CII NATIONAL AWARD FOR EXCELLENCE IN ENERGY MANAGEMENT 2023

KOTA SUPER THERMAL POWER STATION, RRVUNL KOTA

(2X110 + 3X210 + 2X195 = 1240 MW)

Presented By :-
Er. Y. S. Katiyar, Dy. CE., KSTPS
Er. Pradeep Arya, X.En., KSTPS

Presentation Content

- *1. Brief Introduction on Company / Plant*
- *2. Energy Consumption Overview*
- *3. Sp. Energy Consumption in Last 03 Years*
- *4. Information on benchmarks and competitors*
- *5. List of Major EnCon Projects planned in 2023-24*
- *6. Energy saving projects implemented in last three years*
- *7. Utilization of Renewable Energy Sources*
- *8. Innovative Projects implemented.*
- *9. Environment Management– Ash Utilization / Emission / Water*
- *10. Teamwork, Employee Involvement and Monitoring*
- *11. Best Practices in the Plant*
- *12. Implementation of EMS and I SO 9001:2015*
- *13. Learning from CII / Other Award Program*

BRIEF INTRODUCTION ABOUT COMPANY

- ***Formerly, Rajasthan State Electricity Board (RSEB) was formed in Power Sector on 1st July 1957. Later on, RSEB was unbundled into five Government Companies - 01 Generation Company-Rajasthan Rajya Vidyut Utpadan Nigam Ltd., 01 Transmission Company-Rajasthan Rajya Vidyut Prasaran Nigam Ltd. and 03 Distribution Companies-Jaipur Discom (JVVNL), Jodhpur Discom (JdVVNL) & Ajmer Discom (AVVNL) in July 2000 under new Power Reforms Undertaken by State Government. The Head Office of RVUNL is at Vidyut Bhawan, Jaipur (Raj.).***

- ***The installed capacity of RVUNL is 8597.35 MW. In addition to this, RVUNL is also managing and operating Inter-State Hydro Projects (271 MW).***

- ***CMD of RVUNL: Sh. R. K. Sharma***
- ***Director (Projects): Sh. R. K. Soral***
- ***Director (Technical): Sh. D. K. Shringi***
- ***Director (Finance): Sh. B. K. Agnihotri***

BRIEF INTRODUCTION ABOUT PLANT

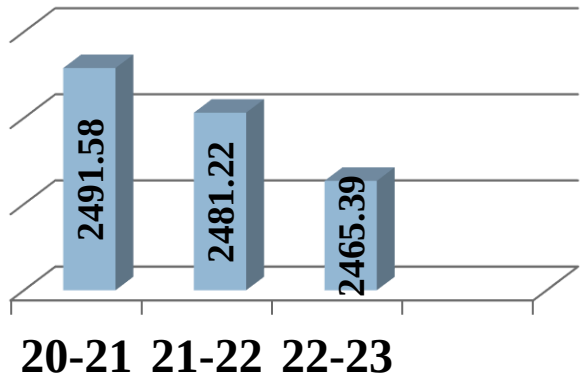
Name of Plant	***KOTA SUPER THERMAL POWER PLANT, Running since 17.01.1983***					
Latitude & Longitude	***25.1729° N, 75.8195° E***					
Location	***Ladpura, Kota, Rajasthan***					
Installed Capacity	***1240 MW***					
Type of Units	**KSTPS has 7 No.s Units having capacity 2X110MW, 3X210MW and 2X195 MW**					
Date of COD	***Unit I***	***:-***	***17.01.1983,***	***Unit-II***	***:-***	***13.07.1983,***
	Unit III	***:-***	***25.09.1988,***	***Unit IV***	***:-***	***01.05.1989,***
	Unit V	***:-***	***26.03.1994,***	***Unit VI***	***:-***	***30.07.2003,***
	Unit VII	***:-***	***30.05.2009***			
Head of Plant	***Sh. A. K. Arya, Chief Engineer***					

ENERGY CONSUMPTION OVERVIEW (2022-23)

Particulars	Unit	Value
Generation	MU	7979.264
PLF	%	73.46
Availability	%	75.83
Gross heat rate	Kcal/kwh	2465.39
Auxiliary power consumption	%	11.50
Boiler Efficiencies (Station wise)	%	Around 85.5 (All Units)
Turbine heat rate (station wise)	Kcal/KWh	U#1:-2230; U#2:-2250 U#3:-2025; U#4:-2055; U#5:-2011; U#6:-2020; U#7:-2040
DM water consumption	%	1.34
Raw water consumption	M_3/ MWh	7.18
Sp. Oil consumption	ml/Kwh	2.91

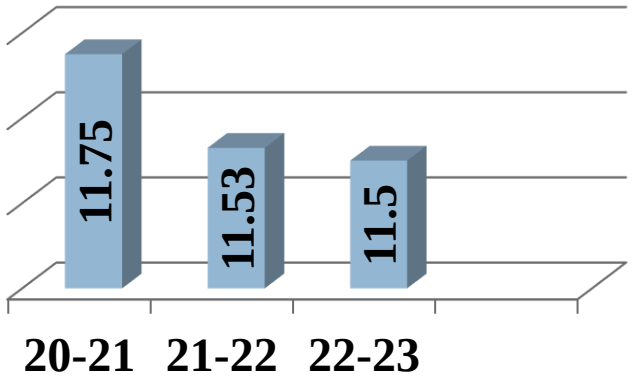
SP. ENERGY CONSUMPTION TREND OF LAST THREE YEARS

Three years Gross Heat Rate trend



FY	% Improvement in SHR in respect to previous year
2020-21	2.39
2021-22	0.42
2022-23	0.64

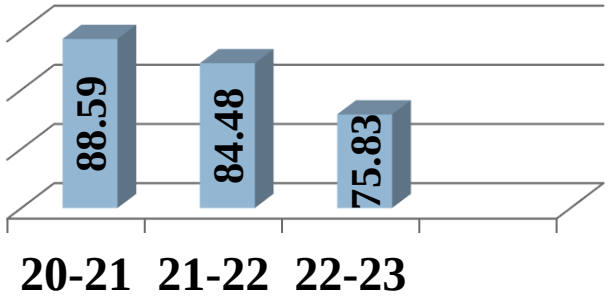
Three year APC trend



FY	% Improvement in APC in respect to previous year
2020-21	1.07
2021-22	1.84
2022-23	0.31

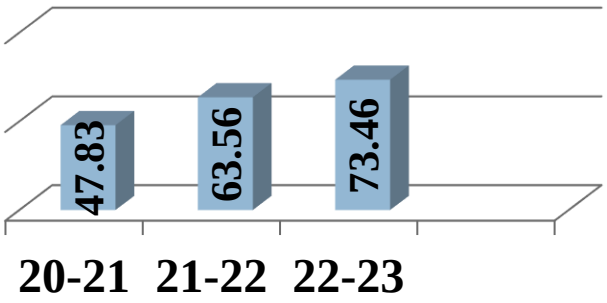
SP. ENERGY CONSUMPTION TREND OF LAST THREE YEARS

Three year Availability trend



FY	% Improvement/ Variation in Availability
2020-21	2.86
2021-22	-4.64
2022-23	-10.24

Three year PLF trend



FY	% Improvement/ Variation in PLF
2020-21	-20.09
2021-22	32.89
2022-23	15.57

REASONS FOR VARIATION

Reason of reduced availability in FY 21-22 :

- Unit # 3 was under Capital Shut down from 15.12.2020. LP and IP turbine rotor balancing was done and HP turbine rotor was replaced. Meanwhile stator core of generator found punctured and same was replaced by BHEL, due to which capital shutdown extended up to 31.07.2021. Even after that KSTPS achieved Normative availability 83% in FY 21-22.

Reason of reduced availability in FY 22-23:

- Unit # 3 was desynchronized 08.08.2022 as seal oil flow of generator at turbine end increased beyond 50 LPM. As per recommendation of OEM M/s BHEL Rotor, seal body and end seal were sent to M/s BHEL, Haridwar where M/s BHEL attended problem and sent them back to KSTPS. Unit was than synchronized on dt. 17.12.2022 hrs.

INFORMATION ON BENCHMARKS AND INTERNAL COMPETITORS

Parameter	Plant name	20-21	21-22	22-23
Availability %	KSTPS	88.59	84.48	75.83
	CTPP(O&M)	86.61	59.67	69.46
	STPS(O&M)	95.43	74.34	57.08
PLF %	KSTPS	47.83	63.56	73.46
	CTPP(O&M)	76.09	52.77	63.14
	STPS(O&M)	7.53	28.32	49.27
SHR (Kcal/kwh)	KSTPS	2491.58	2481.22	2465.39
	CTPP(O&M)	2559.98	2576.992	2644.42
	STPS(O&M)	2512.38	2395.57	2490.28

LIST OF MAJOR ENCON PROJECTS PLANNED IN 2023-24

Sr. no	Title of project	Annual Electrical savings (Million Kwh)	Annual thermal saving (Million Kcal)	Investment (Rs. In million)
1	Improvement in condenser vacuum	68.15	168661.48	4.0
2	Reduction of dry flue gas Loss	98.95	244880.75	5.0
3	Replacement of CT fan blades with FRP material blades	1.466	0	7.1
4	Internal coating of Raw water pump	0.453	0	1.2
5	Savings after conversion of motor roof extractor fan to green turbo ventilators	0.867	0	0.6
6	Savings after conversion of Old lights to LED's	1.133	0	2.5
7	Replacement of re-winded motors with energy efficient motor	1.177	0	15
8	VFD in CEP(U# 6&7)	1.54	0	20

ENERGY SAVING PROJECTS IMPLEMENTED IN LAST THREE YEARS

Year	No. of projects	Annual electrical saving (KWH)	Annual Electrical cost saving (Rs. Million)	Annual Thermal cost saving (Rs. Millions)
FY 2020-21	6	34257983	118.97006	122.068
FY 2021-22	2	506500	1.70	1.471
FY 2022-23	1	1466424	4.9	4.22

UTILIZATION OF RENEWABLE ENERGY SOURCE

- RVUN have planned to develop 2000 MW Solar Park under UMREPP Mode - 8 scheme of MNRE, GOI to avail CFA (Central financial assistance) and installation of 810 MW Solar Power Project.
- RVUN is developing this Solar Park at Tehsil Pugal, District Bikaner for which total 4846.3122 Hectare of Govt. land has been allotted.
- 810 MW Solar Power Project of RVUN shall be installed within this 2000 MW Solar Park by Solar Project Developer. Remaining 1190 MW capacity Solar Project shall be installed by CIL for which MoU has been signed on 13.10.20222 between RVUN and CIL.

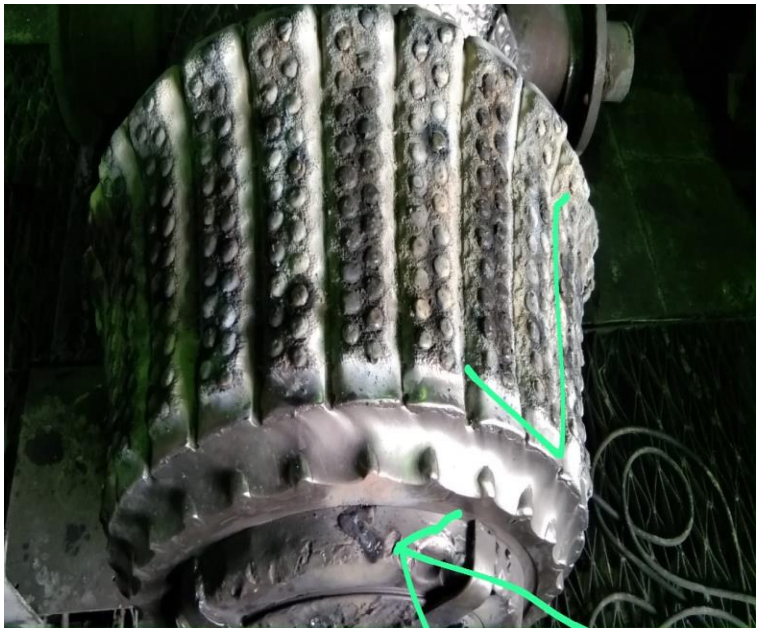
INNOVATIVE PROJECTS IMPLEMENTED

REPAIRED / RECONDITIONED GRINDING MEDIA

- Coal pulverization is being carried out by Bowl mills in Units no. 1 to 4.
- In FY 2021-22, KSTPS faced acute scarcity of grinding media. New idea of crushing coal by repaired / reconditioned grinding media was adopted.
- 10 old sets which have completed their useful running life of 8000 hrs got repaired and bowl mills were run satisfactorily achieving their performance parameters..
- Cost of one set of new grinding roll: Rs. 1122000/-
- Repairing cost of one grinding roll: Rs. 4,00,000/-
- Net saving per set: Rs. 7,22,000/-
- Total saving: Rs. 72,20,000/-

OLD GRINDING MEDIA BEFORE REPAIR

GRINDING MEDIA AFTER REPAIR



Environment Management – Ash Utilization

Particulars	UOM	2020-21	2021-22	2022-23
Ash stock in Plant (Yard+pond)	Tons	336225	792757	278472
Ash Generated	Tons	1376549	1707123	2078796
Ash Utilization	%	128.32	120.13	129.66
Ash Utilized in manufacturing of cement	%	40.40	4.94	5.39
Ash Utilized in Fly Ash bricks	%	8.52	32.89	41.28
Ash Utilized in Mine filing	%	73.57	75.12	69.70
Ash Utilized for Roads pavements	%	5.82	7.18	13.09

- **Ash Utilization being more then 100% since last 3 years (with legacy ash), and revenue generated from sale of ash to Cement Companies since 2014 is Rs 300+ Cr.**
- **Mode of Ash conveying: 80% Dry and 20% Wet**

ENVIRONMENT MANAGEMENT EMISSION

Particulars	UOM	FY 20-21	FY 21-22	FY 22-23
Total CO2 emissions per KW of Generation	Ton/KW	0.000939197	0.000938343	0.000931431
Current SOx emission at full load	Mg/NM3	738.11	793.4	791.34
Current NOx emission at full load	Mg/NM3	379.26	349.06	312.51
Particulate matter	Mg/NM3	103.9	132.81	180.45
Mercury	Mg/NM3	<0.001	<0.001	<0.001

Infrastructure available at KSTPS for Emission Management & Control:

* *Continuous Emission Monitoring System (CEMS).*
- *Ambient Air Quality Monitoring System (AAQMS).*

Best Practices adopted for Emission Monitoring and Control:

* *For Controlling SPM Emission, ESP is installed whose efficiency is*
  - *(Unit 1 to 4) - 99.74%*
  - *(Unit 5 , 6 & 7) - 99.925%*
* *Continuous Emission is Monitored to control Emission Parameters.*

ACTION PLAN TO ACHIEVE CURRENT EMISSION NORMS FOR THERMAL POWER

- R&M works of Unit 1 to 4 were hampered due to Phasing-out plans of these aged units.Now, since CEA/MoP has directed to run aging Units till 2030; R&M and Other works are being taken-up, which will further enhance efficiency & make these units more environmentally compliant .

- ESP retrofitting of Unit#1 to 4 is under consideration.
- Installation of FGD for Unit#5,6,& 7 is under progress.
- Technical bid for installation of cooling tower for Unit#5 has been opened.
- Plantation of 10,000 plants have been targeted this year.
- Sprinkler system has been installed in CHP system to control fugitive dust.

Sprinkler system installed in CHP

ETP under Progress

FGD under Progress

ENVIRONMENT MANAGEMENT - WATER

FY	DM Water Consumption (%)	Raw Water Consumption (m^3/MW)	Whether Plant is Zero Liquid Discharge
20-21	1.39	8.28	No
21-22	1.43	7.65	No
22-23	1.34	7.18	No

Best Practices in water management

- *Waste water is recycled from PHE/AHP stage-II outlet to clarifier stage-I (200m3/hr) and stage-II (400 m3/hr) by laying 300 NB pipeline resulting in saving of 14400 m3 water per day.*
- *Diversion of waste water from hot-well sump to HP pump sump in all units.*
- *Optimization of running of raw water pumps.*
- *Installation of ETP(7.2 MLD) with Ash water recovery system is under progress.*

TEAMWORK, EMPLOYEE INVOLVEMENT AND MONITORING

- Daily Monitoring Meeting of all circles is being organized by Commercial Wing headed by the Chief Engineer for discussion on any problem related to concerned circles, deviations of parameters, plant performance data and APC. Energy consumption of all areas including draft powers are being reviewed in the meeting and high energy consuming area is taken on priority to analyze the reason and its remedial action immediately.
- We have Energy Monitoring system placed in all control rooms for monitoring of all HT drives of plant which are being monitored by Engineers 24/7.
- Duties of RVUN representatives along with CIMFR team for Coal collection and preparation of samples.
- Coal analysis of fired coal being fed in mills is being done on daily basis.
- Coal mill fineness of mills is being tested and monitored regularly.
- Monitoring of online SWAS parameters
- Daily Defects, defects existing more than 15 days are being analyzed.
- In-house training program for Engineers is being organized regularly by Expert Engineers of related fields.

BEST PRACTICES IN THE PLANT

- **Flexibility:** KSTPS 1 to 4 are having bowl mill operation. In Unit #1 & 2 (110MW) normally 3 mills and in Unit # 3 & 4 (210MW) normally 4 mills remain in service to achieve maximum load. We are able to achieve 65 % load i.e around 65MW in Unit # 1 & 2 with 2 mills operation and 140MW in Unit 3 & 4 with 3 mill operation without oil support and optimizing coal feeding.
- **Maintenance and reliaility:** Daily defects is being checked and attended. List of defects more than 15 days is being monitored and material required is being processed to attend as soon as possible. For reliability, repetition of same defects is being monitored.
- **Digitisation:** In the field of digitization, ABT Software for DSM monitoring is installed. AAQMS, CEMS, CEQMS data's are connected and integrated with CPCB and RSPCB. Daily monitoring of all HT drives are being done by EMS system.
- From this year, an electronic file management system:- " Raj-Kaj" has been introduced to expedite and track movement of files. It will not only fast-track finalization of Works & Procurement Cases but will save on huge quantity of Paper also, resulting in saving of approx 2000 paper reams annually. One softwood tree contains 20 paper reams of 500 sheets each, One tree can absorb roughly 26 Kg of CO_2 per year, acting as carbon sink and release Oxygen in replacement. As such, this initiative will result in saving of 100 trees per year and absorption of 2.5 Ton of CO_2 annually. It will add 2.5 Tons CO_2 absorption per year progressively in the years to come.
- **Biodiversity and afforestation:** Regular plantations drive are being carried out by KSTPS officers/officials. Already more than 38% of total plant area i.e 246 hectare area is covered by massive tree plantation. Plant area is home to peacocks and various species of birds.
- **Research :** In the field of Research, the use of BIO mass pallets is being envisaged.

BEST PRACTICES IN THE PLANT

New Initiatives:

*Trial run of 'THERMACT', a multifunctional solid combustion catalyst, developed by IIT, has been carried out in KSTPS.

* Improvement in run back action on tripping of ID/FD fan:

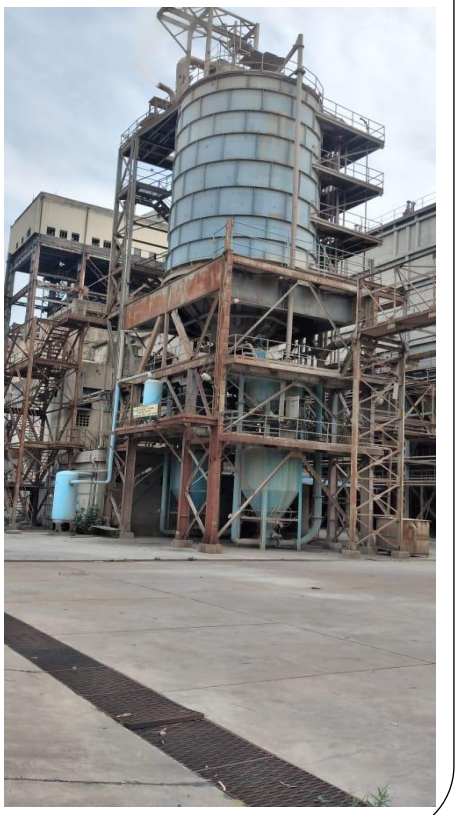
Previously two upper elevation used to trip on run back action after tripping of one ID or one FD. But now only one uppermost elevation trips on the same which has secured stability of Unit.

Other best Practices carried out in KSTPS:

- Unit 3 & 4 (210 MW) run on one FD which used to run on two FD fans previously and it has led to savings of approx Rs. 60 Lacs per annum.
- CW duct of stage II and III made common and reduced one no. running CW pump between stage II and III during winter season.
- Looking to vacuum of Unit 6 & 7 , no. of running CT fans are optimized specially in winter season.
- We have Acoustic Leak detection system(ALDS) for early detection of boiler tube leakage. It avoids long shutdowns and reduce any other secondary damages to boiler tubes.

BEST PRACTICES IN THE PLANT

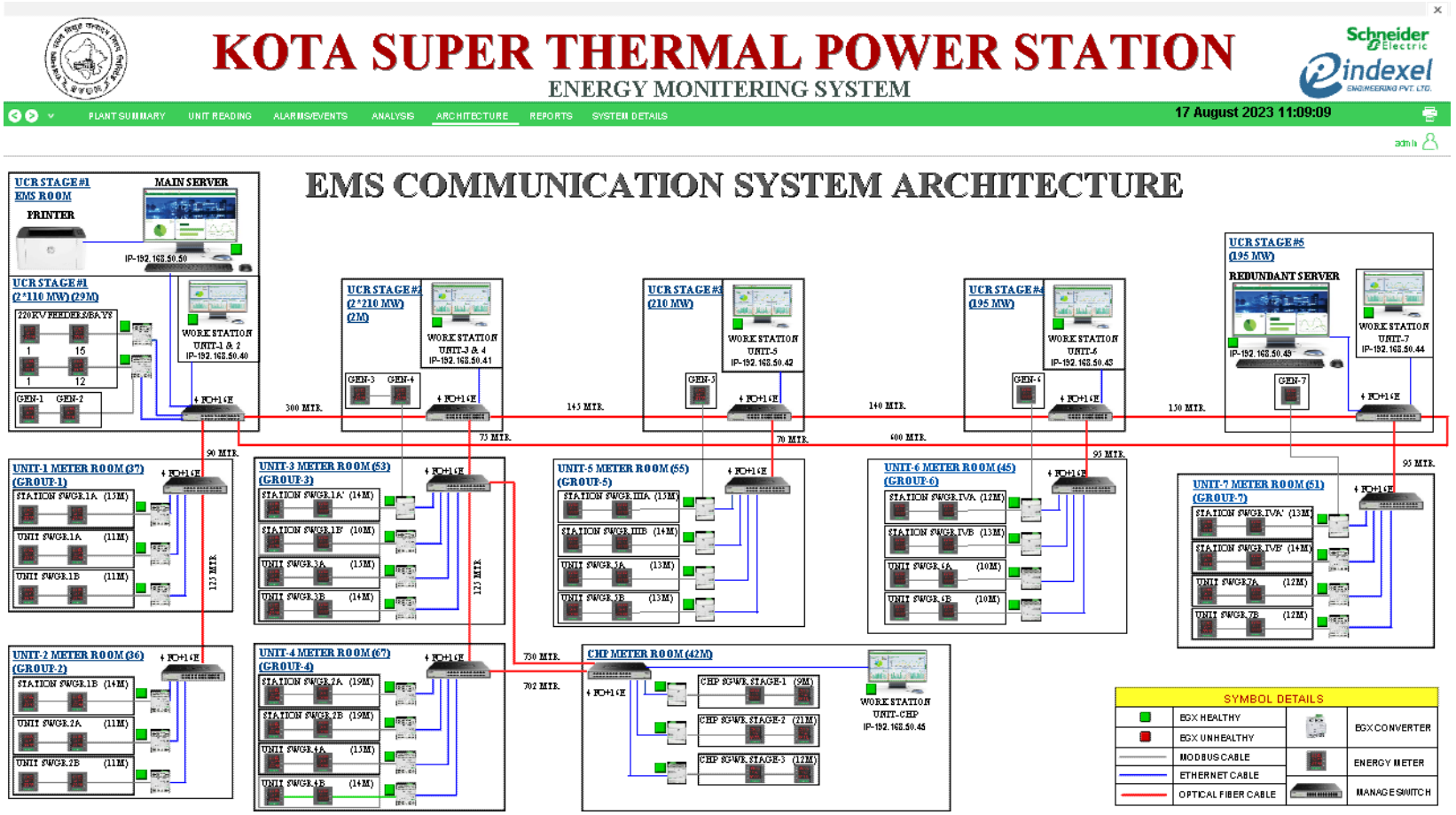
Cleanliness maintained in ESP (40 years old) and SILO Area



IMPLEMENTATION OF EMS AND ISO CERTIFICATION

Energy Monitoring system:

We have Energy Monitoring system for real time monitoring of all HT Drives in Plant area and CHP area. It also generates several reports which leads to accurate analysis of energy consumption of various drives and measurement of Incoming and Outgoing energy of station.



KSTPS IS CERTIFIED BY ISO 9001:2015

BSCIC Certifications Private Limited

BSCIC

Certificate

QUALITY MANAGEMENT SYSTEM

This is to certify that:

RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LTD.

KOTA SUPER THERMAL POWER STATION (KSTPS), KOTA
Distt.-KOTA, RAJASTHAN, INDIA

Hereby granted the Certificate Number: **BN20888/19944**

Subsequent to the **Assessment** of the organization, it has been found to be operating a Quality Management System which complies with the requirements of

ISO 9001:2015

For the following scope:

Establish, Construct, Operation & Maintenance of Coal Based Super Thermal Power Station for Generation of Electricity
IAF Scope: 25, 28

For
BSCIC CERTIFICATIONS PVT.LTD.

Sanjay Seth
Managing Director

Originally Registered: 14-Mar-2022
Issue Date: 14-Mar-2022
Expiry Date: 13-Mar-2025
1st Surveillance Due on: 12-Mar-2023
2nd Surveillance Due on: 12-Mar-2024

Validity of this Certificate depends on the validity of the main certificate of Rajasthan Rajya Vidyut Utpadan Nigam Ltd. i.e BN20888/19944 (Page 1 of 7) (In case if Surveillance Audit is not allowed to be conducted; this Certificate shall be Suspended/Withdrawn).

Please Re-validate this certificate's status at www.bsci-iso.com at REGISTRATION STATUS.
This Certificate of Registration is granted subject to relevant provisions of the BSCIC Certifications PVT. LTD. Contract Terms & Scheme for Registration Form BC18 (Latest Version). Please see BC18 at our website www.bsci-iso.com
The certificate of Registration remains the property of BSCIC Certifications Pvt. Ltd. and shall be returned immediately upon request.
BSCIC Headquarters: Sworn, 1st Floor, SB/15A, Crown Plaza Mall, Faridabad - 121 007, Haryana, India.

Version No. 1

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JAS-ANZ

IAF

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LEARNING FROM CII ENERGY AWARD

- To know about the best practices which are not being implemented in our plant.
- An opportunity to know about the best achieved data's by other plants, which can be a benchmarking for us.
- An opportunity to contact with individuals/companies to know about the best vendors for implementing proposed ENCON projects economically.
- To know about new technology, ENCON Projects, area's of innovation and remedy of same problems.
- Motivation for performing the best by knowing the ideas about how the participating companies is spreading awareness about " Energy Efficiency" to reduce the variable cost and maintaining the Environmental data in the field of Going Green.

AWARDS AND ACHIEVEMENT

CII 2019

CII
Confederation of Indian Industry

20th National Award for Excellence in Energy Management 2019

This is to certify that

KSTPS Rajasthan Rajya Vidyut Utpadan Nigam Limited Kota

has been recognized as

"Energy Efficient Unit"

This acknowledgement is based on the evaluation by panel of judges at the "National Award for Excellence in Energy Management" held during 16 - 18 September, 2019 at Hyderabad.

S Raghupathy
Deputy Director General
Confederation of Indian Industry

Meher Pudumjee
Chairperson, Energy Efficiency Council
CII - Godrej GBC

RECA 2019

Rajasthan Energy Conservation Award

(RECA-2019)

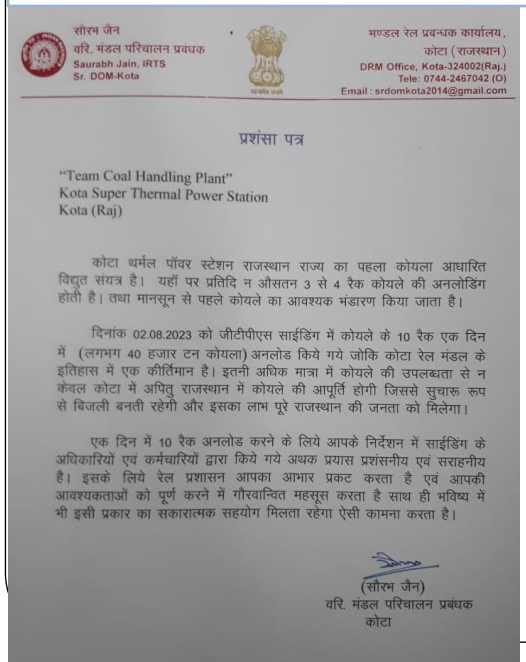
Certificate

In appreciation of the efforts for Energy Conservation for the year 2018-19 Government of Rajasthan, Department of Energy is pleased to award ~~first~~/Second Prize to M/s./Mr./Ms. Kota Super Thermal Power Station Kota (Power Plant)

Department of Energy
Government of Rajasthan, Jaipur
14th December 2019

Principal Secretary

Appreciation Letter by DRM for unloading 10 Rakes in a day without Demurrage



सौरभ जैन
वरि. मंडल परिचालन प्रबंधक
Saurabh Jain, IRTS
Sr. DOM-Kota

मण्डल रेल प्रबन्धक कार्यालय,
कोटा (राजस्थान)
DRM Office, Kota-324002(Raj.)
Tele: 0744-2467042 (O)
Email : srdomkota2014@gmail.com

प्रशंसा पत्र

"Team Coal Handling Plant"
Kota Super Thermal Power Station
Kota (Raj)

कोटा थर्मल पॉवर स्टेशन राजस्थान राज्य का पहला कोयला आधारित विद्युत संयत्र है। यहाँ पर प्रतिदि न औसतन 3 से 4 रैक कोयले की अनलोडिंग होती है। तथा मानसून से पहले कोयले का आवश्यक भंडारण किया जाता है।

दिनांक 02.08.2023 को जीटीपीएस साईडिंग में कोयले के 10 रैक एक दिन में (लगभग 40 हजार टन कोयला) अनलोड किये गये जोकि कोटा रेल मंडल के इतिहास में एक कीर्तिमान है। इतनी अधिक मात्रा में कोयले की उपलब्धता से न केवल कोटा में अपितु राजस्थान में कोयले की आपूर्ति होगी जिससे सुचारू रूप से बिजली बनती रहेगी और इसका लाभ पूरे राजस्थान की जनता को मिलेगा।

एक दिन में 10 रैक अनलोड करने के लिये आपके निर्देशन में साईडिंग के अधिकारियों एवं कर्मचारियों द्वारा किये गये अथक प्रयास प्रशंसनीय एवं सराहनीय है। इसके लिये रेल प्रशासन आपका आभार प्रकट करता है एवं आपकी आवश्यकताओं को पूर्ण करने में गौरवान्वित महसूस करता है साथ ही भविष्य में भी इसी प्रकार का सकारात्मक सहयोग मिलता रहेगा ऐसी कामना करता है।

(सौरभ जैन)
वरि. मंडल परिचालन प्रबंधक
कोटा

- KSTPS is oldest power plant of Rajasthan, running since 1983 .
- KSTPS Achieved better Heat Rate then the Targeted Heat Rate and earned ESCerts. – 29213 Nos.

RRVUNL 2023

राजस्थान राज्य विद्युत उत्पादन निगम लिमिटेड

उत्कृष्टता प्रमाण - पत्र

"कोटा सुपर तापीय विद्युत गृह, कोटा" ने वर्ष 2022 के दौरान विद्युत उत्पादन के क्षेत्र में उत्कृष्ट प्रदर्शन किया है।

सराहनीय कार्यों के लिए "कोटा सुपर तापीय विद्युत गृह, कोटा" को निगम द्वारा आयोजित राज्य स्तरीय 'गणतंत्र दिवस समारोह, 2023' के अवसर पर "सर्वश्रेष्ठ विद्युत उत्पादन गृह" वर्ग में उत्कृष्टता प्रमाण-पत्र प्रदान किया जाता है।

जयपुर
26 जनवरी, 2022

(आर.के.शर्मा)
अध्यक्ष एवं प्रबन्ध निदेशक


Thank you