# 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. G.R.Meena, Superintending 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 **8597.35 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 | 1500 MW |
| 2. | Suratgarh - SC, Suratgarh, Distt-Shriganganagar | 1320 MW |
| 3. | Kota STPS, Kota | 1240 MW |
| 4. | CTPP – O&M, Chhabra, Distt. Baran | 1000 MW |
| 5. | CTPP – SC, Chhabra, Distt. Baran | 1320 MW |
| 6. | Kalisindh Thermal Power Station, Kalisindh, Distt. Jhalawar | 1200 MW |
| 7. | Dholpur CCPS , Dholpur | 330 MW |
| 8. | Giral Lignite TPS ,Giral, Distt. Barmer | 250 MW |
| 9. | Ramgarh Gas Thermal Power Station,Distt. Jaisalmer | 273.50 MW |
| 10. | Mahi Hydel Power Station.Distt-Banswara | 140 MW |
| 11. | Mini Micro Hydel Schemes | 23.85MW |
| | Total | 8597.35 MW |

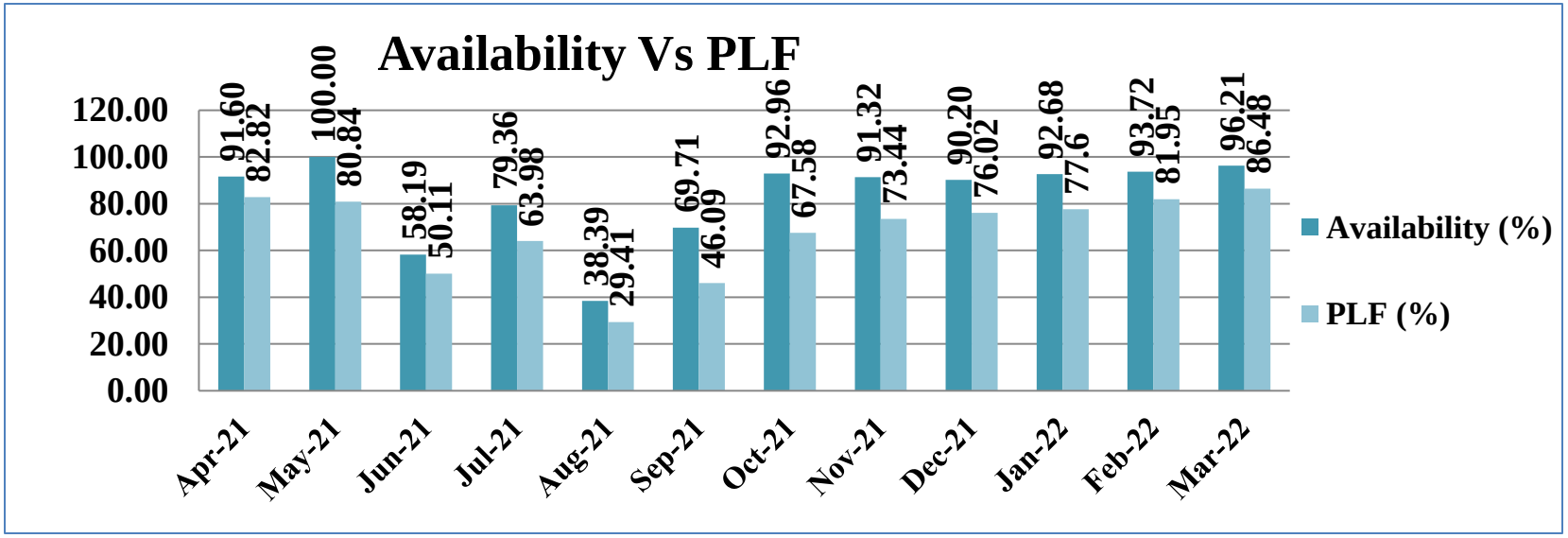
# ENERGY CONSUMPTION OVERVIEW

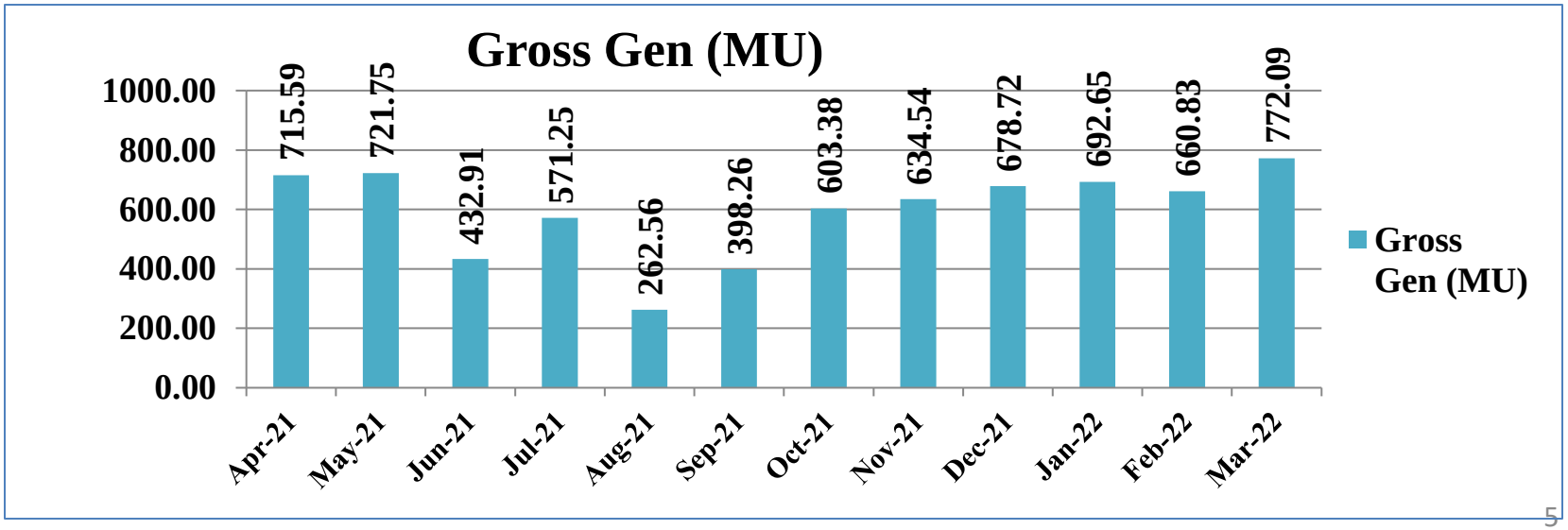
## Performance Parameters for FY 2021-22

| S. No. | Parameters | Unit | Value |
|---|---|---|---|
| 1. | Annual Generation | MU | 7144.53 |
| 2. | PLF | % | 67.97 |
| 3. | Availability | % | 82.83 |
| 4. | Gross Heat rate | KCal/KWh | 2463.03 |
| 5. | Aux. Consumption | % | 6.47 |
| 6. | Boiler Efficiencies (station wise) | % | 86.48 |
| 7. | Turbine Heat Rates (station wise) | KCal/KWh | 2277.10 |
| 8. | DM Water Consumption | $M^3$ | 175024.62 (0.76 %) |
| 9. | Raw Water Consumption | $M^3$ | 16344122 (2.597 $m^3$/MW ) |
| 10. | Sp. Oil Consumption | (ml/KWh) | 0.821 |

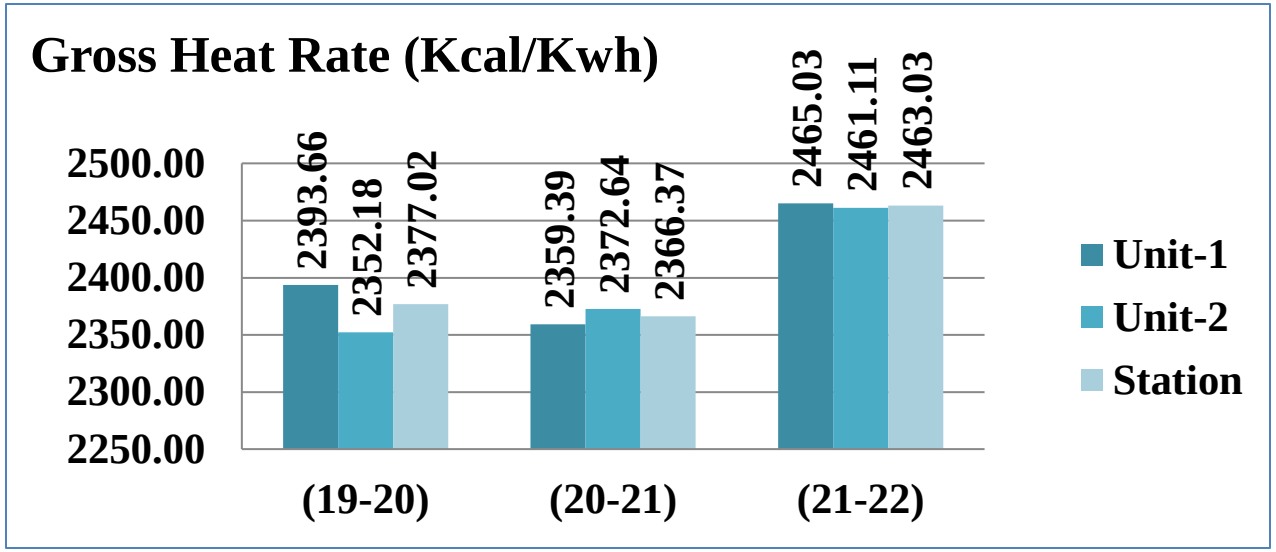
# ENERGY CONSUMPTION OVERVIEW

## Performance Parameters for FY 2021-22

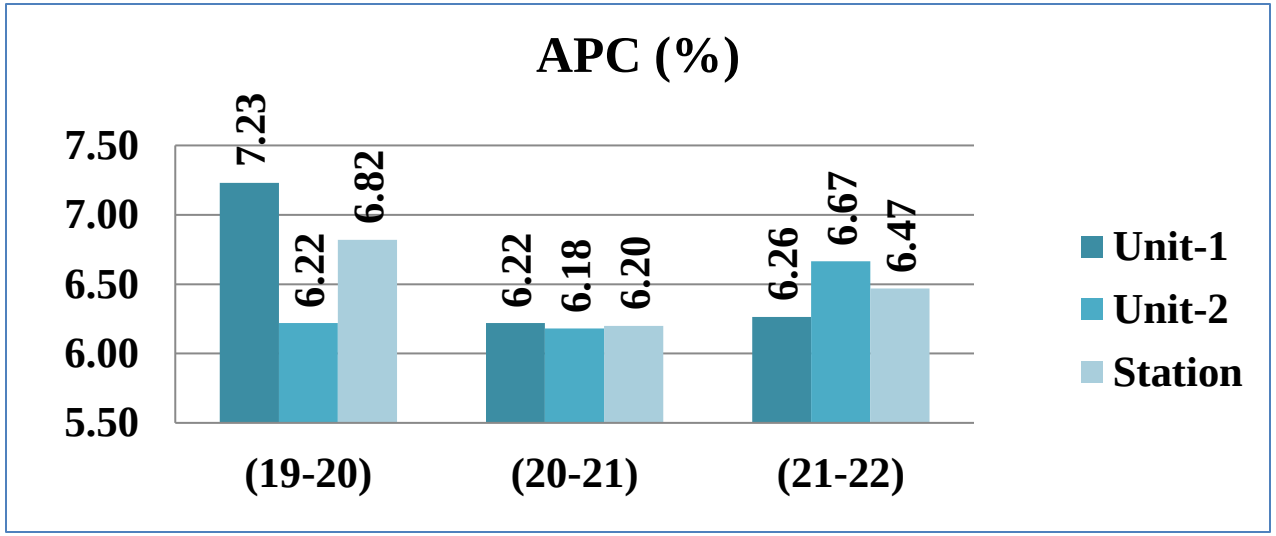


# SPECIFIC ENERGY CONSUMPTION

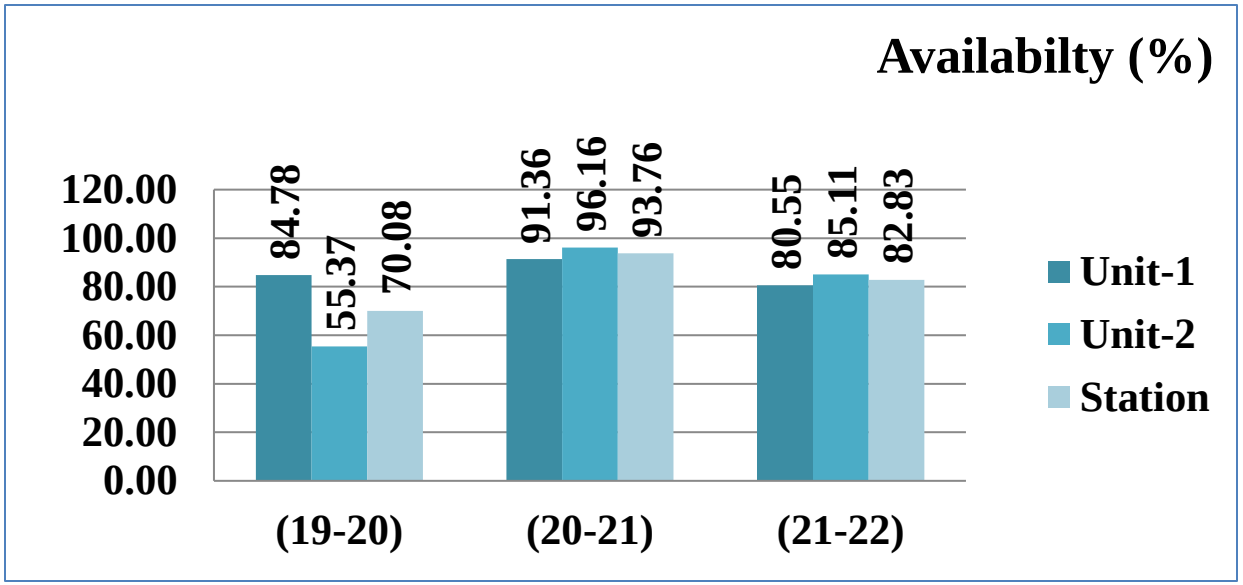



| FY | % Improvement SHR |
|---|---|
| 2019-20 | -1.265 |
| 2020-21 | -0.448 |
| 2021-22 | 4.08 |



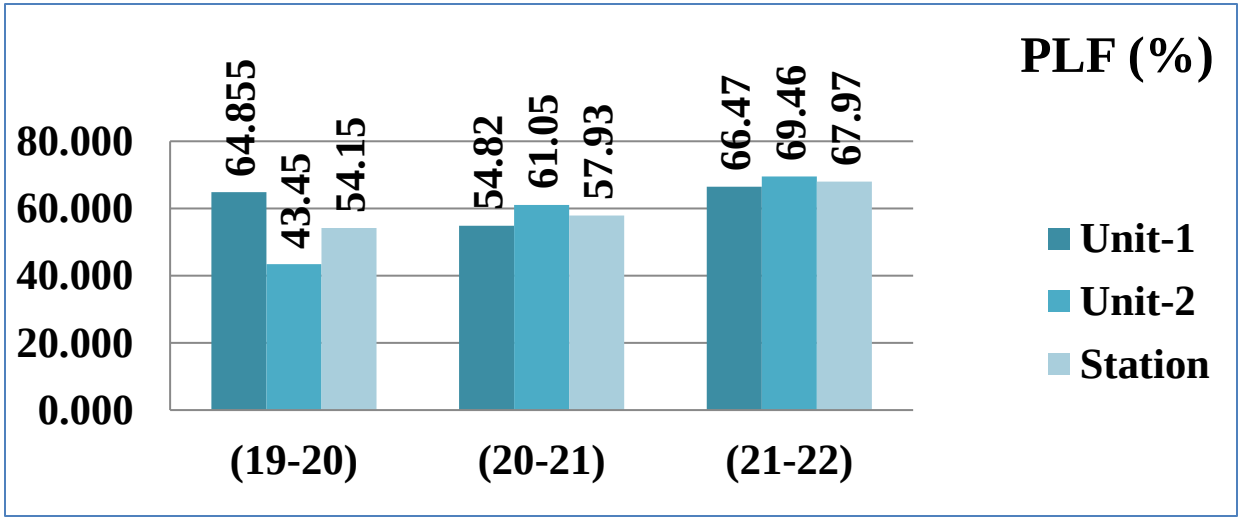

| FY | % Improvement APC |
|---|---|
| 2019-20 | 2.711 |
| 2020-21 | -9.09 |
| 2021-22 | 4.34 |

# SPECIFIC ENERGY CONSUMPTION




| FY | % Improvement Availability |
|---|---|
| 2019-20 | 35.76 |
| 2020-21 | 33.79 |
| 2021-22 | -11.66 |

**Availability Loss due to Coal crisis = 11.44%**




| FY | % Improvement PLF |
|---|---|
| 2019-20 | 2.56 |
| 2020-21 | 6.98 |
| 2021-22 | 17.32 |

# SPECIFIC ENERGY CONSUMPTION

**Reasons of Variations**

- Loss of SHR @2.8% due to backing down by LD (35.82% of operated hrs). 5178.67 hrs. (BD) / 14459.35 hrs (Operated). APC @0.5 also increased.
- Unit boxed up and later run on partial load due to coal shortage and later on received coal was of very poor quality, muddy, lumpy and sticky containing high moisture up to 22.89 % and GCV up to 3312 Kcal/Kg; which further causes increase in SHR as well as APC.
- Due to worst coal, frequent tripping of mills causes tripping of Units; oil consumption (1555.8 KL) increased; hence SHR Increased.

# MUDDY, LUMPY, STICKY COAL





MUDDY, LUMPY, STICKY COAL

# SPECIFIC ENERGY CONSUMPTION

## Reasons of Variations

- Unit # 2 was continuous running since 14.10.2019, Annual shutdown was not permitted for maintenance of equipments.
- Annual over hauling work done during forced shut down of the Unit # 2 from 08.04.2022 to 13.06.2022.
- Draft Power of Unit # 2 improved from 28.5 KWH/MW to 20.4 KWH/MW. Saving in APC = 1.069 LU per day.
- After annual overhauling work of Unit # 2 CEPs approx. saving in APC for both CEP 0.08 LU per day.
- Cooling Tower effectiveness achieved 74.83% against design value 71.4%.
- PHE performance also improved ($7.3^0$C against $7.0^0$C).

# 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 2020-21)

| Name | Capacity | SHR (KCal/KWh) | APC (%) |
|---|---|---|---|
| KaTPP | 1200 MW (2X600) | 2366.37 | 6.20% |
| METTUR THERMAL POWER STATION - II | 600 MW (1X600MW) | 2441.04 | 7.19% |
| SIMHADRI SUPER THERMAL POWER STATION- NTPC | 2000 MW (4X500) | 2409 | 6.68 % |
| NTPC Limited – RAMAGUNDAM SUPER THERMAL POWER STATION | 2600MW (3X200 + 3X500 + 1X500) + 10 MW Solar | 2351 | 6.72% |
| JSW Energy, Vijayanagar (1690 MW) & CPP (O&M for JSWSL)] | (1690 MW) [2X130MW + 2X300 MW IPP + 830 MW] | 2410 | 8.16% |

# ENCON PROJECTS FY 2022-23

| S. No. | Project Detail | Investment (Rupees) | Verified Savings (Rs.) | Verified savings (KWh) | Units | Fuel | Status | Pay back year |
|---|---|---|---|---|---|---|---|---|
| 1 | Replacement of conventional ceiling fan (65W) by Energy efficient BLDC fan (28W) | 346920 | 94345.93 | 18907 | - | - | Completed | 3.68 |
| 2 | Variable Frequency Drives in CEPs | 50000000 | 16367200.00 | 3280000 | - | - | Under progress | 3.06 |
| 3 | Cost Economics by Insulating steam pipes & Boiler | 54500000 | 2540982.85 | 509215 | MT | 295.84 | Under progress | 13.70 |
| 4 | Polymer Coating in CW Pumps | 2400000 | 15528011.74 | 3111826 | - | - | Under progress | 0.15 |
| 5 | Reduction in Reheater Spray | 10000000 | 0.00 | 0.00 | MT | 8790.0 | Under progress | 0.23 |
| 6 | Reduction in leakages in APH & Flue Gas Ducts | 3000000 | 40853134.99 | 8187001 | - | - | Under progress | 0.07 |
| 7 | Variable Frequency Drives in HFO Pumps | 3000000 | 168143.04 | 33696 | - | - | Under progress | 17.84 |
| 8 | Energy Savers for Split AC | 125000 | 124750.00 | 25000 | - | - | Under progress | 1.00 |
| | Total | 12,33,71,920 | 7,56,76,569 | 1,51,65,645 | | 9085.8 | | |

# ROAD MAP FOR FUTURE TARGET

- **Focus on timely completion of EnCon projects planned for FY 22-23.**
- **Saving through 50 Nos. Microwave Switches installation in Office buildings.**
  **(Investment = INR 26550.00/-;**
  **Saving = INR 95808.00 /-)**
- **Focus on solar power also in coordination with our Head Office.**
- **FGD installation is under process in phased manner.**
- **Freedom from OEM dependency.**

# 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(2019-20) | 2 | 3.3142 | 1.1015 | 63.13 | 5.1234 |
| FY(2020-21) | 10 | 3.1698 | 0.7539 | - | 3.581 |
| FY(2021-22) | 6 | 6.1002 | 1.7788 | 110.51 | 10.5405 |

# ENCON PROJECTS FY 2021-22

| S. No. | Project Detail | Investment (Rupees) | Verified Savings (Rs.) | Verified energy savings (KWh) |
|---|---|---|---|---|
| 1 | Replacement of HPSV 150W lamps of street lights in various areas by LED 40W | 4,42,411.20 | 7,19,050.77 | 1,44,098.40 |
| 2 | Solar Switches installed for street lights in various areas of Plant | 43,200 | 49868.56 | 9993.70 |
| 3 | Cost economics to reduce the power cons. by pump coating of CW water pump. (1 No) | 5,35,454 | 41,40,001.40 | 8,29,659.60 |
| 4 | Cost economics by insulating steam pipes & boiler . | 51,92,598 | 21,63,575.58 | 4,33,582.28 |
| 5 | Isolation of OHE Lines through Isolator in CHP area | 0 | 16,19,411.39 | 3,24,531.34 |
| 6 | Replaced Chain Link assembly of AF#1 & AF#2 with new modified Chain Links without welding attachments. | 0 | 2,49,358.48 | 49,971.64 |
| | Total | 62,13,663.20 | 89,41,266.18 | 17,91,836.91 |

# INNOVATIVE PROJECT

## Modification in OHE lines installed at Railway marshalling yard



➢**Problem:-** Delay in deployment of man power for coal sampling due to risk of OHE lines. **Unloaded Racks:-** 1130 Nos. **Effect:-** Delay in unloading of racks.

➢**Modification:-** OHE Lines isolated by disconnecting Isolator.

➢**Cost of Modification:-** NIL

➢**Annual Saving:-** 324531.34 KWh; 16.19 Lacs Rs.

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

# INNOVATIVE PROJECT

## Modification of discharge chute of Stacker cum Reclaimer



➢**Problem:-** At the time of reclaiming possibility of feeding foreign material / iron scrap from the yard with coal.

➢**Effect:-** foreign material / iron scrap damages the conveyor belt.

➢**Modification:-** Erection of grill sized 250 X 250 sq. mm in the discharge chute .

➢**Cost of Modification:-** Rs. 50,000 /-

➢**Annual Saving:-** 10.0 Lacs Rs.

➢**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. RRVUNL got approval of establishing a Solar park of 2000 MW. Recently RRVUNL got approval of establishing a Solar park of 1310 MW out of 2000 MW in Ph1; Land acquisition for this is under progress.
- Hence no any project regarding Renewable Energy is being dealt by KaTPP, Jhalawar.

# ENVIRONMENT MANAGEMENT - ASH UTILIZATION

| Particulars | UOM | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|
| Ash Stock in Plant (yard + pond) | Tons | 889951 | 54444.48 | 606932 |
| Ash Generated | Tons | 1014713 | 1113162.21 | 1406911.90 |
| Ash Utilization | % | 118.38 | 103.23 | 101.62 |
| Ash Utilized in manufacturing of cement/concrete – other similar products | % | 62.84 | 74.41 | 53.02 |
| Ash Utilized in Fly Ash Bricks | % | 8 | 19.1 | 8.11 |
| Ash Utilized in Mine filling | % | NIL | NIL | NIL |
| Ash Utilized for Roads pavements | % | 21.27 | 144.7 | 24.34 |
| 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 | 8.04 |
| 3. Others(lifted/utilized by Red Bricks manufactures/potters from Ash Dyke) | % | 32.39 | 25.71 | 8.11 |
| Expenditure on Ash Utilization (annual) | INR(Lakhs) | Nil | Nil | Nil |

## Ash Handling done through various Methods

| | | |
|---|---|---|
| Ash Handled (Wet Method) | % | 17.07 |
| Ash Handled (Dry Method) | % | 74.89 |
| Ash Handled (Semi Wet) | % | 8.04 |

# ENVIRONMENT MANAGEMENT- EMISSION

| Particulars | UOM | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|
| Total CO2 Emissions Per KW of Generation | Ton/KW | NA | NA | 0.967 Kg/KWh |
| Current SOx Emissions at Full Load* (U#1/U#2) | $mg/Nm^3$ | 769 / 1110 | 1081 / 1206 | 838 / 771 |
| Current NOx Emissions at Full Load* (U#1/U#2) | $mg/Nm^3$ | 74 / 149 | 113 / 191 | 86 / 150 |
| Particulate Matter * (U#1/U#2) | $mg/Nm^3$ | 63 / 24 | 57 / 62 | 51 / 54 |
| 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. NOA for EPC Package has been placed on 18.05.2022 to M/s Techno-Electric & Engg Co. Ltd. Kolkata.

## 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 | 2019-20 | 2020-21 | 2021-22 |
|---|---|---|---|---|---|
| DM water Consumption of Plant | % | 1 | 0.84 | 0.81 | 0.80 |
| Raw Water Consumption of Plant | $m^3$/MW | 3.5 | 2.64 | 2.73 | 2.60 |

## 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.

# BEST PRACTICES ADOPTED AT KATPP

**Mill Area** ⇒ Achieved maximum running hours of coal mills against guaranteed life by optimizing mill loading pressure and proper maintenance of Coal Mills.

| Sr. No. | Name of Mill | Running Hours | Manufacturer Guarantee Life in Hours | Grinding media manufacturer |
|---|---|---|---|---|
| 1 | Coal Mil- 1A | 20960 | 15000 | AIA, Ahmadabad |
| 2 | Coal Mil- 1C | 12748 | 6000 | BPEG, China |
| 3 | Coal Mil- 1D | 29988 | 15000 | AIA, Ahmadabad |
| 4 | Coal Mil- 1E | 25561 | 15000 | AIA, Ahmadabad |
| 5 | Coal Mil- 1F | 22795 | 15000 | AIA, Ahmadabad |
| 6 | Coal Mil- 1G | 20816 | 15000 | AIA, Ahmadabad |
| 7 | Coal Mil- 1H | 13695 | 6000 | BPEG, China |
| 8 | Coal Mil- 2B | 20737 | 15000 | AIA, Ahmadabad |
| 9 | Coal Mil- 2E | 20762 | 15000 | AIA, Ahmadabad |
| 10 | Coal Mil- 2F | 19919 | 15000 | AIA, Ahmadabad |
| 11 | Coal Mil- 2G | 17810 | 15000 | AIA, Ahmadabad |
| 12 | Coal Mil- 2H | 8140 | 6000 | BPEG, China |

# BEST PRACTICES ADOPTED AT KATPP

**Hazardous waste Management**

- Chemical sludge from waste water
- Used/spent oil.


- CTDF Udaipur membership for disposal of chemical sludge.
- Chemical sludge generated in the previous financial year = 40 MT.
- Spent/Used oil generated in the previous financial year = 44.16 KL and transformer used oil = 1.4 KL.

# BEST PRACTICES ADOPTED AT KATPP

**New Initiatives** ⇒ **Freedom from OEM Dependency (FY 22-23) and saving in maintenance cost.**

**CEPs**

- Attended the leakages of diffuser casing and taper casings in all 3 CEP pumps (U#2) without any OEM (M/s KSB China) support.
- Expenditure for above work = INR 2,33,000/- against 97,91,800/- through OEM.

**CV-3**

- Developed spindle outer threads, coupling internal thread and partial modification in locking pin of HP Turbine control valve CV-3.
- Expenditure INR 1,65,000/- against INR 35,00,000 /- through OEM.

**MSV-1 (Unit#1)**

- Leakage of MSV-1 attended within 56Hrs without help of OEM (M/s DEC China).
- Expenditure INR 25,000/- against INR 10-12 Lacs through OEM in 7-8 days.

# 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 (22-23) (Million Rs.):- 123.37.

**Training**:- Managing and facilitating changes in Coal based Power Plants

**Kaizen**

**Supervisor Level:-** Inclined portion of TTR is modified by providing extra roller frames and structures to resolve problem of runaway of TTR (Travelling tripper).
**Expenditure** :- Rs. 50,000 /-

**Workmen Level:-** Pre wetting system has been installed to sprays the water on the coal wagon before tippling for reducing the coal spillage.
**Expenditure** :- Rs. 1,00,000/-

**Areas of Concern**:- Boiler tube Leakage, Generator Vibration

# IMPLEMENTATION OF ISO

BSCIC Certifications Private Limited

BSCIC

Certificate

QUALITY MANAGEMENT SYSTEM

This is to certify that:

RAJASTHAN RAJYA VIDYUT UTPADAN NIGAM LTD.

KALISINDH SUPER THERMAL POWER STATION (KaSTPS)
KALISINDH, Distt.-JHALAWAR, 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 | 1st Surveillance Due on: | 12-Mar-2023 |
| Issue Date: | 14-Mar-2022 | 2nd Surveillance Due on: | 12-Mar-2024 |
| Expiry Date: | 13-Mar-2025 | | |

**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.bsc ice.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 ..... and shall be returned immediately upon request

The certificate of Registration remains the property of BSCIC Certifications Pvt Ltd and shall be returned immediately upon request

BSCIC Headquarters &work, 1st Floor, 5B/15A, Crown Plaza Mall, Faridabad - 121 007, Haryana, India

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**% Investment of Energy Saving Projects on Total Turnover of The Company (FY 21-22) – 0.02**

# LEARNING FROM CII AWARDS 2021 & OTHER PROGRAMS

Use of Solar Energy to reduce APC

Use of VFDs in CEP

Installation of Online Ash Analyzer to monitor Ash % in coal.

Energy conservation by stopping of Standby Mill Lube Oil Pumps.

# AWARDS & ACHIEVEMENTS

## CII 2020


## CII 2021


## SAFETY 2021


## RECA 2020


## RECA 2021


## SAFETY 2022


**Team Members Contact Details**

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