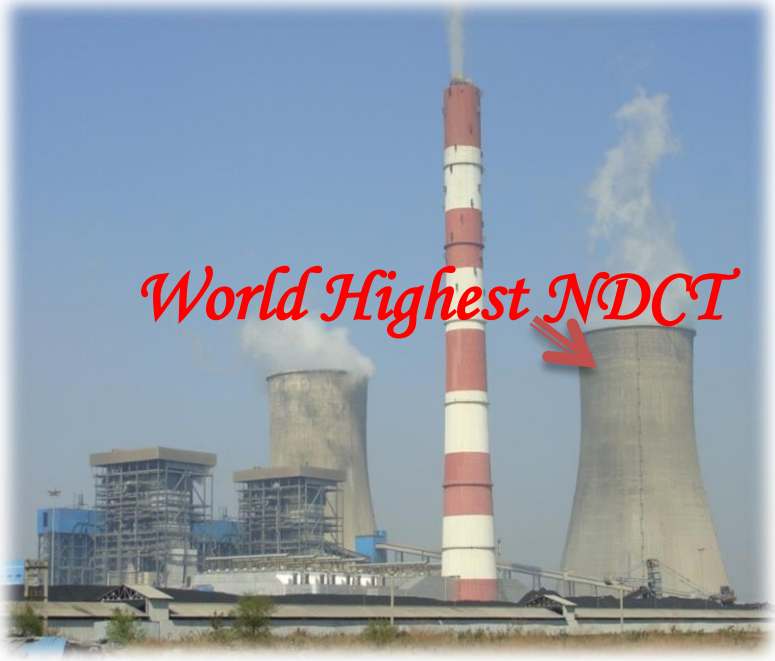
KALISINDH THERMAL POWER PROJECT, RRVUNL, JHALAWAR



2X600 MW=1200 MW

Height of NDCT:- 202 m.
Completion Period:- 767 days
Completion Date:- 12.04.2012

Presented By:-

Mr. K. L. Meena, Chief Engineer
Mr. Pradip Sah, Executive Engineer
Ms. Reeta, Addl. Executive Engineer

History of Power Development in Rajasthan

- **Rajasthan** → 1949; 19 princely states merged.
- **Total number of towns and villages electrified** → Max 42.
- **Installed generating capacity** → 13.27 MW.
- **Rajasthan State Electricity Board (RSEB) formed** → 1st July 1957 and development of power sector started.
- Under new Power Reforms Undertaken by State Government, RSEB was unbundled into five Power Companies in **July 2000**.
- Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL) is one of them.

Introduction of RRVUNL

- RRVUNL has been entrusted with the job of development of power projects under state sector, in the state along with operation & maintenance of state owned power stations.
- Present Installed Capacity of RRVUNL is **7937.35 MW** and **271 MW** (ISP).

RRVUNL is also managing and operating the following Inter State Projects (ISP)

S.No	Power Station	Present Capacity
01.	Rana Pratap Sagar Hydel PS (4X43 MW)	**172 MW**
02.	Jawahar Sagar Hydel PS (3X33 MW)	**99 MW**
	Total	**271 MW**

PRESENTLY INSTALLED CAPACITY

S.No.	Power Station	Present Capacity
1.	Suratgarh STPS, Suratgarh, Distt-Shriganganagar	2160 MW
2.	Kota STPS, Kota	1240 MW
3.	Chhabra Thermal Power Station, Chhabra, Distt. Baran	2320 MW
4.	Kalisindh Thermal Power Station, Kalisindh, Distt. Jhalawar	1200 MW
5.	Dholpur CCPS , Dholpur	330 MW
6.	Giral Lignite TPS ,Giral, Distt. Barmer	250 MW
7.	Ramgarh Gas Thermal Power Station,Distt. Jaisalmer	273.50 MW
8.	Mahi Hydel Power Station.Distt-Banswara	140 MW
9.	Mini Micro Hydel Schemes	23.85MW
	Total	7937.35 MW

ONGOING PROJECTS OF RRVUNL

S. No.	Power Station / Unit	Capacity
1.	Suratgarh Supercritical Thermal Power Station U# 8	660 MW
	Total Capacity	660 MW

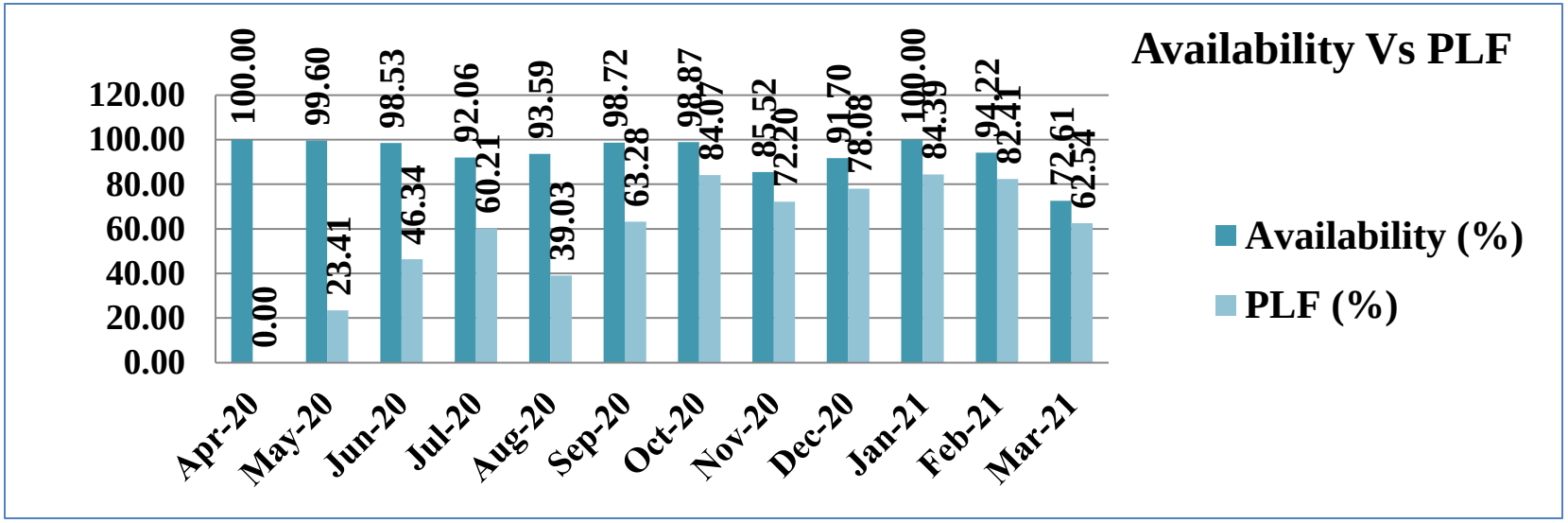
ENERGY CONSUMPTION OVERVIEW

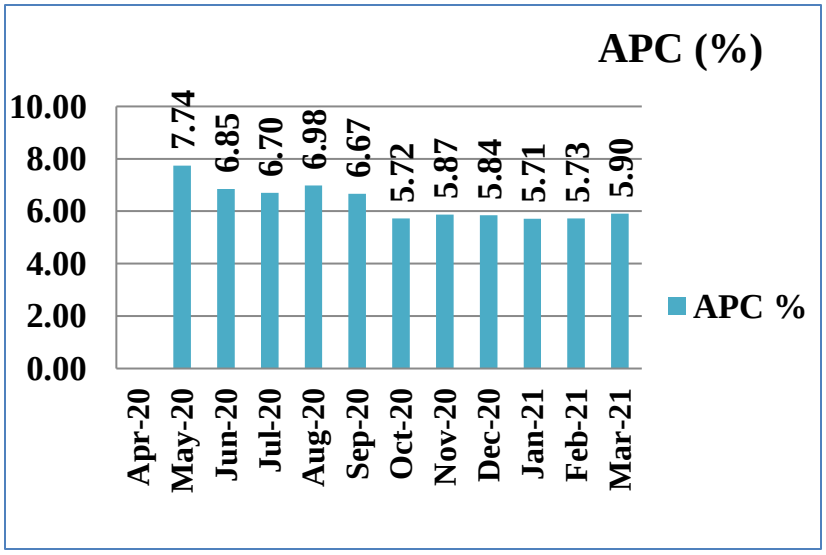
Performance Parameters for FY 2020-21

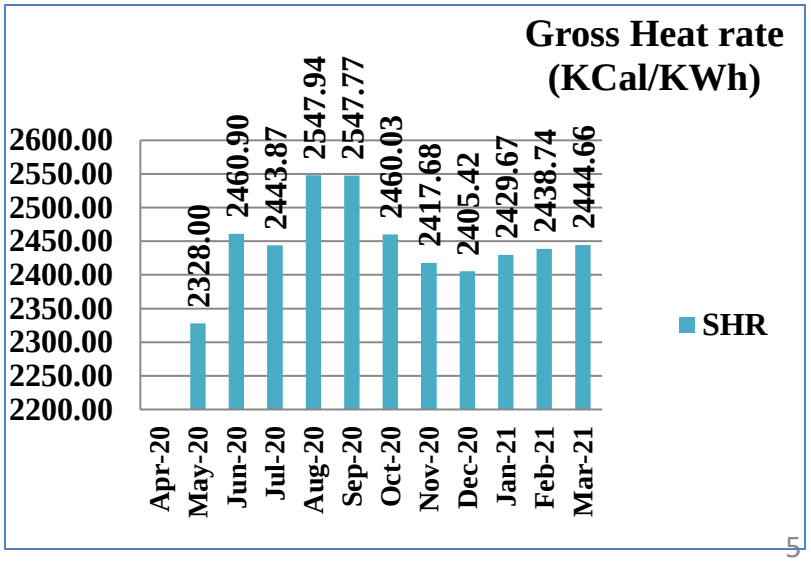
S. No.	Parameters	Unit	Value
1.	Annual Generation	MU	6089.98
2.	PLF	%	57.93
3.	Availabilty	%	93.76
4.	Gross Heat rate	KCal/KWh	2366.37
5.	Aux. Consumption	%	6.2
6.	Boiler Efficiencies (station wise)	%	86.437
7.	Turbine Heat Rates (station wise)	KCal/KWh	2231.4257
8.	DM Water Consumption	M^3	196536 (0.81 %)
9.	Raw Water Consumption	M^3	16344122 (2.73 m^3/MW)
10.	Sp. Oil Consumption	(ml/KWh)	0.6217

ENERGY CONSUMPTION OVERVIEW

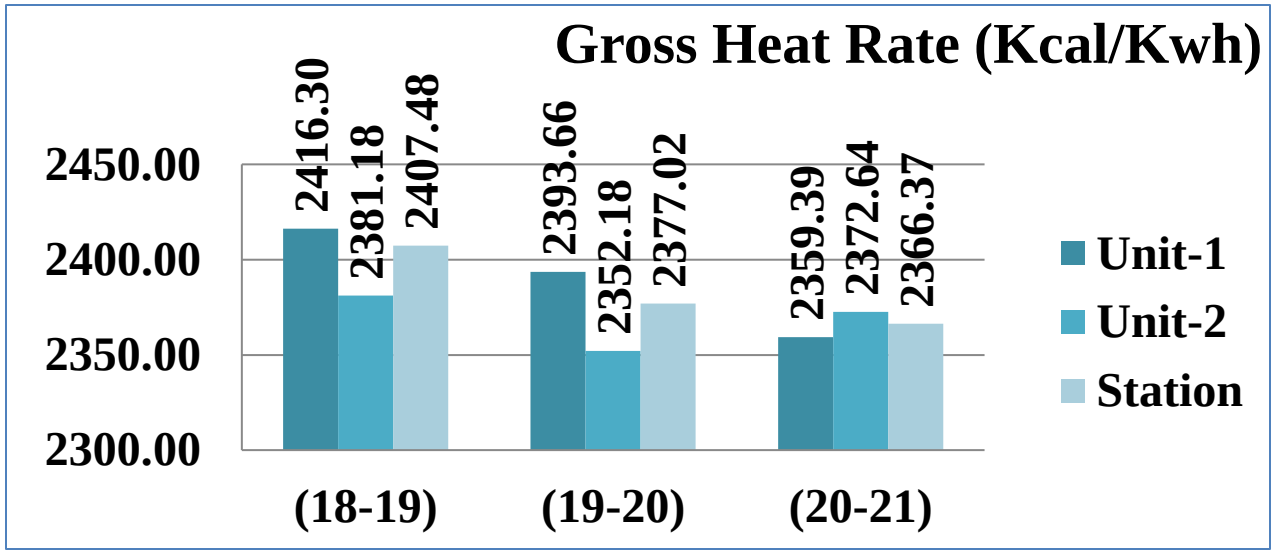
Performance Parameters for FY 2020-21



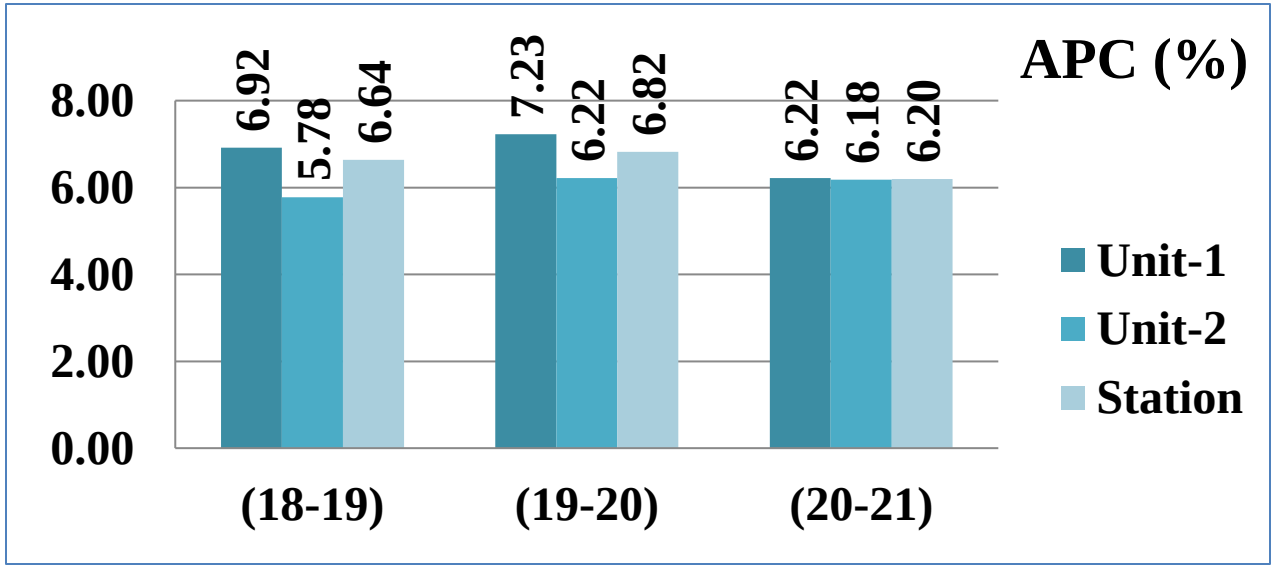




SPECIFIC ENERGY CONSUMPTION

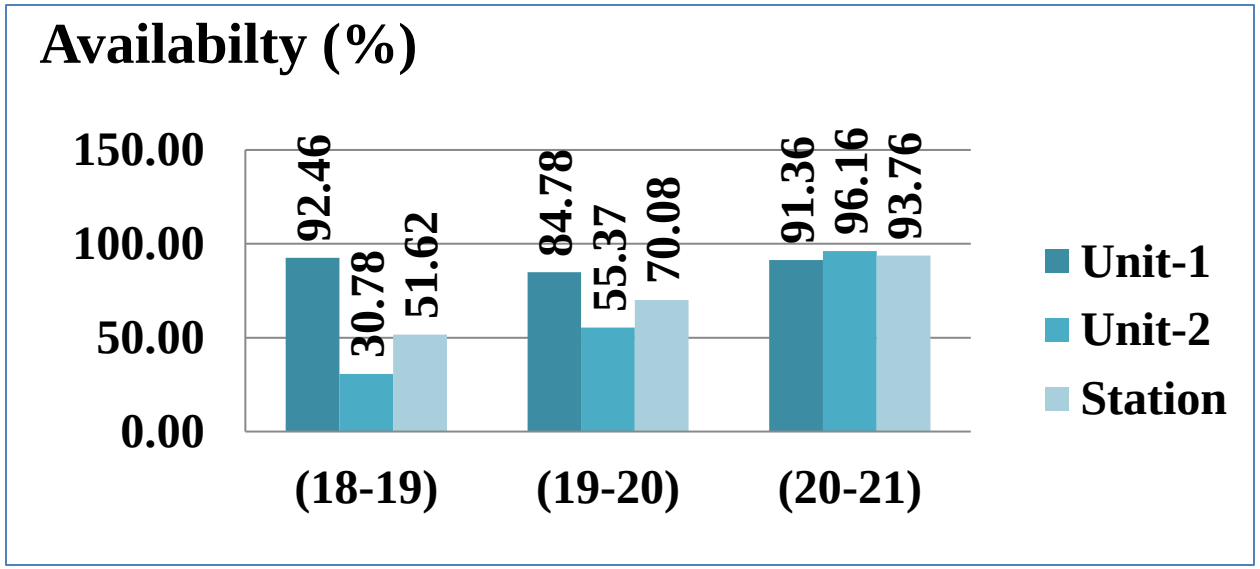


FY	% Improvement SHR
2018-19	0.722
2019-20	-1.265
2020-21	-0.448

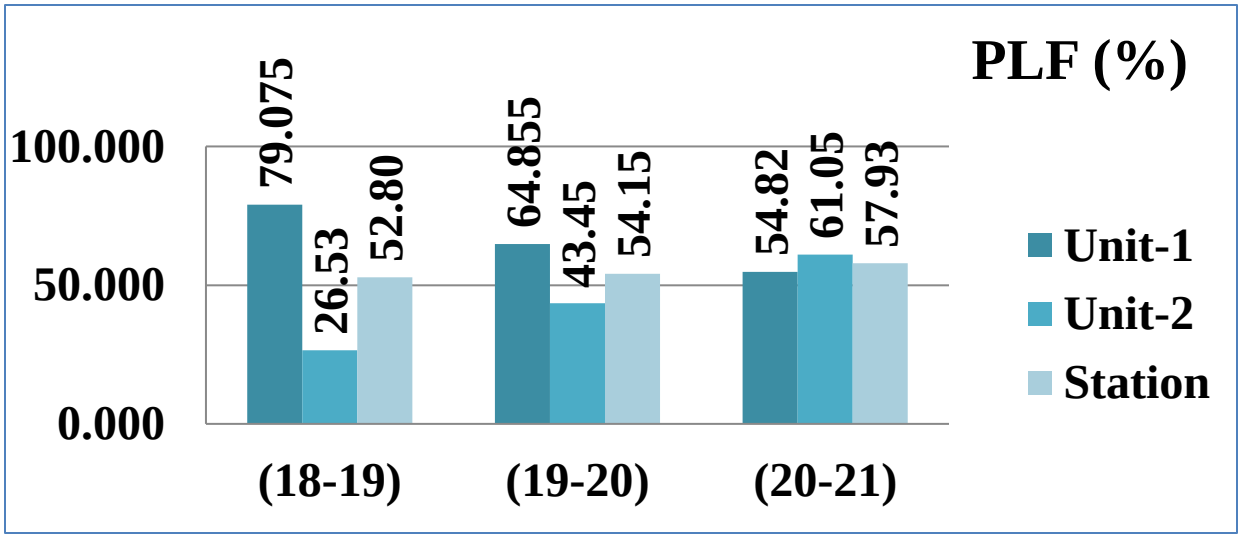


FY	% Improvement APC
2018-19	1.840
2019-20	2.711
2020-21	-9.09

SPECIFIC ENERGY CONSUMPTION



FY	% Improvement Availability
2017-18	-40.44
2018-19	35.76
2019-20	33.79



FY	% Improvement PLF
2017-18	-17.05
2018-19	2.56
2019-20	6.98

SPECIFIC ENERGY CONSUMPTION

Reasons of Variations

- Loss of SHR due to backing down by LD. APC also increased. (Loss of Gen. due to back down = 3374.65 MU)
- Due to increase in no of tripping, oil consumption increased; hence SHR Increased.
- Due to High Percentage of moisture unaccounted loss of heat energy increases causing high SHR.
- In U#2 due to high vibration at TG bearing No 7, unit run on partial load the SHR , APC , Sp. oil cons. increased .

BENCHMARKING

Internal Benchmarking (FY 2020-21)

KaTPP	APC - Unit # 1	APC - Unit # 2	Station
FY 2019-20	7.23 %	6.22 %	6.82 %
FY 2020-21	6.22 %	6.18 %	6.20 %

National Benchmarking (FY 2019-20)

Name	Capacity	SHR (KCal/KWh)	APC (%)
KaTPP	1200 MW (2X600)	2371.6	6.82%
SIMHADRI SUPER THERMAL POWER STATION- NTPC	2000 MW (4X500)	2432	6.45%
NTPC Limited – RAMAGUNDAM SUPER THERMAL POWER STATION	2600MW (3X200 + 3X500 + 1X500) + 10 MW Solar	2349	6.88%
JSW Energy, Vijayanagar (1690 MW) & CPP (O&M for JSWSL)]	(1690 MW) [2X130MW + 2X300 MW IPP + 830 MW]	2378	7.9%

ENCON PROJECTS FY 2021-22

S. No.	Project Detail	Investment (Rupees)	Verified Savings (Rs.)	Verified energy savings (KWh)	Units	Fuel	Status	Pay back year
1	Cost economics by Installing natural ventilators in TG area	22500000	6699020	1445000	-	-	Under progress	3.36
2	Cost Economics by Insulating steam pipes & Boiler	146900	1930596	332277	MT	187	Under progress	0.08
3	Cost economics to reduce the power cons. By pump coating of CW water pumps.	489500	4095895.68	836580	-	-	Under progress	0.12
	Total	23136400	12725511.68	2613857				

Road Map for Future Target

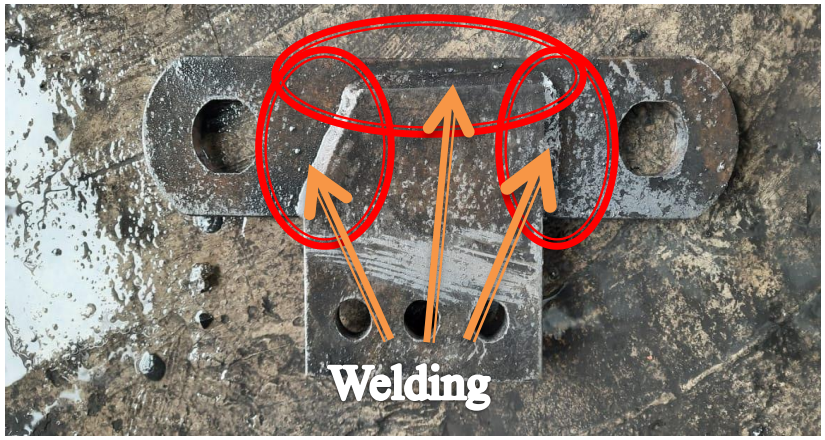
Online Energy Monitoring System has been installed for close monitoring of APC and henceforth reduction in APC achieved in FY 2020-21 as per internal benchmarking. Now focus on national benchmarking.

ENCON PROJECTS IMPLEMENTED

Year	No of Energy saving projects implemented	Investments (INR Million)	Electrical savings (Million KWh)	Thermal savings (Million Kcal)/MTOE)	Savings (INR Million)
FY (2018-19)	3	2.5250	0.3418	0.0001	1.6913
FY(2019-20)	2	3.3142	1.1015	0.0001	5.1234
FY(2020-21)	3	3.1698	0.7539	-	3.6910

INNOVATIVE PROJECT

Modification in Chain Link of Apron Feeder of Wagon Tippler



Old Chain Link Design With Welded Attachments

- **Problem:-** Chain Link of Apron Feeder broken.
- **Effect:-** Wagon tippler outage for 6-8 hrs. **No. of Wagon Tipplers -** 4.
- **Frequency**:– 2-3 times in a month / Wagon Tippler (Annually – 120-150).
- **Reason** :- Chain links with welding attachments are not durable.

- **Cost of replacement of Chain Link :-** 9 Lakhs **(**150*6000 = 9,00000 /- yearly)

- **Response of OEM:-** OEM (ROLCON, TRF) denied to modify the design as proposed by KaTPP Engineers without welding attachments.

INNOVATIVE PROJECT

1. Modification in Chain Link of Apron Feeder of Wagon Tippler

New Link Design Without Welding

- **Modification:-** New Link is designed without welding. Old chain links are replaced with new links. These links are more durable.
- **Modification Month:- AF#1**:–April-2021; **AF#3**:–Oct-2020.
- **Result-** No breakdown in modified Apron Feeders as yet. This modification ensures more availability of wagon tipplers.

- **Investment:-** Costs of new links are around same as old links.

- **Replication Potential :-** Can be explored by other plants also if they are also facing such type of problems.

RENEWABLE ENERGY SOURCES

- Renewable Energy Sources are looked after by our State Entity i.e. Rajasthan Renewable Energy Corporation (RREC), Jaipur. They take care of all renewable energy projects in the State.
- Now Solar power under Renewable Energy Sector is being dealt by RRVUNL Head office for all power plants of RRVUNL. Recently RRVUNL got approval of establishing a Solar park of 2000 MW.
- Hence no any project regarding Renewable Energy is being dealt by KaTPP, Jhalawar.

ENVIRONMENT MANAGEMENT - ASH UTILIZATION

Particulars	UOM	2018-19	2019-20	2020-21
Ash Stock in Plant (yard + pond)	Tons	463709	889951	54444.48
Ash Generated	Tons	914091	1014713	1113162.21
Ash Utilization	%	118.22	118.38	103.23
Ash Utilized in manufacturing of cement/concrete – other similar products	%	71.23	62.84	74.41
Ash Utilized in Fly Ash Bricks	%	8.38	8	19.1
Ash Utilized in Mine filling	%	NIL	NIL	NIL
Ash Utilized for Roads pavements	%	5.8	21.27	144.7
Ash Utilization in Other Areas –	%			
1. In Ash Dyke raising	%	0.28	0.42	0
2. In reclamation of low lying area	%	0.13	0.13	0
3. Others(lifted/utilized by Red Bricks manufactures/potters from Ash Dyke)	%	32.39	25.71	84
Expenditure on Ash Utilization (annual)	INR(Lakhs)	Nil	Nil	Nil

Ash Handling done through various Methods

Ash Handled (Wet Method)	%	20
Ash Handled (Dry Method)	%	80
Ash Handled (Semi Wet)	%	0

ENVIRONMENT MANAGEMENT- EMISSION

Particulars	UOM	2018-19	2019-20	2020-21
Total CO2 Emissions Per KW of Generation	Ton/kW	NA	NA	NA
Current SOx Emissions at Full Load* (U#1/U#2)	mg/Nm^3	991 / 790	769 / 1110	1081 / 1206
Current NOx Emissions at Full Load* (U#1/U#2)	mg/Nm^3	108 / 110	74 / 149	113 / 191
Particulate Matter * (U#1/U#2)	mg/Nm^3	40 / 14	63 / 24	57 / 62
Mercury*	Mg/Nm^3	NA	NA	NA

Infrastructure available at KaTPP for Emission Measurement and Control

- **Continuous Emission Monitoring System**
- **Ambient Air Quality Monitoring System**

Future Plan for achieving Target:-

FGD installation is planned to control SO_X emission. NIT Floated on dated 25.03.2021. LOI is targeted by 30.09.2021.

Best Practices Adopted for Emission Control and Monitoring:-

For control of NO_x emission OFA is installed and for SPM ESP are installed. Also, monitoring of air is being done for optimized air-fuel ratio.

ENVIRONMENT MANAGEMENT-WATER

Particulars	UOM	Normative Value by MOEF	2018-19	2019-20	2020-21
DM water Consumption of Plant	%	1	0.86	0.84	0.81
Raw Water Consumption of Plant	m^3/MW	3.5	2.69	2.64	2.73

Best Practices in Water Management

- Recycle waste of Dual media filter, Ultra Filtration, Rapid Gravity Filter backwash & Cooling Tower Blow down through Effluent Treatment Plant.
- Metering and measuring of water through flow meters at different locations.
- Treated waste water is used for Cooling Tower Make-Up.
- For treatment of waste water Effluent Treatment Plant (ETP) is installed of capacity 4033 KLD. Complete effluent is being recycled and Zero Liquid Discharge concept is maintained. Treated waste water of ETP clarifier is also used for gardening.
- Treated waste water after passing through Reverse Osmosis is used for production of De-Mineralised (DM) Water.

BEST PRACTICES ADOPTED AT KATPP

Reduction in APC

- Only one CEP kept in service during synchronization in place of both CEPs.
- One TDBFP taken in service during cold and warm start up of units in place of MDBFP if one unit is already running.
- Practice of 2 CWP & 3 ACWP instead of 3 CWP & 4 ACW Pump (as per design) is adopted in winter & rainy seasons.
- Only two compressors (1-SAC & 1-IAC) kept in service in place of 4-nos.

Reduction in Synchronization Time

All 03 Nos. of CPU taken in service during unit start up to reduce time of DPR.

Reduce Oil Consumption

- Boiler preheating during cold light up.

BEST PRACTICES ADOPTED AT KATPP

Wagon Tippler Area

- Increased tipping angle of Wagon Tippler (WT) to reduce residual coal in wagons.
- Installed pre-wetting system at Inhaul of each Wagon Tippler.
- Declamping of WT is interlocked with the angle of turn table instead of timer to ensure declamping occurs at the desired position only.
- The cam gear switch has been shifted to the End ring of the tippler from Gear box output to avoid misalignment of turn table and ensure more availability of WT.

Stacker

- Increased speed of Stacker from to 5 Mtrs/Min to 10 Mtrs/Min.
- Installation of Water Spray system during stacking of coal to suppress coal dust.

TEAM WORK, EMPLOYEE INVOLVEMENT & MONITORING

Daily Monitoring of plant performance and problems along with solution is done through daily morning meeting.

Review Meeting is Chaired by Plant Head (Chief Engineer)

Budget Allotted for Energy Conservation FY (21-22) (Million Rs.):- 23.1364.

Training:- Flexibility and Improving Efficiency in Coal based Power Plants

Kaizens

Supervisor Level:- Modification done in existing pipe line header of ash water recovery system by providing branch line to CT blow down tank for makeup.
Expenditure :- INR 147146 /-
Saving :- 3200 Ton water Daily and 1,16,800 KWh costing INR 554800 /- annually.

Workmen Level:- Modification done in condensate drain system to avoid frequent compressor tripping.
Expenditure :- INR 91000/-; **Saving**:- INR 7868020 /-

Areas of Concern:- Boiler tube Leakage, Generator Vibration

IMPLEMENTATION OF ISO

BSCIC Certifications BSCIC Private Limited

BSCIC

Certificate

QUALITY MANAGEMENT SYSTEM

This is to certify that:

RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LTD.
KALISINDH SUPER THERMAL POWER STATION
KALISINDH, DISTT- JHALAWAR, RAJASTHAN, INDIA

Hereby granted the Certificate Number: BN17169/17321

Subsequent to the **Assessment** of the organization 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

Originally Registered: 11-Jul-2018
Latest issue: 11-Jul-2018
Expiry Date: 10-Jul-2021

For
BSCIC CERTIFICATIONS PVT.LTD.

Sanjay Seth
Managing Director

Validity of this Certificate is subject to Annual Surveillance Audits to be done Successfully on or before 10-Jul-2019 and 10-Jul-2020 resp.
(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.bsc-icc.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 B018 (Latest Version). Please see B018 at our website www.bsc-icc.com
The certificate of Registration remains the property of BSCIC Certifications Pvt. Ltd. and shall be returned immediately upon request. BSCIC Headquarters: IInd Floor, SCO 150, Sector - 21 C, Faridabad 121001, Haryana, India

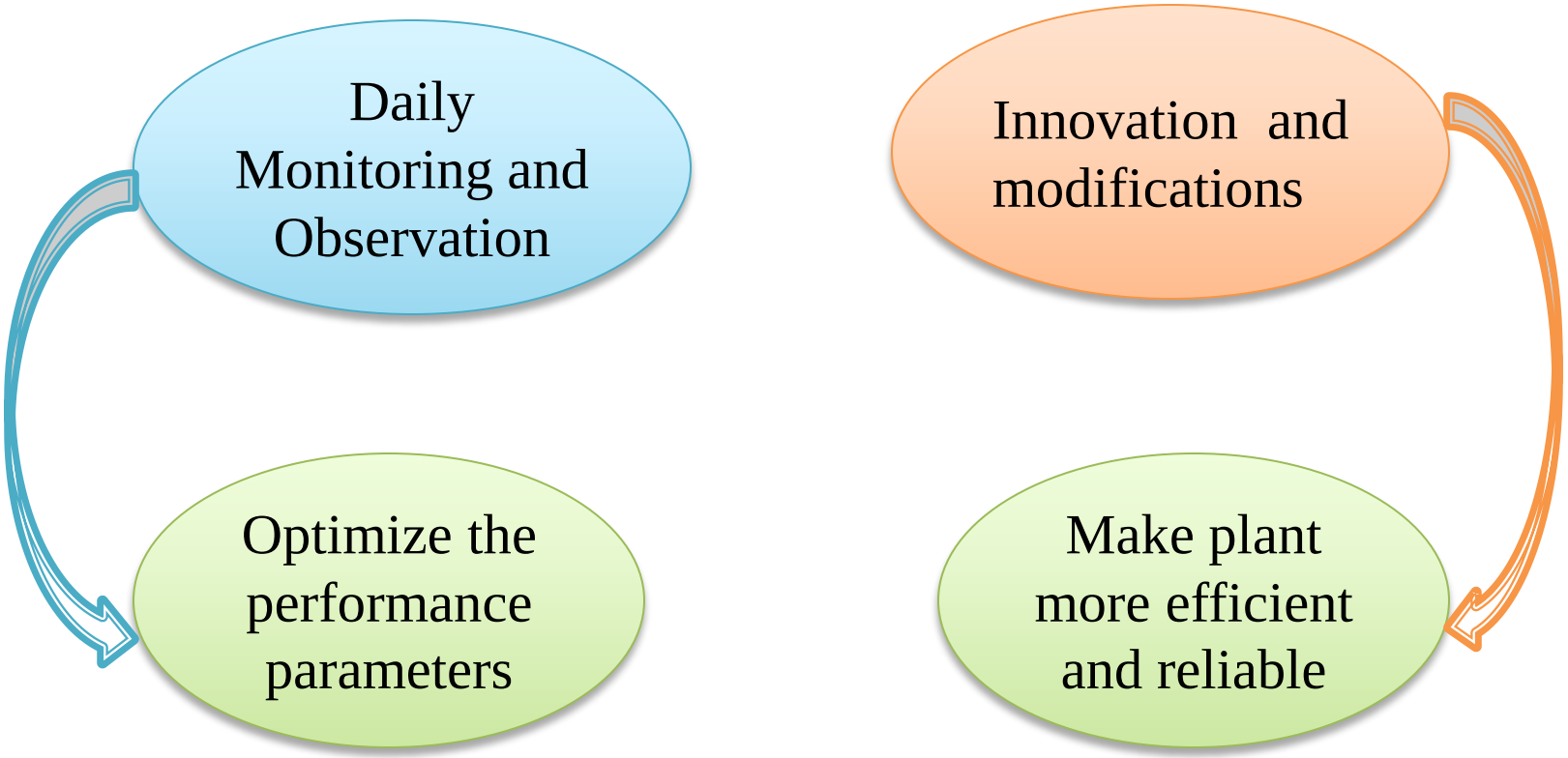
Page 5 of 5

BSCIC JAS-ANZ IAF

Renewal is under process.

% Investment of Energy Saving Projects on Total Turnover of The Company – 0.083

LEARNING FROM CII AWARDS 2020 & OTHER PROGRAMS



AWARDS & ACHIEVEMENTS

CII

Confederation of Indian Industry
125 Years - Since 1895

21st National Award for Excellence in Energy Management 2020

This is to certify that

Kalisindh Thermal Power Station, RRVUNL, Jhalawar

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 25 - 28 August 2020.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

GOVERNMENT OF RAJASTHAN

STATE SAFETY AWARD-2021

This certificate is awarded on 4th March, 2021
to

RRVUN, Kalisindh Thermal Power Project, UNDAL, Jhalawar (RJ/31105)

for their participation in Rajasthan Factory Safety Award Scheme, 2021 and efforts to promote high standards of competence and compliance of Occupational Health, Safety and Welfare provisions under Factories Act, 1948 and rules made thereunder.

D.K.Chaudhary
Chairman
National Safety Council
Rajasthan State Chapter

Mukesh Jain
Chief Inspector
Factories & Boilers
Rajasthan

सत्यमेव जयते

Rajasthan Energy Conservation Award

(RECA-2020)

Certificate

In appreciation of the efforts for Energy Conservation for the year 2019-20, Department of Energy Government of Rajasthan is Pleased to award ~~first~~/Second/~~Third~~ Prize to M/s./Mr./Ms. Kalishindh Super Thermal Power Project, Jhalawar in the category of Industry - Power Plant

Dinesh Kumar IAS
Principal Secretary
Energy Department
Government of Rajasthan

RRECL
14th December-2020

Dr. Subodh Agarwal IAS
Chairman & Managing Director
Rajasthan Renewable Energy Corporation

2021-8-10/3000

Team Members Contact Details

- Mr. K. L. Meena, Chief Engineer; Email: ce.katpp@rrvun.com
- Mr. Prdip Sah, Executive Engineer; Email: se.coml.katpp@rrvun.com
- Ms. Reeta, Assistant Engineer; Email: reeta_48424@rvun.in