



NTPC Ramagundam



## NTPC Ramagundam (an ISO 50001 Certified station)

### Our Mission:

*‘To Provide Reliable Power & related solutions in an Economical, Efficient & Environment friendly manners driven by Innovations & Agility’*



### EnMS Objectives:

*Providing the solutions for generating Efficient, Economical and Environment friendly Power with Operational Excellence through Systematic practices of Monitoring, Analysis and employing innovation Techniques*

Presentation Team: S. N. SWAIN, M.VAMSI KRISHNA & R HARISH (EnMS team)



# Profile: NTPC Ramagundam



Installed Capacity Configuration		
Capacity	No of units	Total Capacity
200 MW	3	600 MW
500 MW	4	2000 MW
10 MW Solar PV	1	10 MW
100 MW Floating Solar PV	1	100 MW
<b>Total Installed Capacity</b>	<b>2710 MW</b>	

**Upcoming Projects Capacity addition:**  
**Capacity: 1600 MW (2x800 MW)**  
**Unit-1 Trail Run completed**  
**&**  
**Unit-2 COD by Nov' 23**

**Renewable energy future Plans:**

- Addition of Solar : 170 MW Capacity
- BESS: 40MWh / 10MW capacity Li-ion BESS COD by March 2025
- Net Zero Township & 3TPD waste to charcoal plant

NTPC Ramagundam is firmly guided by its philosophy of

- Core business of power generation is intricately intertwined with **social and environmental growth**.
- Generating reliable energy at **competitive prices in a sustained manner**.
- Employing a mix of energy sources using innovative & eco-friendly technologies.



**The Brighter Plan 2032**

- Green Environment
- Enriched life
- Waste minimization
- Circular Economy
- Total Safety
- Diversity and Inclusion
- Operational Excellence



# PERFORMANCE FY 22-23

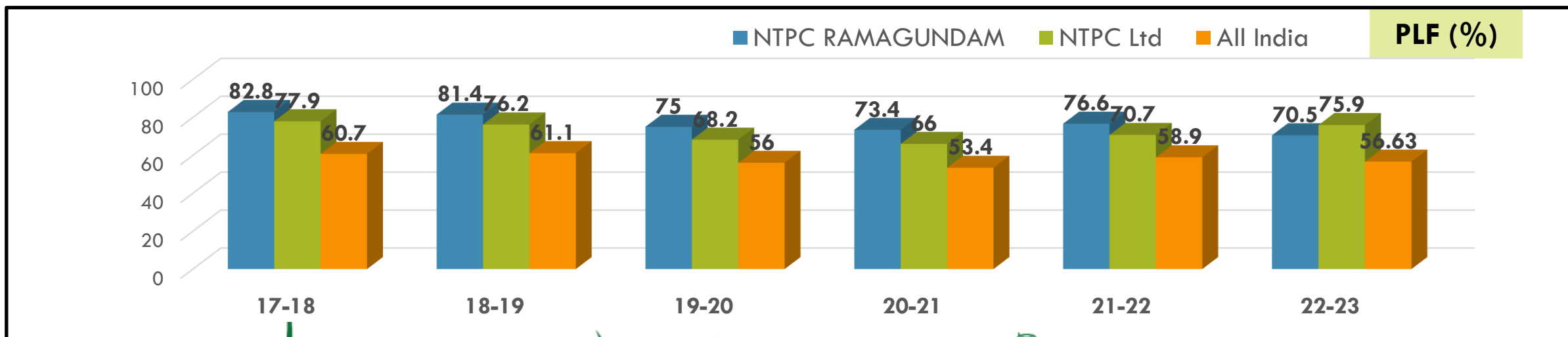
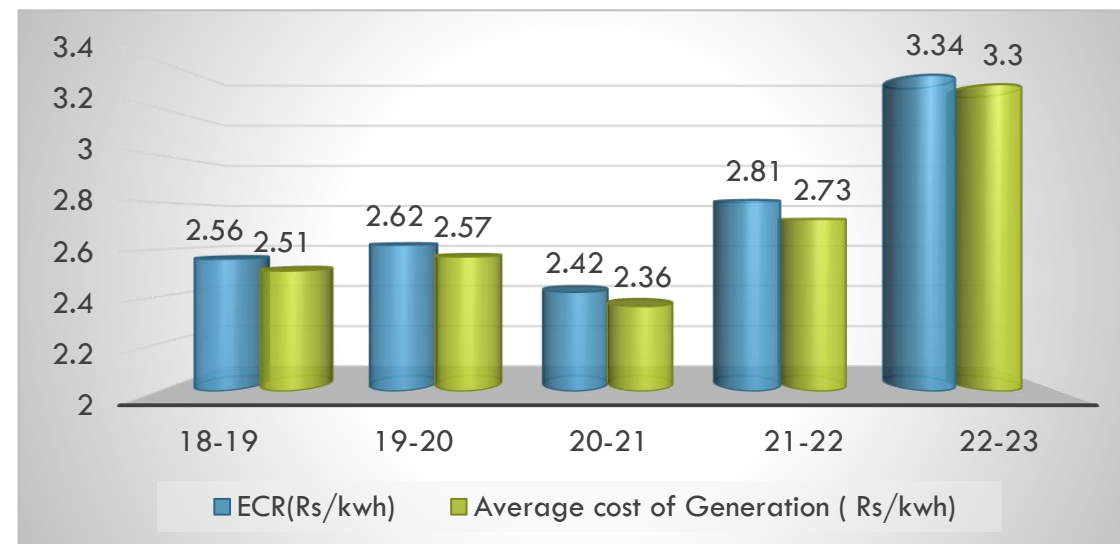
S No	PARAMETER	UNIT	FY 2022-23	
			TARGET	ACHIEVED
1	Generation	MU	15600	16059
2	PLF	%	68.49	70.51
3	Declared Capacity	%	85.00	85.73
4	APC	%	6.88	7.17
5	Sp. Oil Cons.	ml/kwhr	0.50	0.49
6	Heat Rate	KCal/kWh	2399	2337
7	Boiler Efficiencies	%	86.6	86.85
8	Turbine Heat Rate	KCal/kWh	2077	2030
9	Net Heat Rate	KCal/kWh	2576	2517
9	Raw Water Consumption	Ltr/kWh	3.5	3.25
10	DM Water Consumption	Ltr/kWh	0.07	0.068



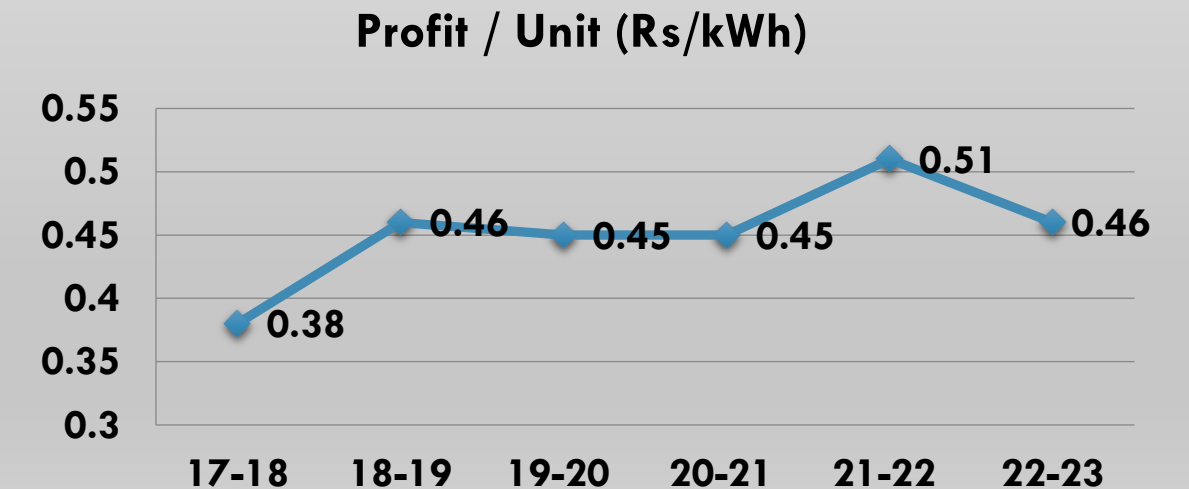
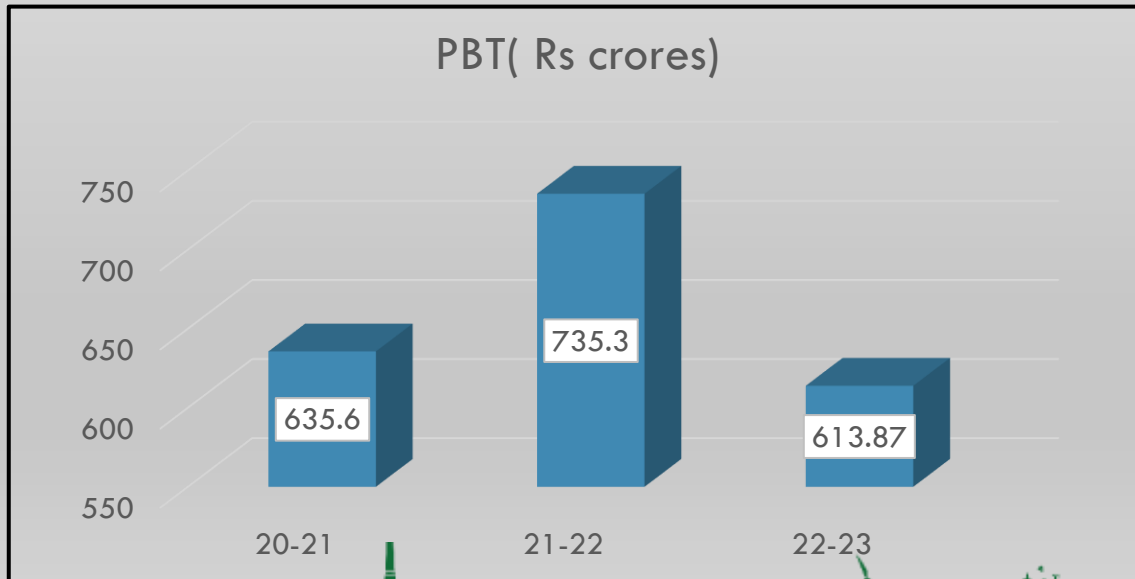
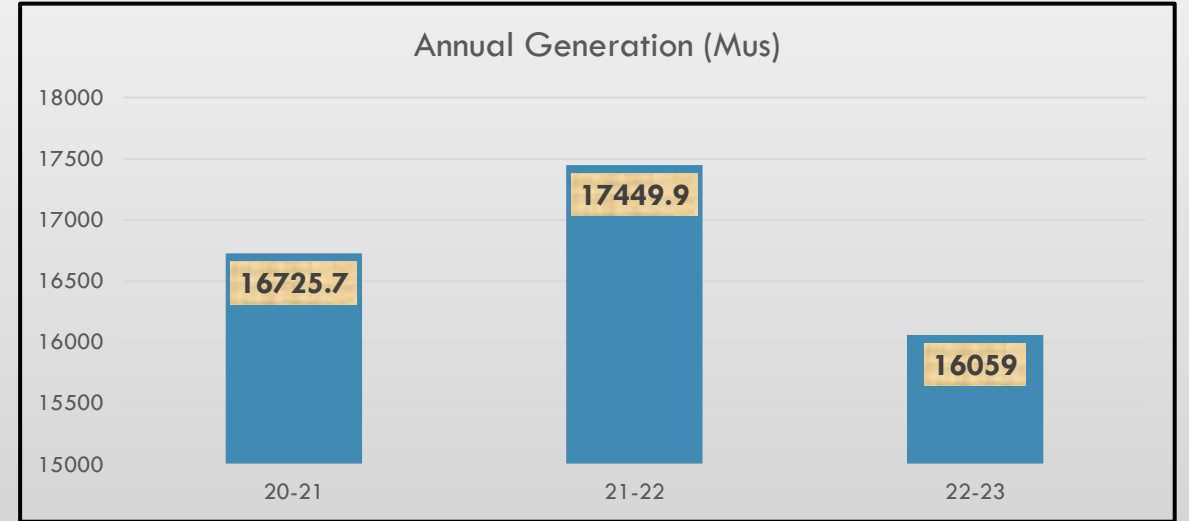
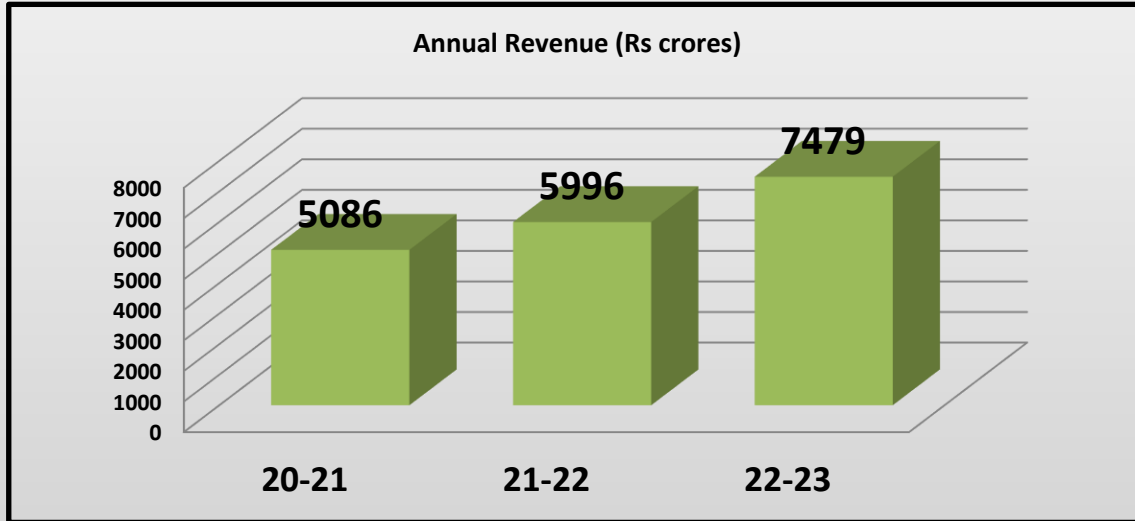


# OPERATIONAL PERFORMANCE

		₹ Crore	
S.N	OPERATION PROFITABILITY	FY 21-22	FY 22-23
1	Marginal Contribution aftr sharing	63.42	24.68
2	Gains due to sharing of SCED	5.93	6.11
3	Net DSM Gain	3.78	19.14
4	SG Incentive	3.62	6.21
5	RRAS	7.82	12.32
7	DAM, RTM & AGC Gains	1.24	13.27
8	O&M Cost	50.24	56.56
9	<b>TOTAL</b>	<b>136.05</b>	<b>138.29</b>



# FINANCIAL PERFORMANCE

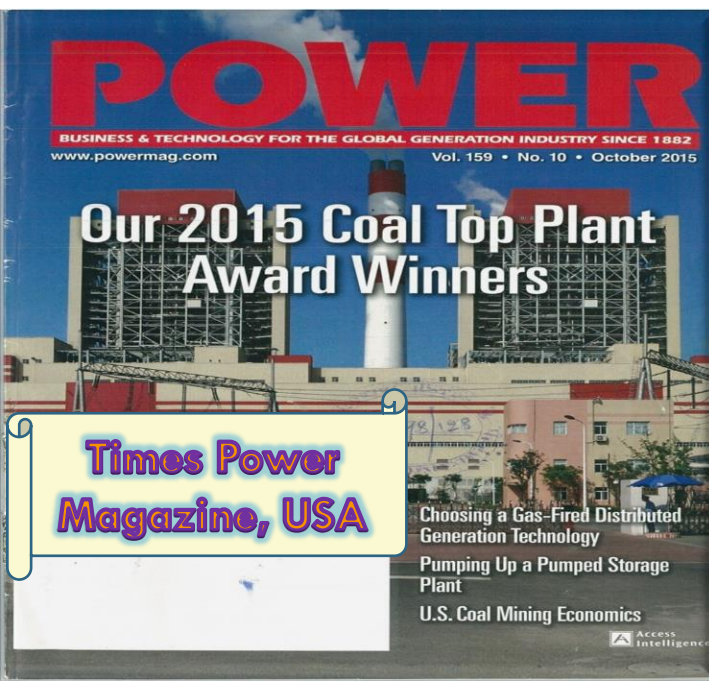
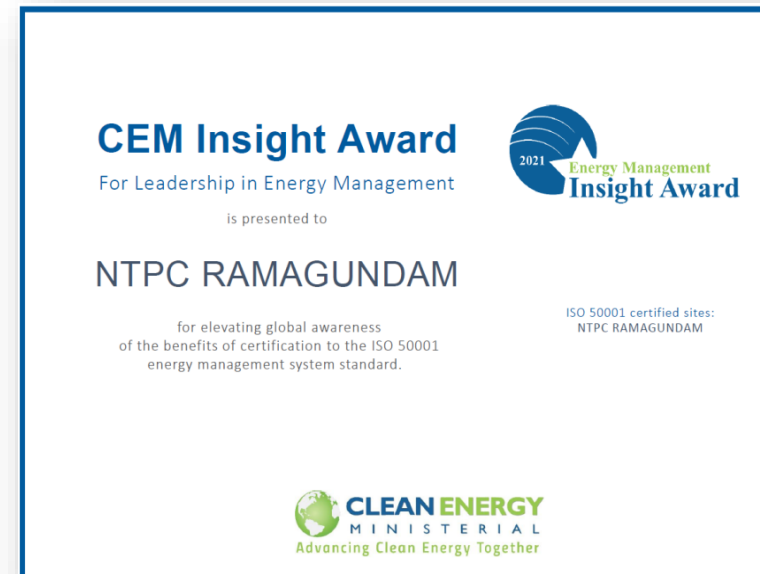


# NTPC Ramagundam – Global footprint



*NTPC Ramagundam received the Energy Management Insight Award for 2021 from the international Clean Energy Ministerial (CEM) forum under Department of Energy, United Nation Industrial Development Organization.*

*“This award recognizes organizations that have implemented energy management systems to achieve energy, economic, and sustainability benefits”*



*NTPC Ramagundam received POWER MAGAZINE Award, USA. This award recognizes diverse state-of-the-art technologies to address both unique and global challenges towards climates and economic environments*

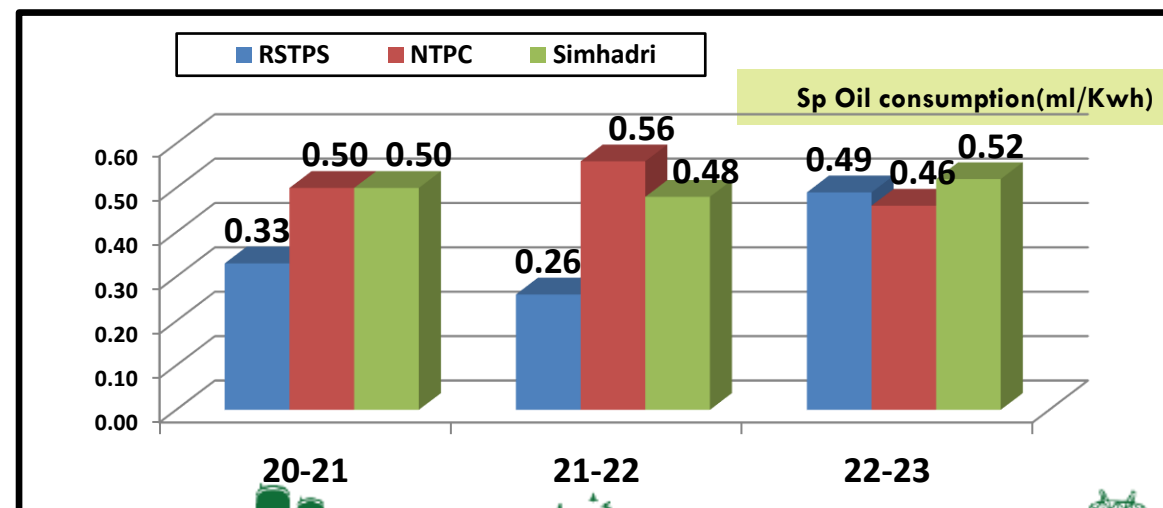
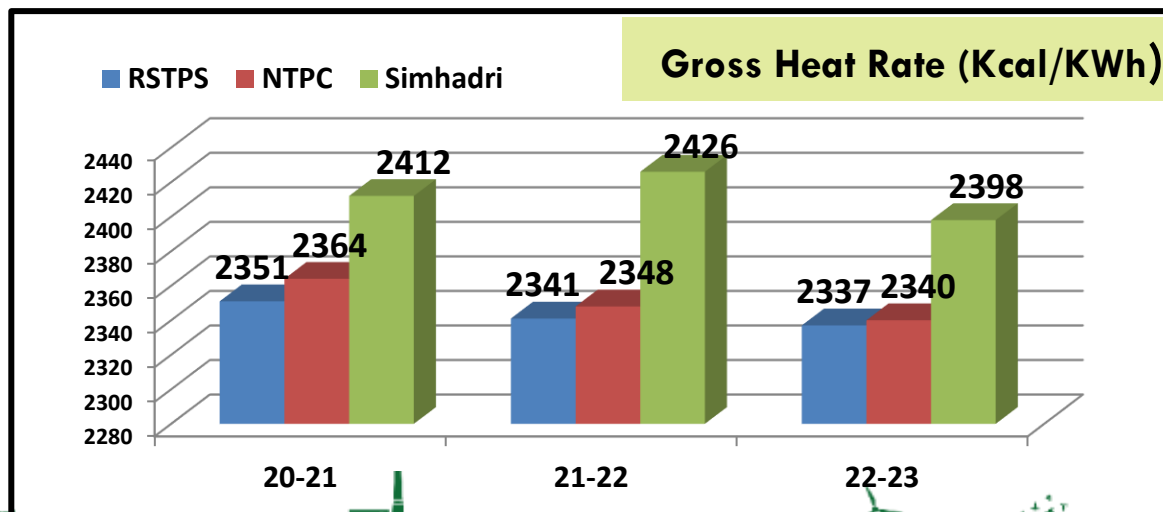
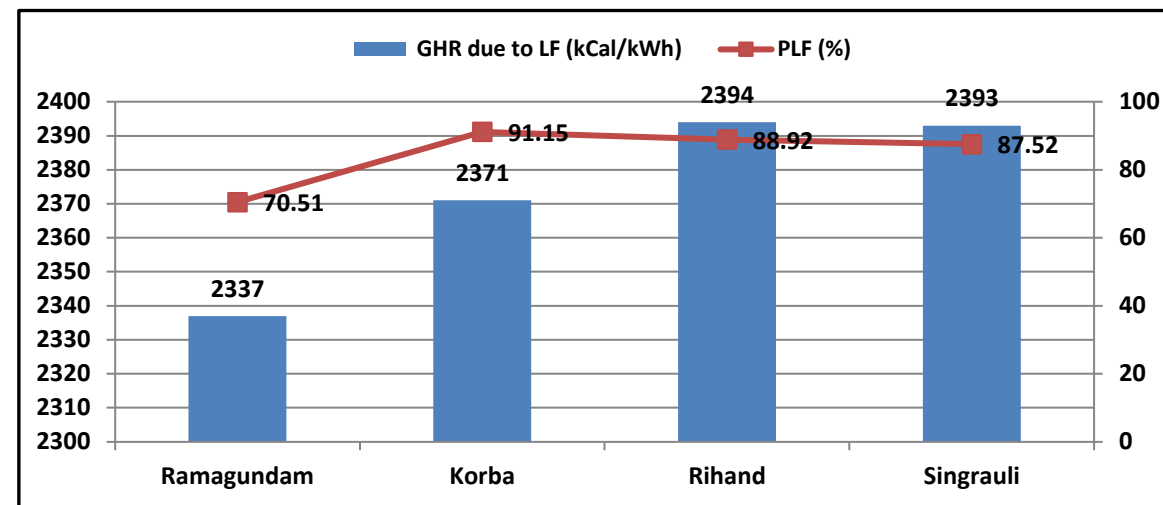
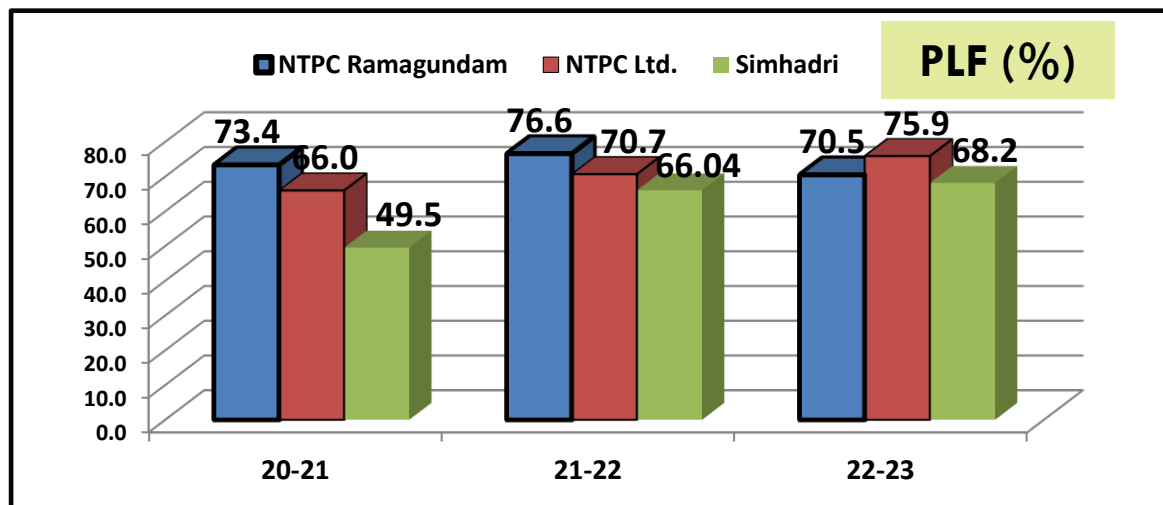
*“For nearly four decades this plant has been essential power provider as it had added capacity over the years. Even as the plant ages, it has been setting new performance records thanks to technological & environmental upgrades”*



# Information on Competitors, National benchmark



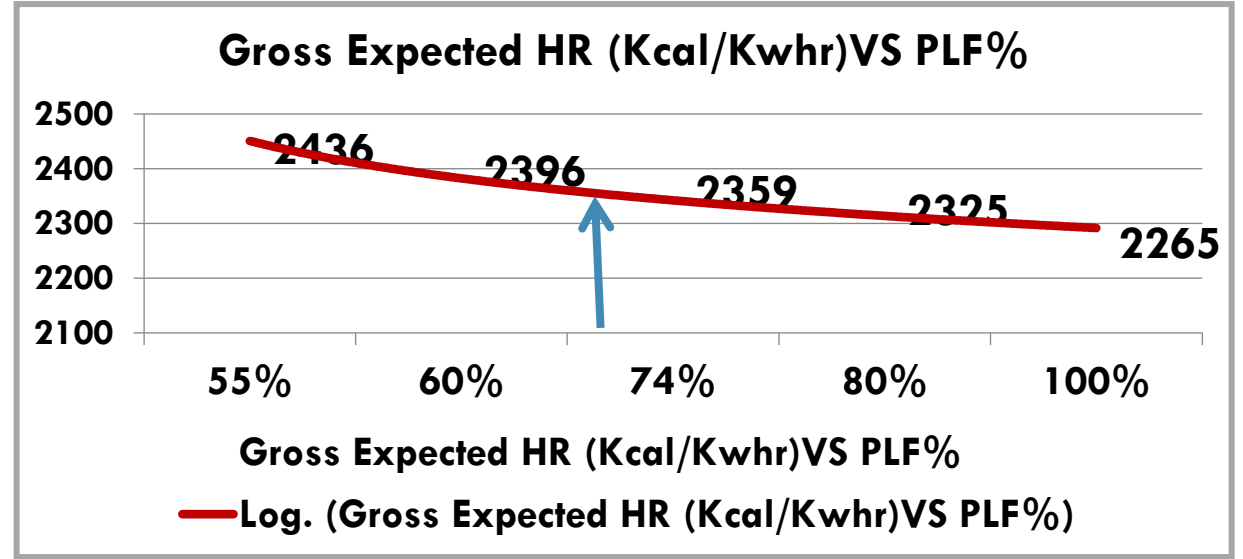
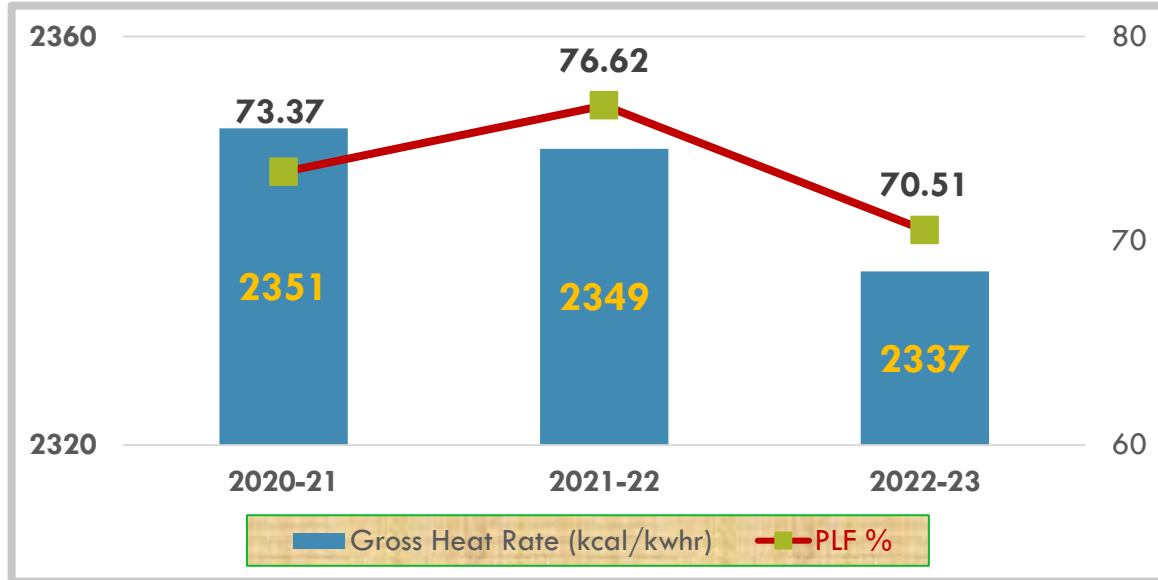
**NTPC Ramagundam (RSTPS) has been the best performing station amongst its internal peers over the years**





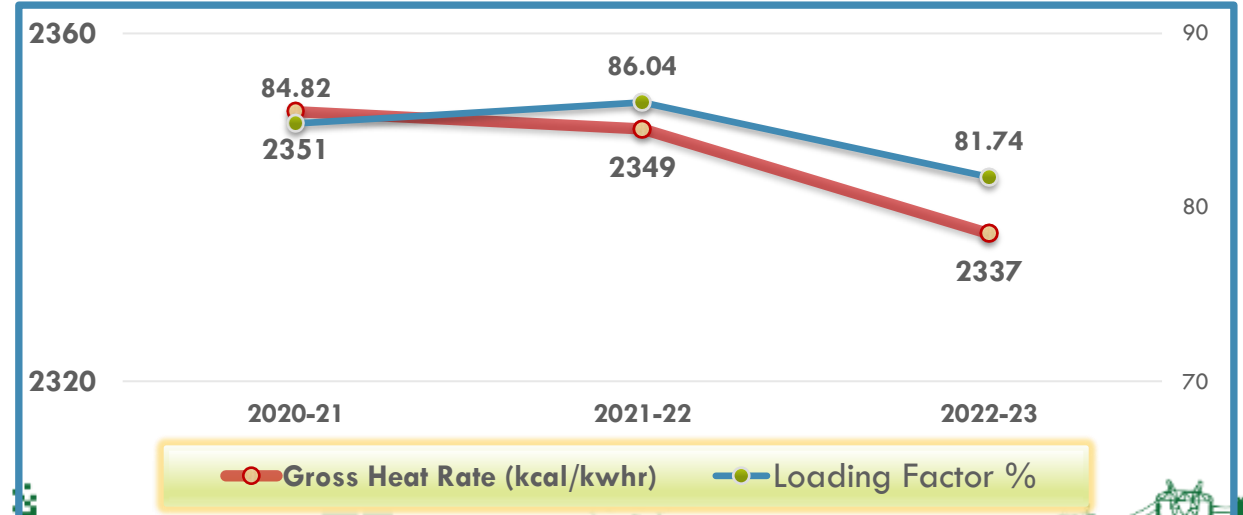
# Specific Energy Consumption – Last 3 years

Gross Heat rate (GHR): CERC Norms for RSTPS: 2399 kcal/Kwhr



## Remarks:

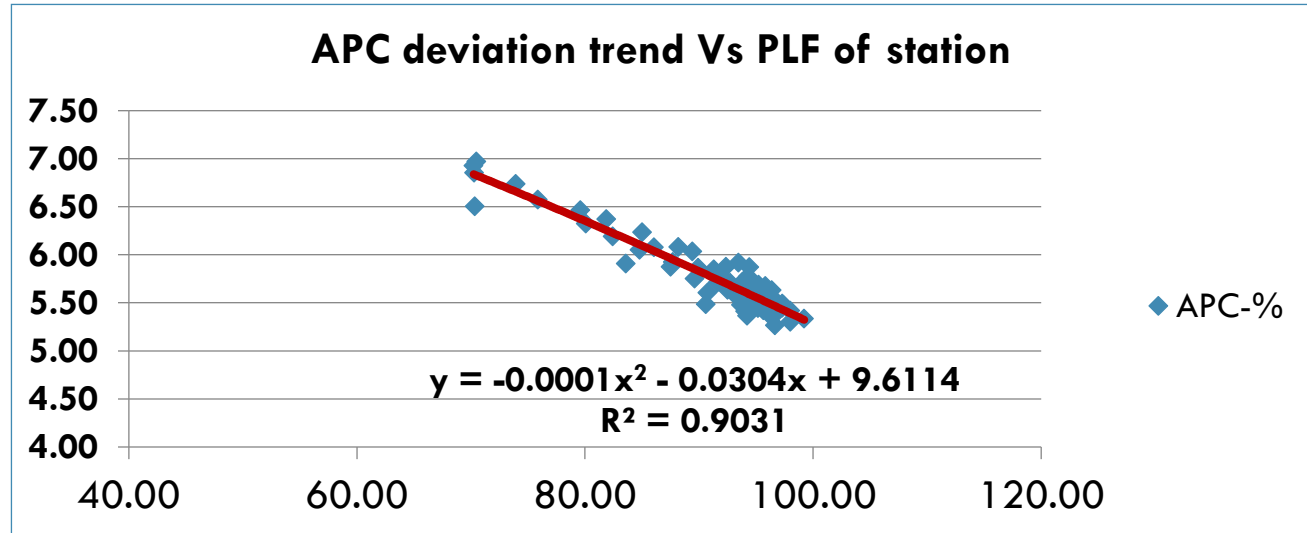
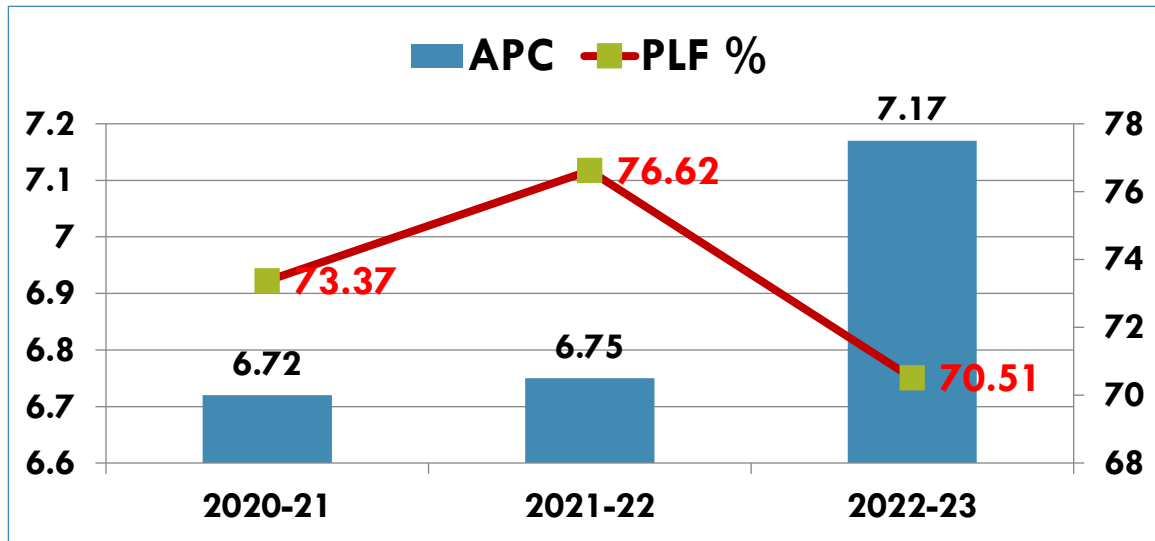
- Improvement in GHR is mainly due to Implementation of HR improvement action plan through R&M of Unit#1,2 & 3 turbine in FY 22-23
- Major impact of Unit-2 shall come in FY 2023-24
- The gross HR at the given PLF is in line of Manufacturer curve





# Specific Energy Consumption – Last 3 years

Auxiliary Power Consumption (APC) CERC Norms for RSTPS: APC of 6.88%



- APC of the station (7.17%) has marginally higher than PY (6.75%) because of RSD,ESP R&M works and U6 over due for OH draft power increased by 2.9 MW
- However at PLF of 70.51% the APC is less than compensated APC of 7.53%

## Actions taken for improvement:

- Unit 6 major Duct works completed during OH in June 2023. APC reduction of 3.0 MW noticed
- U4/3 OH is planned in Oct-Dec 2023. Expected draft power reduction by 4.5 MW



# Roadmap to achieve benchmark

Action Plan Proposed	UHR improvement (Kcal/Kwhr)	Station HR Improvement (Kcal/Kwhr)			Heat Rate Improvement Action plan Roadmap	
		2022-23	2023-24	2024-25	2022-23	2023-24
U#3 Mega R&M (Turbine upgradn)	189				Completed in Dec 21.	
U#2 Mega R&M (Turbine upgradn)	50	3.85			Completed in FEB 2023	
U#1 Mega R&M, Blr OH & Chem cleaning	50	3.85			Completed in May 2022	
Augmentation of LP Economizer in one Stage-I unit. Expected Temp reduction by 15-20 deg C	15			1.15		Under SG R&M: package under approval. For one unit.
Unit 7 BLR annual OH with NOX modification works	8	1.54			Completed in Aug'22	
Unit 5 Overhauling (Boiler, LP/IP Turbine)	25	4.81			Completed in Jan'23	
Unit 6 Overhauling (Boiler, HP/IP Turbine)	24		4.61			Completed in Jun'23
Unit 4 Overhauling (Boiler, Generator)	24		4.61			OCT-23
Unit 3 Overhauling (Boiler)	12		0.92			Nov-23
<b>Total HR Improvement</b>		<b>18.86</b>	<b>10.14</b>			



# MAJOR ENCON PROJECT PLANNED IN 23-24

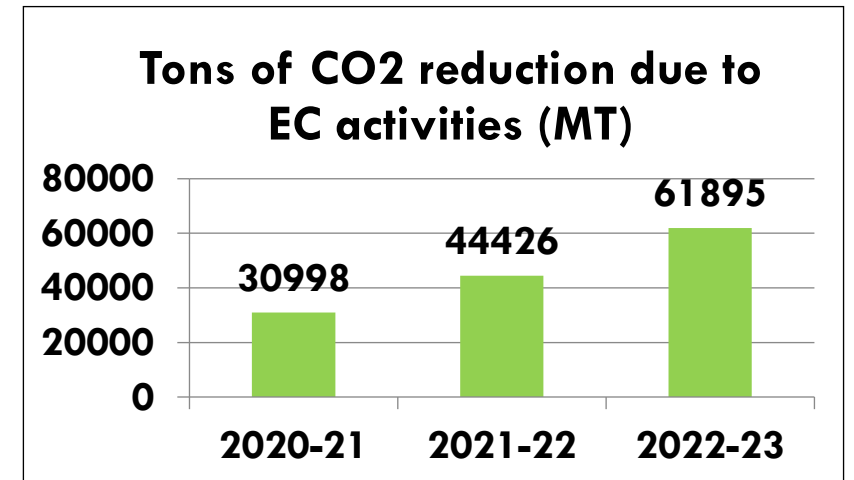
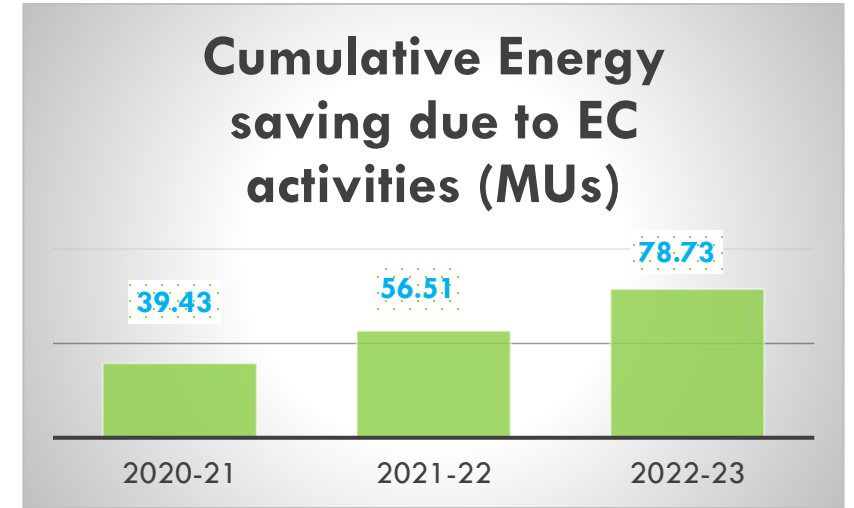
S.N	Particulars	Investment (Rs in Million)	Annual Electrical Savings (Million kWh)	Payback Prd (Yrs)	Target Date
1	Reduction in draft power consumption after overhauling of Unit-6,4 & Unit-3	OH	30.32	--	Unit-6 Completed (June-23) Unit-4 in Oct'23 & Unit-3 (Nov'23)
2	Replacement of Township conventional electrical fittings with energy efficient equipment	15.2	3.97	1.5	Feb-24
3	Installation of Soft starters for CT Fans in Stage II Units	3	1.3	0.9	Completed . May-23
4	Installation of Soft Starters for Stage-2 Bottom ash series pumps (8 PUMPS)	3.26	0.73	1.7	Sep-23
5	Installation of VFD in ID Fan motors of 1 units of 500 MW	30	3.8	2.5	Completed . June-23

**Total Expected Energy Saving due to ENCON PROJECT in 2023-24 : 40.12 Mus**



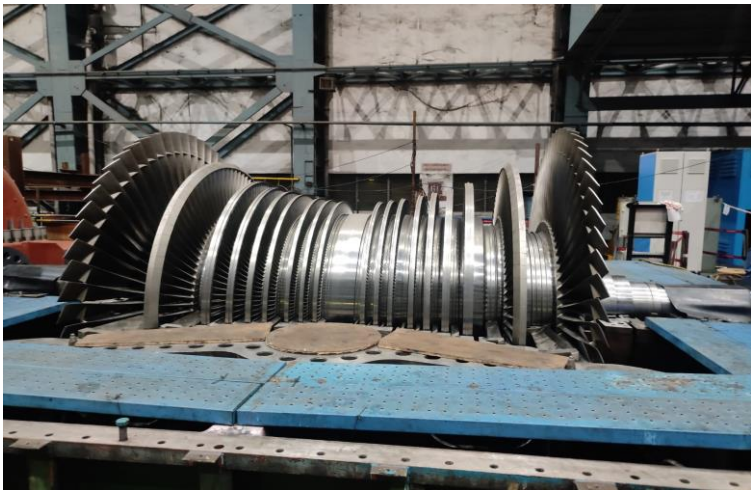
# Energy Saving projects implemented in last three years

FY	No. of Proposal	Investment (In Rs. Millions)	Electrical Savings (in MUs)	Savings (In Rs. Millions)	Payback Year
20-21	8	58.5	11.2	27.12	2.16
21-22	8	36.05	18.8	52.65	0.68
22-23	9	44.13	22.22	74.43	0.60





# Energy Efficiency Project: STAGE-1 ( 3 X 200 MW Units ) TURBINE UPGRADATION AFTER AGING OF 40 YEARS OF OPERATION



PARTICULARS	STAGE-1 R&M	
	BEFORE R & M	AFTER R & M
Capacity (MW)	200	210
Boiler Efficiency (%)	86%	86%
Turbine Heat Rate (kcal/kwh)	2165	1935
Unit Heat Rate (kcal/kwh)	2518	2250
Coal Factor (kg/kwh)	0.662	0.592
Coal Cons (MT/Hr.)	132.4	118.4
Per Year Coal Consumption at 70% PLF (MT)	811876	726028
Per year saving in Coal Consumption (MT)	85848	
Landed Cost of Coal	Rs 4904/MT	
Saving in Fuel Cost PA per each Unit	36 Crores	
For All 3 Units	106.8 crores	
CO2 emission Reduction MT/Year	2.2 Lakhs MT/Year	



## Flexibilization

- Pilot study in association with Denmark Energy Agency Team for flexibilization of one of 500 MW units up to 40% of MCR without oil support.
- Units are being operated with Flexibilization with 1% Ramp Rate and study is going on for achieving 3% Ramp rate.
- AI based State variable control is incorporated in place of conventional PID. For preventing Metal Temperature excursion
- TDBFP R/C valve modification for smooth Drum level control
- 40MWh/10MW BESS and 100 MW floating solar power will be used for bundling of thermal power.

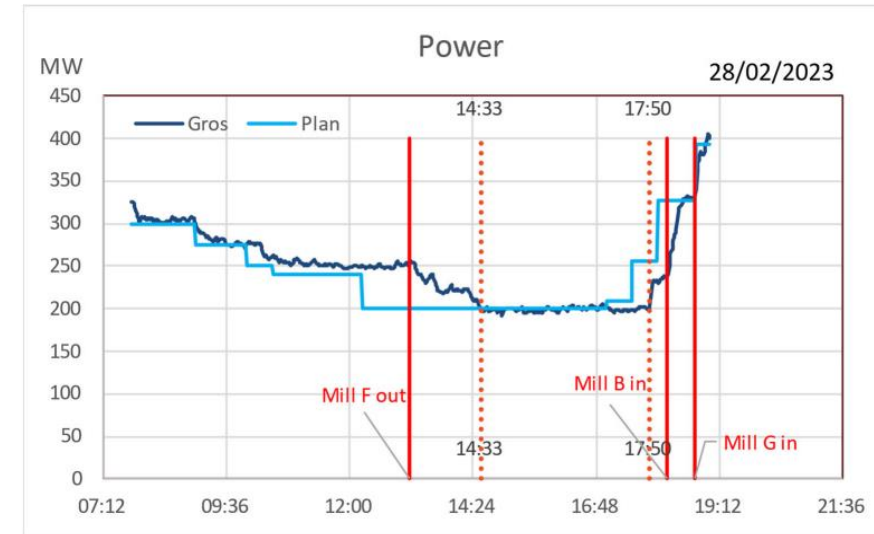
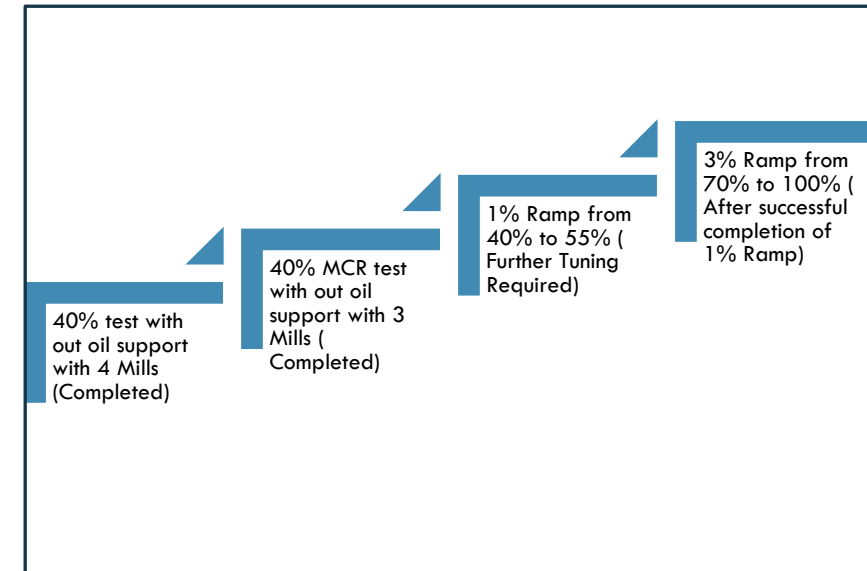
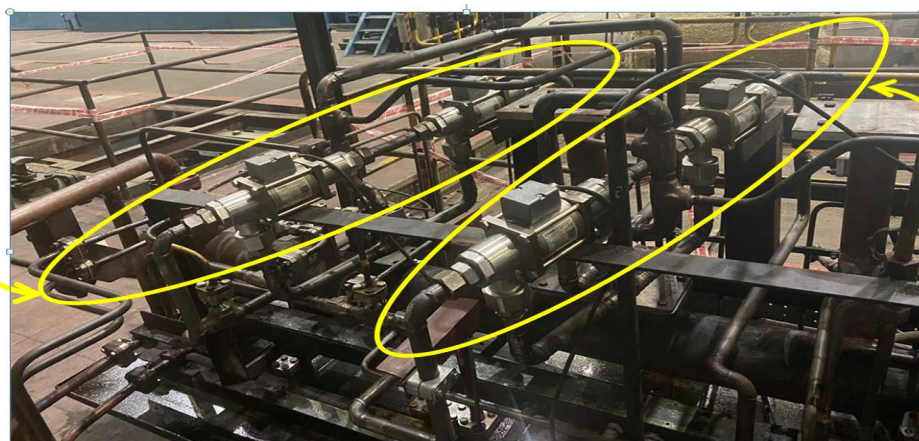


Figure 1. Load progress 1<sup>st</sup> test day.



## Problems Faced

1. Boiler Tripping on Reheater protection during Turbine Trip
2. Due to Delayed opening of LPBP due to Governing mechanism



2 solenoids for LPBP SV/CV-02

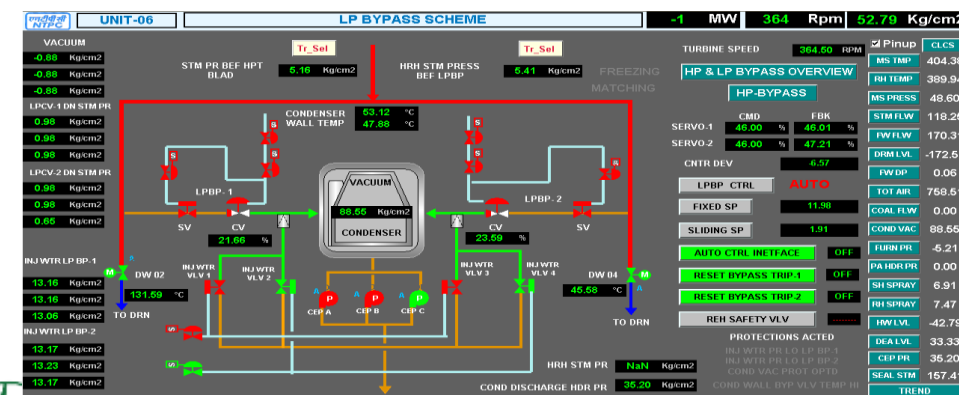
2 solenoids for LPBP SV/CV-01

## Results Achieved:

1. LPBP improved response avoided Boiler tripping on Reheater Protection
2. Saving of oil consumption around 40 KL for each trip. Monetary Gain of 32 Lakhs for unit outage on Case to Case basis

## LPBP R&M

1. LPBP EHC governor replacement with proportional valve
2. Local mechanical protections: Low Vacuum, Spray Water injection pressure shifted to DDCMIS
3. Enhanced field monitoring for LPBP downstream pressure transmitters (6 No's), injection water pressure transmitters (6 no's), Vacuum transmitters (3 no's)
4. Independent operation of both LPBP valves





# Digital Initiatives: In house Developed Performance Monitoring APP

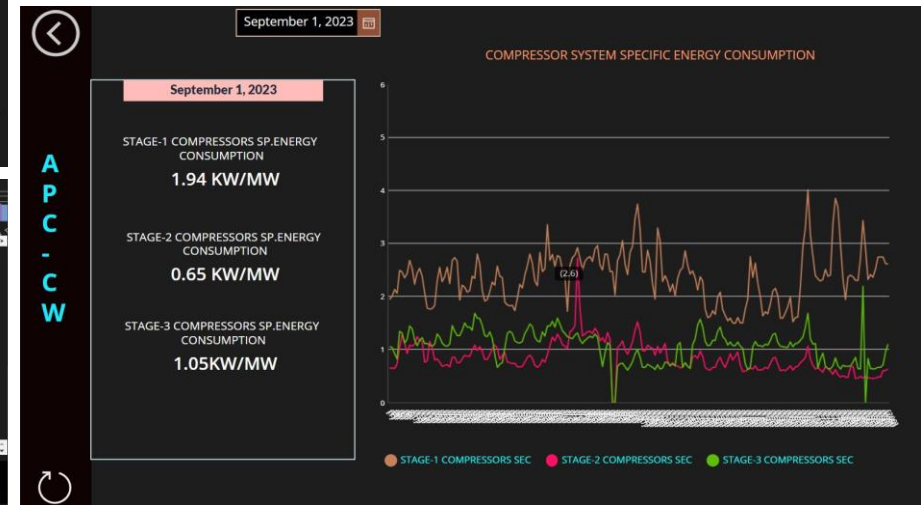


- Station Auxiliary Power Consumption monitoring through in house developed dashboard.

- Automated Alerts to the concerned Maintenance Team in case of Excess Power consumption & Suggested corrective Action Message

- It will Guide the Operator to operate efficient Drive during Normal operation especially during Start up & Shutdowns

- Will help in trending of Equipment performance for taking corrective Actions





# Digital Initiatives: Boiler Health Monitoring App



Boiler Health Application

Current user: rdmu7  
[Logout](#)

Mode:

Basic  Detailed

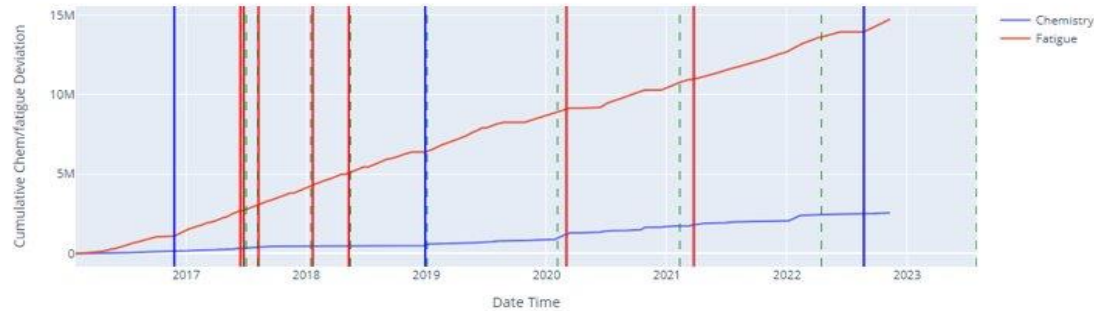
Next Predicted Chemistry BTL date: 31/07/2023

Current per day health consumption:0.1863

Desired per day health consumption:0.0671

MS TEMP SD L: 5.49 MS TEMP SD R:4.38

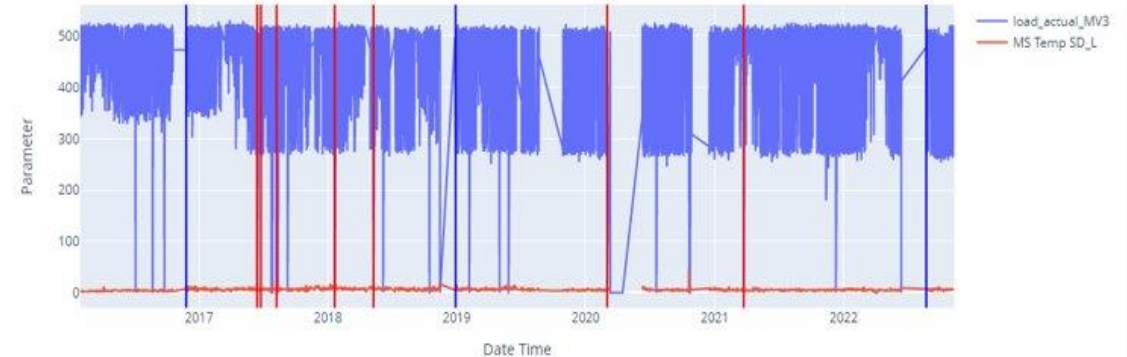
Cumulative Chemistry/fatigue Parameters Deviation



BTL-Red,Overhauling-Blue, Predicted BTL- Dash green lines

- PH Boiler Water
- Chloride Boiler Water
- Cation Conductivity Condensate
- Sodium Condensate
- DO Condensate
- CATION CONDUCTIVITY MAIN STEAM
- Sodium Main Steam
- Cat ion conductivity
- BOILER LOAD INDEX
- Drum pressure
- MS TEMP AT ESV (L)
- load\_actual\_MV3
- Specific Coal
- Fatigue DP
- Fatigue Temp
- Fatigue SH spray
- PH Lower Diff%
- PH Upper Diff%
- DO Diff%
- CATCONMS Diff%
- CATION Diff%
- CLBW Diff%
- SODCON Diff%
- CATCON Diff%
- MS TEMP AT SH O/L-R L
- MS Temp SD L
- fatigue MS Temp SD L
- MS Temp SD R
- fatigue MS Temp SD R

Chemistry Parameters



- Unit-7 Boiler Health monitoring app was developed to assess the life of Boiler and Tube leakage prediction.
- The App deploys unit operating, chemical parameters and AI model to assess the Life consumption of Boiler.



# Environmental Management- Ash Utilization



- Use of Fine Fly Ash for Geo polymer concrete for road & building construction
- Bottom ash as replacement of sand in Mine Stowing, Ash Dyke Raising, Ash Bricks Utilisation
- National Highway construction
- Ensuring Dry Ash system availability. Dry Ash Utilization has increased from 30% to 50%.
- Customer meets & Industry visits for increased customer base.



## Best Practice of NTPC Ramagundam

Fly Ash Geo polymer road construction at RSTPS



Dry Ash supply Rake Loading System



Value added products (Aggregates) from fly ash at RSTPS)





## Environment Management Project: Geo Polymer Aggregate from fly ash



Developed geo-polymer coarse aggregates using 90% fly ash content as a replacement to natural aggregates for use in building construction.

Technical parameters of the newly developed substance was tested & accepted by the **National Council for Cement and Building Materials (NCCBM)**.

**Geo Polymer coarse aggregates:** With the aim of increasing utilization of Fly Ash & reducing stress in Ash Dyke, the concept of developing

**Value added products (Aggregates) from fly ash at RSTPS)**

Sh. Ramesh Babu V, Dir(O) Inaugurated GPC Model Bhavan: 12.12.2021



**Replicable for all Thermal power plant .**

### Advantages

- 1. Increases fly ash utilization and also saves the environment.**
- 2. Reduces requirement of land for ash pond.**
- 3. Reduces water consumption and Carbon Emission**
- 4. Helps in meeting the estimated demand of aggregates in a country to some extent.**



# Environmental Management-Emission

NTPC RSTPS supplied 60 LMT Ash for producing Fly Ash bricks in Last 5 years

In last 5 years, Saved 6 Lakh tons of coal Fired for producing Clay bricks

Avoided CO2 emission of 5.6 LMT

Saved Approx 660 acres from degradation of soil by producing Fly Ash bricks instead of clay Bricks

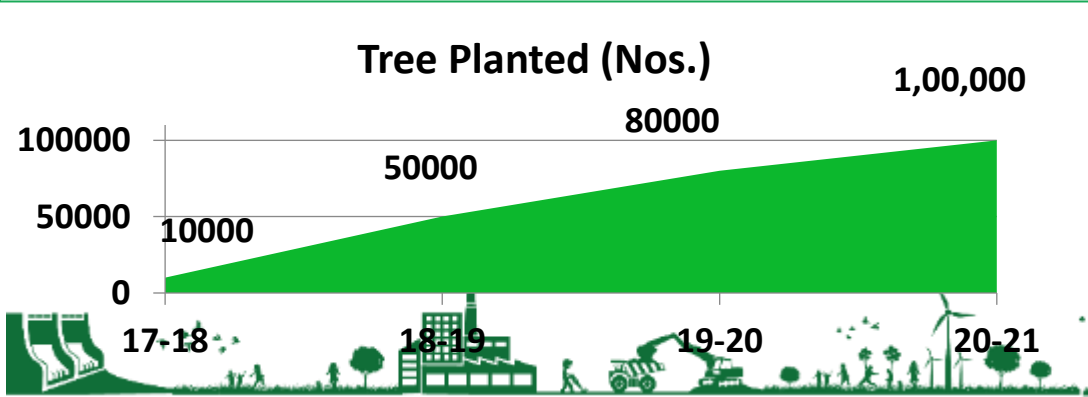
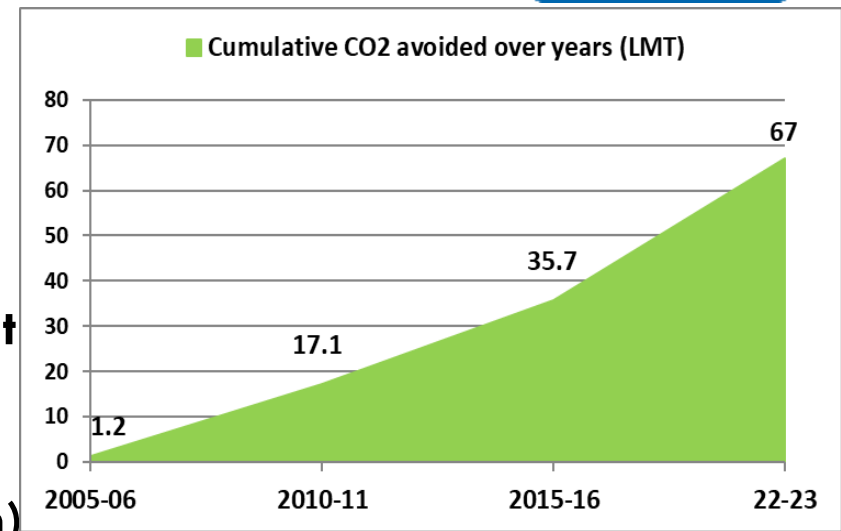




# Environmental Management-Emissions



- Ash Utilization > 100% for 5<sup>th</sup> consecutive year
- Mass Tree Plantation ~ 1 Lakh nos plantation done in FY 20-21
- CO2 emission reduction in last 18 years is approx 67 LMT
- Solid Waste Mgt: Bio Methanation Plant and Vermi composting unit
- Geo Tagging of all trees in plant and township
- Mini forest development using Miyawaki method(32500 plantation)
- ESP R&M of stage-1 units is completed and Stage-2 ESP R&M is in progress.
- Nox reduction: Combustion modification system St-III is completed & 3.5 MLD STP completed
- SOx reduction: FGD St-I & II, Awarded – Under implementation



# Environmental Management-Emission

## Absolute Emissions and Emission Intensities

Particulars	UOM	20-21	21-22	22-23
Total CO <sub>2</sub> Emissions Per kW of Generation	Ton/kW	0.000766	0.000773	0.000773
Current SO <sub>x</sub> Emissions at Full Load*	mg/Nm <sup>3</sup>	1393	1350	1341
Current NO <sub>x</sub> Emissions at Full Load*	mg/Nm <sup>3</sup>	440	409	401
Particulate Matter *	mg/Nm <sup>3</sup>	73	71	74
Mercury*	Mg/Nm <sup>3</sup>	0	0	0

## Current Emission Details

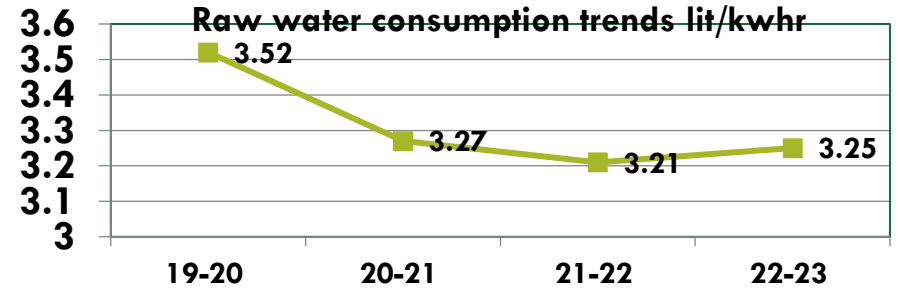
Parameters	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
SOX (mg/Nm <sup>3</sup> )	1610	1522	1541	1531	1621	1591	1430
NOX (mg/Nm <sup>3</sup> )	487	425	428	430	431	394	200
Opacity (mg/Nm <sup>3</sup> )	72	79	85	92	89	76	74

FGD under implementation and NOX modification of Stage-3 is completed.

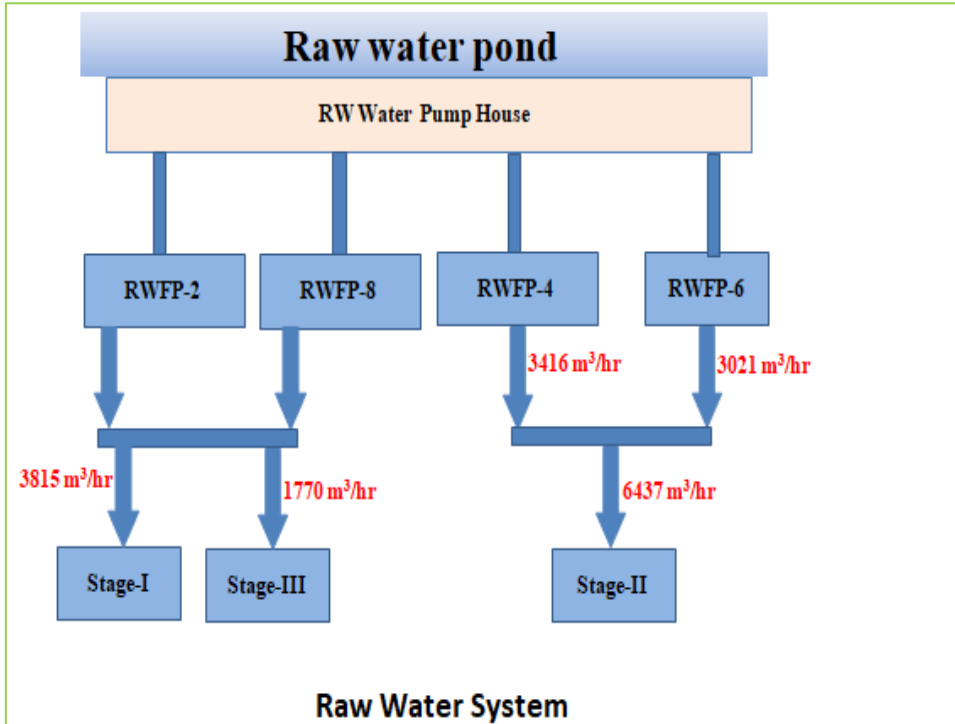


# Environmental Management- Water

DM water consumption (%)			Raw water consumption m <sup>3</sup> /mwhr		
20-21	21-22	22-23	20-21	21-22	22-23
0.82	0.87	0.85	3.27	3.21	3.25



**Plant has implemented Zero Liquid Discharge**



## Best Practices in Water Management

- i. Third Party Water Balance Audit completed in FY 22-23
- ii. Target Sp water consumption for FY 2023-24 is 3.0 lit/Kwhr against Regulatory norms of 3.5 m<sup>3</sup>/mwhr.
- iii. Water dashboard for monitoring of raw water intake to plants.
- iv. Use of Municipal sewage water through STP. 3.5LPD STP in place
- v. Township rain water harvesting (In use).
- vi. Bottom ash timing optimization based on monitoring leading to ash water ratio improvement.
- vii. Ash Water Recirculation system recovers 1500 m<sup>3</sup>/Hr water from Ash Pond.
- viii. Using AWRS water for Coal pile spray System. Additional water Ring provided

## Green Energy Project : 100 MW Floating Solar PV Plant



Capacity: 100 MW  
Water surface Area :450 acres on water reservoir  
Project cost: 423 Cr

*Dedicated to the nation by Hon'ble PM  
Sh. Narendra Modi on 30.07.2022.*

➤ The cost of generation from Solar PV plant is **competitive** & helping in replacing thermal power under **Gol flexibilization scheme**.

➤ 100-MW Floating Solar project at Ramagundam, **Largest in the segment** in the country, is endowed with **advance technology** as well as environment friendly features.

### Benefits:

- **Total Generation till Aug'23: 272 MUs (CUF: 20.34%),**
- **Water Evaporation reduction : 1.1 million m<sup>3</sup> per year**
- **2 LMT CO<sub>2</sub> emission neutralization per year**
- **Better efficiency due to cooling water effect of water underneath**



**Replicable for all Thermal power plants  
having Water Bodies**





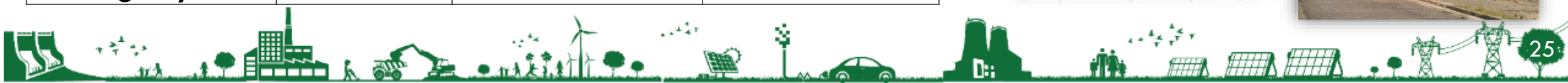
# Utilization of renewable energy sources



FY	Technology	Type of energy	Onsite/ offsite	IC (kw)	Gen. (MUs)	% of Electrical Energy used
20-21	PV Plates	Solar	Onsite	10135	14.3	1.27
21-22	PV Plates	Solar	Onsite	90135	34.89	1.10
22-23	PV Plates	Solar	Onsite	90135	32.4	1.04



Upcoming Renewable Energy Projects			
Name of Project & Location	Project Capacity	Investment made (Rs Million)	Expected Power generation year
Additional 50 MW Floating Solar PV plant on water reservoir & 120 MW Land	170 MW	Under plan	2024-25
Battery energy Storage System	40MWh/10 MW capacity Li-ion BESS	Under plan	2024-25

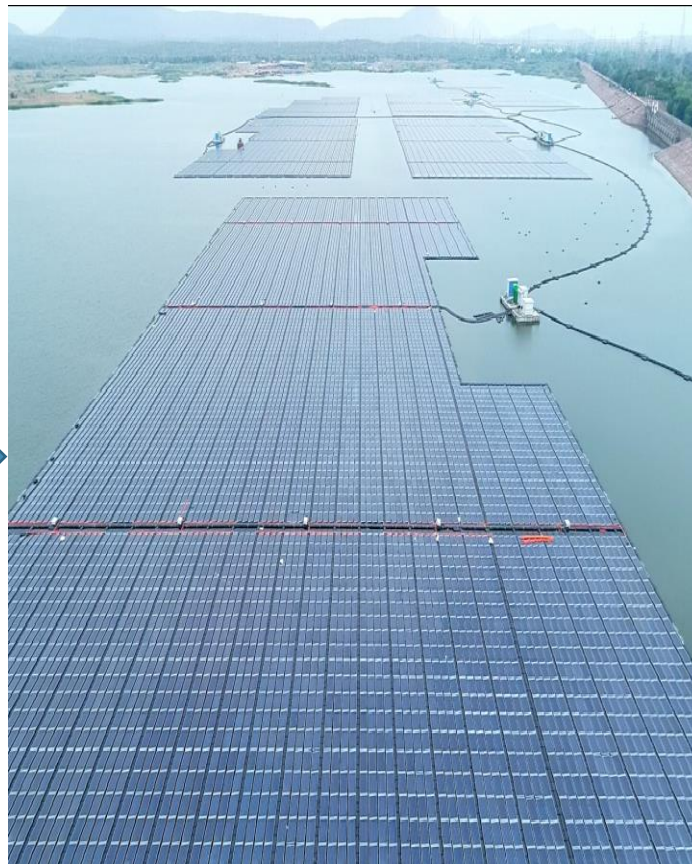


# INNOVATIVE INTEGRATED BUSINESS PROPOSAL FOR RE AUGMENTATION



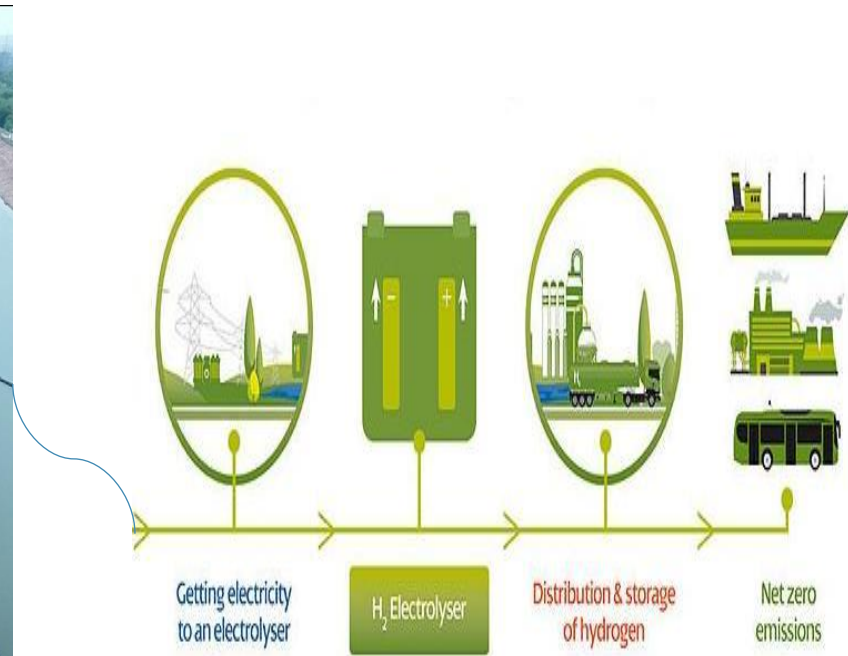
BACK WARD Integration

SOLAR CELL MANUFACTURING PLANT



FORWARD Integration

GREEN HYDROGEN PLANT





# PROPOSED SOLAR PV MANUFACTURING PLANT





# AERIAL VIEW OF THE PROPOSED GH2 @ RSTPS



GREEN HYDROGEN TO TOWNSHIP & FUELING STATION

H2 GAS PIPE LINE

RF  
CL





# REPLICATION IN PAN NTPC & NATIONAL LEVEL



- 2000 MW FLOATING SOLAR IN HIRAKUD DAM & 1000 MW SOLAR PV MANUFACTURING PLANT & GREEN HYDROGEN PLANT NEAR TO NTPC LARA & DARLIPALLI
- 1000 MW FLOATING SOLAR IN RIHAND DAM & 50 MW SOLAR PV MANUFACTURING PLANT & GREEN HYDROGEN PLANT NEAR TO NTPC RIHAND
- 100 MW GROUND BASED SOLAR PLANT EACH IN FARAKKA, SIPAT, LARA, VINDHYACHAL & GREEN HYDROGEN PLANT IN VINDHYACHAL, FARAKKA

## COST CALCULATIONS

- 1 GW SOLAR PV PLANT
  - 200 MW @ RAMAGUNDAM
  - 400 MW @ LARA
  - 400 MW @ RIHAND/VINDHYANCHAL

### ■ INVESTMENT COST

■ 3200 CRORES

SOURCE- FIRST GREEN CO



# SWOT ANALYSIS FOR NTPC'S INTEGRATED R.E AGUMENTATION



## Strength:

NTPC Brand value

Existing footprint in Energy sector fetches us the image as a reliable player  
International Presence (International Loan Financing will be easier)

## Weakness:

Aggressive bidding from Private players  
Weaker Rupee in international Market  
Domestic PV cost remains high

## Opportunities:

Increasing demand for Power  
Govt policies for mandatory renewable power mix for Discoms.

## SWOT

## Threats:

Improper implementation may lead to cost overrun  
Continual Technological Advancement



# Best Practices in Plant

Activities	Status of Implementation	Benefits achieved
<b>Safety</b>	Implemented. Suraksha app developed for NTPC Ramagundam	Started 100% Reporting of UA/UC / Near Miss Through App Only
<b>Circular Economy</b>	Installation of 3TPD capacity waste to energy based on Torre faction technology for charcoal production	Waste minimization and Circular Economy
<b>Daily Monitoring system</b>	Energy Efficiency Performance Monitoring Tools	Online Performance Monitoring using PI tools/TLA/SEED. Regular performance testing using Off-line instruments and gap analysis. Optimized and Efficient Light up plan and HR deviation analysis.
<b>Research</b>	Demonstration building construction using geo Polymer aggregates and tiles in shopping complex	Model building using the same is construct in township shopping complex

## KNOWLEDGE SHARING PLATFORM: JYOTHI VANI

- i. **JYOTHI VANI** learning platform launched on by NTPC Ramagundam.
- ii. Participation being received from all NTPC Plants and also many industry experts.
- iii. 60 no. presentations on various topics including Commercial aspects, upcoming regulations latest developments of technology, Lifestyle Diseases & cures and many more.
- iv. All presentations are shared on intranet for future reference.





# Teamwork & Employee Involvement

## Energy Efficiency through Team Work:

### a. Energy Efficiency/Awareness Training Programs

1. Commercial impacts of Efficiency improvement was organized by NTPC Ramagundam in 2017, 2019 & 2022.
2. Handhold onsite training workshop for 50 executives from other NTPC stations in Dec .
3. In addition, participants from Telangana State Gencos & IPPs viz. Vendata, Jharsuguda were allowed to participate.



## b. IOT Systems Installed

1. Implementation of face recognition punching system.
2. Smart Lighting system with occupancy sensor in offices
3. Development of mobile app for monitoring O&M performance
3. Smart wireless water consumption mapping for optimizing the water use
4. Implementation of Contract Labor Integrated Management System (CLIMS)
5. Artificial Intelligence for finding violation in use of arc suit violation

## c. The projects implemented through Kaizen

1. Segregation of Bottom Ash & Fly Ash slurry sump in Stage-1 resulted in increased Bottom Ash utilization
2. Interfacing ASLD to DCS system to alert Operator incase of Boiler Tube Leakage



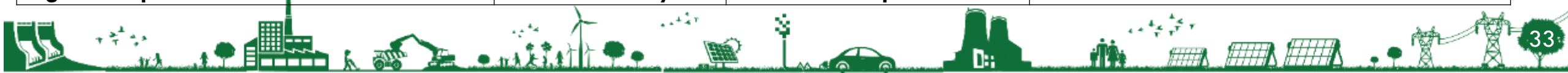
# Teamwork & Employee Involvement

## Monitoring and reporting system to review SEC on (online/daily/monthly/annual) basis

- I. Performance optimization groups (POG) are the **cross functional groups** constituted for the purpose of ECR reduction, Water use optimization, APC optimization
- II. Online Heat Rate (HR) Monitoring through PI, TLA, and real time DDCMIS data. **By EEMG dept in association with C&I and Operation dept**
- III. Auxiliary Power Consumption (APC) monitoring through OLEMS (Online Energy Energy Management System). **Electrical Maintenance Dept**
- IV. Equipment wise Specific Energy Consumption monitoring through SEED (System Energy Efficiency Display), developed In-house. **IT dept**
- V. In addition to above online/realtime monitoring system OFFLINE testing using Wireless instruments are being done as per Efficiency Management guidelines
  - i. Boiler Efficiency testing & Air pre Heater Performance testing
  - ii. Turbine Heat rate Testing & Heater performance testing
  - iii. Condenser Performance testing & Cooling Tower capability testing

**Energy Efficiency Performance Monitoring System**

Meetings	When	Headed By	Corrective actions generated from monitoring & review meetings implemented in Operational and Maintenance Practices
Planning Meeting	Daily	O&M Head	
Operational Review Team Meeting	Monthly	Plant Head	
Regional Management Committee	Quarterly	Regional executive Director	
Regional Operational Performance Review	Half Yearly	Director Operations	



# ISO Certifications



- I. Assessment and review to mitigate the challenges ahead and Involvement of employees & interested parties
- II. Formulation of Baseline performance data of Energy performance indicators (EnPI) like Heat Rate, Auxiliary Power, Oil consumption.
- III. Comply with all applicable legal and other requirements related to energy management.
- IV. Energy use/carbon emissions reduction in systematic way.
- V. Demonstrate to stakeholders the corporate commitment to comply with their best practice to protect the environment.




## EnCon Project budget allocation( FY 2021-22 )

Total turnover of the company/plant : 6002 (Rs. Cr)

Amount invested in EnCon Projects : 3.24 (Rs Cr)

Investment: 0.056 %

	<b>Energy Management System</b>	<b>Ramagundam</b>
	<b>ENERGY AND EFFICIENCY MANAGEMENT GROUP</b>	

<b>Section No: 4</b>	<b>TITLE</b>	<b>Revision No: 01</b>
Page: 17 of 51	Energy Management System Policy	Rev. Date: 22.07.20
		ISO Ref: Clause 5.2

### ENERGY MANAGEMENT SYSTEM POLICY OF NTPC RAMAGUNDAM

NTPC Ramagundam is committed to the Generation and Delivery of Quality, Reliable & Cheaper Power to the satisfaction of Customers and other Stakeholders, through Systems and Processes, in line with our Vision, Mission and Core Values.



**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: NTPC Ramagundam  
Address: PO Jyothinagar, District Peddapalli, Telangana State - 505215

has been assessed and found conforming to the following requirement

Standard: ISO 50001:2018  
Scope: Electricity Generation  
Certificate No.: IRQS/201000633

Original Certification Date: 19/10/2020  
Current Date of Granting: 19/10/2020  
Expiry Date: 18/10/2023

**Shashi Nath Mishra**  
Head IRQS

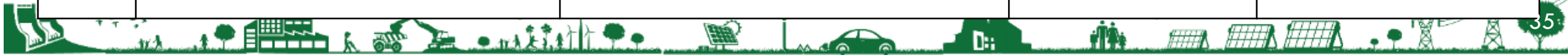
This approval is subject to continued satisfactory maintenance of the Energy Management Systems of the organization to the above standard which will be monitored by IRQS. The use of the Accreditation Mark indicates accreditation with respect to activities covered by the certificate with accreditation no. ENM 001. Condition Overleaf  
CDM/IRQS/NABCB/ENMS/Rev 00  
Head Office: 52A, Adi Shankaracharya Marg, Opp.Powal Lake, Powal, Mumbai - 400 072, India.

**NTPC Ramagundam is ISO 50001 station since Oct'20**



# Learning from CII Energy Award 2022

S.N	Particulars	Area of benefits	Implementation Status	Savings/ annum
1	Use of Solar Light pipe & Roof top Solar with BEES System	<ul style="list-style-type: none"> <li>a. Electricity generation</li> <li>b. Reduces carbon footprint.</li> <li>c. No additional space required for installation.</li> </ul>	140 KW installed. Another 900 KW under proposal	1 Lakh Metric tons of CO2/year
2	Use of Soft starter in motors	<ul style="list-style-type: none"> <li>a. Frequent start /stop of ash slurry pumps as per optimization for energy conservation</li> </ul>	By Sep'23	0.5 MUs of saving
3	Converting the admin Building at RSTPS as the "Net Zero Building"	<ul style="list-style-type: none"> <li>a. Offsetting Energy Conservation and Emissions.</li> <li>b. Onsite Energy generation thru Renewable Energy</li> <li>c. Rain water harvesting</li> </ul>	Proposal under consideration	0.1 Lakh MT tons of CO2/year
4	Net Zero Township	<ul style="list-style-type: none"> <li>a. Proposal for 10 MW Roof top solar installation in Township</li> </ul>	Under Investment Approval	0.15 Lakh MT tons of CO2/year



# Awards & Accolades



Confederation of Indian Industry

## 22<sup>nd</sup> National Award for Excellence in Energy Management 2021

This is to certify that

**NTPC Limited, Ramagundam**

has been recognized as

*"National Energy Leader"*

for their consistent and progressive performance in energy management.

This acknowledgment is based on the evaluation by panel of judges at the

"National Award for Excellence in Energy Management" held during 24 - 27 August 2021.

K S Venkatagiri  
Executive Director  
CII - Godrej GBC

Ravichandran Purushothaman  
Chairman, Energy Efficiency Council  
CII - Godrej GBC



State level National Energy Conservation Award 2020 by TSREDCO, Govt of Telangana



**BEE PUBLISHED THE VIDEO ON ENERGY MANAGEMENT SYSTEM PRACTICES OF NTPC RAMAGUNDAM AND SAME CAN BE SEEN USING THE LINK**

**[HTTPS://BEEINDIA.GOV.IN/SITES/DEFAULT/FILES/VIDEO\\_UPLOAD/THERMAL%20POWER.MP4](https://beeindia.gov.in/sites/default/files/video_upload/thermal%20power.mp4)**



2021, 2022 & 2023



State level National Energy Conservation Award 2020 by TSREDCO, Govt of Telangana





24<sup>th</sup>  
**National Award for 2023**  
Excellence in Energy Management



**CII Theme for 2023-24**

*Thank  
you*



NTPC Ramagundam

Website: [www.ntpc.co.in](http://www.ntpc.co.in) | Email: [hopraramagundam@ntpc.co.in](mailto:hopraramagundam@ntpc.co.in)

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# Arc-Suit Violation Detection



- AI based object detection system YOLO is used to identify and classify the object into classes.
  1. Person not wearing arc suit.
  2. Person wearing arc suit but not helmet.
  3. Person wearing all PPE.



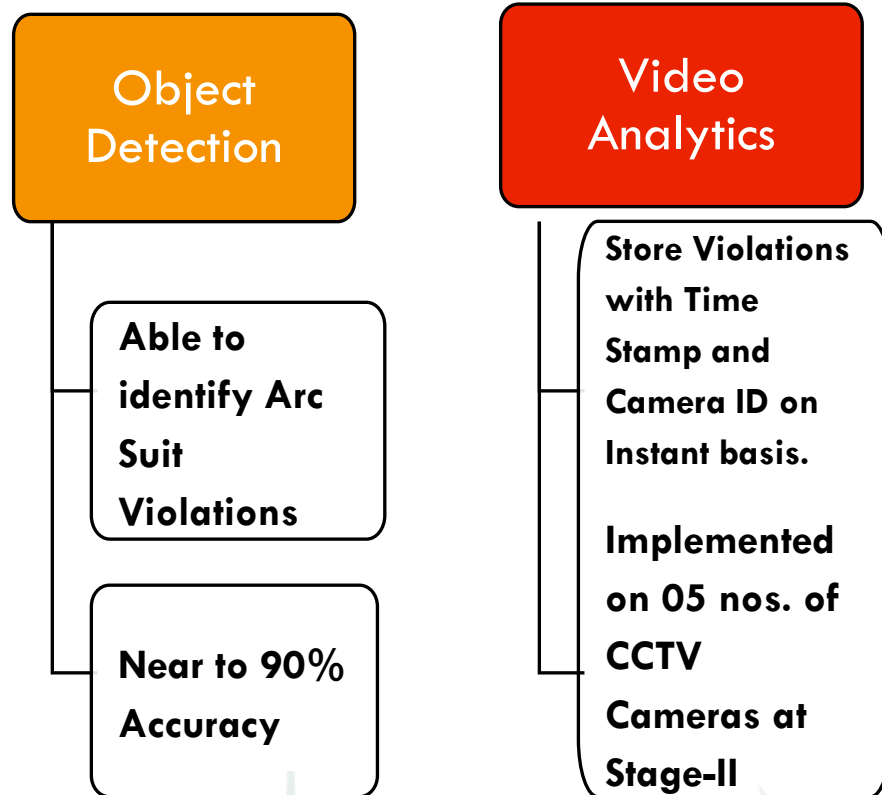
- ✓ Darknet -neural network framework
- ✓ YOLO – Object Detection Model
- ✓ Pre-trained models trained on various datasets such as
  - COCO dataset,
  - the KITTI dataset,
  - and the Open Images Dataset.

## How our Solution Worked

- Electrical Safety implementation: Violation in use of arc suit during electrical isolation.
- Recognized by use of artificial machine learning technique with alarm to Unit controller

*Replicable for all Switchgear Breakers*

- Switchgear Breakers are prone to flashovers and person working in these areas must wear arc-suit.
- **NTPC Ramagundam has developed in-house state of the art “ Arc suit violation detection system.**
- This ensures the safety of the manpower and safe operation of switchgear.







- |   |   |
|---|---|
|   |   |
| 1 | Enhanced Availability   |
| 2 | Avoidance of unit tripping on RH protection due to faster opening |
| 3 | Protection and limiting functions flexibility enhanced            |

% LPBP COMMAND	Action
>-3	Water injection set (1,3) will open (1 <sup>st</sup> stage)
>0	Both Stop Valves will open
>30	Control Valve-01,02 will start opening
>70	Water injection set (2,4) will open (2 <sup>nd</sup> stage)

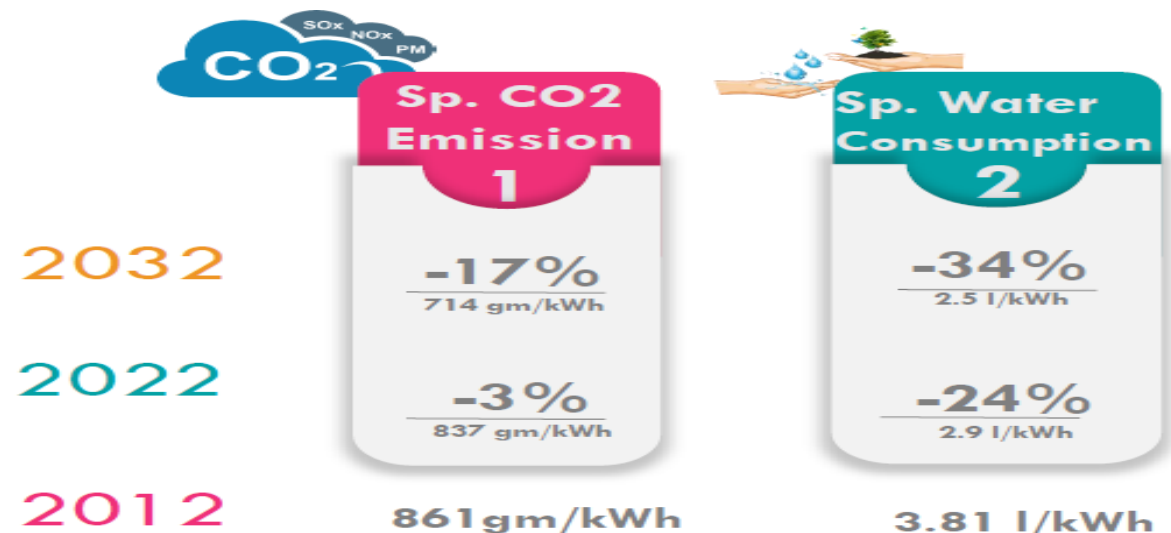
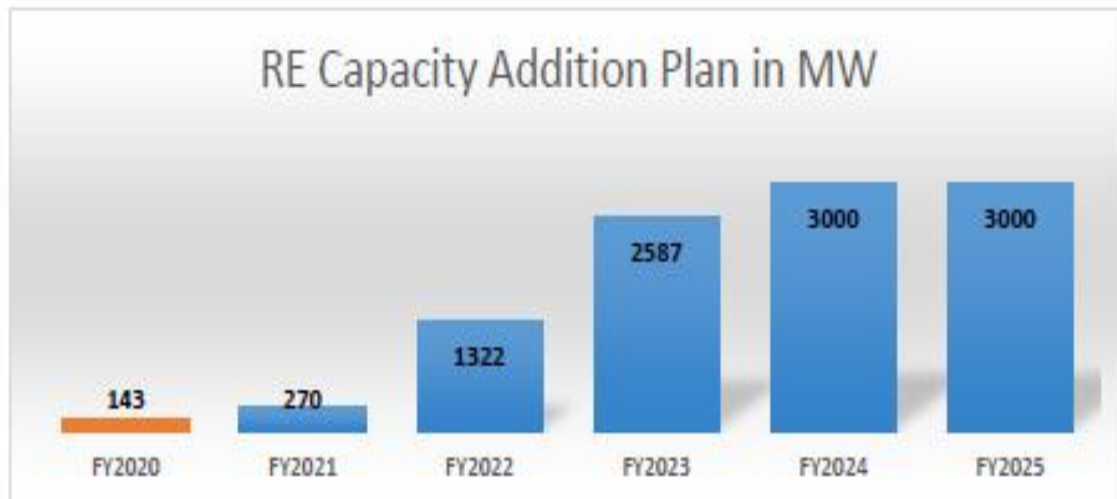




# GHG Emissions in NTPC



Type	Details	Unit	FY 2019-20	FY 2020-21	FY 2021-22
Scope 1 (Direct Emissions)	CO2 emissions from the electricity production	Mil T eq	252.44	263.90	304.14
Scope 2 (Indirect emissions)	GHG emissions due to electricity consumption at offices , training centres , plant premises, townships	Ton CO2	15845.30	15221.86	16400.34
Scope 3 (Related emissions)	GHG emissions due to fuel transportation	Ton CO2	980753.13	561135.58	1101885.05



# Green Hydrogen -Enablers

Availability  
of cheap  
renewable  
power

Technological  
Advancement

Environmental  
concerns

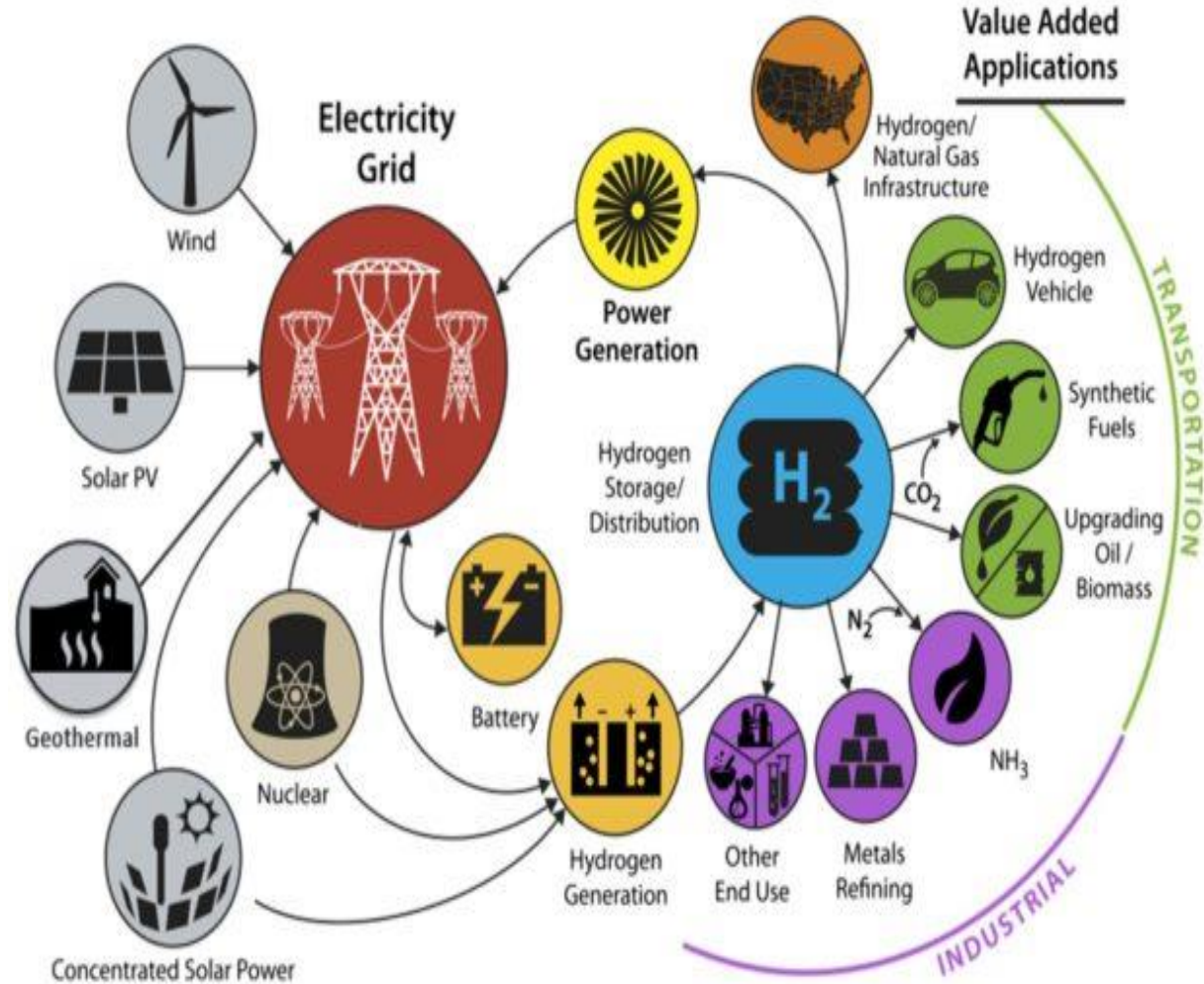
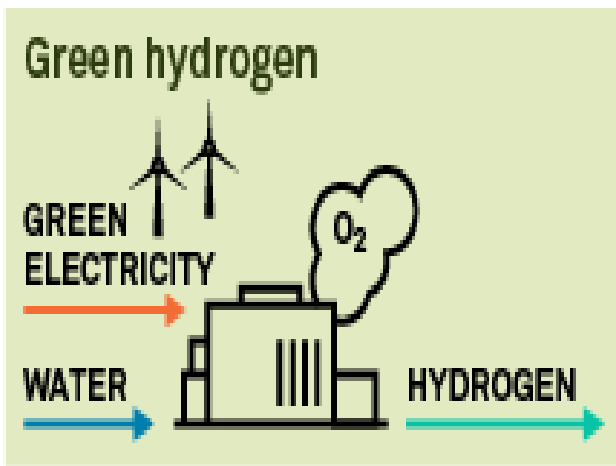
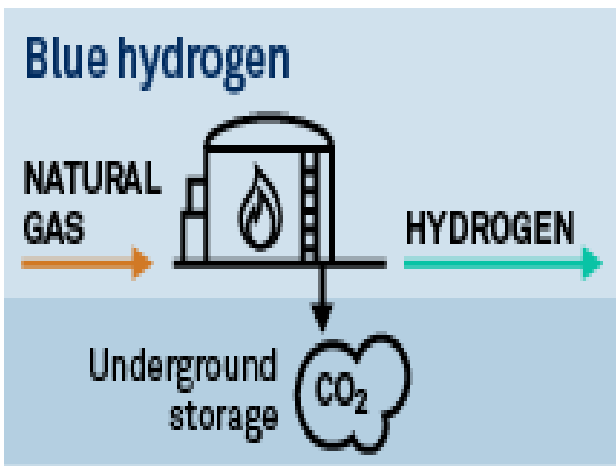
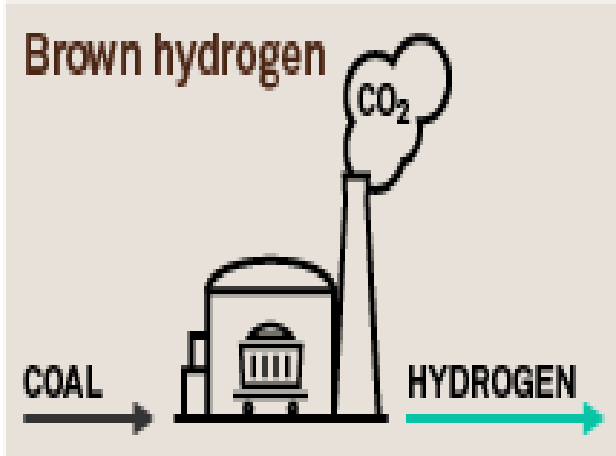
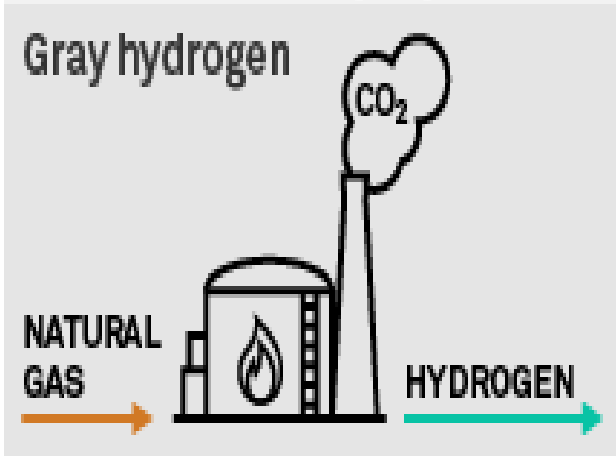
Record low solar tariff INR1.99

Electrolyzer Technology

Increased sensibility  
towards Environment



# TYPES & USAGE OF GREEN





# Future Plan for CO2 Emission Reduction

