



Confederation of Indian Industry

JAIPRAKASH
POWER VENTURES LIMITED

POWER PLANT SUMMIT - 2024

TRANSFORMING THERMAL POWER PLANTS THROUGH IMPROVED ENERGY EFFICIENCY, FLEXIBLE OPERATIONS AND ADOPTION OF AI

Reduction of Auxiliary Power Consumption in Thermal Power Stations

JAYPEE NIGRIE
SUPER THERMAL POWER PLANT- 2X660 MW
(A Unit Of Jaiprakash Power Ventures Limited)

Our Source of Inspiration



Hon'ble Shri. Jaiprakash Gaur
(Founder Chairman of Jaypee Group)



Shri. Manoj Gaur
(Executive Chairman of Jaypee Group)



Shri. Suren Jain
(Managing Director of JPVL)


JPVL - Organization Vision & Mission

Vision

- To be the most efficient Power company of the country with optimum utilization of resources, to provide power to all, while bringing reward to all its stakeholders continuously.

Mission

- To develop & operate technically sound projects in cost effective manner.
- To ensure best monitoring & maintenance techniques which would offer us a competitive advantage in the industry.
- To become a world class, diversified & transnational power company with diversified sources of revenue & low business risk.
- To play a significant role in the growth of the Indian power sector.
- Expand our installed capacity to develop a superior portfolio of assets.
- Maintain a high level of social responsibility in the communities in which we operate.
- To uphold the principles of trust, corporate governance and transparency in all aspects of business.



JAYPEE GROUP

Indradhanush
The Jaypee Way of Life

COLLECTIVE WISDOM • EXCELLENCE IN PERFORMANCE
CREDIBILITY • HUMANE FACE • CONVICTION
COMMITMENT • LEADERSHIP BY EXAMPLE

- COLLECTIVE WISDOM
- EXCELLENCE IN PERFORMANCE
- CREDIBILITY
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New Benchmark for Supercritical Units

JNSTPP Unit # 2 Continuous running- 471* days

*** Running Continue**

*** Till 11th September 24**

**NIGRIE STATION WAS RANKED 24TH AMONGST
THE TOP 25 PERFORMING STATIONS OF INDIA
IN THE FY 2023-24**

JPVL at a Glance - Installed Capacity- 2220 MW



**Vishnu Prayag
Hydro Power Plant
4X100 MW**



**Jaypee Bina
Thermal Power Plant
2X250 MW**



**Jaypee Nigrie
Super Thermal Power Plant
2X660 MW**



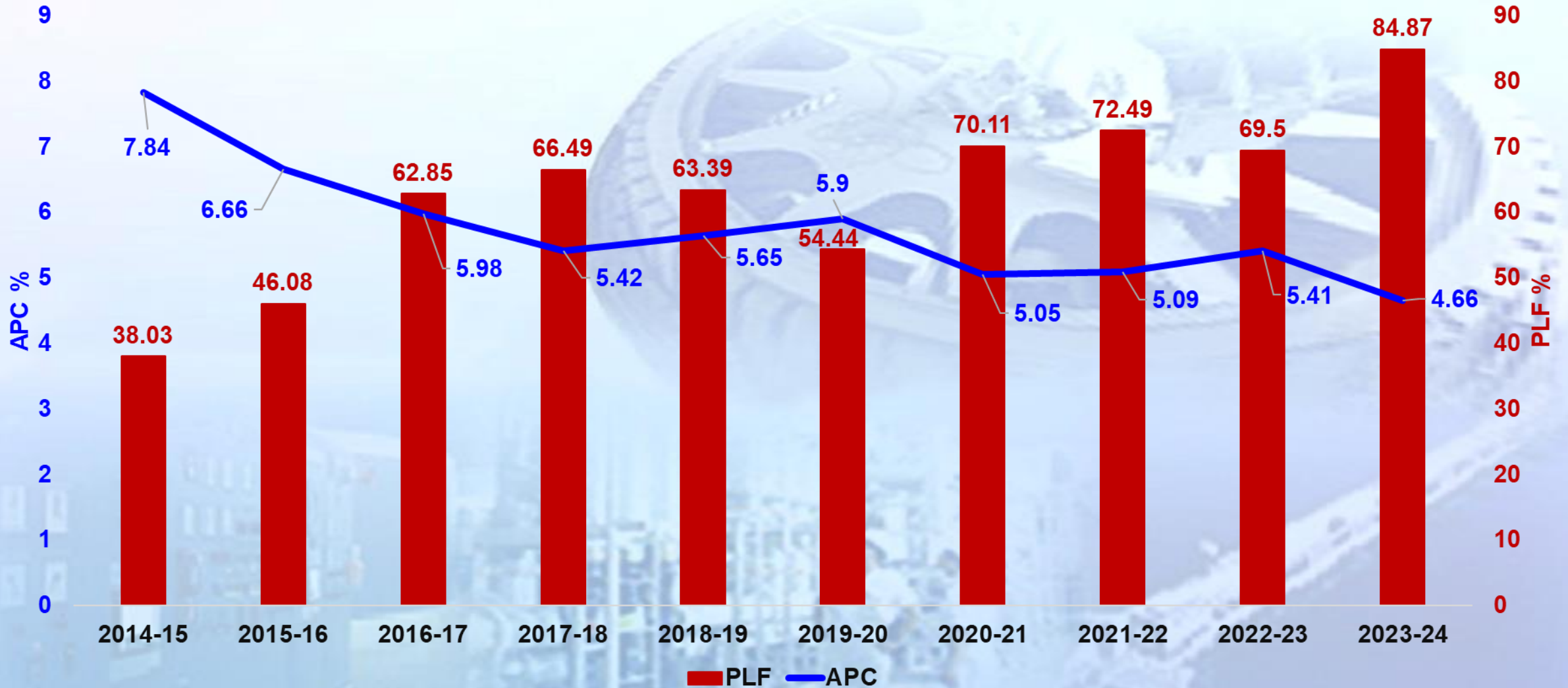
**Amelia (North) Coal Mines
3.92 MMTPA Mining Capacity**

Vishnuprayag,
400



- Boiler Details: L&T MHI Make, 2322 TPH, Supercritical Twin Vortex, Coal Fired Boiler.
- Turbine Details: L&T MHI / MHI Reheat and Condensing, 3 casing, 4 exhaust flow type (TC4F-30).
- COD Unit # 1 - 03/09/2014
- COD Unit # 2 - 21/02/2015
- Dedicated Transmission Line (400 kV DC) 161 km Nigrie-Satna Line.

APC & PLF Trend Since COD

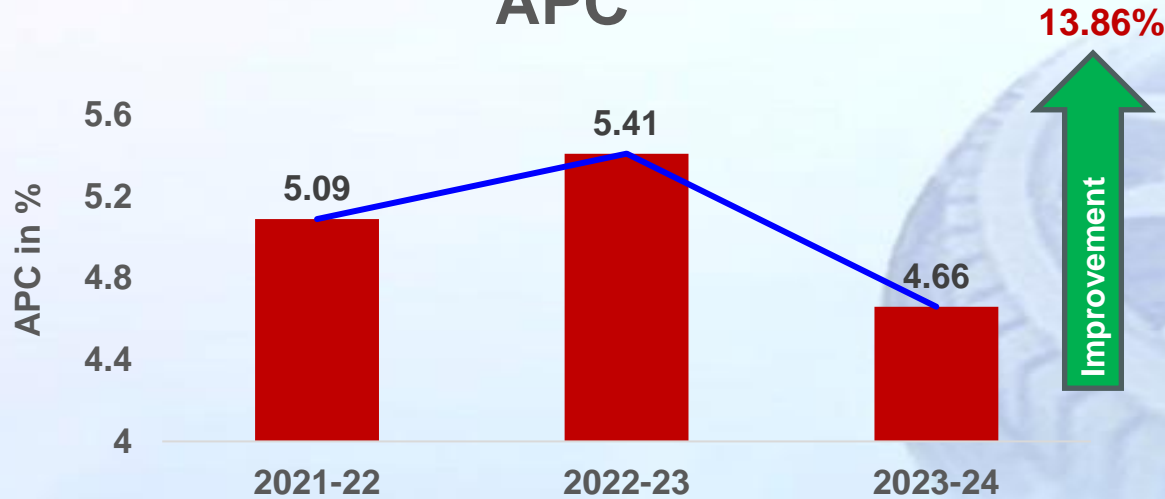


JNSTPP, Nigrie - Station Performance

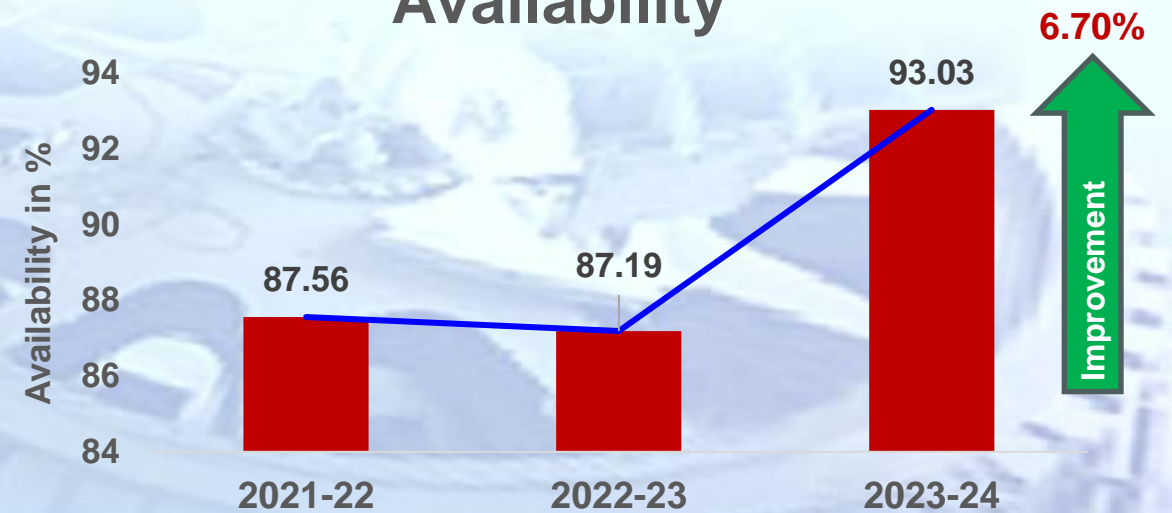
Sr. No.	Parameters	Unit	FY 21-22	FY 22-23	FY 23-24
1	Annual Generation	MU's	8391.88	8036.35	9841.56
2	PLF	%	72.49	69.50	84.88
3	Availability	%	87.56	87.19	93.03
4	APC	%	5.09	5.41	4.66
5	DM Water Make Up	%	0.41	0.37	0.34
6	Sp. Raw Water Consumption	M ³ /MWh	1.91	2.05	2.03
7	Sp. Oil Consumption	ml/kWh	0.333	0.313	0.163

Station Performance - Consecutive 3 Years

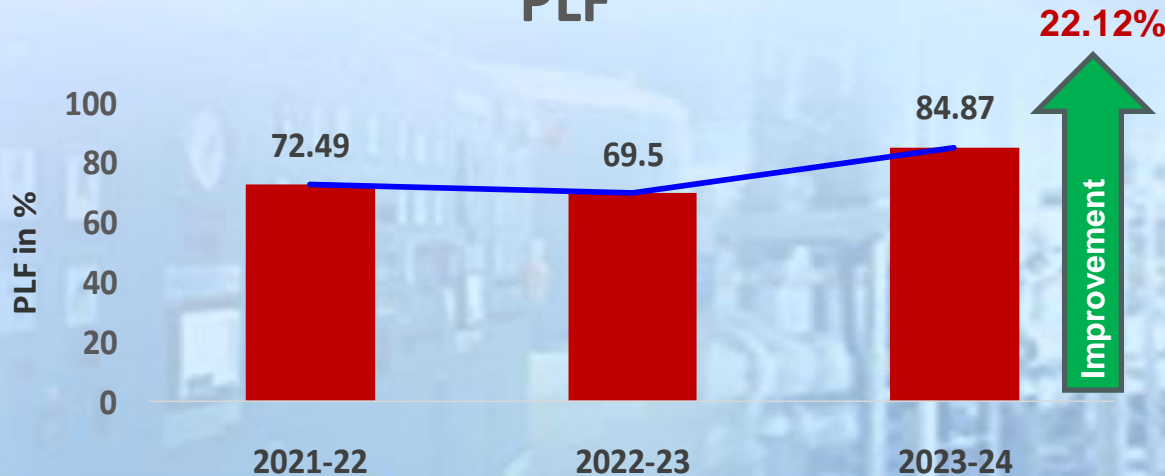
APC



Availability



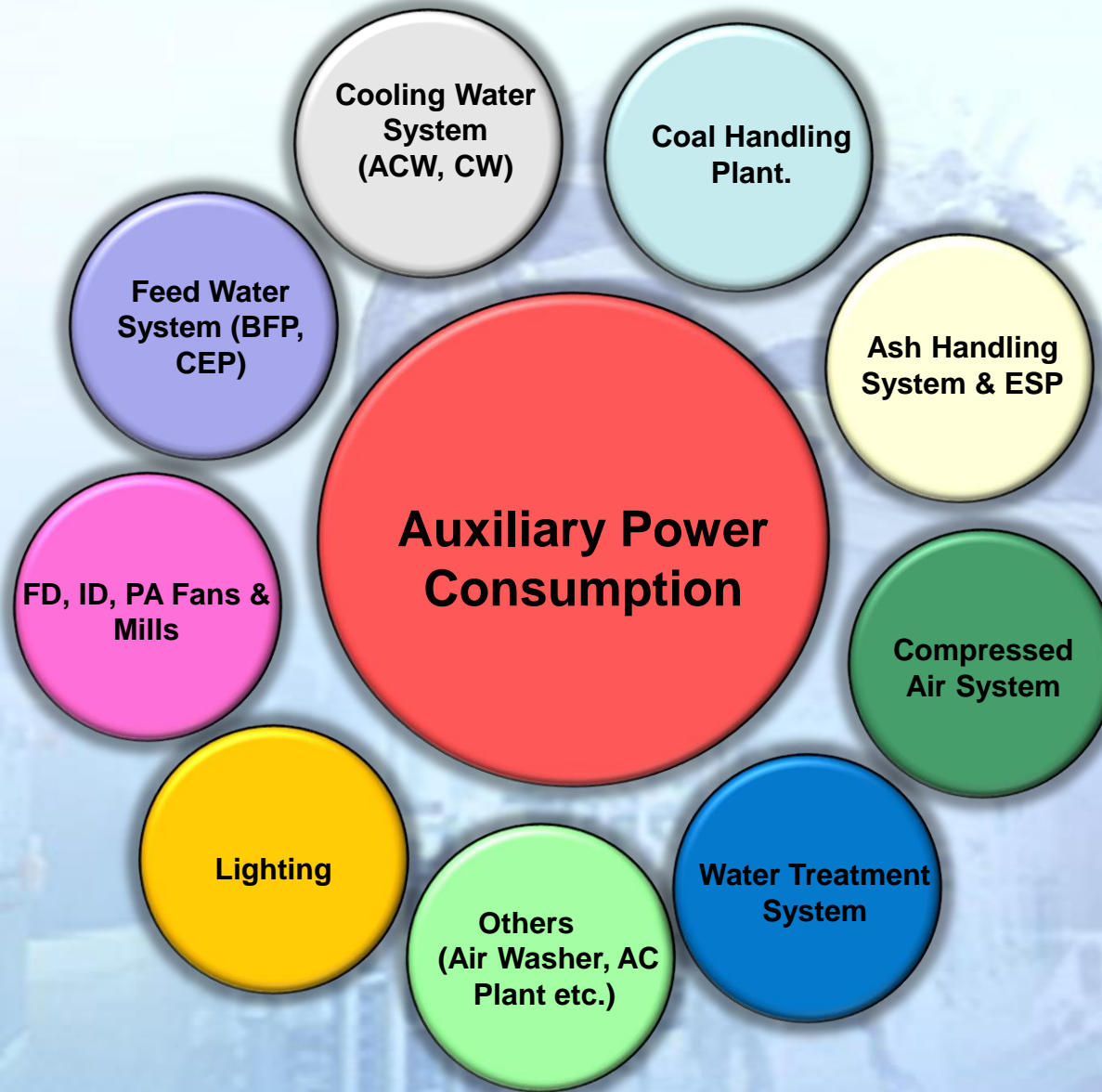
PLF



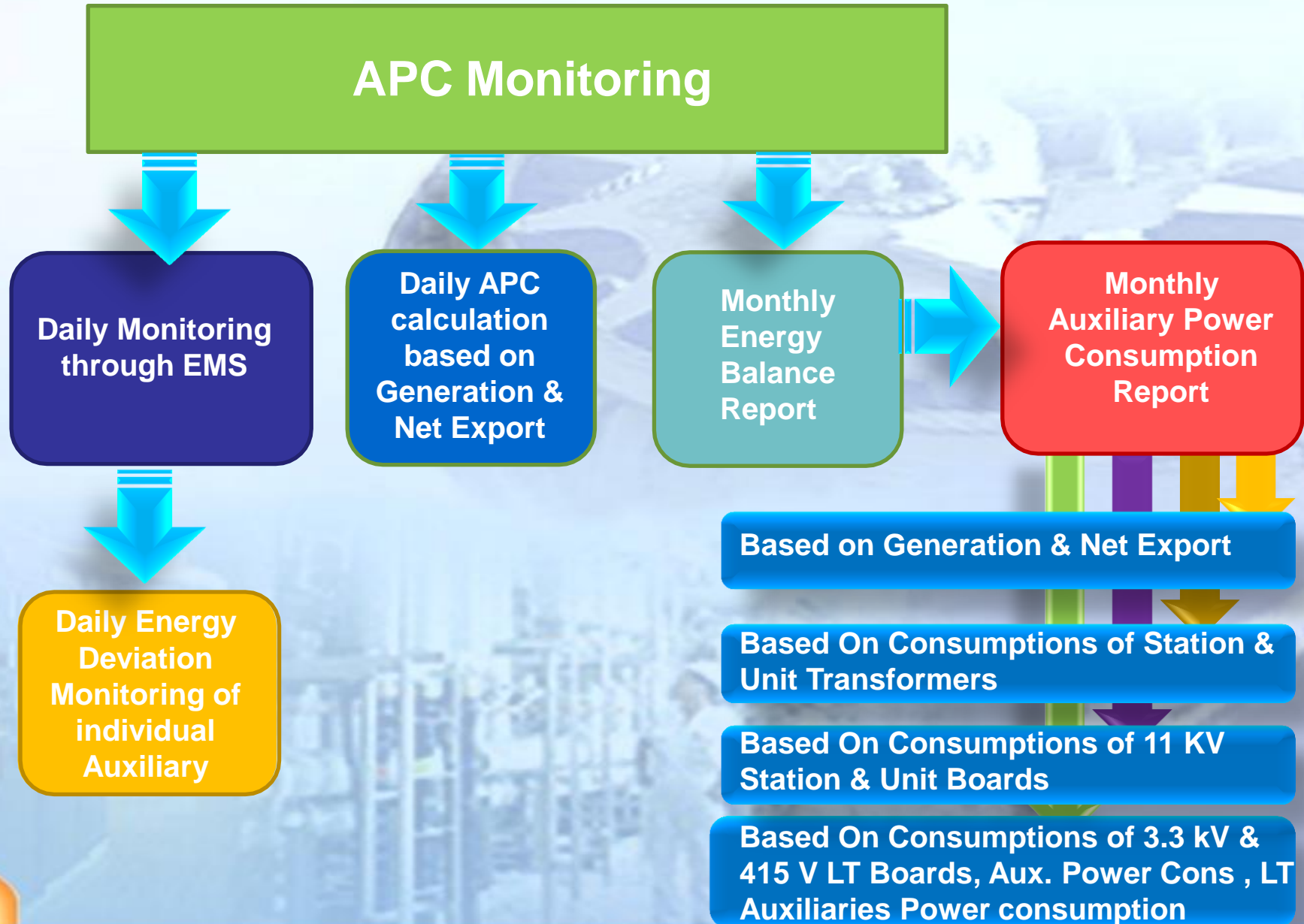
Reasons for Improvement:-

- ❖ Unit # 1 Boiler, HIP Turbine AOH done in FY 23-24 (August-23).
- ❖ Unit # 2 BTG COH done in FY 22-23 (Feb-March-23).
- ❖ Adoption of best operational practices & implementation of various Encon Projects.

Auxiliary Power Consumption Elements

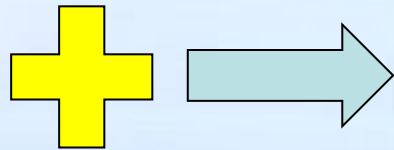


APC Monitoring Systems



Factors Affecting APC

Operating the equipment at maximum efficiency



Energy Conservation in Power Station

Reduction of APC

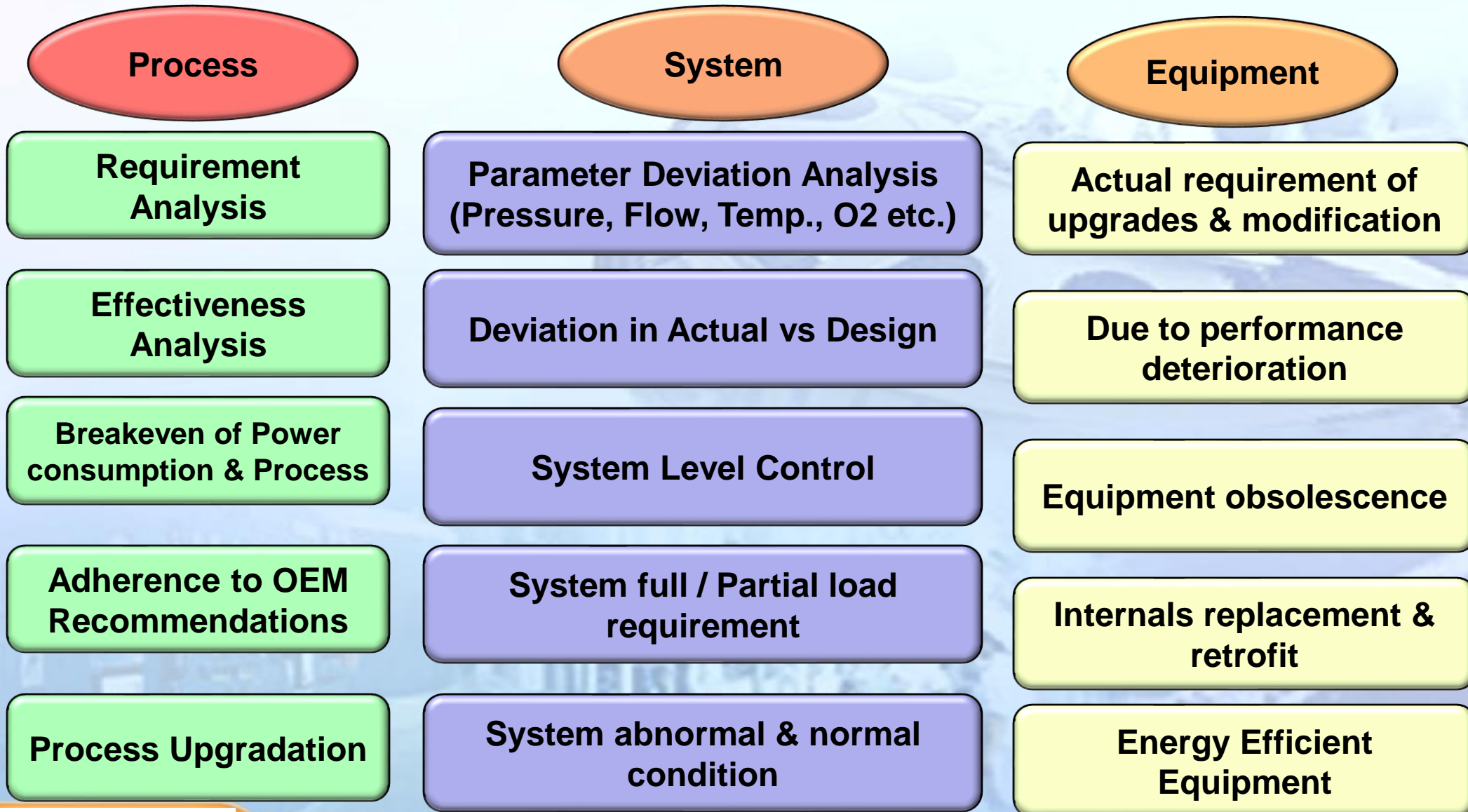
Factor affecting APC

Plant Load Factor	High
Operational efficiency of equipment	Moderate*
Startup & Shutdown	Low
Age of the Plant & Equipments	High*
Coal Quality	Moderate to High

*Depends on R&M

Reduction in APC with retrofits and system optimization techniques could be achieved. Major retrofits can result into higher APC reduction.

Auxiliary Power Consumption Reduction Measures



Approach adopted for APC reduction

Auxiliary Power Consumption Reduction



Design



Process Optimization



- Technology
- Plant Layout
- Dedicated Mine

Approach adopted for APC reduction

Process Optimization

- Excess Air optimization
- Single BFP Operation at part load.
- Three CW pumps operation in winter season.
- Mill grinding pressure optimisation.
- Five Mills operation for full load.
- CHP Belt loading optimisation.
- Unit start up by one pass of fan.
- BTG area instrument air compressor optimisation.
- PA header Pressure Optimization.
- Monitoring of compressors loading & unloading
- Continuous monitoring of High Energy Drains.
- BFP recirculation Valve by temperature measuring elements.
- Boiler & ESP weekly air ingress checking & rectification.
- Air pressure optimisation in instrument & service air compressors of BTG & Ash Handling system.
- Stage -2 Air Drier kept off Due to high ambient temperature (April to June).
- ESP 1st Pass heaters kept off during summer (April- June).
- DM Water & Raw Water pump running hours optimization.
- Deashing Pump optimized from 3 Stages to 2 Stages.
- Maximum Coal unloading by Track Hopper & Minimum Belt length from CHP to Bunker.
- Monthly PM of equipment

Energy Saving Projects Implemented in Last 3 years



FY 2021-22

No of Projects-16
Elect. Saving (Million kWh)-6.596
Thermal Saving (Million Kcal)-32348.8



FY 2022-23

No of Projects-8
Elect. Saving (Million kWh)- 4.847
Thermal Saving (Million Kcal)- 22799.11



FY 2023-24

No of Projects-8
Elect. Saving (Million kWh)- 26.876
Thermal Saving (Million Kcal)- 24936.59

➤ Major Encon Project FY 2021-22

Sr. No.	Name of Energy Saving Projects	Electrical Savings (Million kWh)
1	Replacement of Conventional lights with LED	0.1767
2	Energy Saving by arresting of Air Ingress in ID Fan Line at Boiler-1 by duct repairing	0.7186
3	Energy Saving by arresting of Air Ingress in ID Fan Line at Boiler-2 by duct repairing	2.167
4	Energy Saving by Optimizing Air Pressure of Main Plant Instrument Air Compressor	0.2031
5	Energy Saving by Optimizing Air Pressure of Stage-1 Ash Conveying Air Compressor	0.7887
6	Energy Saving by Optimizing Air Pressure of Stage-2 Ash Conveying Air Compressor	2.2475
7	Energy Saving by Optimizing Air Pressure of AHP Instrument Air Compressor	0.1040

➤ Major Encon Project FY 2022-23

Sr. No.	Name of Energy Saving Projects	Electrical Savings (Million kWh)
1	ACW Pump-C energy saving by chemical coating and overhauling.	0.0398
2	Unit # 2 Energy saving by RAPH sector plate seals replacement, fan maintenance, duct repair and SCAPH cleaning.	4.3450
3	Energy Saving in Stage -2 Air Drier - Due to high ambient temperature (April to June).	0.1899
4	Energy savings by replacing HPSV lights by LED lights.	0.2719


➤ Major Encon Project FY 2023-24

Sr. No.	Name of Energy Saving Projects	Electrical Savings (Million kWh)
1	Energy saving of 03 Nos Instrument Air Compressors by optimization of Loading and Unloading pressure.	0.163
2	Energy Saving in instrument air compressors by increasing the unloading hours by attending the air leakages of the Ash Handling System.	0.394
3	CW Pump -5 energy saving by chemical coating and overhauling	0.417
4	Energy savings by replacing HPSV lights by LED lights.	0.286
5	Unit # 1 Energy saving by RAPH sector plate seals replacement, fan maintenance, duct welding and SCAPH cleaning.	7.762
6	Energy Saving in Stage -2 Air Drier - Due to high ambient temperature (April to June).	0.190
7	Energy Savings by using 3 CW pumps instead of 4 in winter season.	7.65

Energy Management System

Aim is to achieve/better energy targets according to PG test/Design.

- 250+ drives are connected through EMS system.
- Automatic APC report generation on daily/hourly basis.
- Actual targets set for every department for optimal energy consumption.
- Energy Management System access is provided to all departments.
- In daily planning meeting area wise energy consumption deviations are discussed.
- All HoDs are given responsibility to monitor energy consumption & ensure efficient operation of their respective areas.
- Availability of meter reading & energy consumption on real time basis.
- Real time visual summary of full day DSM report.
- JNSTPP, Nigrie FY 23-24 station APC 4.66%. Improvement from last year 13.86%.**

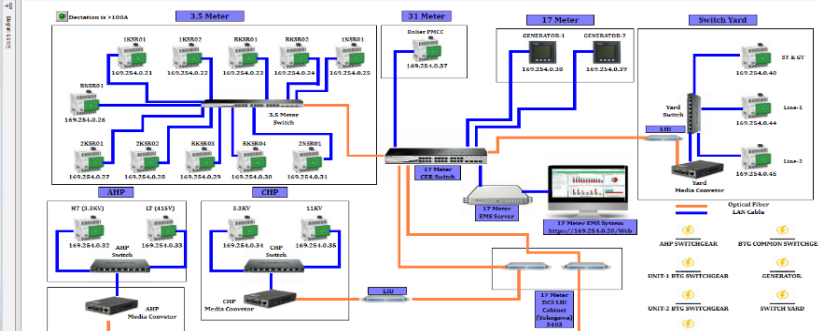

Jaypee Nigrie Super Thermal Power Plant, Nigrie MP

Energy Monitoring System

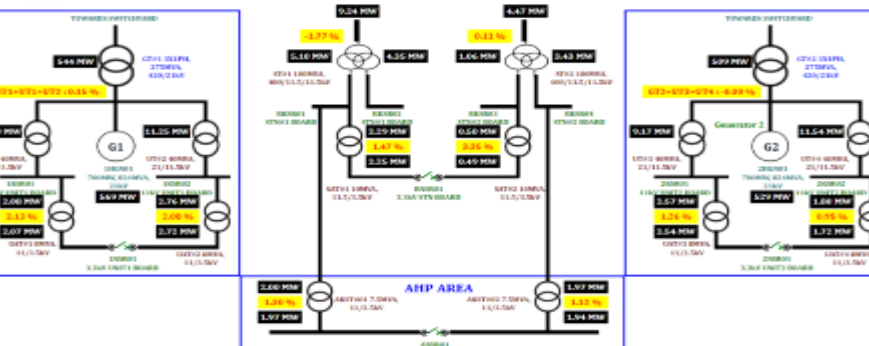
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GENERATION	AUX. POWER CONSUMPTION	EXPORT	APC%
UNIT-1: 569.57 MW	UNIT-1: 29.47 MW	LINE-1 EXPORT: 518.39 MW	UNIT-1: 5.175 %
UNIT-2: 529.17 MW	UNIT-2: 29.40 MW	LINE-2 EXPORT: 520.75 MW	UNIT-2: 5.556 %
TOTAL: 1,098.56 MW	TOWNSHIP: 0.00 MW	TOTAL: 1,039.69 MW	STATION APC: 5.350 %
	JNGCU: 0.10 MW		
	BOP+CHP+ AHP: 7.12 MW	STATION APC: 58.78 MW	

Board Distribution



Transformer Losses

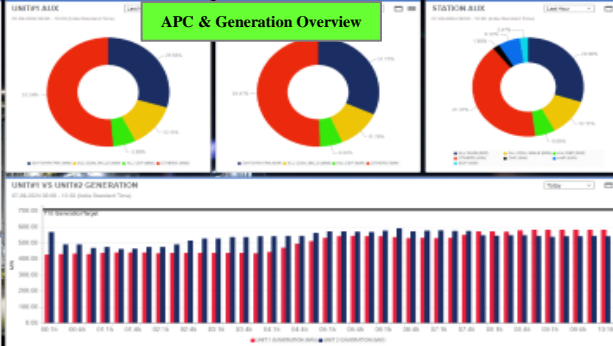


IMPORTANT BUS VOLTAGE

	R-ph	Y-ph	B-ph
UT-1	10.98 kV	10.95 kV	11.00 kV
	860.41 A	853.90 A	845.60 A
UT-2	11.01 kV	10.96 kV	10.96 kV
	750.36 A	741.77 A	734.95 A
UT-3	11.20 kV	11.16 kV	11.17 kV
	602.76 A	590.47 A	585.83 A
UT-4	11.11 kV	11.07 kV	11.06 kV
	764.10 A	749.31 A	747.71 A

	R-ph	Y-ph	B-ph
ST-1 (LV-1)	11.22 kV	11.16 kV	11.17 kV
	288.11 A	286.17 A	277.17 A
ST-1 (LV-2)	11.19 kV	11.14 kV	11.17 kV
	332.31 A	333.87 A	325.31 A
ST-2 (LV-1)	11.14 kV	11.09 kV	11.08 kV
	225.86 A	225.41 A	219.89 A
ST-2 (LV-2)	11.13 kV	11.09 kV	11.08 kV
	103.03 A	105.77 A	101.13 A

APC & Generation Overview



Teamwork, Employee Involvement & Monitoring

Daily Monitoring System

- Daily Planning Meeting(DPM) is conducted every day to discuss the critical issues, previous day performance & target for next day. It is chaired by COP & Unit Head. Wet ash disposal System -Daily Ash to Water Ratio Monitoring, Stringent Effort are being applied to reduce Ash to Water Ratio, Boiler tube Metal Temperature monitoring, Raw water & DM Water Consumption.

Operation Review Meeting

- Chief Technical Officer & COO chairs this meeting once in a month to discuss plant performance & to address issues of various departments.

Systems and Practices

- System-wise and equipment-wise efficiency and gap analysis done (Design vs Actual), Boiler tube Metal Temperature monitoring, Historical data extraction for detailed analysis and reporting, Various other initiatives to improve efficiency, Monitoring of high energy drain valve passing in every 15 Days. Timely inspection & maintenance of Transmission line ensure 100% availability. Department wise monthly safety meeting & GAMBA walk.

Training

- All Operation desk engineers have been provided training regarding Energy Efficiency performance of thermal power plant including boiler, turbine and other auxiliaries during 01 year induction training.
- Employees are encouraged to attend exams organized by Bureau of Energy Efficiency &Boiler Operation Engineer.

Peer learning

- Knowledge sharing through case studies conducted on O&M and safety issues.

THANK YOU

A photograph of an industrial facility, likely a power plant, featuring two large, white, conical cooling towers and a tall, red-and-white striped chimney. The structures are reflected in a calm body of water in the foreground. The sky is a deep blue with scattered white clouds. The text 'THANK YOU' is overlaid in the top right corner in a large, bold, red, serif font.

Email Id: Jnstpp.eemg@jalindia.co.in

Contact: 7389943874