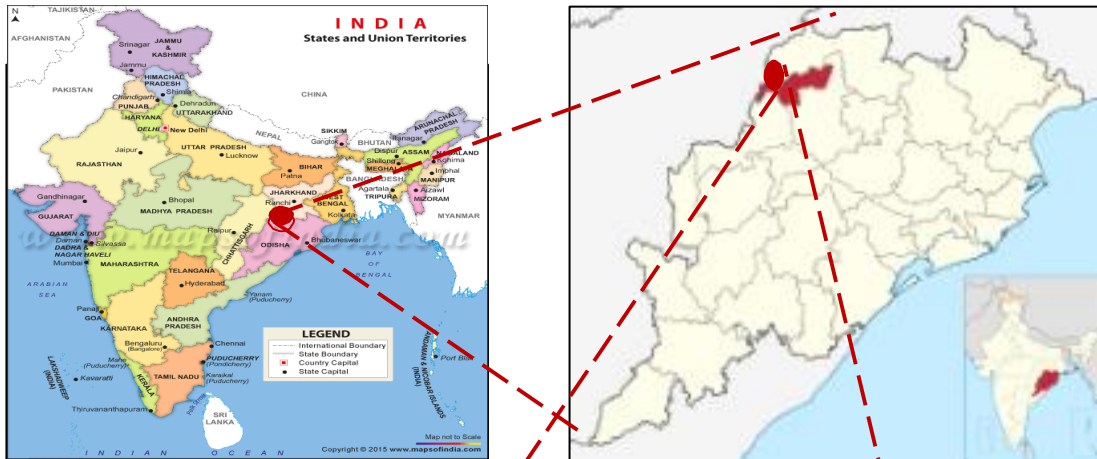


Team Members:

Sudhakar Swain (Plant Head)
Pravupada Acharya
Braja Kishore Das

CII-24th National Award for Excellence in
Energy Management Sept-2023

About OPGC



PLANT SITE



- ✓ The only fully owned Government company of State of Odisha in Thermal Sector
- ✓ Total generation capacity of 1740 MW
 - 2x210 MW (Stage-I)
 - 2x660MW Supercritical (Stage-II).
- ✓ Units 1 & 2 (OPGC- I) commissioned in Dec'94 & Jun'96 respectively
- ✓ Unit 3 & 4 (OPGC II) commissioned in July'19 & Aug'19 respectively
- ✓ OPGC is the Top Performer/ contributor in Odisha Power Sector - catering >30% load share of the state alone.

An ISO 9001, 14001, 55001 & OHSAS 45001 Certified Company

OPGC at a Glance..



100% PPA for both OPGC-I & II with GRIDCO



5.5 Km Long Dedicated Water Intake Channel from Hirakud Reservoir, with Contracted allocation 1.3 L m³/day



Dedicated Coal Mines with Annual Contracted Capacity of 80 LMT from OCPL for OPGC- II



48 Km Long Dedicated MGR Railway Line from OPGC to Manoharpur for Coal Transport

OPGC Performance: FY22-23



Annual Generation

8930.9 MU

Annual Avg Gen : 1020MW

Plant Load Factor:

77.24%

Plant Availability:

90.1%



Gross Heat Rate

2168 Kcal/Kwh

Auxiliary Power

5.64%

Turbine Heat Rate

1880 Kcal/kwh



Boiler Efficiency

86.7%

Coal Consumption: 6264081 MT

DM Water Consumption

0.80%

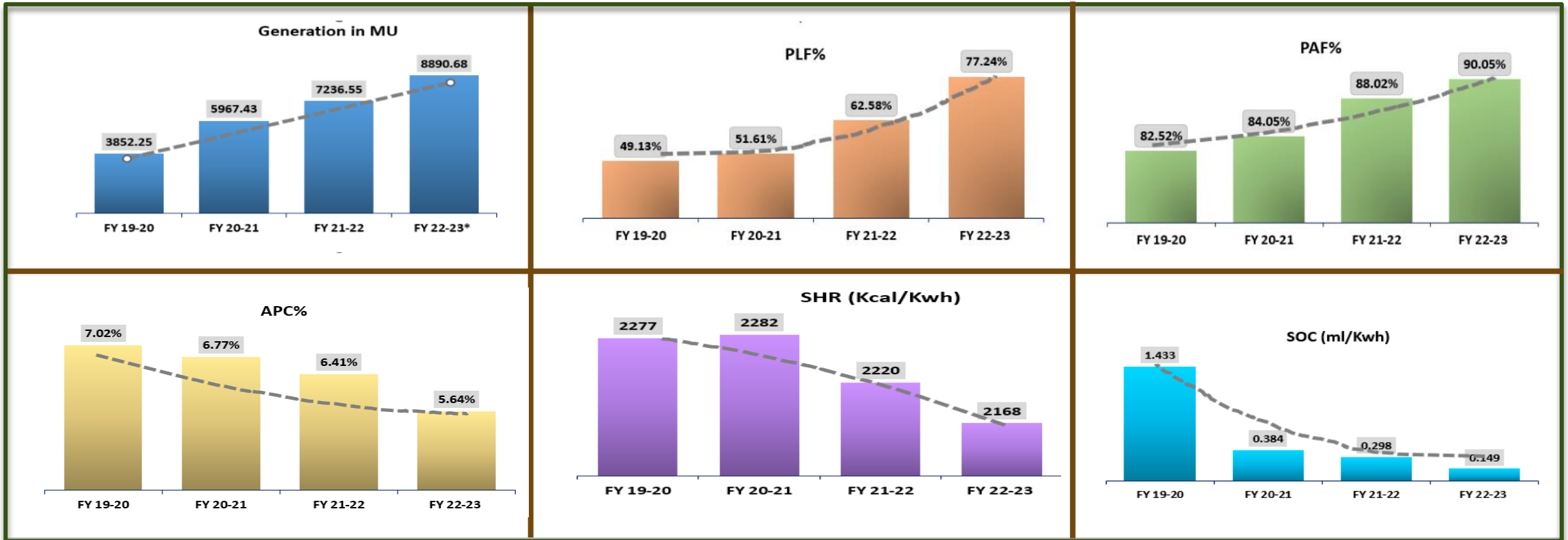
DM Consumption: 226516 MT

Specific Oil Cons

0.149 ml/Kwh

Oil Cons: 1334 KL

OPGC Performance Trend (Last 4 years)..



- ❖ In FY 21 & 22, PLF% was low mainly due to Ash Evacuation Constraints. After completion of Ash Extraction & Conveying System Modification (in Jan22), PLF improved significantly.
- ❖ Continual improvement in Plant load factor resulting into surpassing all India avg. PLF in FY 22-23
- ❖ Aux power consumption & Gross Heat Rate in FY 22-23 was reduced by 0.8% & 52 Kcal/kwh respectively due to implementation of improvement projects
- ❖ SOC Reduction is mainly due to Start up/SD reduction & process improvisation.

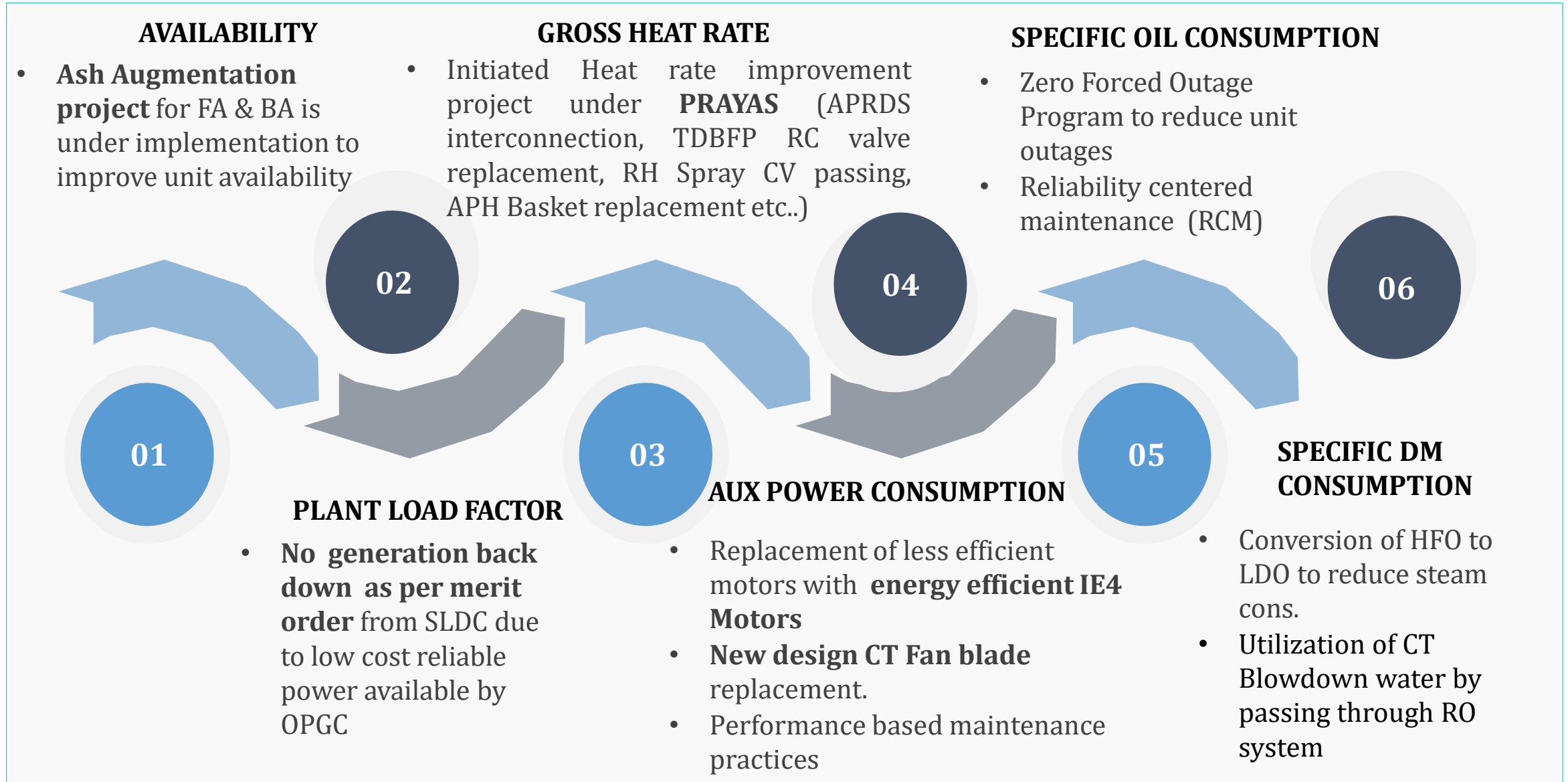
Energy Benchmarking:



OPGC Stance among other Peers:

- OPGC is one of the pioneer company in thermal utility of India and has set a high performance benchmark among other similar capacity plants.
- ❖ **Our Short Term Plan:**
 - Efficient & Reliable Operation
 - Efficient Energy Monitoring and taking remedial measures
 - Implementation of ENCON Projects
 - Exploring New Opportunities and Using Latest Technologies
- ❖ **Our Long Term Plan:**
 - To continually improve the station performance by adopting best O&M practices, efficient Operation and by use of energy efficient products and services

Road Map to achieve Global Benchmark:



Major Encon Projects Planned for FY 23-24



**APRDS Interconnection
between Stage-1 & 2**

Benefit: Improving Start
up time & reduction of
sp. Oil (~60 KL/Yr)

**₹ 4.0
Million/Yr**



**HFO to LDO
Conversion**

Benefit: Saving of coal
due to reduction in
steam cons. (~ coal
19667 MT/Yr)

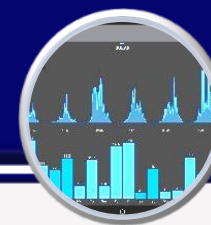
**₹ 27.3
Million/Yr**



**New design CT Fan
blade replacement
and IE4 Motors
installation**

Benefit: Saving in APC
of 2.1 MU/Yr

**₹ 7.0
Million/Yr**



**Implementation of
AIML as a part of
Industry 4.0**

Benefit: Saving in APC of
~0.7 Mu/Yr and Coal
saving ~14460 MT/Yr

**₹ 29.6
Million/Yr**



**Online Drain Temp.
monitoring**

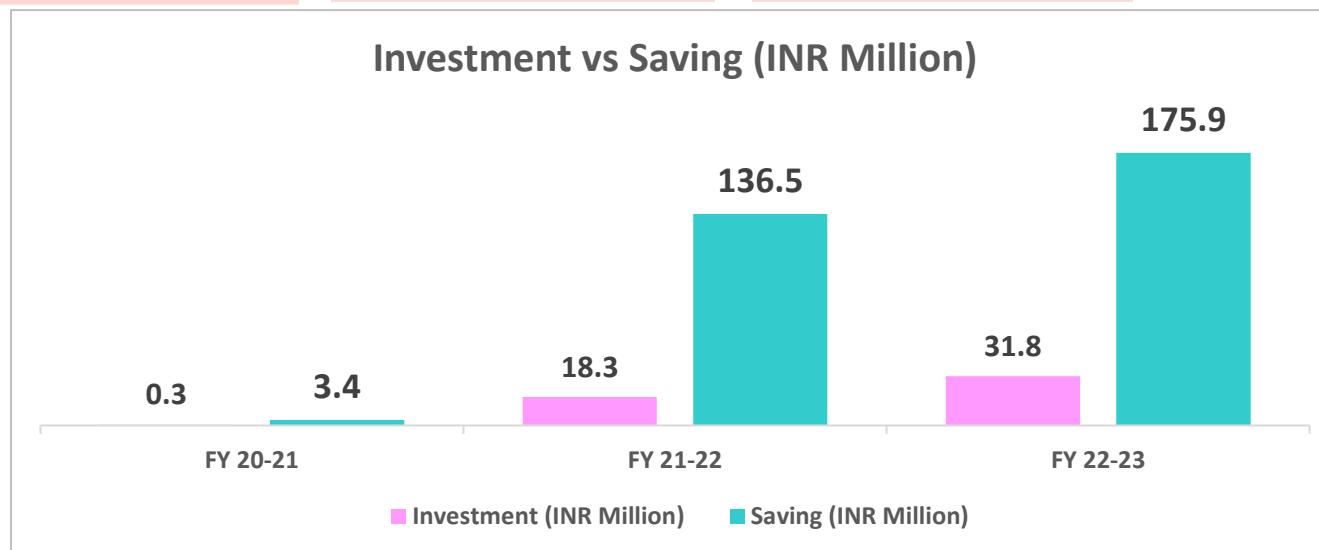
Benefit: Estimated
coal saving ~8676
MT/Yr

**₹ 16.3
Million/Yr**

ENCON Projects Summary (Last 3 years):



Year	No. of Energy Saving Projects	Investments (INR Million)	Electrical Saving (Million kWh)	Thermal Saving (Million Kcal)	Saving (INR Million)
FY 2020-21	4	0.3	1.05	0	3.4
FY 2021-22	11	18.3	5.33	155,478	136.5
FY 2022-23	11	31.8	10.9	218,193	176



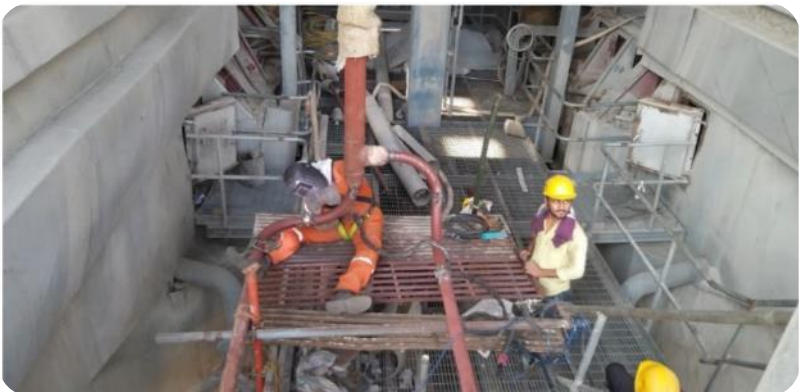
ENCON Project Details.. FY 22-23

S No	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Total Annual Saving (Rs Million)	Investment (Rs Million)	Payback (Months)
1	RH Temp. improvement by repairing of HPBP Spray CV and RH spray Block & Control valve	-	35,652	21.6	2.7	1.5
2	Stoppage of CT Fans during winter by maintaining desired CW inlet Temp. to avoid sub cooling in condenser	1.57	-	5.3	0	-
3	192 nos. of APH Basket replacement and water washing of the APH in Unit-4	-	50,374	30.8	0.58	0.2
4	Replacement of conventional lights with LED Light	0.91	-	3.1	2.73	11



ENCON Project Details FY 22-23 ..contd

S No	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Total Annual Saving (Rs Million)	Investment (Rs Million)	Payback (Months)
5	Soot blowing line size modification along with higher valve size in both the APH of Unit-4	-	44,654	27.3	1.03	0.5
6	Implementation of OSI PI software along with 6 applications: Pi vision, Pi alert, pi explorer, pi Datalink, Pi Builder & e-log book	0.42	35723	23.3	19.4	10
7	Start-up Oil saving due to modified start-up practices and additional drain line provision in atomizing line	-	1,803	6.6	0	-
8	14 nos. of High Energy passing valves replaced with better design /repaired (HWL ,MAL drain, Boiler Eco. Drain etc..)	-	20,149	12.3	0.85	2.9



APH Soot blowing line size increased to 2.5'



Scoring marks in Plug of HWL



Damaged Seat ring in HWL CV



After lapping blue matching checked for disc & wedge

High energy passing valves rectification

ENCON Project Details FY 22-23:

S No	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Total Annual Saving (Rs Million)	Investment (Rs Million)	Payback (Months)
9	New design CT Fan Blade replacement in Unit-3 CT	0.1	-	0.32	0.45	17
10	Energy saving in ID, FD , PA Fans ,ESP & CEP by attending APH seal leak, duct leakage & CEP RC valve repairing	7.9	-	26.8	0.5	0.2
11	Condenser Heat Loss reduction by vacuum improvement(Jet cleaning & arresting Flash tank & spray line joint leak)	0	30,224	18.4	1.46	1
	TOTAL	10.9	218,192	176.0	31.84	



Thinning & Damaged Radial seal

APH Damaged Seal replaced with new one



Replaced with new seal and seal adjustment done



CT Fan blade replacement with new design



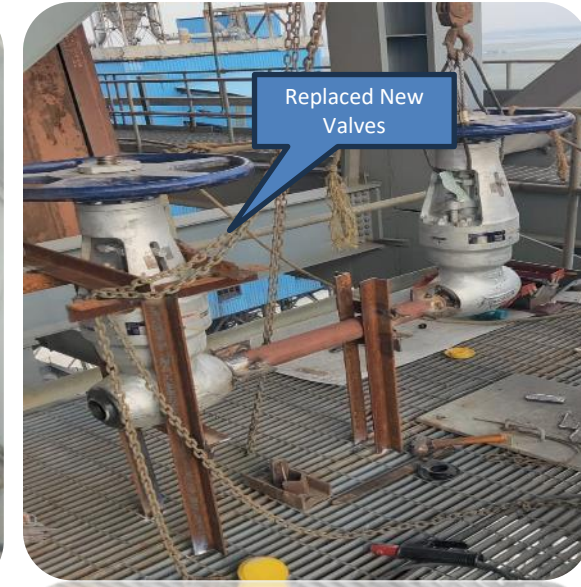
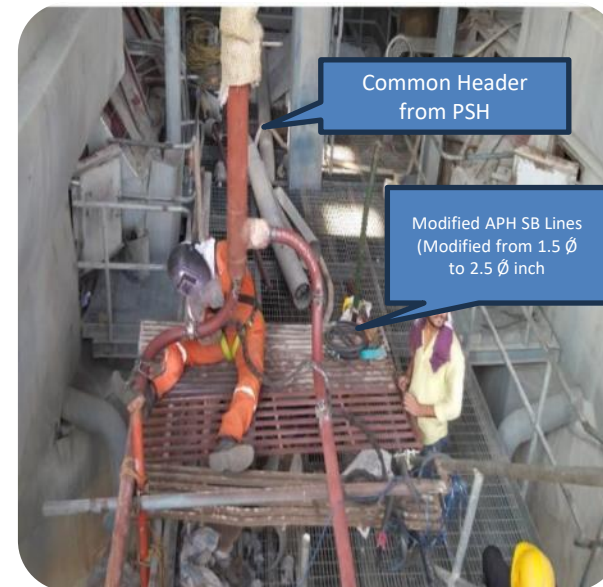
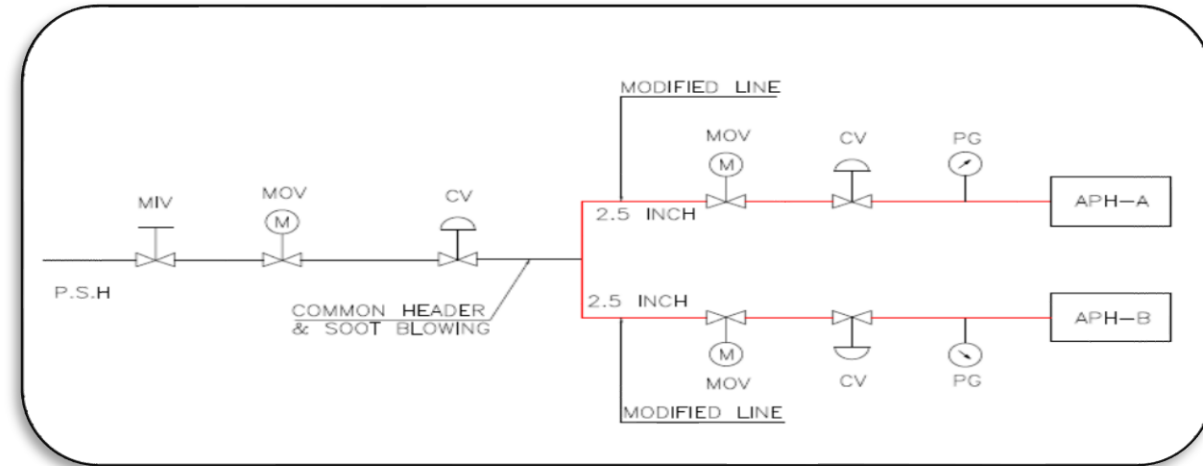
High pressure water jet cleaning along with Bullet cleaning

Condenser Tube cleaning

Innovation: Project-1

APH Soot Blowing Line Modification (In House):

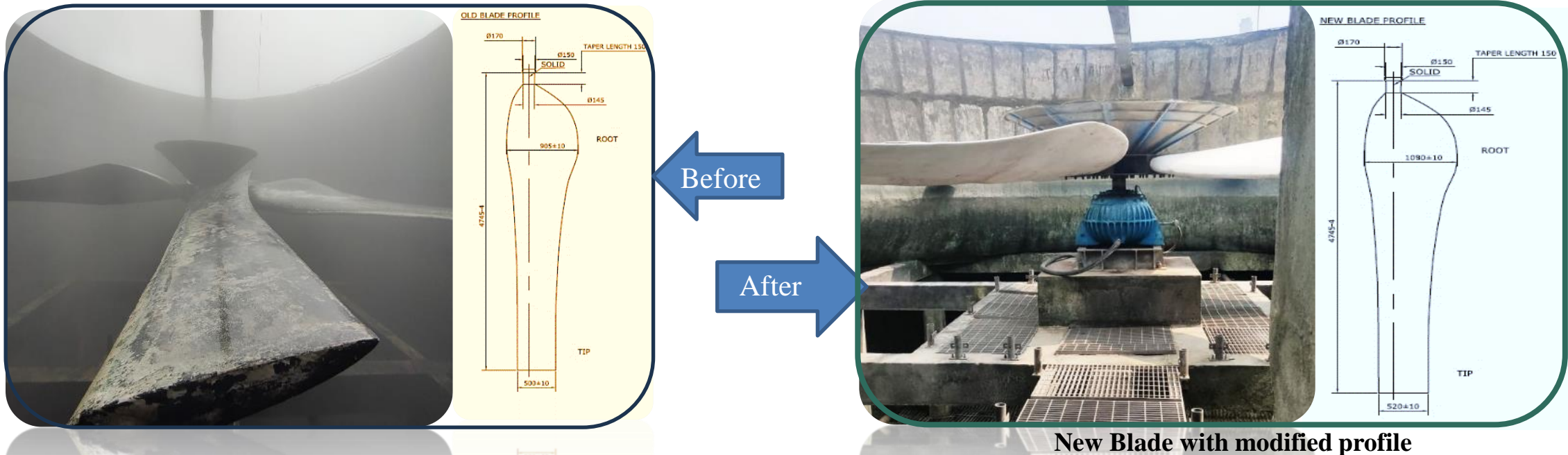
- ❖ After Commissioning, the APH Soot Blowing system was ineffective due to lower SB steam pressure . (Only 6-8 Kg against the design pr 12-14Kg). As a result, the Exit Flue gas temp was running high, resulting higher flue gas loss.
- ❖ After root cause analysis, it was decided to modify the SB Line & Increase the line size with proper Valve arrangements to increase APH SB pressure.
- ❖ The branch lines which were of 1.5” have been replaced with 2.5” new pipelines with modified MOV & CV
- ❖ After the line Modification, The APH SB Steam Pressure increased from 6 Kg to 12 Kg .
- ❖ There was an improvement (reduction) of FGET of appx **4-5 deg**, resulting into Boiler Eff improvement with a Heat Saving appx **4 Kcal**
- ❖ The total cost saving of **INR 27.7 Million/Annum**
- ❖ This project is replicable.



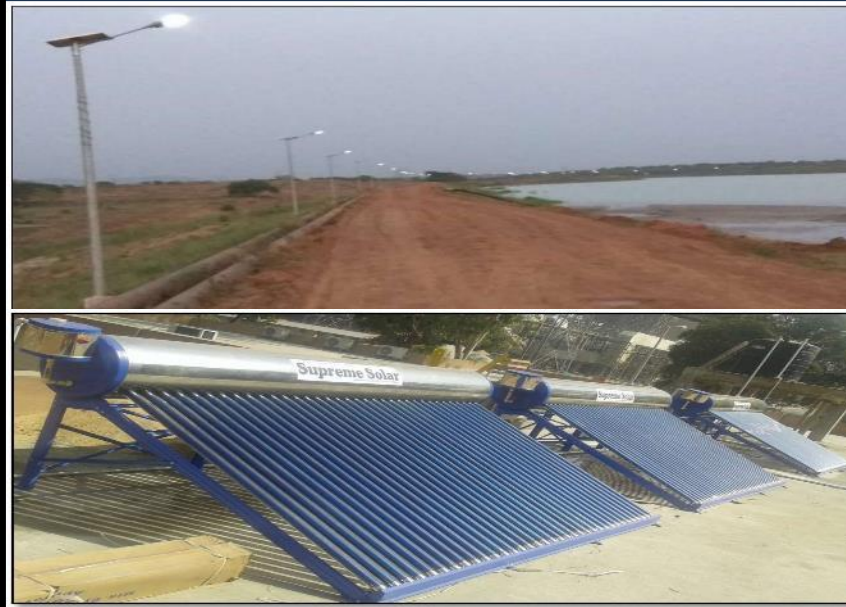
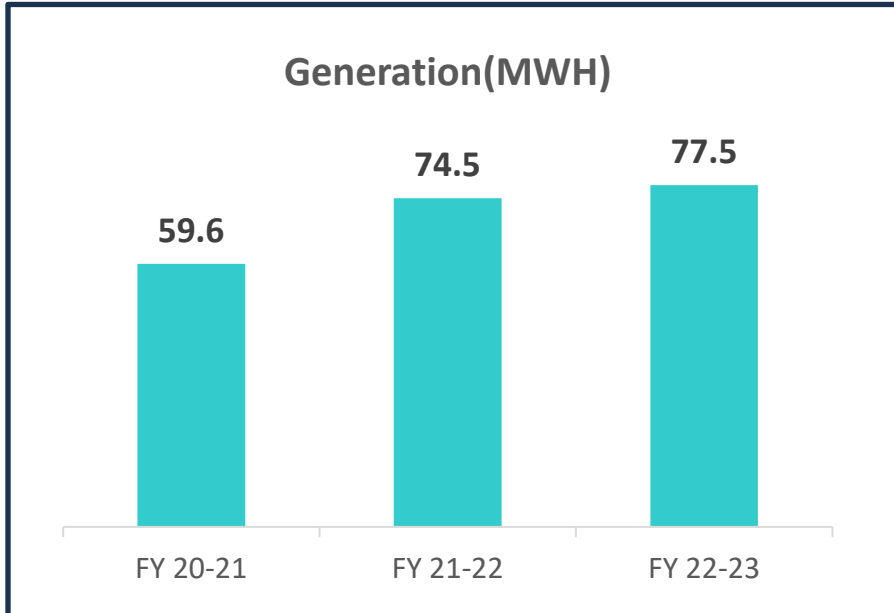
Innovation: Project-2

Replacement of CT Fan Blades with New Design High Efficient Fan Blades:

- ❖ Existing Old Fan Blade profile has been replaced with newly designed “High Efficiency Energy Saving Axial Flow FRP Fan Blades” using the same hub for higher energy efficiency, improvement in longevity as well as improvement in overall performance of Cooling Tower.
- ❖ The modification results into reduction in power consumption by 20-25% while delivering same air flow at equal blade angel. Average Power Saving is about **15 Kw/Fan**.
- ❖ Total 10 Nos of blades have been replaced and remaining blades are planned to be replaced in next opportunity.
- ❖ Total Saving: **Rs. 3.2 Million/annum**.



Renewable Energy:



OPGC Green Initiatives:

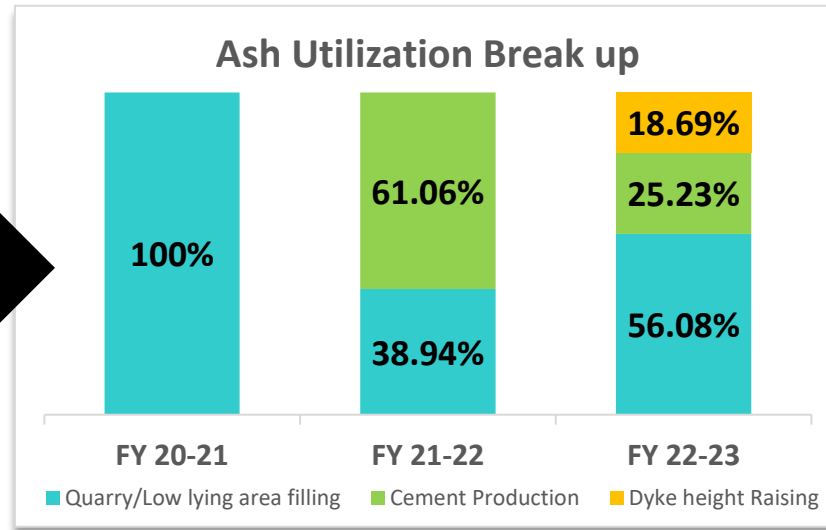
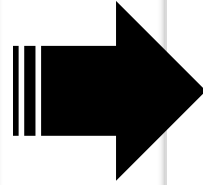
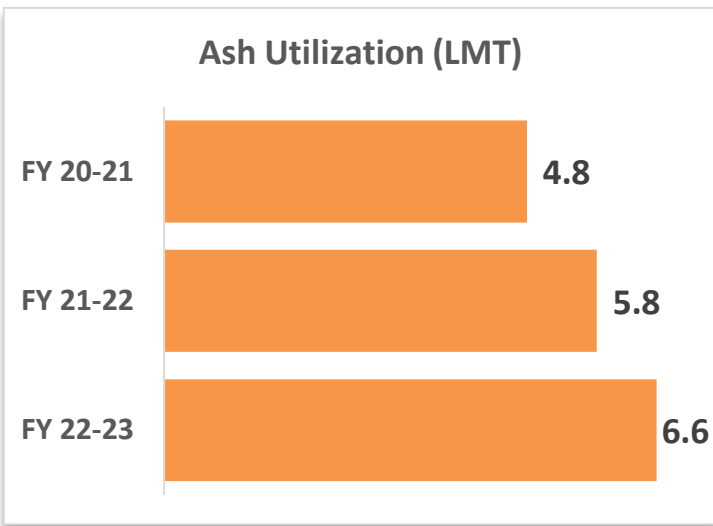
- Total Solar PV panels installed capacity is 39 Kw to fulfill the day time consumption requirement in plant canteen, service building, WTP & Switchyard.
- Total 60 nos. of 50 Watt LED's are installed at Ash pond-C with capacity of 3KW
- 900 Litre /day Solar Water Heaters are installed on the roof of plant canteen
- Solar water Heaters are installed for 160 families in 10 nos. of newly constructed building at Colony.



❖ Our Long Term Plan:

- Proposed 50 MW Solar power plant at Ash pond area is under pipe line (DPR Completed).
- Another 2 MW Solar power plant feasibility study under progress at Raw water intake channel

Environment Management: Ash Utilization



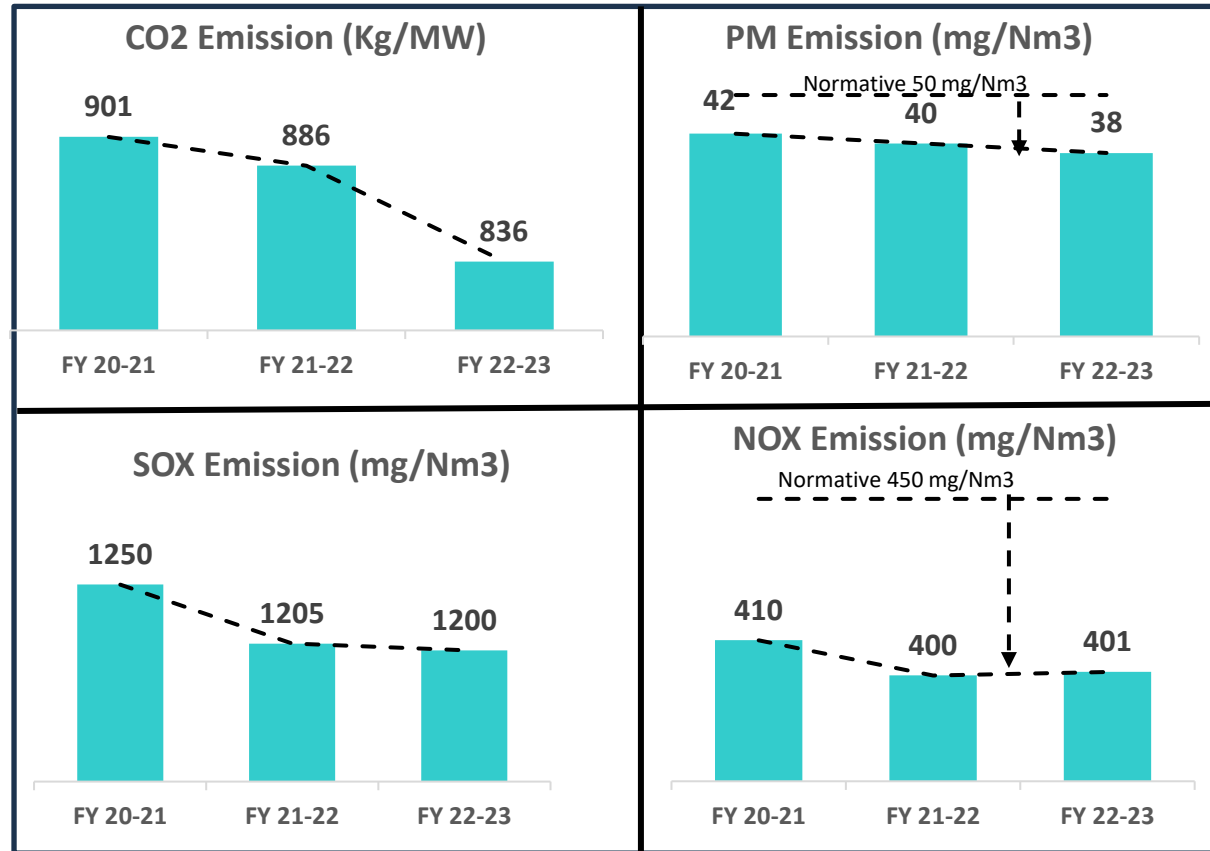
UO M	2020-21	2021-22	2022-23
Ash Stock in Plant (Yard + Pond) LMT	26.6	45.0	66.7
Ash Generated LMT	21.2	24.2	28.3
Ash Utilization %	22.8	23.88	23.29
Ash Utilization Expenditure INR Lakhs	726	1145	1392

Best Practices in Ash Utilization

- OPGC has constructed a 100m road with fly ash apply geo polymer technology as a pilot project in consultation with VNIT Nagpur. The road has been found to be of adequate strength and OPGC will replicate the same for all its internal roads maintenance
- OPGC has developed state of art technology for direct loading of ash in to rail from the silos. Till date OPGC has dispatched 523232 MT of ash to cement industries.
- Reclamation of low lying/Quarry filling after taking due NOC from OSPCB.



Environment Management: Emissions



Public Disclosure :

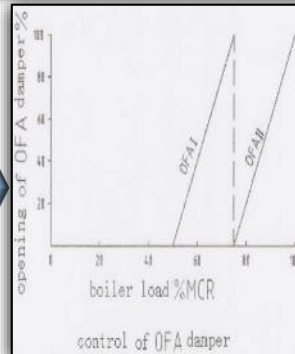
1. GHG data is submitted to Central Electrical Authority (CEA) **(Scope-1)**.
2. The data is displayed in front of plant gate and on company website for public interest.
3. Refer link :
https://www.opgc.co.in/env/half_comp_powerplant.asp

Retrofitting of Wet FGD System : Target Dec'24 & 45% completed

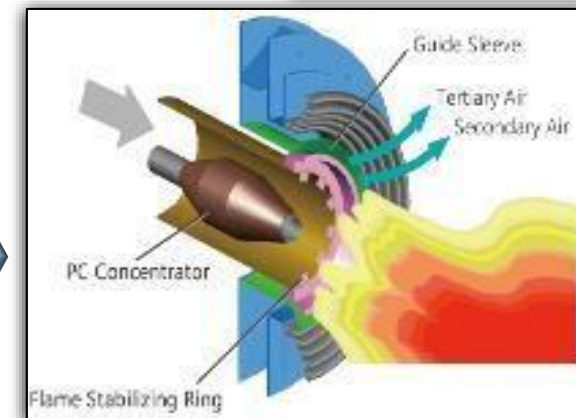


Practices adopted for emission control & monitoring

Control by COFA & SOFA Dampers

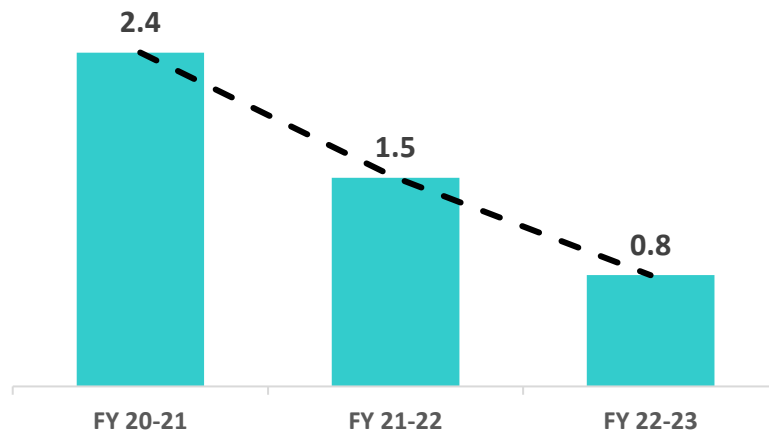


Installed Low NOx Fuel Burners

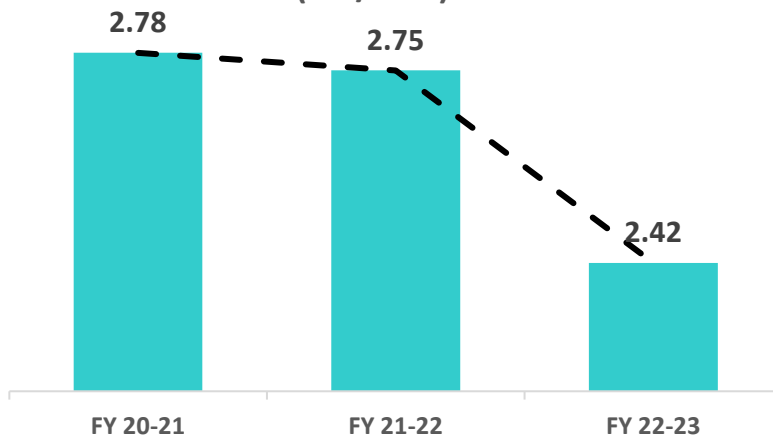


Environment Management: Water

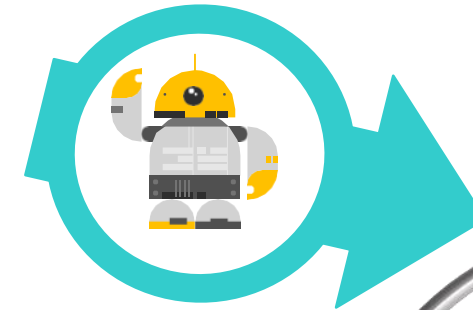
DM water Consumption of Plant (%)



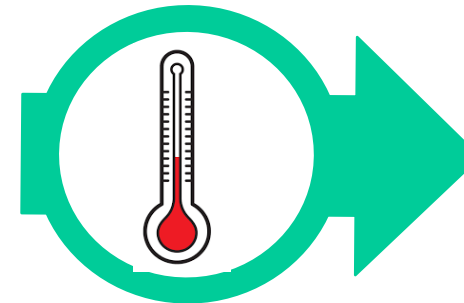
Raw water Consumption of Plant (m³/MW)



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








Recycle & Reuse of waste water

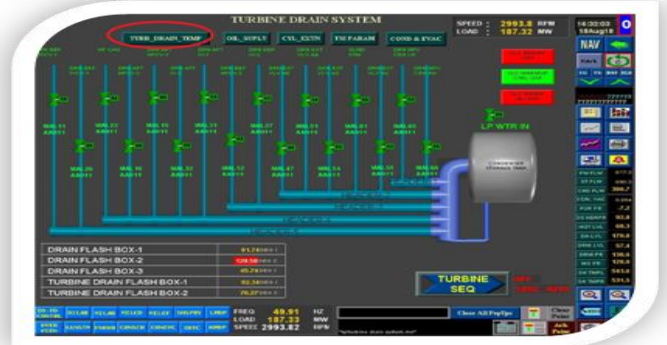
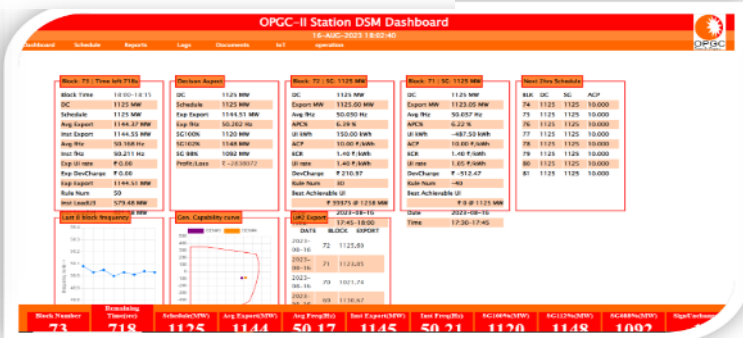
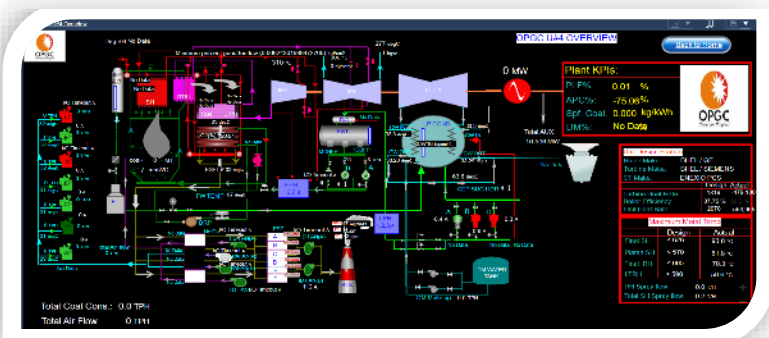
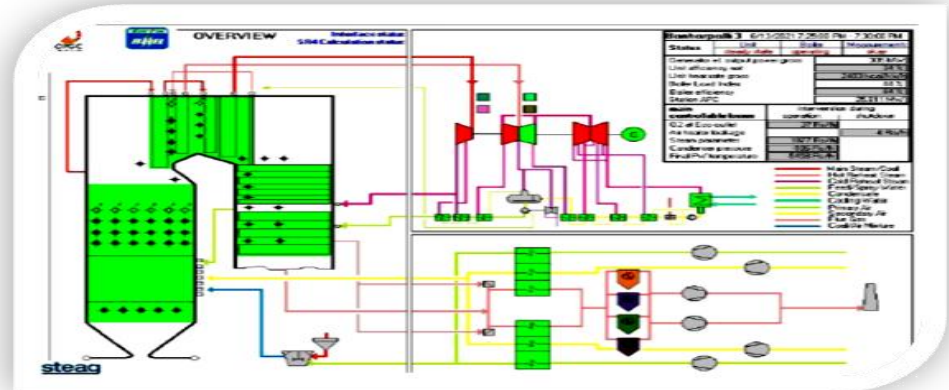
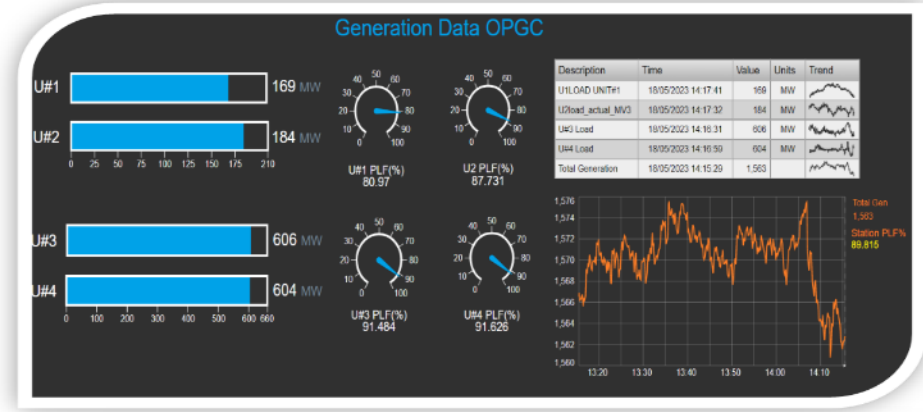
- 21000 m³ waste water recycled
- 1000 KLD capacity STP for treatment of Domestic Sewage & reused In horticulture



Best Practices : Digitization

Digitization

- 
OSI Soft PI
 Historian & Real Time Monitoring system
- 
PADO
 Performance Analysis, Diagnosis & Optimization tool
- 
DSM Software (In House)
 Real Time Export, Sch, ACP & Deviation Monitoring
- 
ENMS System
 Energy Management System for HT Drives Cons tracking
- 
Online High Energy Drain Temp & Coal Pipe temp Monitoring



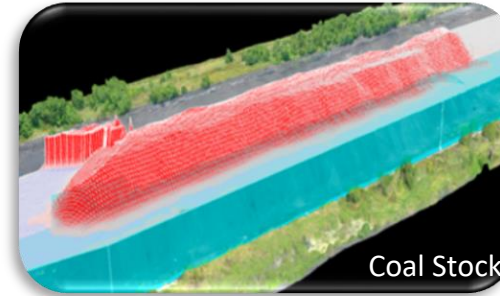
Best Practices :New Technology Initiatives

New Technology



Monitoring Through "DRONE"

Smart Surveillance enabling Bird's-eye view of the Project /Process, eliminating human risk



Coal Stockpile Inspection & PV through Drone:



Monitoring Through "Robotics"

Boiler Tubes thickness monitoring



Cooling Tower Inspection through Drone:



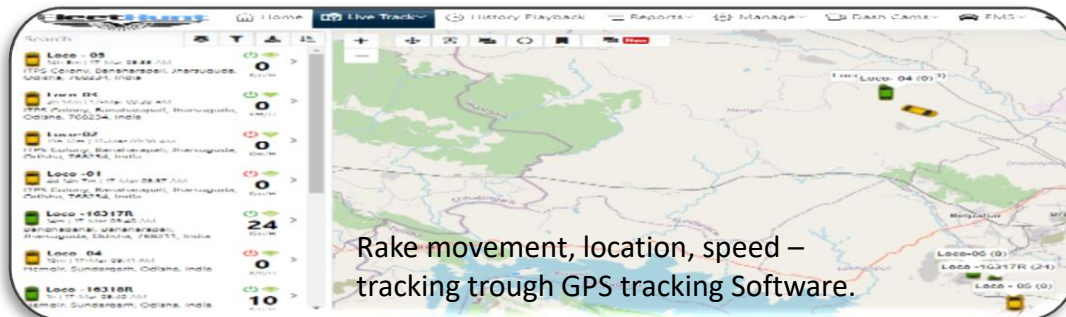
Rake Movement Tracking Through GPS tracking Software (In House)



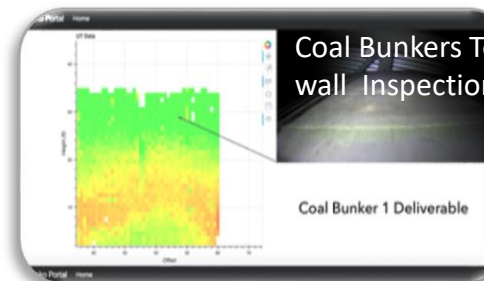
Boiler Burner & WB Inspection through Drone



Chimney Inspection through Drone:



Rake movement, location, speed – tracking through GPS tracking Software.



Coal Bunkers Temp. mapping & Boiler water wall Inspection through Robotics

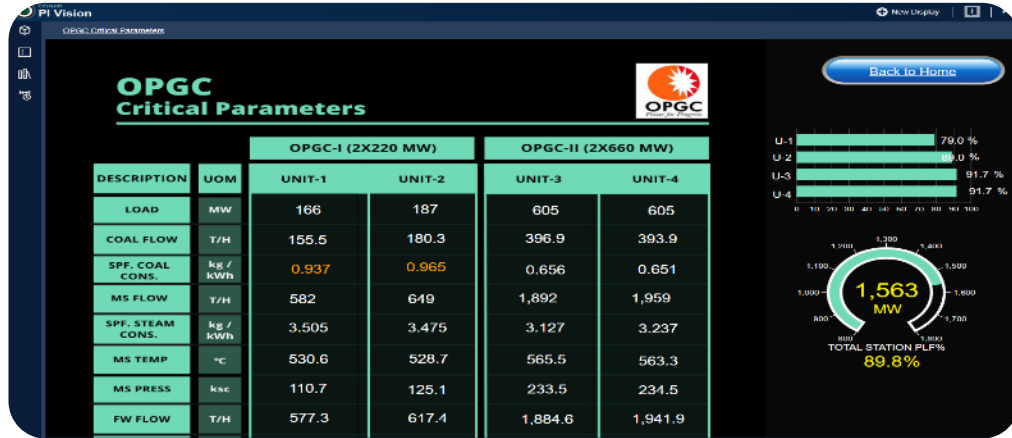
Coal Bunker 1 Deliverable



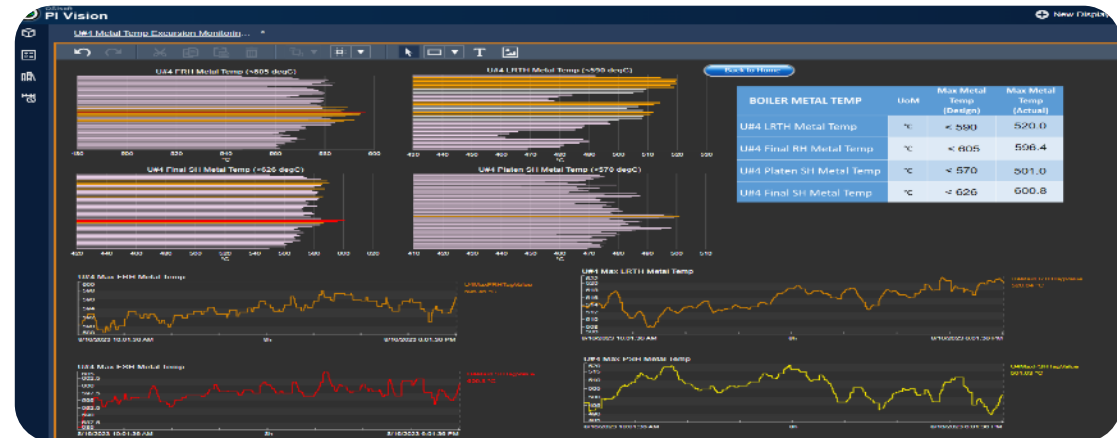
Wall Thickness, Tube Position, Thickness

Best Practices : Analytics & Industry 4.0

- With the Use of PI Applications like E log Book, PI Vision, PI message Alert, AF tools, PADO Analytical & Diagnosis tools etc, Interactive & Real Time Dash Boards have been created which not only provide real time data, trend & efficiency, but also give instantaneous Alert (through Message & Mail) if any major deviations occur.



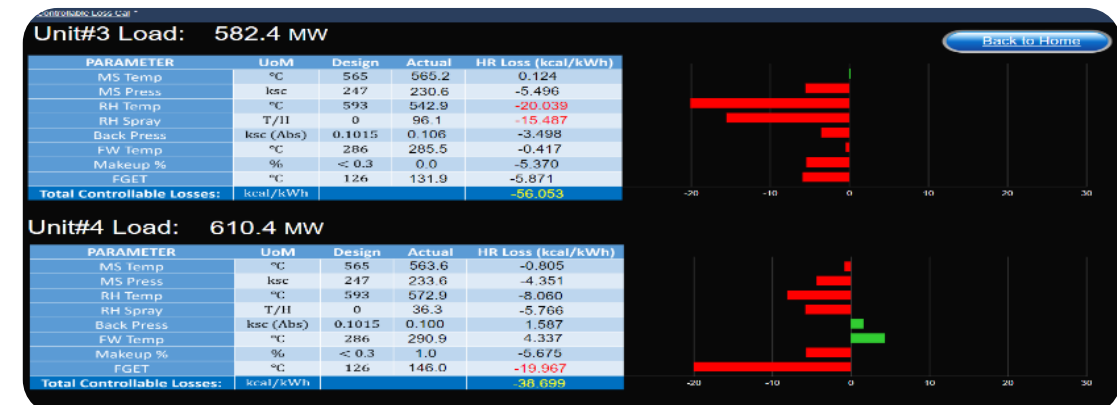
Process improvement through critical Parameters Tracking



Reliability improvement through Boiler Metal Temp Excursion Monitoring



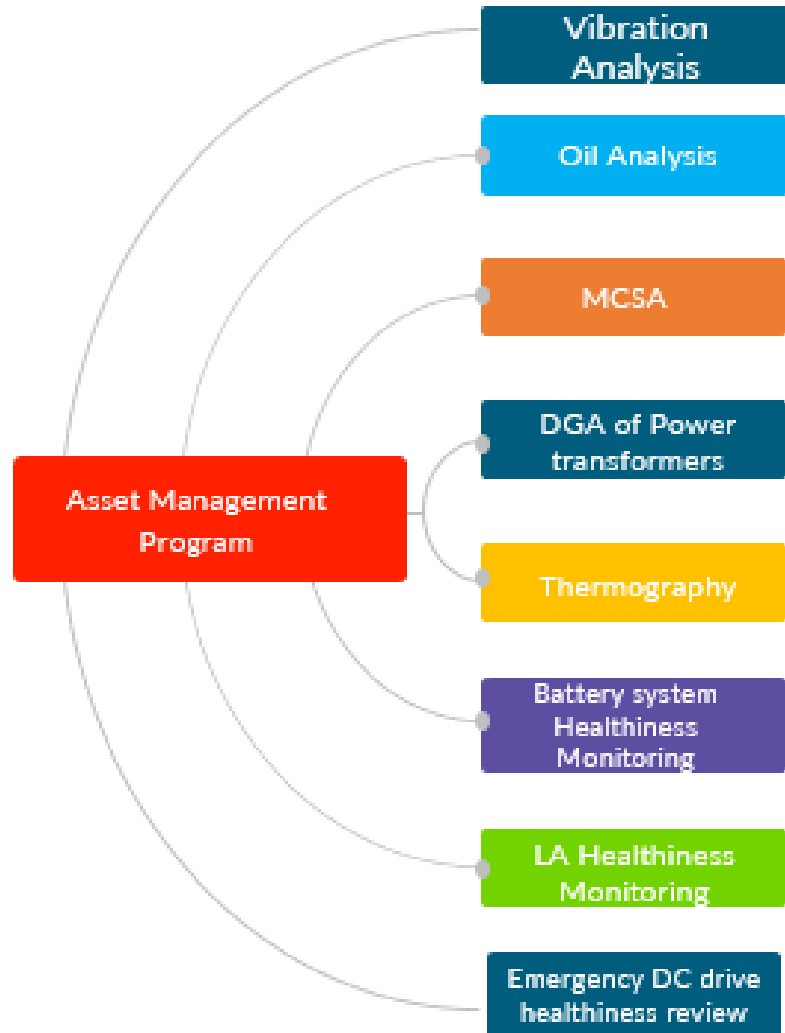
Reduction in Aux Power Cons through SEUs & HT equipments cons monitoring



Heat Rate improvement through real time Turb & Boiler Loss deviation Analysis

Best Practices : Asset Optimization

Best Maintenance Practices:



Remote Breaker Operation



NABL Accreditation for Coal Lab



Man-lifter Operation



Eco Friendly Solar Trolley System



QR Codes scanners in Switchgears



ARC Flash Suits

Best Practices: Afforestation

GREEN OPGC

- The Green belt covers 34.73% against the statutory requirement of 33%
- OPGC has developed more than 200 acres of green belt which is additional to the 225 acres natural forest inside the plant (mostly sal tree).
- Strategically chosen species like neem, Bakul, teak, arjun, Kadamb, Karanja etc. for plantation
- OPGC also distributes ~1000 hybrid mango saplings per year for developing afforestation in the community

NATURAL FOREST



GREEN TOWNSHIP



Hybrid mango sapling distribution to nearby community



Plantation on Environment Day-2022



Plantation by school students

Teamwork & Employee involvement :

Excellence Awards



Appreciation by D(O) to school children



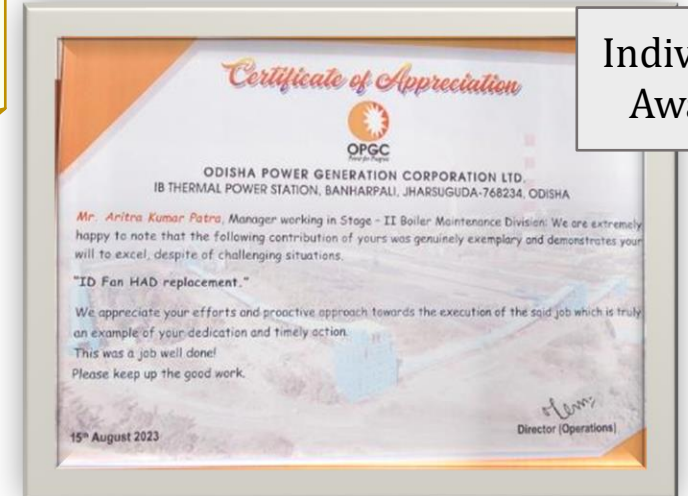
Water supply to nearby Village



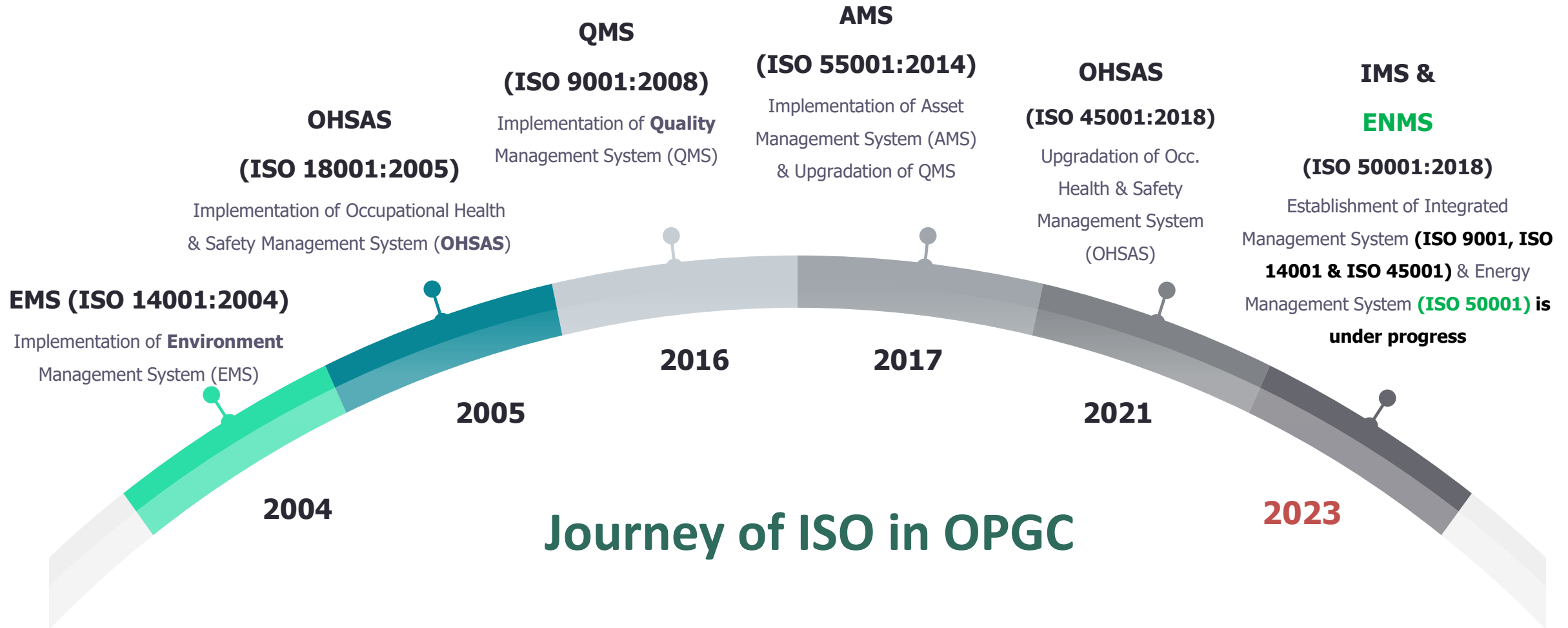
Tool box talk to contract Employee



Individual Awards



Implementation of ISO:



1st Verification Audit for ENMS (ISO 50001:2018) by 3rd Party completed in Aug 2023.
2nd Stage Audit is scheduled from in Oct-2023

Energy Conservation Week:



EC Awareness to School Students



Quiz Competition



Drawing Competitions



Winners



EC Awareness to Township Ladies

Major Achievements : Awards & Accolades



**ET Energy Leadership Awards:2023
(CEO of the Year)**



**Power Generation Company of the
Year Award: 2023**



Energy Conservation Award 2022

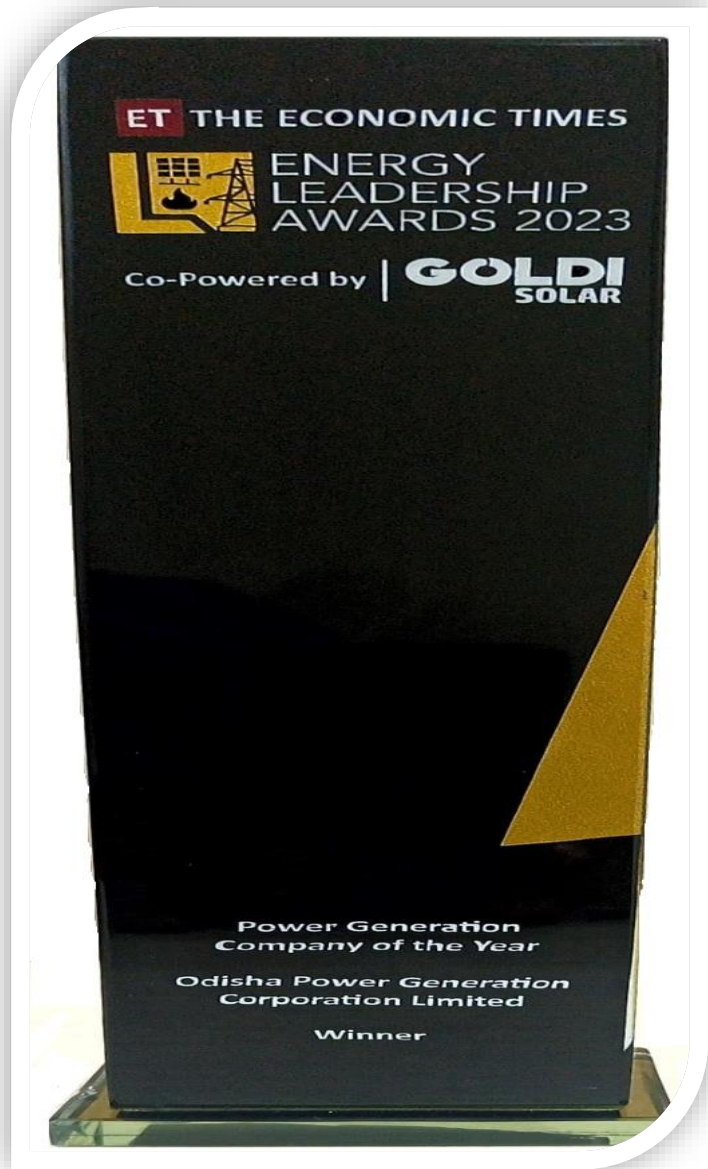


International British Safety Award 2023



Electrical Safety Awards 2023

Awards & Accolades



Thank You
THANK YOU

Sudhakar Swain (Plant Head): sudhakar.swain@opgc.co.in

Madhumita Soren (Energy Manager): madhumita.sore@opgc.co.in

Pravupada Acharya : pravupada.acharya@opgc.co.in

Braja Kishore Das: braja.das@opgc.co.in



AGENDA

Company Profile	1		2	Energy Consumption Overview
Energy Benchmarking	3		4	Roadmap FY24
ENCON Projects Summary FY 20-23	5		6	ENCON Projects FY 22-23
Renewable Energy	7		8	Innovation
Environment Management	9		10	Best Practices
Teamwork, Employee Involvement & Monitoring	11		12	Implementation of ISO / EMS Certification
Awards & Recognitions	13		14	Major Achievements