1 X 18MW Captive Power Plant – KCP Cement Ltd.,

V Madhusudan Rao
Vice President – Operations
vmr@kcp.co.in, 9491373671

N L Srinivas – Dy.GM (Energy Mgr.)
Cpp.rkpuram@kcp.co.in,
9491296172

About “The KCP Limited”

“Celebrating more than 80 years of success”

1941 — *“Journey started with setting up of 800TCD sugar plant at Vuyyuru, krishna Dist. Andhra Pradesh by Sri.V.Ramakrishan Founder of KCP”*

1958 — *“India’s first dry process cement plant was installed at Macherla by Humboldt AG, Germany”*

1999 — *“Hydel Power Division setup at Nekkarikallu, Andhra Pradesh on the Guntur Canal of Krishna river to generate 8 MW of power”*

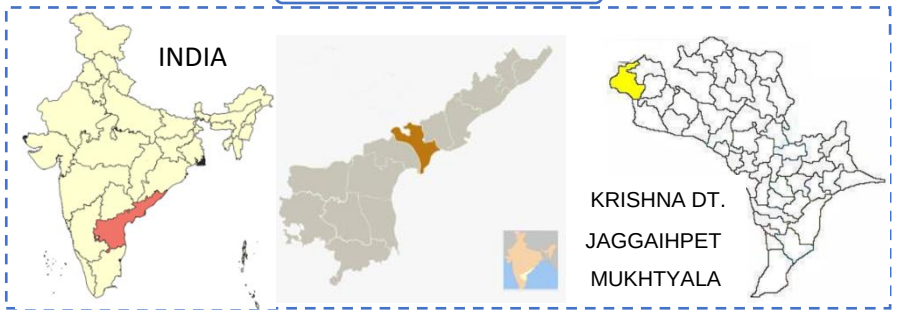
2006 — *“Wind Power generating Unit setup at Uthumalai village in Tirunelveli District of Tamil Nadu”*

2011 — *“Cement Plant II line # 1 Commissioned at Ramakrishnapuram, Muktyala, Andhra Pradesh, Line # 2 commissioned in 2018 at the same location”*

2013 — *“Commissioning of 1.15 MW Solar at Muktyala Cement Plant, Ramakrishnapuram, Muktyala, Andhra Pradesh”*

2014 — *“Commissioning of 18MW Thermal Power Plant at Muktyala Cement Plant, Ramakrishnapuram, Muktyala, Andhra Pradesh”*

Site Location



8500TPD Cement plant - Mukhtyala

Heavy Engg, Workshop- Chennai

1200TPD Cement plant - Macherla

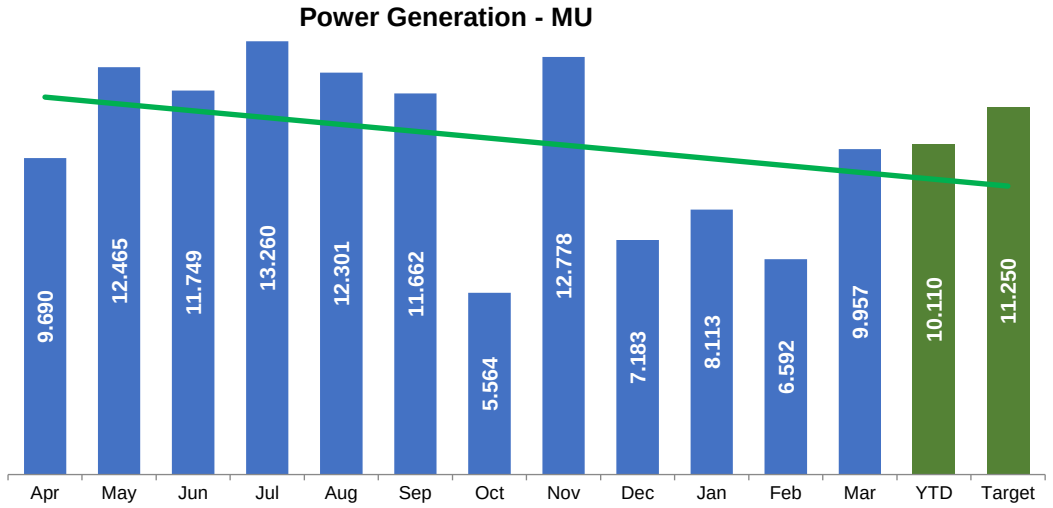
2500TCD Sugar plant Vietnam

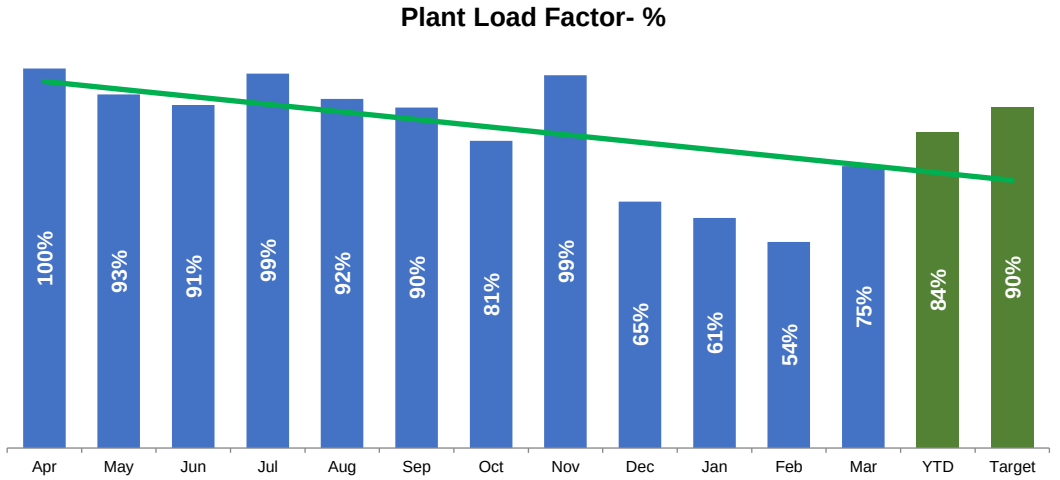
Mercure Hotel - Hyderabad

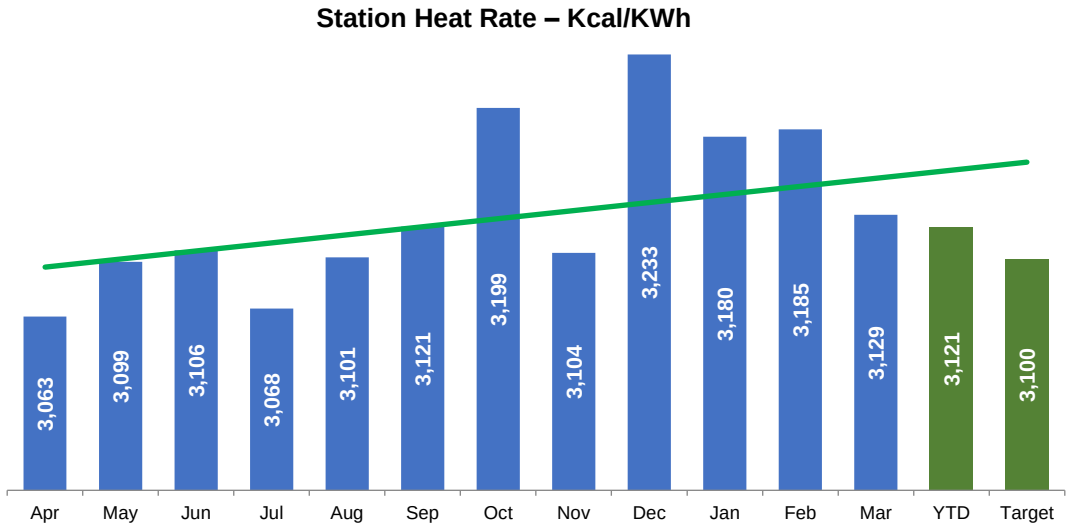
1.15MW Solar Power Plant

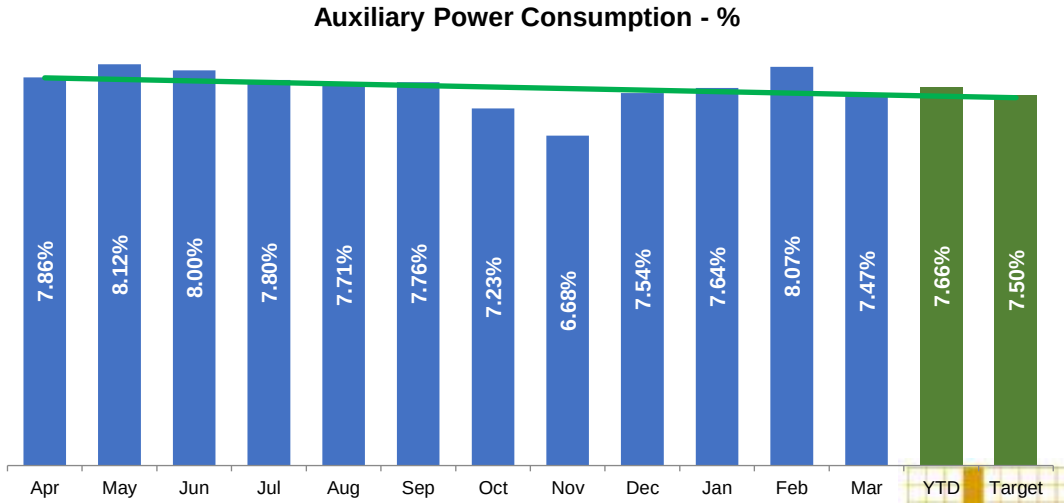
“Legacy Continues”

CPP – KPI's at a glance (FY 2021-22)









- Auxiliary power consumption has raised due to:
  - Air ingress was high in air preheater till Oct'21 (Major overhaul) , the same is attended by replacing 540 no of tubes in 1st module.
  - Usage of Indian coal with low GCV and high ash has lead to increased CHP & AHP run hours.
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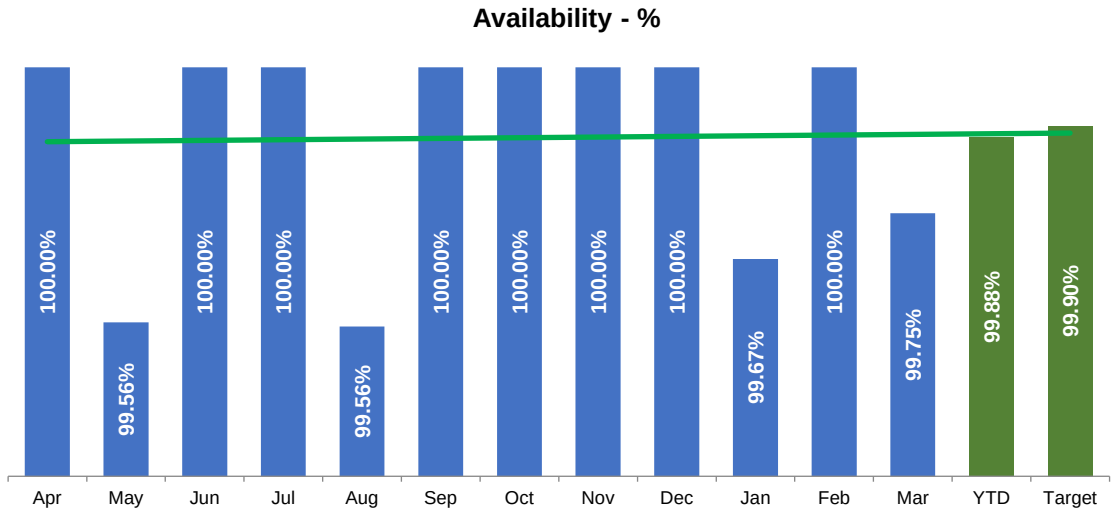
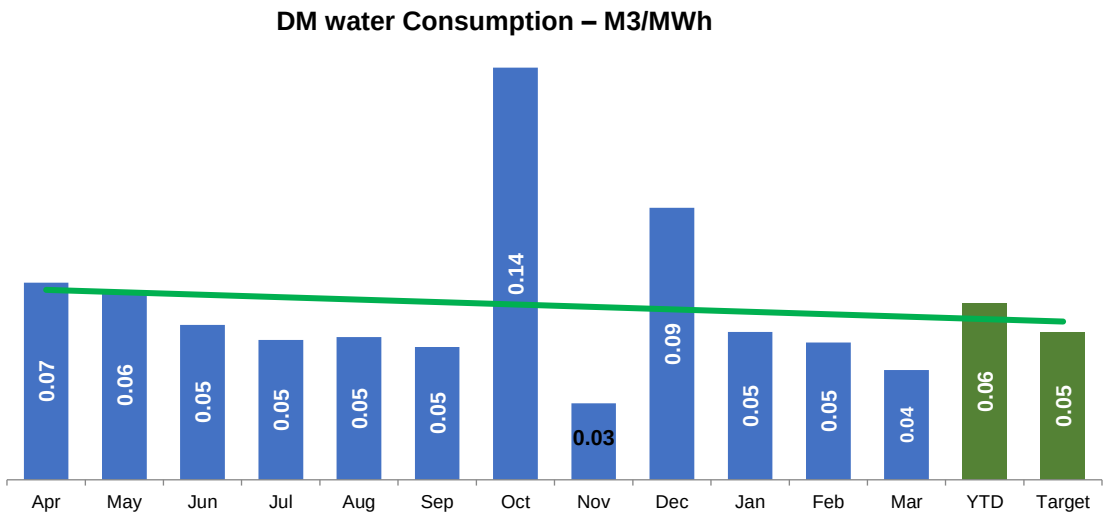
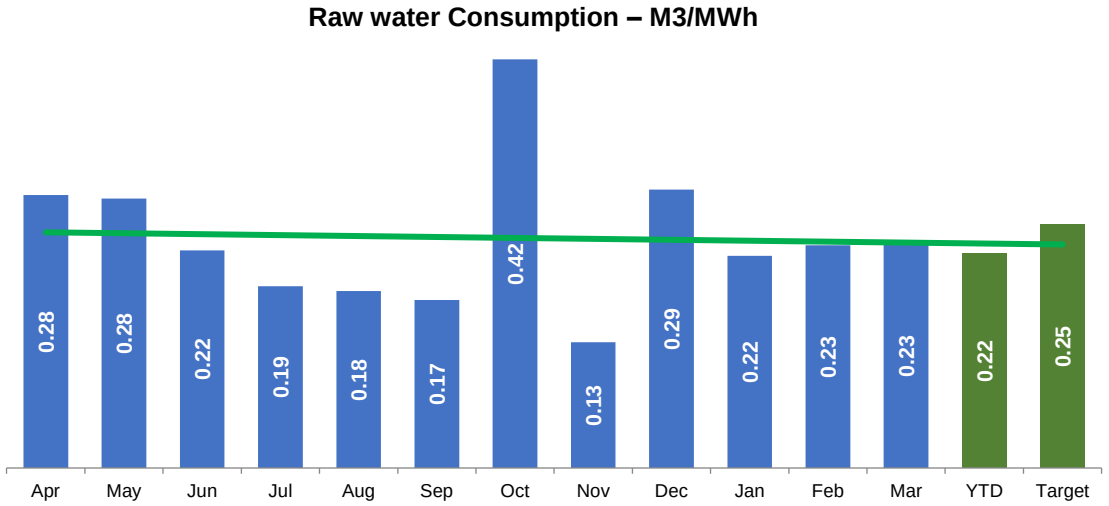
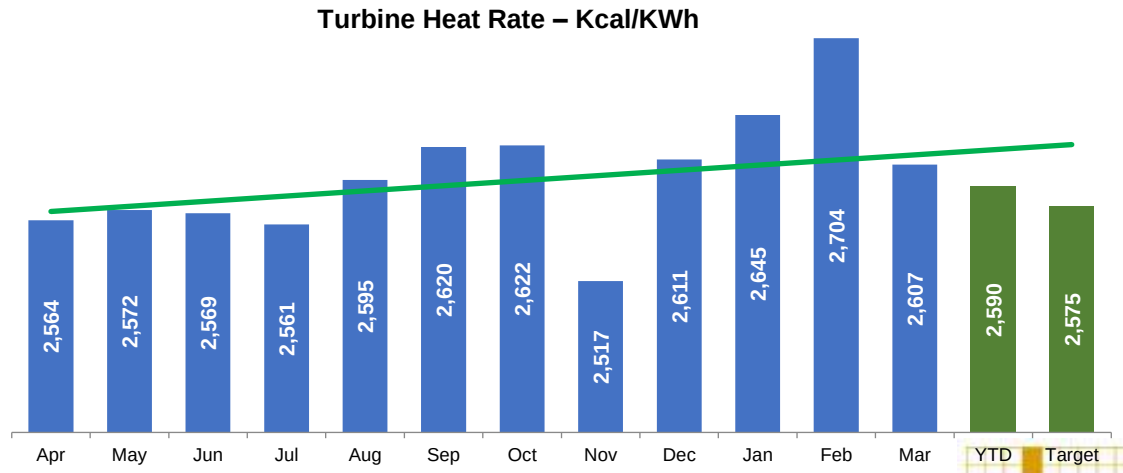
CPP – KPI's at a glance (FY 2021-22)

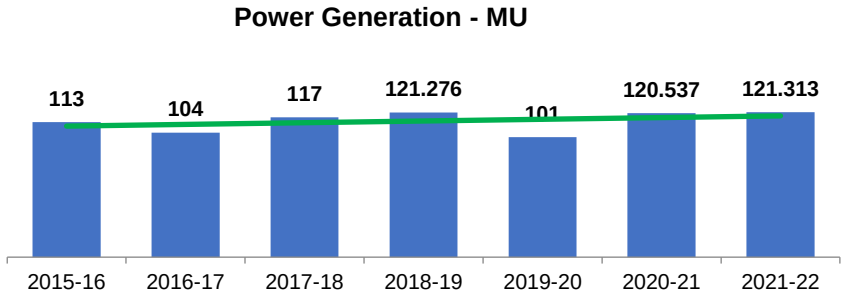


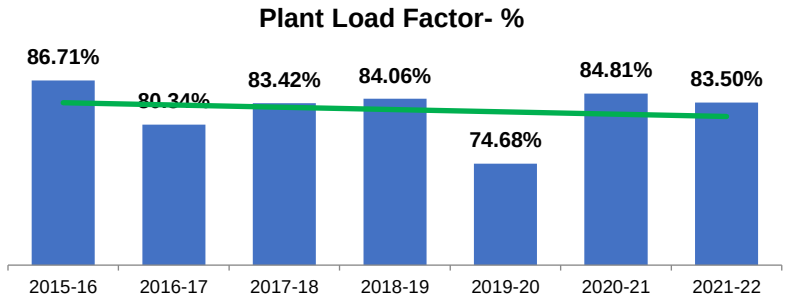


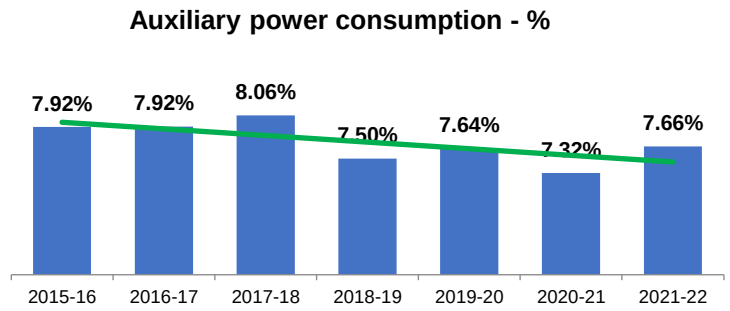


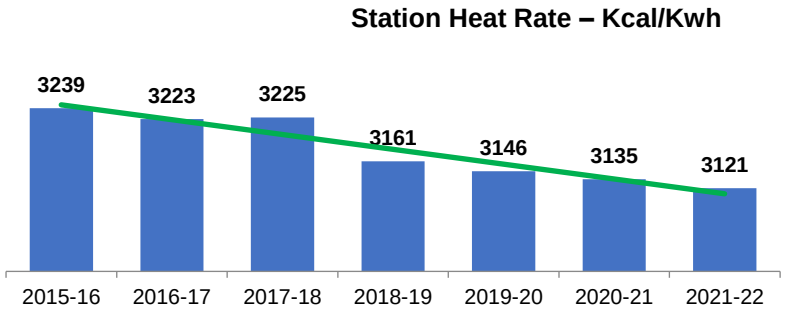


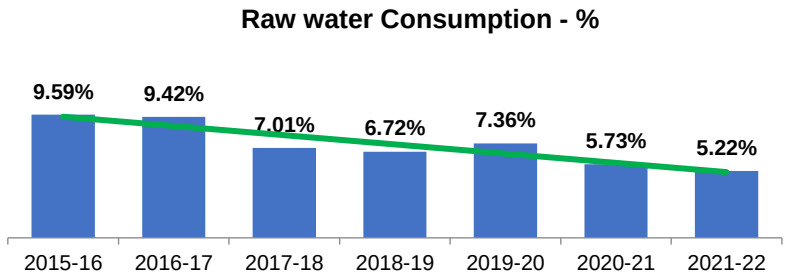
CPP – KPI's at a glance (YoY)

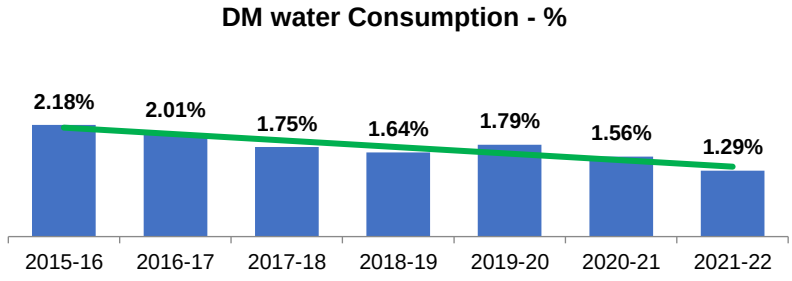


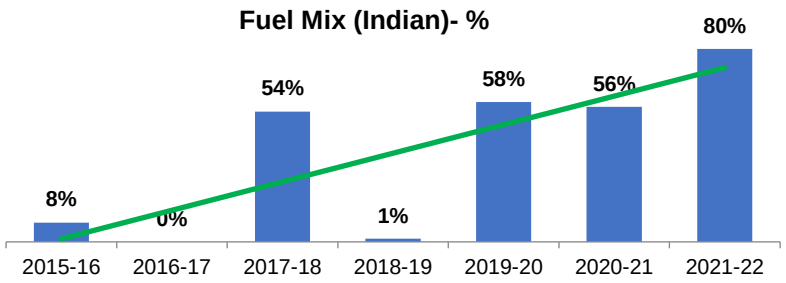


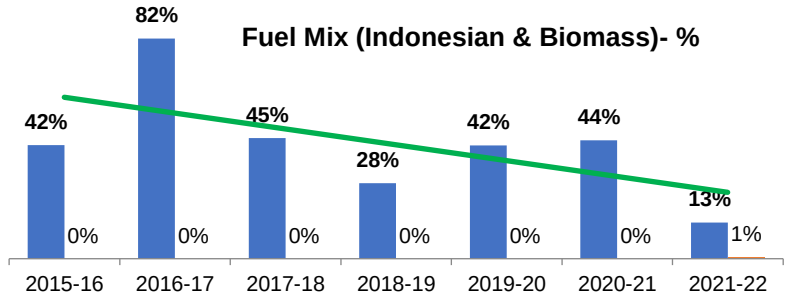


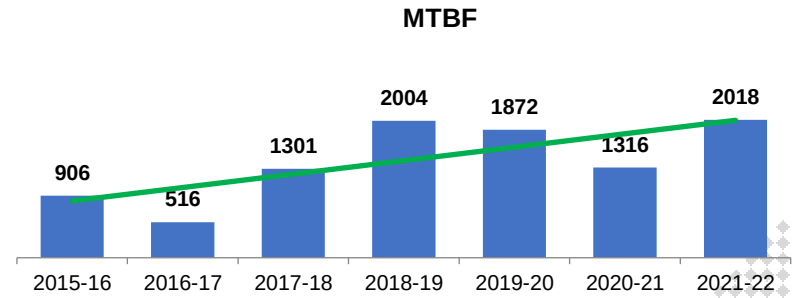


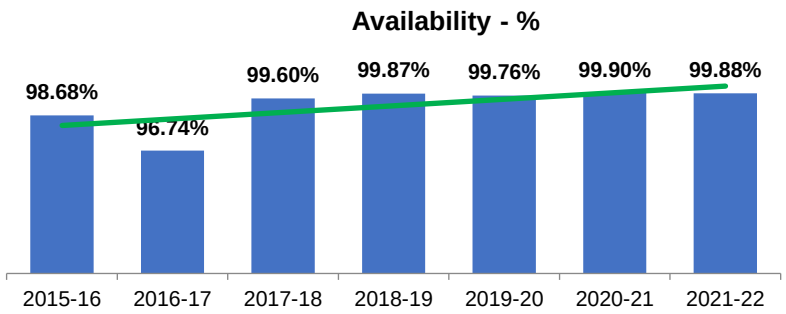












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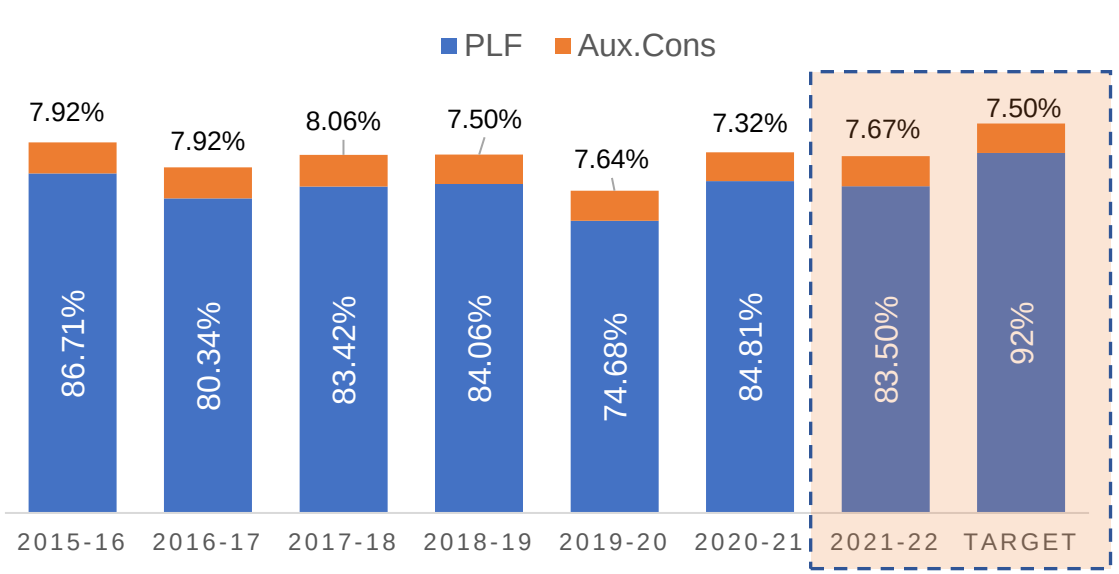
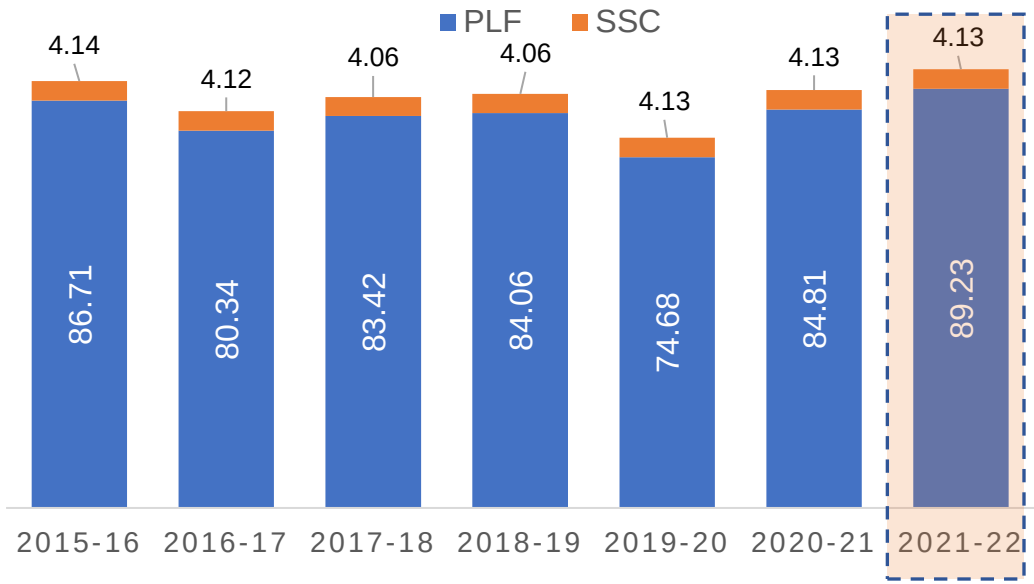
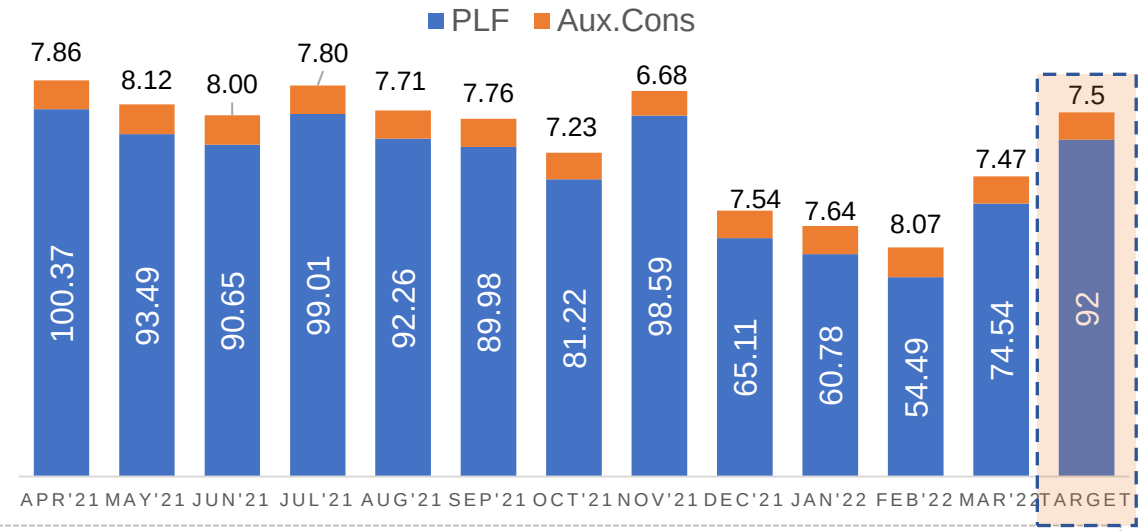
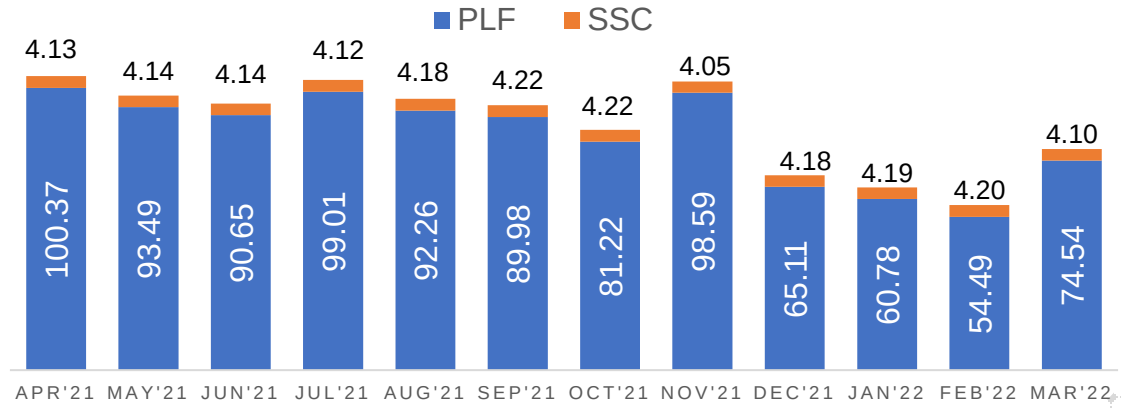
KPI's Comparison with Plant load factor





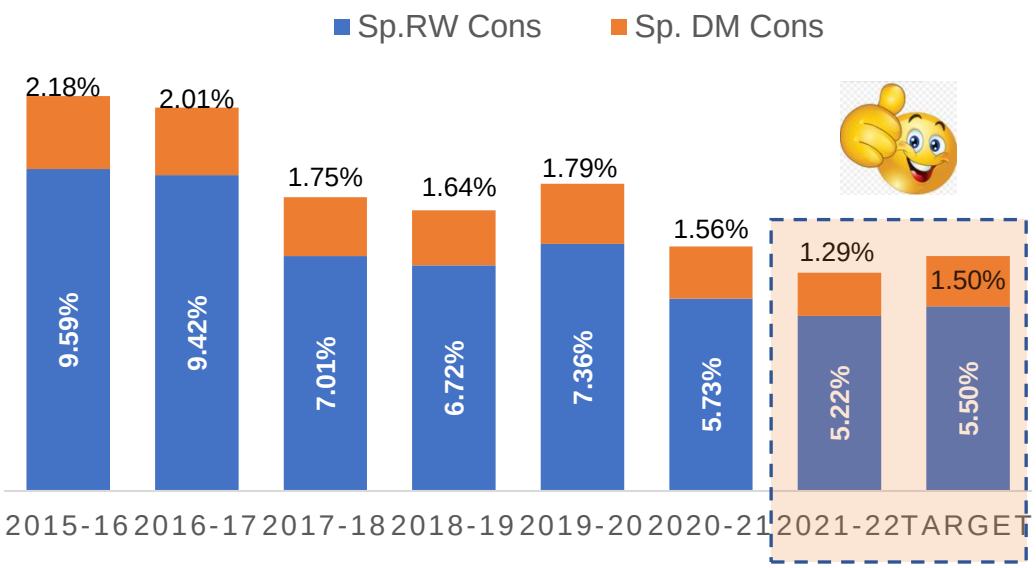


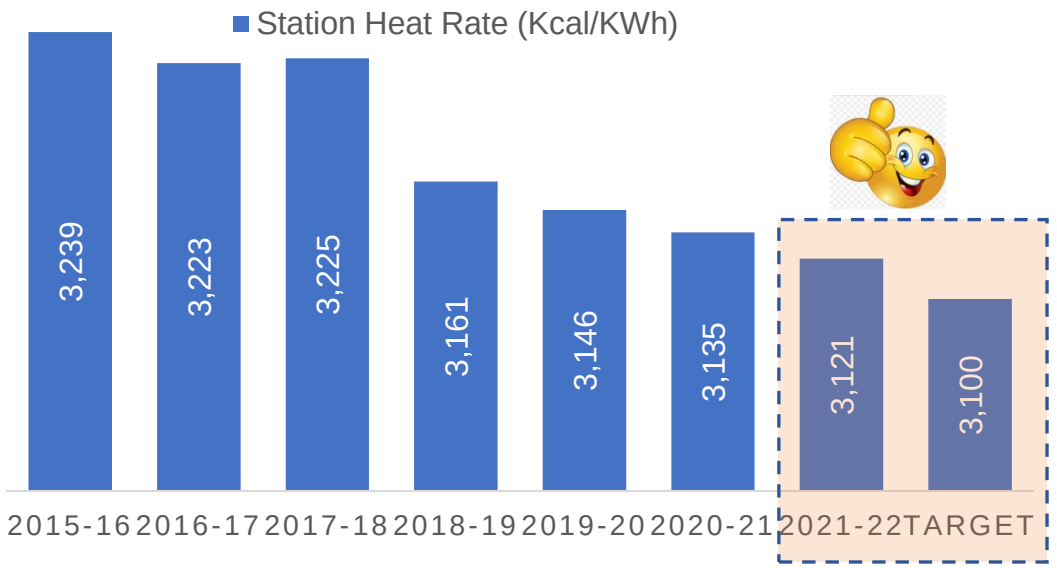


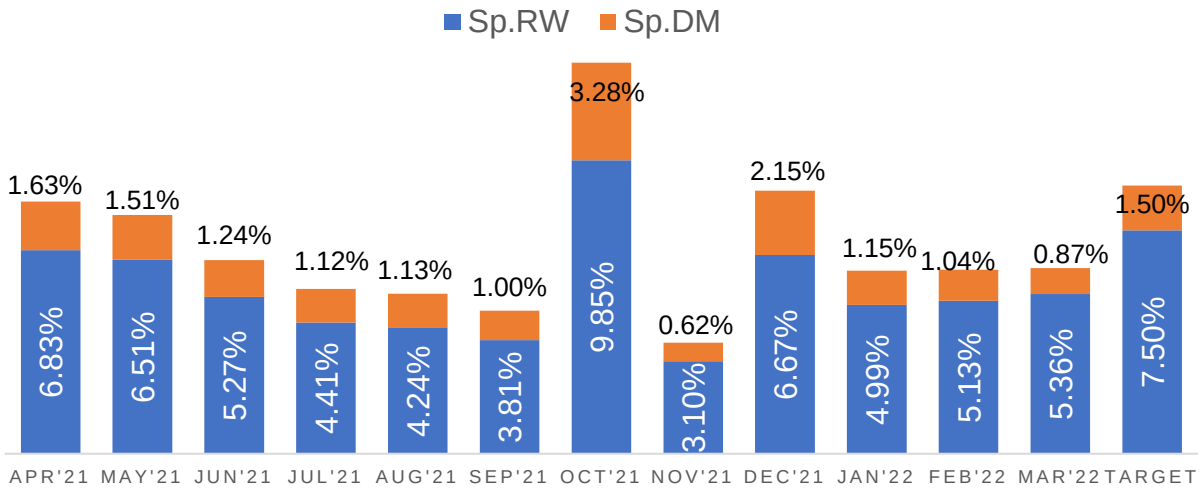
- Marginally PLF% was reduced still Aux.cons% increased due to below:
  - Due to increase in Indian coal consumption (G-13) Increased CHP & AHP operations.
  - Low PLF% in the month of Dec'21, Jan'22 & Feb'22

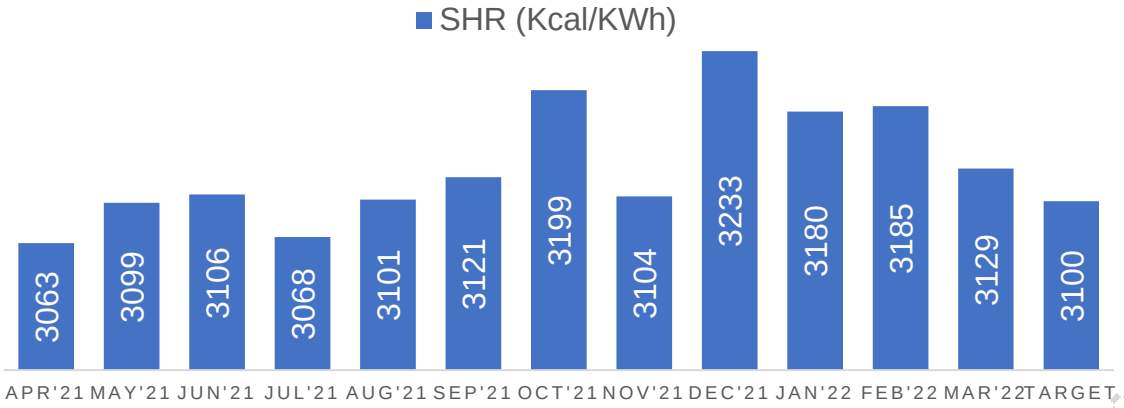
- Sp. Steam Consumption increased due to below:
  - Due to low PLF in Dec'21, Jan'22 & Feb'22
  - In Nov'21 SSC is 4.05T/MWh

KPI's Sp.Raw water & DM Water consumption





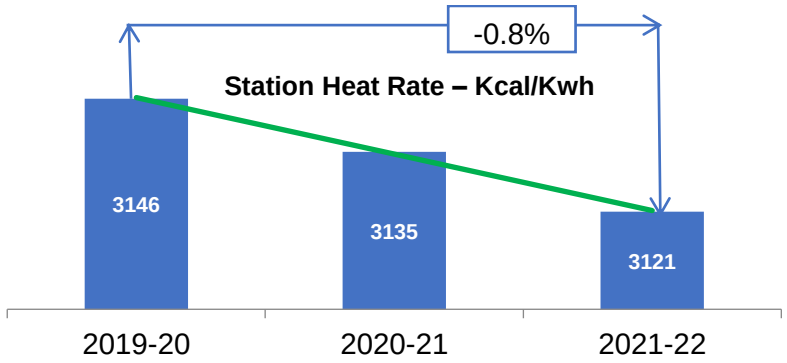


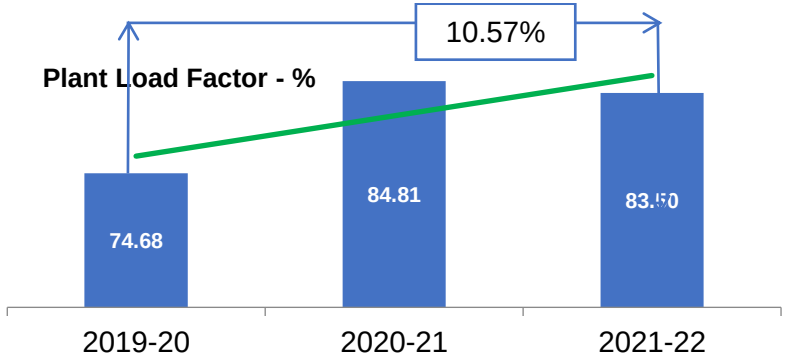


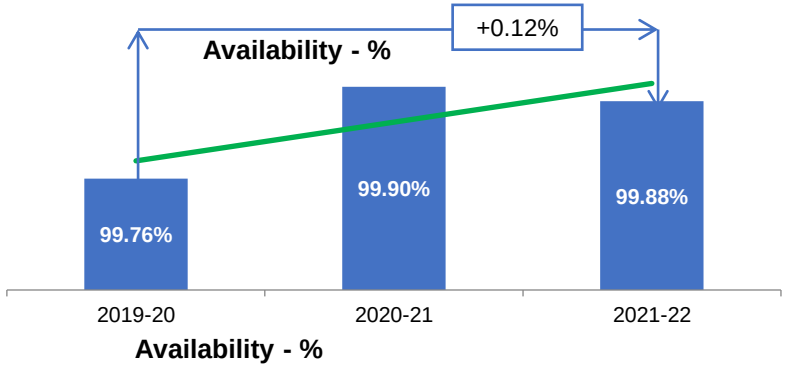
- Specific Raw water & Specific DM Water consumption are in down trend:
  - Optimizing boiler CBD by monitoring of Phosphates.
  - For road cleaning & ash removal raw water was used. The same is avoided.

- Station heat is reduced due to below:
  - Usage of Indian Coal & PLF%
  - Due to reduction in LOI%.

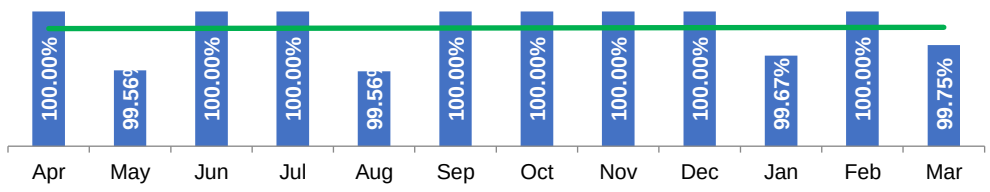
Station Heat Rate & Availability

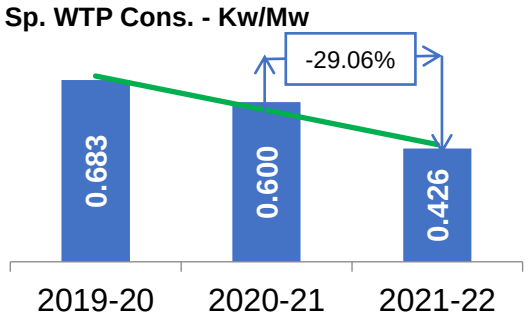


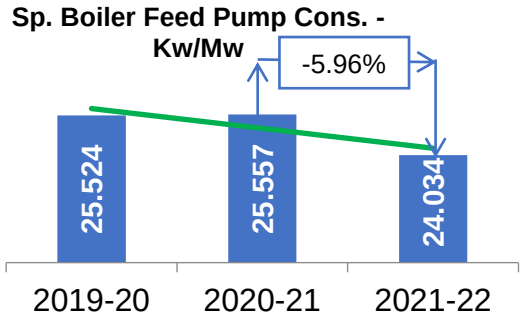


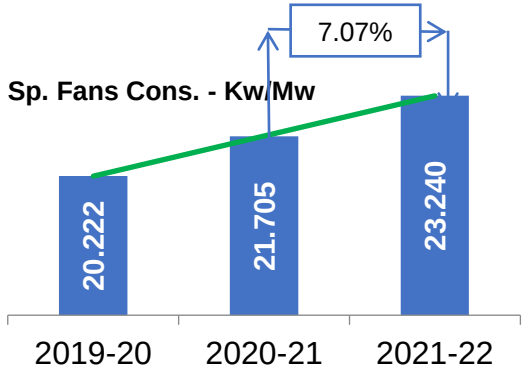


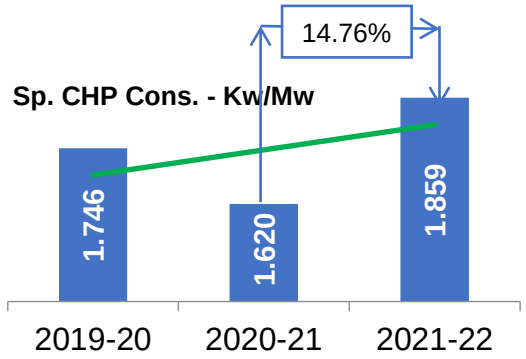
- Station Heat Rate (target – 3100kcal/kwh, Achieved – **3121**Kcal/KWh):
  - Air preheater air ingress% was noticed, the same was attended by replacing 600 tubes in the month of Oct'21.
  - Still 240 Tubes are to be replaced as we don't have spare the same are plugged.
  - Carried out Turbine, Gear Box & Generator major overhauling, which lead to reduction of specific steam consumption and improved turbine heat rate.
  - Optimization of air fuel ratio & Usage of Indian coal (low GCV arb - 2550Kcal/kg & Ash 55 to 60%) mix to the max. utilization ie., 80%.
  - Indian coal cost was also cheaper than the imported coal cost, which has increased to Rs.22,000/MT and at average Rs.12,000/MT.
  - Introduction of Rice husk(Bio-mass) as fuel (4.5% on Thermie Basis) in the month of Nov'21 to Jan'21, Which has further reduced LOI% in fly ash.

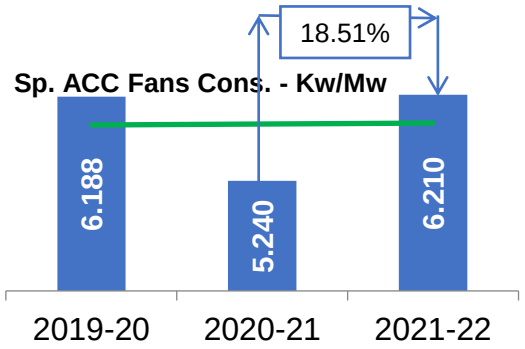




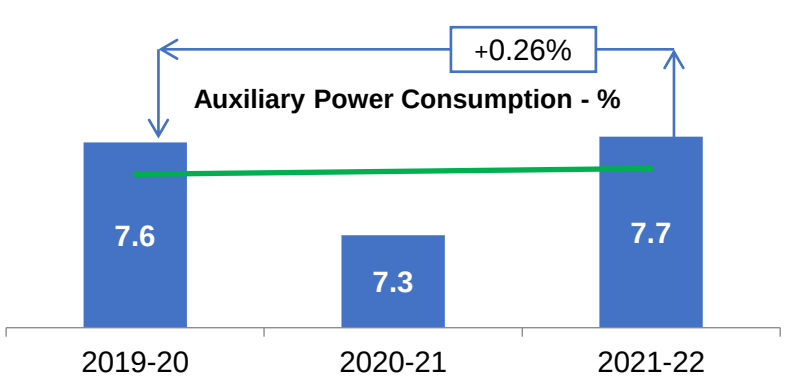


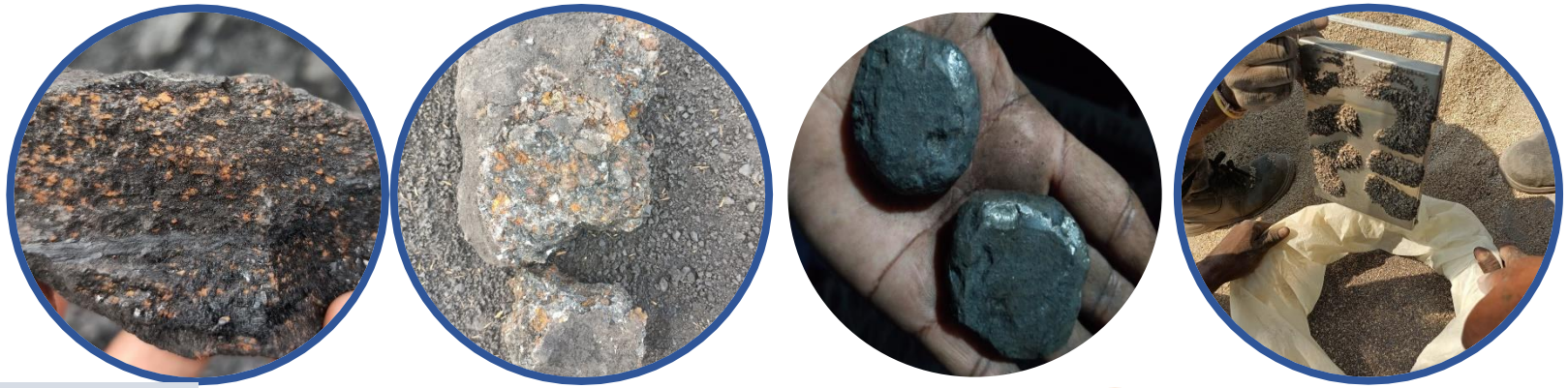






Auxiliary Power Consumption





APH Tubes fouling /Replacement in Oct'21

Iron in Raw coal & bed ash

Site is located on bank of river Krishna, Humid and high ambient Temp.

In the vicinity 15 to 20KM Radius there are 6 national and state level cement plants, KCP – CPP KPI's are the best. Due to ambient temp. we may not be the best in National level, still we will try to be the best …

Competitor # 1
2 X 18MW –
APC – 8.5%

Competitor # 2
1X 27MW
1X 35MW, APC
is 8.4 & 8.7%

KCP cement
1 X 18MW is
Least APC
(7.66%) in
cluster

Competitor # 3
1 X 43MW
APC is 9.4%

Competitor # 4
1 X 15MW
APC is 8.5%

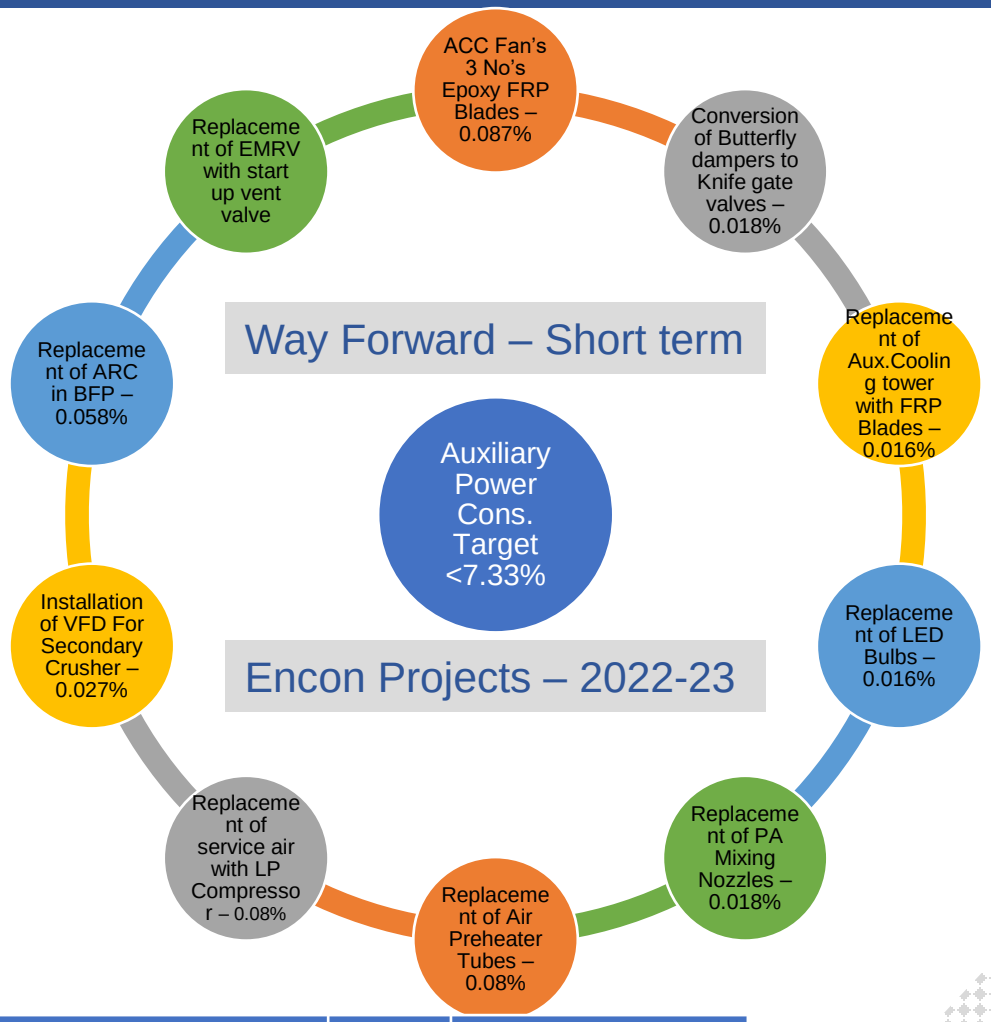
Internal & External Benchmarking – Way Forward

Parameter	Unit	Achieved	Internal Bench mark	National Bench Mark
Plant Heat rate (3067– Design)	Kcal/Kwh	3121	3100	3018
Auxiliary Power Consumption	%	7.6	7.5	7.9
Competitors # 1,2,3,4 – APC %	%	8.5,8.5,8.5,9.4	7.5	7.9
Installed Capacity	MW	18	18	17.5
Type	AFBC	AFBC	AFBC	AFBC
PLF	%	84	92	82.3
Coal GCV	Kcal/kg	3063	3060	3210
LOI in Fly Ash silo	%	4.8	<5.5	5.1
Sp. Raw Water Consumption	M3/MW	0.26	0.23	0.45
Sp. DM Water Consumption	M3/MW	0.03	0.05	0.06

Way Forward – Long term 2022-23

Replacement of Hybrid bag filter with ESP – 0.185% → Operation of Boiler feed with speed control mode – LCV 100% Open – 0.09% → Boiler Consultancy for reduction of LOI % to <3% → Installation of WHRS 1 X 12.5MW

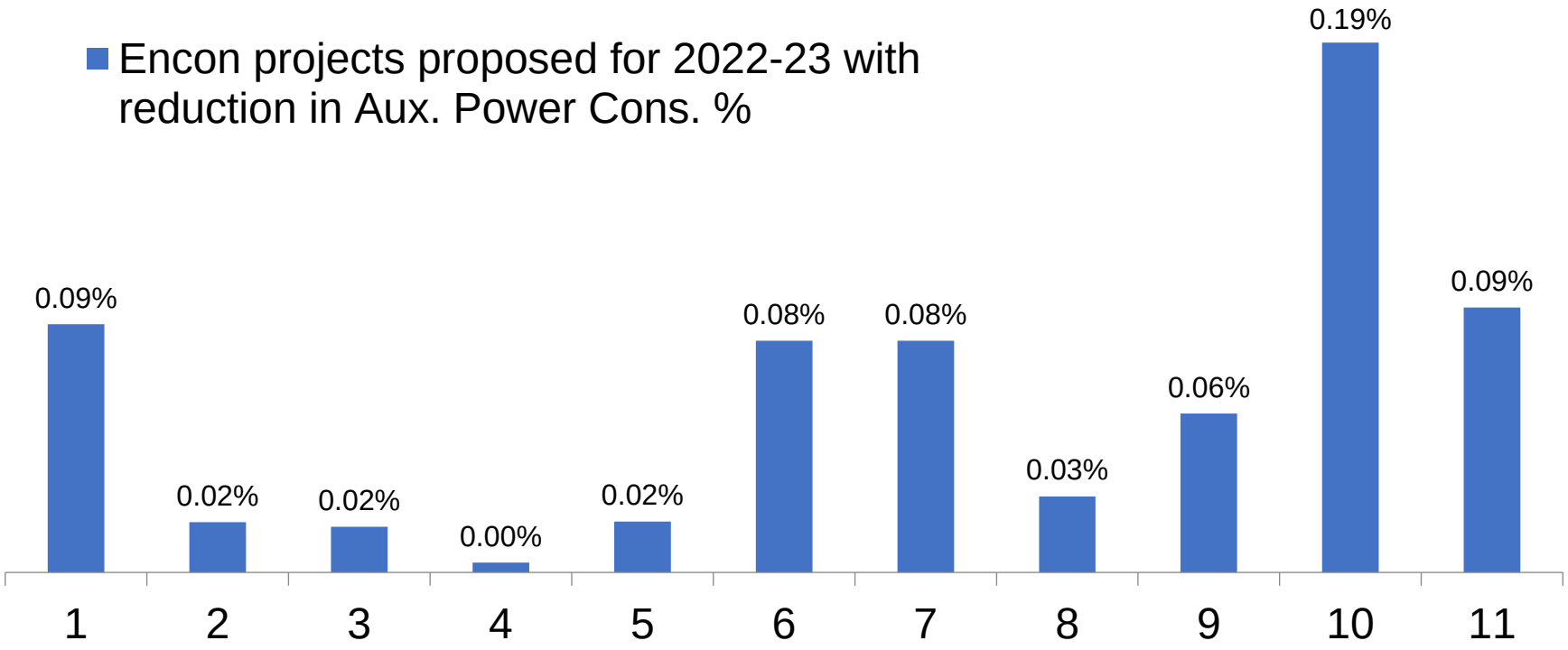
Way Forward – Short term



Projects	UoM	APC Reduction
Short Term Projects	%	0.330
Long Term Projects	%	0.275
Existing APC	%	7.66
After Projects	%	7.05

Energy Saving Projects implemented from last three years

Year	No of Proposals	Investments (In Lac Rs.)	Savings (In Lac Rs.)
2018-19	3	75.1	68.05
2019-20	8	1.2	35.41
2020-21	2	0	0
2021-22	30	71.56	236.47



S.No	Project Description – (2022-23)
1	ACC Fans – 3 Fans No's Epoxy blades replacement with existing blades
2	Replacement of butterfly dampers with knife gate valves
3	Replacement of two modules of auxiliary cooling tower with FRP blades
4	Replacement of existing 450/250 SV lamps with 70W LED bulbs
5	Replacement of damaged PA Mixing nozzles with new nozzles
6	Replacement of plugged APH tubes with new tubes
7	Installation LP compressor as against HP compressor of ash conveying
8	Installation of VFD for secondary crusher
9	Replacement of BFP – ARC valve as the same is passing at low loads
10	Conversion of ESP from existing hybrid filter with ESP
11	Operating BFP with drum level mode with speed mode (FCV – 100% open)

Summary of encon projects undertaken in 2021-22

S.No	Project Description	Investment	Power Savings	Savings in Rs. @ 5.40
1	Removal of FD Fan suction duct	15,000	109020	5,88,708
2.	Optimizing of boiler blow down/Chemical	NIL	545100	29,43,540
3	Bye passing of Drag chain coal feeders	55,000	64860	3,50,244
4	Interconnecting of Raw water pumps	15,000	8280	44,712
5	Conversion of delta to star connection for CT fans	NIL	64170	3,46,518
6	Boiler feed pump DP control (Dp – 3.0Kg/Cm2	NIL	178020	9,61,308
7	Condensate extraction pump DP Control	NIL	66930	3,61,422
8	Air Preheater leakages arresting	2,56,500	563040	30,40,416
9	Installation of 100 LED lamps at various locations	1,20,000	37950	2,04,930
10	Installation of VFD for Service air compressor	3,75,000	124200	6,70,680
11	Installation of VFD for Instrument air compressor	3,75,000	96600	5,21,640
12	Hydrophobic coatings for various pumps(ACW)	5,00,000	74520	4,02,408
13	Implementing of DP logic for hybrid bag filter	NIL	82800	4,47,120
14	Major overhauling of turbine, gearbox & Generator	50,92,571	2256300	1,21,84,020
15	Mist spray arrangement under ACC Fans	55,000	79350	4,28,490
16	PA Lines/Steam drum, boiler man hole doors Insulation works	26,500	0	0
17	Usage of ETP water to Bed/Fly ash conditioner	66,000	9315	50,301

Summary of encon projects undertaken in 2021-22

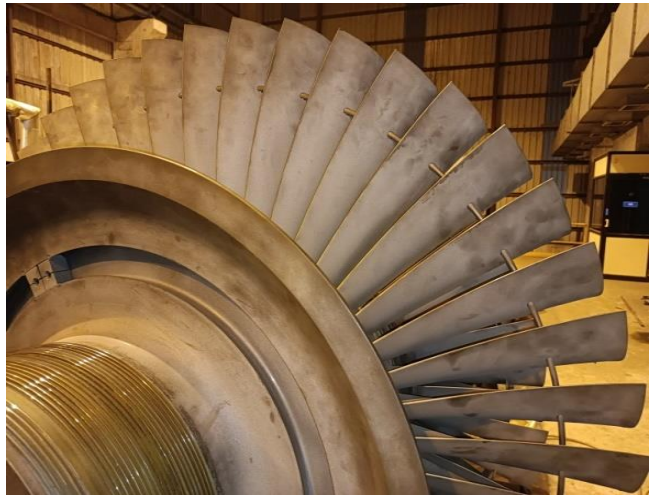
S.No	Project Description	Investment	Power Savings	Savings in Rs. @ 5.40
18	Conversion of Delta to Star conn. For Hot well pumps	NIL	3450	18,630
19	Conversion of Delta to star conn. For CT make up pumps	NIL	2760	14,904
20	Motive steam(Ejector) temp. increased to 380 from 280°C	18,000	Improved Vacuum	0
21	Elimination of Thermostatic valve in service air compressor	5,000	NIL	5,450
22	Usage of Secondary crusher impact bars on both sides	21,000	Spares reduced	0
23	Reduction of booster line in Ash conveying pipes	NIL	Spares reduced	0
24	Hoist arrangement for lifting of charcoal/bed Material – man power	36,000	Man Power	0
25	Flange guards for BFP/Turbine Flanges – Add on safety	5,600	Safety/Reliability	0
26	FD Air reduced by installing damper in spreaders air duct(not n use)	8,400	1725	9,315
27	ACC Fans (bundles/Structural) openings are sealed by cementing	5,500	Power Savings	0
28	Usage of ETP water against Fire hydrant water by installing new line	1,05,000	10695	57,753
29	Reduction of Inst. Air pressure from 6.2 to 5.7Kg/Cm2	NIL	0	0
30	Reduction of service air pressure from 6.2 to 4.8Kg/Cm2	NIL	0	0
31	Drag chain feeders trip logic implemented in case of SPM>45mg/Nm3	NIL	CPCB Requirement	0

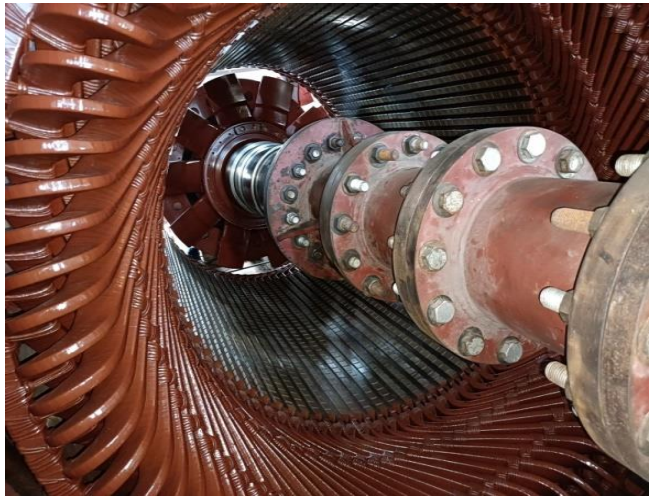
Total Investment – 71.56Lac Rs.
Total Power Savings – 4379.085MWh/year
Total Power Savings – 236.47Lacs/year

Power & Spares reduction by modifying DCF coal feeders

Description	UoM	Before	After
Drag chain coal feeders	Ea	15	5
Power consumption for each feeder	KWh	1.2	1.2
Power consumption for total feeders	KWh	432	244
Power savings @ Rs.5.40/KWh	Rs./day	972	
Spares consumption per year	Lacs/yr	12	3
Total Savings	Rs.	6,35,000	
Investment	Rs	NIL	
Return on investment	Month	Immediately	

TURBINE MAJOR OVERHAULING

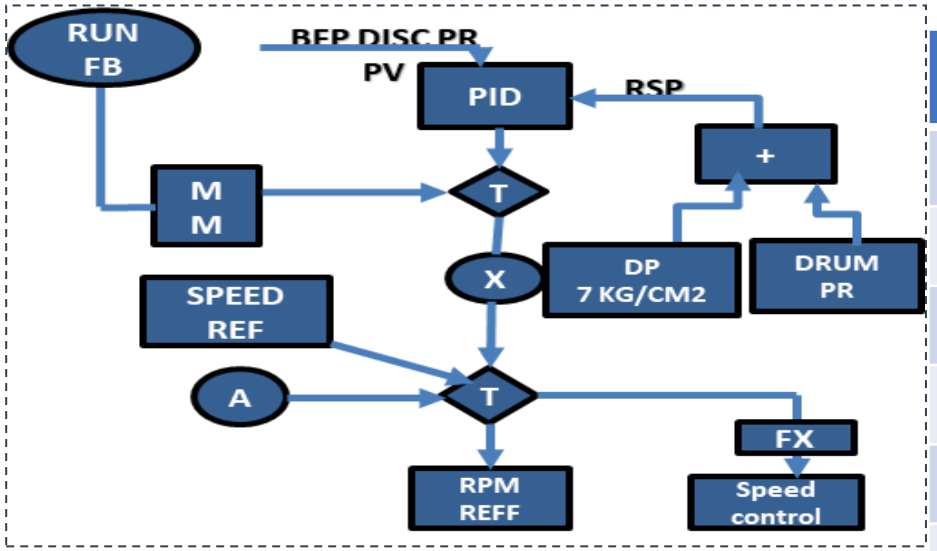




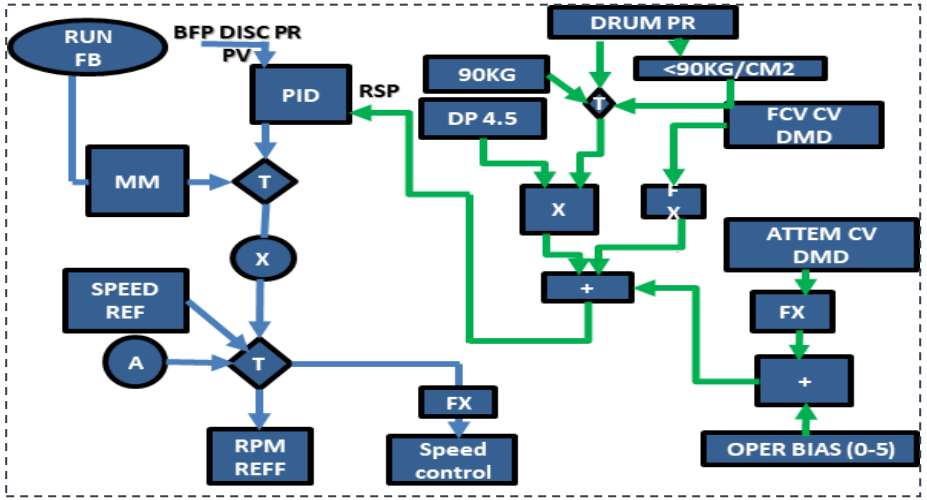
- TG Major overhauling job activities carried out:
  - Turbine de-syncrhonized on04.10.21 at 00:01Hrs
  - Turbine dismantling
  - Steam flow path measurement
  - Turbine rotor & Carriers sent to M/s.SV Turbo works, Hyderabad.
  - De-finning & re-finning of turbine stages.
  - Gear box input pinion shaft burnishing and balancing
  - Turbine rotor balancing.
  - Generator rotor removal.
  - Generator dry ice (CO_2) cleaning.
  - Electrical testing.
  - Assembling of TG
  - Synchronized on 18.10.21 @ 3.23AM

Implementation of Boiler feed pump – DP logic control

BEFORE LOGIC OF BFP DP



AFTER LOGIC OF BFP DP



Description	UoM	Before	After	Remarks
BFP header Pressure	Kg/Cm2	100	95	Pressure reduced
BFP DP across CV	Kg/Cm2	8	4	DP is reduced
BFP Speed	RPM	2569	2545	Speed reduced
BFP Power Cons.	KWh/day	8249	7733	
Drum Level	%	52	52	Drum level same
Power savings	KWh/day	516		
Amount invested	Rs	NIL		In house modification
Monetary savings	Rs./Day	2,786		@ Rs.5.40/KWh
Return on investment	Months	Immediately		@ Rs.5.40/KWh

Power Savings attained by removal of FD Fan silencer

BEFORE

AFTER

Description	UoM	Before	After	Remarks
FD Fan Suction pressure before silencer	MMWC	80	-	Silencer is removed
FD Fan suction pressure after silencer	MMWC	20	20	
FD Fan Discharge pressure	MMWC	760	760	
FD Fan Speed	RPM	1296	1275	
FD Fan Power Consumption	KW	275	262	
Power Savings attained	KW	316		
Cost investment	Rs.	NIL		
Return on investment	Months	Immediately		

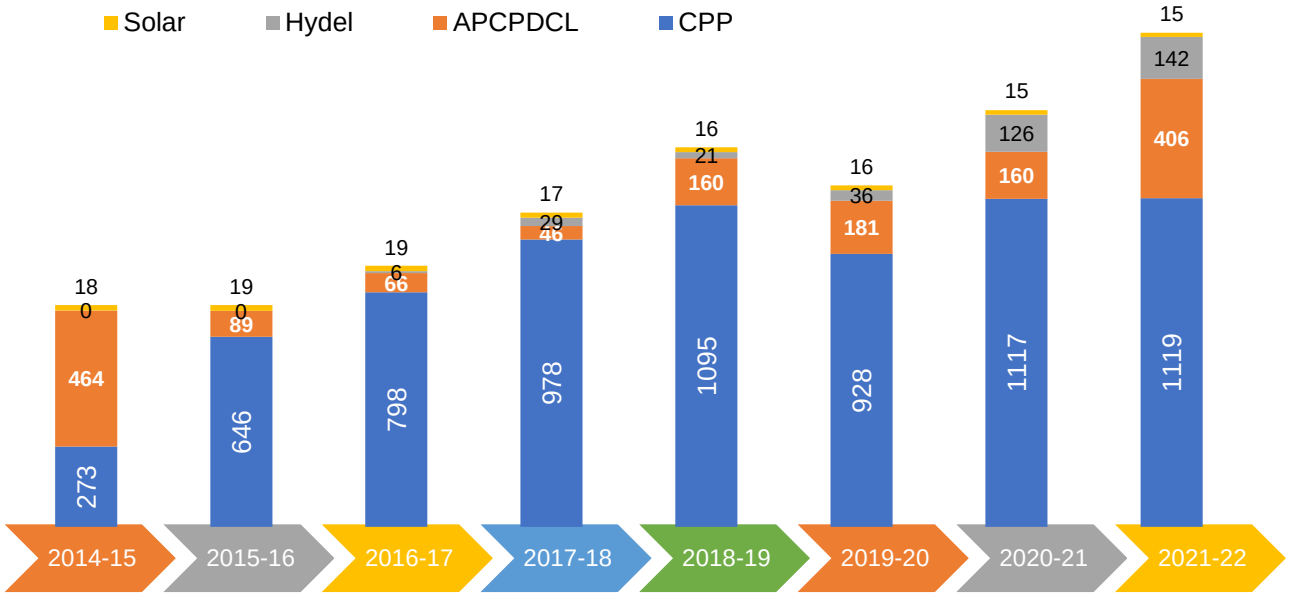
Power Savings attained by mist spray arrangement under ACC Fans

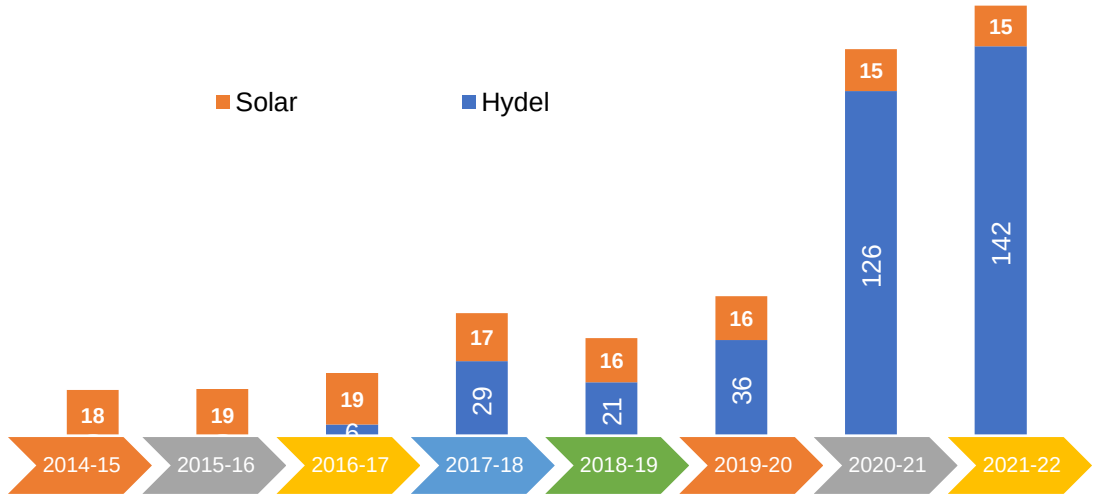
BEFORE

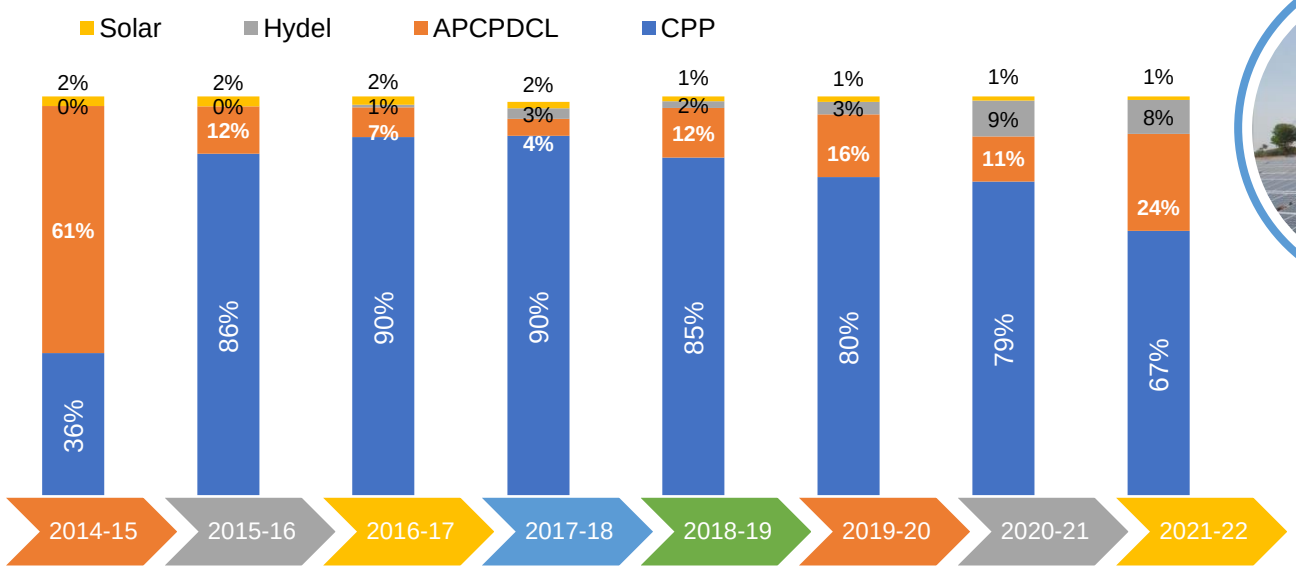
AFTER

Description	UoM	Before	After	Remarks
Mist spray arrangement under the ACC fans when mercury >38°C				
ACC Fans speed	RPM	890	850	
ACC Fans power consumption	KW	3356	3245	
Power Savings attained	KW	111		
Vacuum	Kg/Cm2	-0.83	-0.84	
Turbine Heat Rate	Kcal/KWh	2595	2580	
Heat Rate savings	Kcal/KWh	15		

Power Mix & Utilization of Renewable energy sources







Utilization of Renewable energy resources & TOE

Description	2019-2020	2020-2021	2021-2022
Thermal Energy Consumption TOE	31656	37787	37867
Electrical Energy Consumption from Grid KWH	247608	163999	213853
Over all Energy Consumption TOE	31678	37802	37886

Location	Green Power	Capacity
Cement Unit-II	Solar	1.15 MW
Cement Unit-I	WHR	2.30 MW
Nekarikallu	Hydel	8.25 MW
Uthummalai, TN	Wind	3.25 MW
Total		14.95 MW

Year	Technology	Type of Energy	Onsite/ offsite	Installed capacity(MW)	Gen. MU (KWH)	% of Overall Elec. Energy	Type of Energy	Onsite/ offsite	Installed capacity(MW)	Gen. MU (KWH)	% of Overall Elec. Energy
2014-15	PV Cell – Tilting Type	Solar	Onsite	1.15	0	0%	Hydel	Offsite	8.50	18	2%
2015-16	PV Cell – Tilting Type	Solar	Onsite	1.15	0	0%	Hydel	Offsite	8.50	19	2%
2016-17	PV Cell – Tilting Type	Solar	Onsite	1.15	6	1%	Hydel	Offsite	8.50	19	2%
2017-18	PV Cell – Tilting Type	Solar	Onsite	1.15	29	3%	Hydel	Offsite	8.50	17	2%
2018-19	PV Cell – Tilting Type	Solar	Onsite	1.15	21	2%	Hydel	Offsite	8.50	16	1%
2019-20	PV Cell – Tilting Type	Solar	Onsite	1.15	36	3%	Hydel	Offsite	8.50	16	1%
2020-21	PV Cell – Tilting Type	Solar	Onsite	1.15	126	9%	Hydel	Offsite	8.50	15	1%
2021-22	PV Cell – Tilting Type	Solar	Onsite	1.15	142	8%	Hydel	Offsite	8.50	15	1%

Fly ash utilization

Particulars	UOM	2018-19	2019-20	2020-21	2021-22
Ash Stock in Plant (yard + pond)	Tons	73.86	90.19	68.32	47.82
Ash Generated	Tons	53199.7	36401.7	41338.2	58258.5
Ash Utilization	%				
Ash Utilization in cement manufacturing	MT	17158.6	9578.34	7634.97	18347.8
Ash Utilized in Fly Ash Bricks Manufacturing	MT	36024.7	26845.2	33723.7	39915.7
Ash Utilized in Fly ash bricks	MT	90.19	68.32	47.82	42.88
Ash Utilized in Fly Ash Bricks Manufacturing	%	32%	26%	18%	31%
Ash Utilized in Fly ash bricks	%	68%	74%	81%	68%
Ash Utilized for road pavements					
Ash Utilization in other areas					
Expenditure on Ash Utilization (annual)	INR (lacs)				

Ash Handling done thru Various methods

Ash Handling Wet Method	%	NIL
Ash Handling dry Method	%	31
Ash Handled Semi-wet method	%	68

Including bed ash, 100% ash generated in cpp is utilized in Cement Plant, 3rd party sales and Own Bricks manufacturing unit

Fly ash silo – 420M3
Dense phase pneumatic handling system

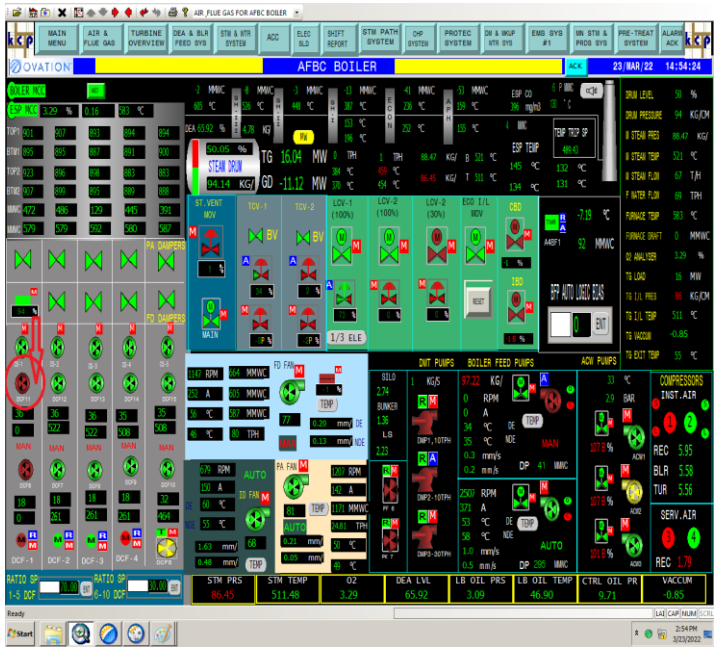
Bed ash re-cycling, with sieving machine installed. Re-cycle to bed material Bunker

Ash Bricks with Bed ash, KCP has own bricks manufacturing unit adjacent to CPP

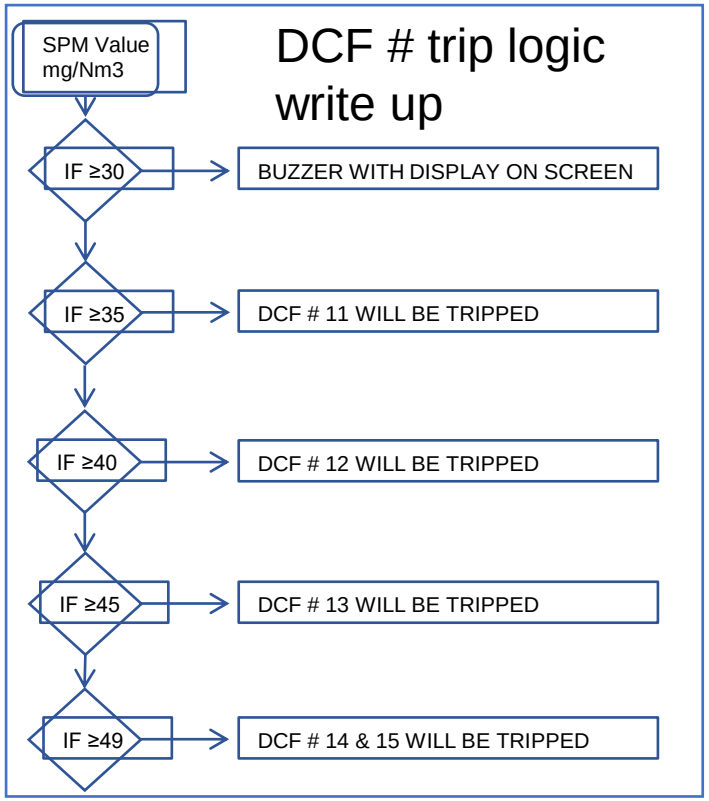
Bed ash silo – 120M3
Dense phase pneumatic handling system, Covered wall protection to avoid fugitive's

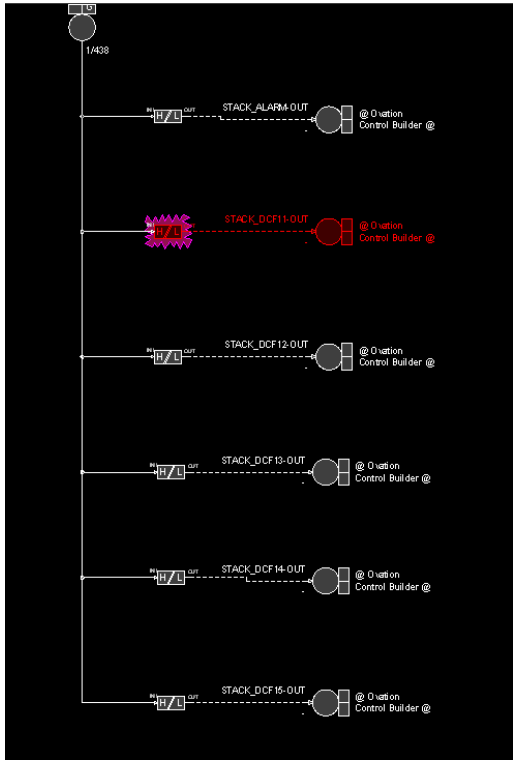
Environment Management - Emission

Particulars	UoM	2018-19	2019-20	2020-21	2021-22
Total CO2 Emission Per KW of Generation	Tons/kw	0.0016	0.0015	0.0016	0.0014
Current SOx Emissions at Full Load	Mg/Nm3	310	350	345	305
Current NOx Emissions at Full Load	Mg/Nm3	149	228	252	220
Particulate Matter	Mg/Nm3	8	12	15	14
Mercury	Mg/Nm3	NA	NA	NA	NA

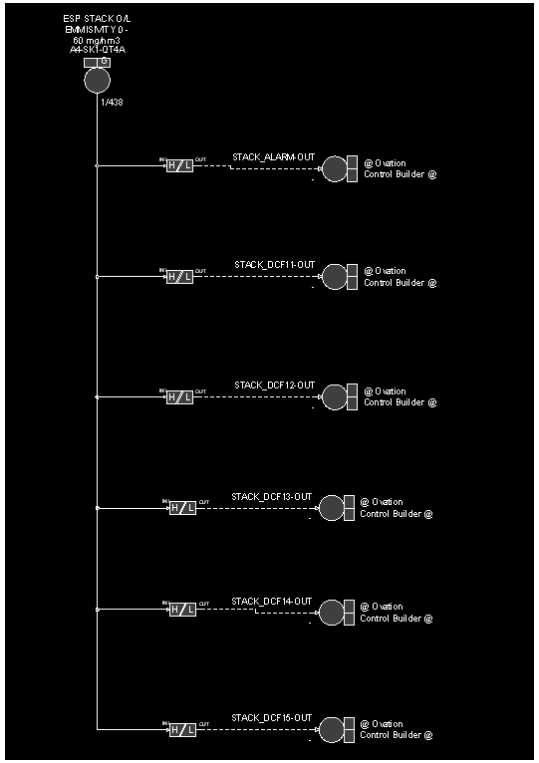


Screen shot on live mode while DCF Trip





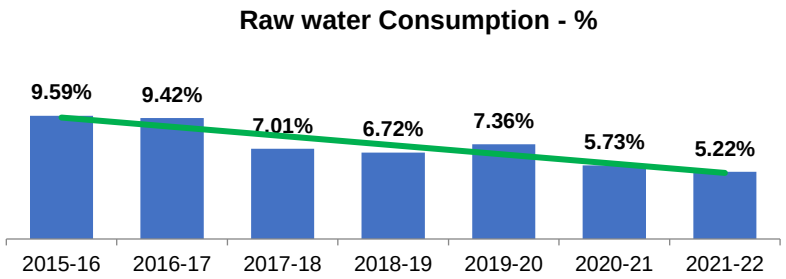
DCF–Trip simulation if SPM>45mg/Nm3

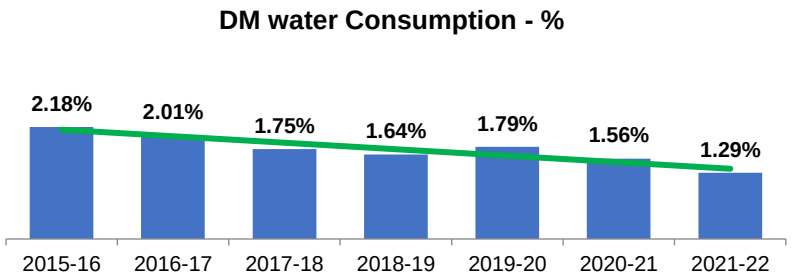


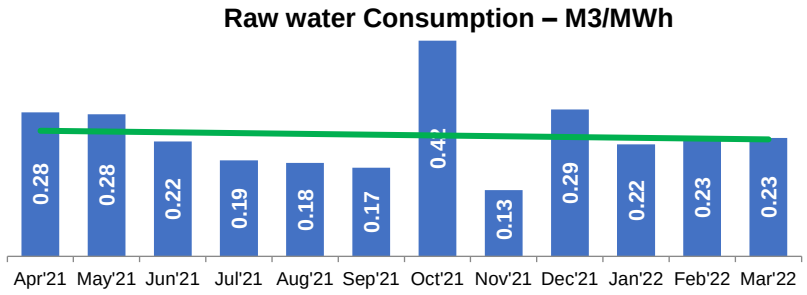
DCF–Trip logic if SPM>45mg/Nm3

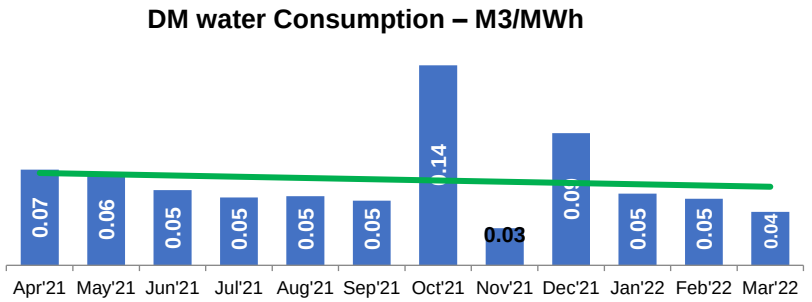
- Emission measurement and control through continuous emission monitoring system
- Installed Hybrid bag filter (ESP + 2 Module bag filter) and SPM is maintained <15mg/Nm3
- Emission norms are maintained as per gazette notification and remote access for calibration access is given to CPCB

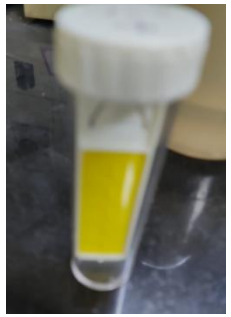
Environment management - Water











100counts/100ml SRB Kits

Corrosion Coupons installed in Circulating water piping and monitoring of the same

SRB & TBC are being carried out to optimize dozing of H_2SO_4, Hypo & ACT BD water

Best Practices in water Management:-

- HP Dozing qty is optimized by which phosphates are reduced, resulting in reduction of boiler blow down water. Boiler blow down water is routed to Auxiliary cooling tower where the Conductivity and silica are suitable for the Auxiliary cooling tower. Water, Steam and condensate analysis is being done once in a shift and is compared with standards on every day basis. Water samples are being sent to third parties and other power plants, analysis of the same is compared with our readings.
- Raw water is pumped to another storage tank and from such storage tank one more pump is utilized for ash conditioner, the same is replaced with single effluent water pump(instead of two pumps) by laying a separate line. By which raw water and Auxiliary power savings are obtained.
- SRB (Sulphate reducing bacteria) is being carried out and H2So4 dozing rate & ACT blow down rate is optimized.
- TBC (Total Bacteria Count) is being carried out by which biocide and Hypo dozing rates are optimized.
- Corrosion coupons (SS & MS) are being installed in circulating water and continuously monitored on every fort night basis and comparing with standards (SS - 0.5MPY. MS - 3MPY)
- 5S jobs are initiated in DM plant by which document retrieval time and chemicals identification are clearly visible, maintain the water parameters in control range are being monitored.

Usage of boiler blow down water for make up of Auxiliary cooling tower

- Boiler Blow down water quality :– Ph – 9.9, Conductivity - 68, Silica – 0.23, hardness – NIL, Phosphate – 7
- Auxiliary cooling tower water :- Ph – 8.1, Conductivity – 750, Silica – 10, hardness – 250, Phosphate - NIL

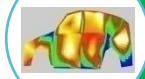
Daily 3 to 5KL of water is saved

- Whether plant is Zero liquid discharge
  - YES

Best Practices carried out at 1 X 18MW CPP

1. Condition Monitoring of equipment's internally every fortnight. 2. Condition Monitoring of equipment's by 3rd party vendor once in 3 months. 3. Analyzing deviations of KPI's in Boiler & turbine desk is helping shift in charges to take immediate action for the cause of deviation.

Digitalization



Carrying out thermography once in 3 months:
1. ACC Radiation 2.Steam traps 3. Critical eqpt.'s bearings 4. Boiler Radiation 5. Electrical Panels

Maintenance & Reliability

Daily analysis of Coal, Water, Steam, Condensate, & Ash analysis on day/shift basis.
Comparing of analysis with 3rd party results and ensure analysis is done scientifically

Maintenance & Reliability

Carrying Out complying 100% Preventive maintenance compliance on regular basis.
Carrying out & complying 100% Lubrication replacement/top up on regular basis.
Carrying out Thickness mapping of boiler pressure parts in every opportunity & shutdown

Asset Management

Once in 6 months oil sample(Turbine & Critical Gear box) is sent to 3rd party analysis
Carrying out boiler pressure parts thickness survey & mapping of the same
Installed Nash filter in addition to the regular oil centrifuge operation

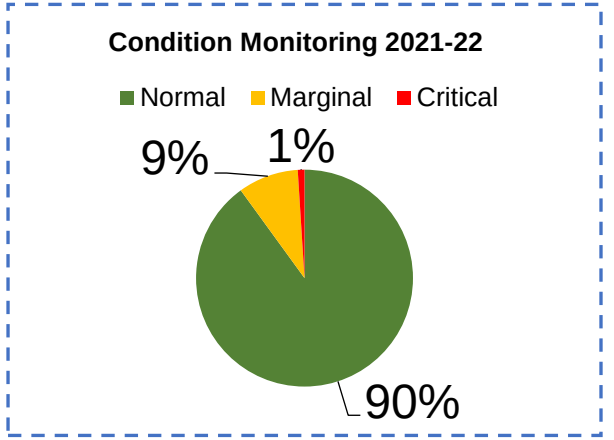
New Initiatives

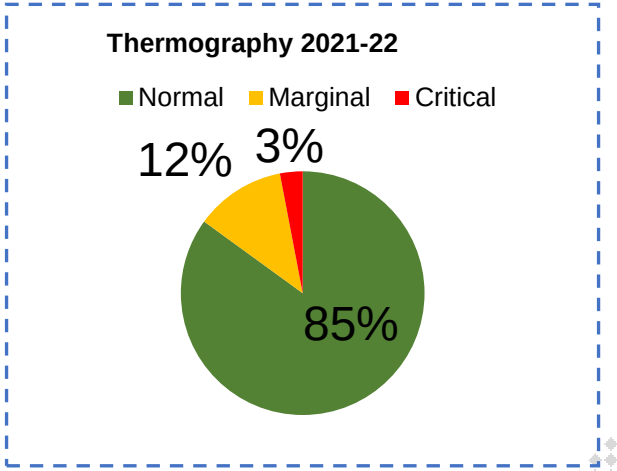
Monitoring Emission parameters thru continuous emission monitoring system
Planation – 7550 Saplings and 11000 Sq.ft of green mat is developed in 2021-22, Out of which 2000 Plantations in 2.5Acres land was highly successful and appreciated by government authorities & auditing agencies.

Afforestation

Calibration of instruments in internal & external parties
Energy Meters Calibration once in a year
Control & protection relay's calibration once in 2 years with 3rd party

Maintenance & Reliability





Best Maintenance Practices carried out 1 X 18MW CPP

LUBE EXPERT — LUBE EXPERT OIL ANALYSIS PROGRAM

For Aimil Ltd. Instrumentation & Technologies

Considered Judgement of Wear Situation: **NORMAL**

OPN-17 — TEST REPORT NO:TR/LEPL/2018-19/JC-328/038

Customer Details: The KCP Limited - Ramachandrapuram

ANALYTICAL FERROGRAPHY ANALYSIS TEST REPORT AS PER ASTM D 7690-11

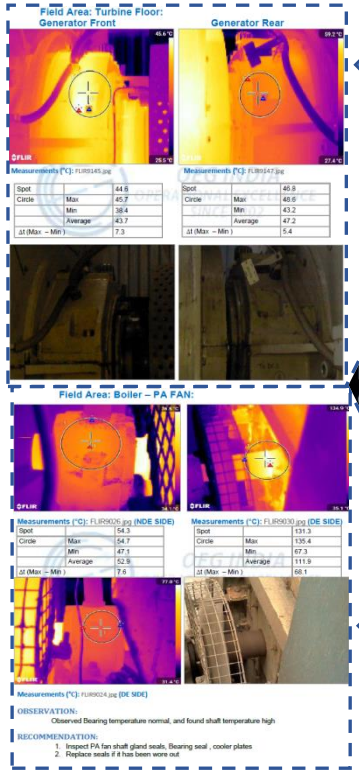
EQPT NAME	CPP TURBINE-TURBINE OIL	RECEIVED	09.03.2021
COMPONENT	TURBINE	REPORT	17.03.2021
MFR	NOT AVAILABLE	SAMPLE ID	VAD 4685
LUBE NAME	TURBINE XT46(HINDUSTAN PETROLIUM)	LOCATION	N/A
RESERVOIR CAP	8552 Ltrs	M/C HRS	N/A

Remarks:Continue normal operation no abnormal particles are observed on the ferrogram.

Discussion of Results:The wear particle concentration WPC is 10.6 WPC limit considered as 15.0. Normal rubbing wear (<15 microns) particles are observed in small quantities. Low alloy steel severe sliding wear particles of size ranging up to 24 microns are observed in small quantities.Babbit bearing wear particles of size ranging up to 30 microns are observed in small quantities.Red oxide particles are observed in negligible quantities.Sand/dirt particles are observed in small quantities.

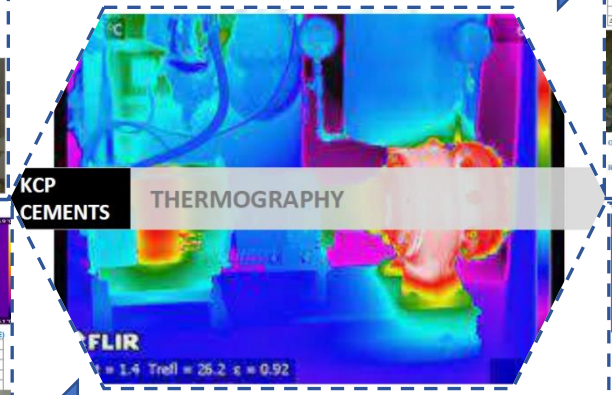
Sample Date			28.12.2018	04.03.2021		-
Machine Condition			NORMAL	NORMAL		
ACCEPTABLE WPC LIMIT:	15.0.	# WPC	8.4	10.6		
(Wear particle concentration)		# PLP %	28.57	26.42		
Wear Particles type	UOM	Rating	Severity in 0-10 scale/Particles Size in Microns			
Ferrous Wear						
Rubbing Wear- Wear Particles of Size less than 15 microns	FEW	1-4	2	2	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Sliding Wear-Elongated particles of aspect ratio >30:1	FEW	1-4	2/22	2/24	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Cutting Wear-Curly particles of aspect ration >50:1 due to abrasive contamination or misalignment.	FEW	1-4	--	--	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Chunks-Gear Wear (Pitch line fatigue/Scoring/Scuffing particles)	FEW	1-4	--	--	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Reworked- Laminar Particles (Bearing Wear) - Fatigue /Pitting/ Spallingparticles.	FEW	1-4	--	--	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Spheres-Early indication of Rolling contact fatigue.	FEW	1-4	--	--	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Dark Metallo-Oxides(Black Oxides)-Due to insufficient Lubrication.	FEW	1-4	--	--	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Red Oxides(Rust/ Ferrous oxides)	FEW	1-4	1	1	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Corrosive Wear Debris- Additive depetion/TAN value increase.	FEW	1-4	--	--	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--
Others	FEW	1-4	--	--	--	--
	MODERATE	5-7	--	--	--	--
	HEAVY	8-10	--	--	--	--

Environmental Condition: Temperature : 22.6 ° C ± 5 ° C, RH:56% ± 5% — Page:1 of 2



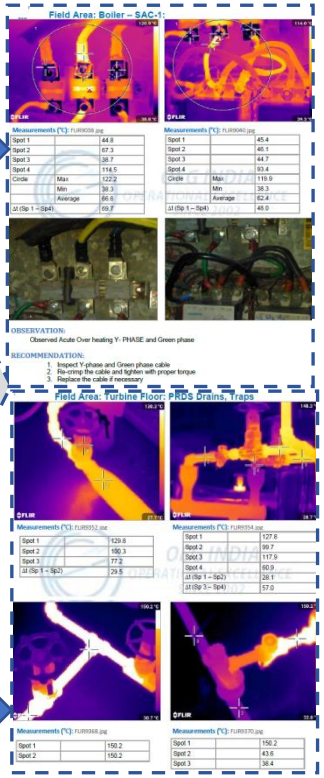
Generator bearings

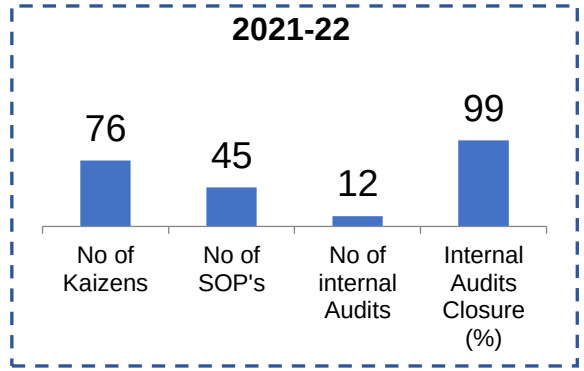
Electrical termination

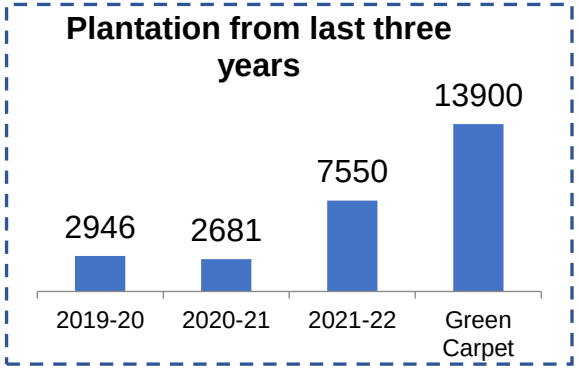


PA Fan Bearings

Steam Traps







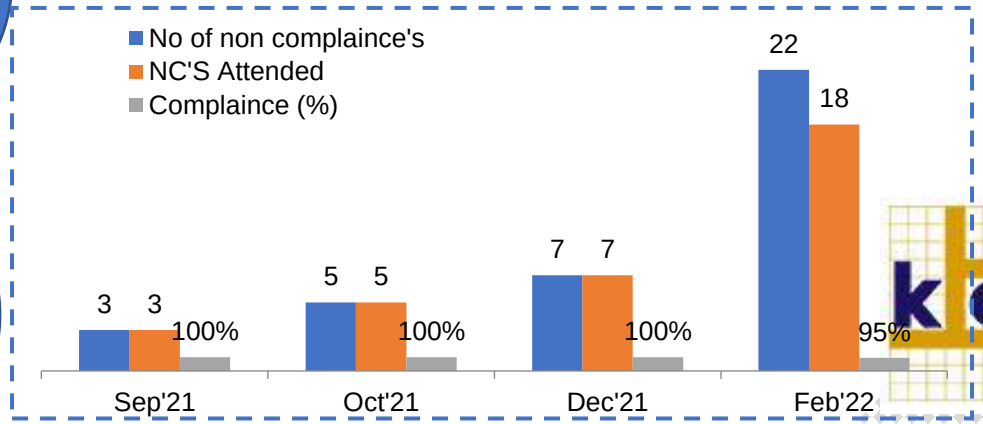
Miyawaki Plantations was a major success in 2021-22

Best Safety Practices & Implementation of 5S.

Fatalities	0
Total Lost time injury	0
Total no of near misses	0
Total no of LTIFR	0
Tot. n/o near misses closed'22	150 No's & 100%
Total no of safe training hours	600hr/Month–2021-22
Total safe man hours	4.96 Million from 2019-22

Before

After



Team work employee involvement & Monitoring

Daily Generation report with comparison with national best achieved figures

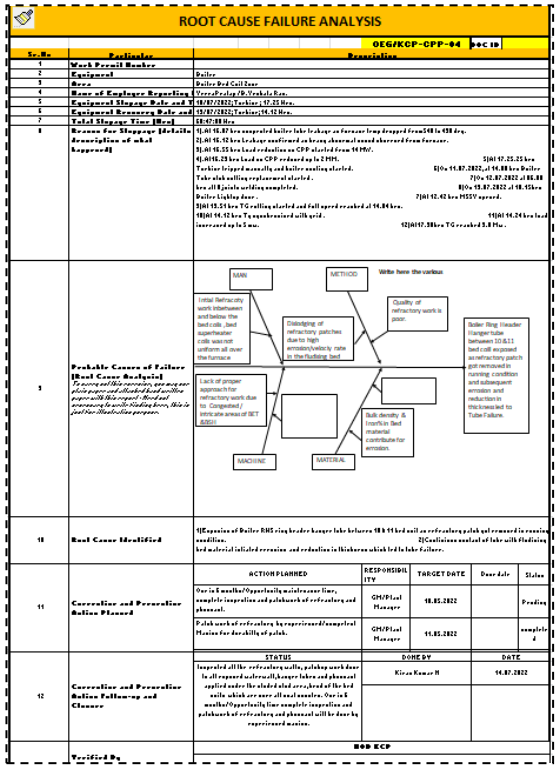
KCP CEMENT LTD, Unit # 2 RK PURAM

CPP : Daily Performance Report — Date: 31 MAR 2022

Parameters	UOM	Opening Stock	Generation/Import O/D	Generation/Import MTD	Generation/Import YTD	Export / Consumption O/D	Export / Consumption MTD	Export / Consumption YTD	Closing Stock
Power Units	MWh		371.668	9957.472	121313.124	343.331	9203.175	111890.986	
Auxillary Consumption	MWh		-	-	-	28.337	754.297	9422.138	
Steam	MT		1563	42772	519316	1530	41849	506106	
Coal	MT		247	7392	128130	375	10949	121950	
Bed Ash	MT		28	726	3839	28	726	3633	
Fly Ash	MT		180	4510	58331	234	4517	58263	
Raw Materials			**Receipt**			**Consumption**			
Bed Material	MT	30	0	0	0	0	0	30	30
South African Coal RB # 3	MT	0	0	0	1989	0	0	1989	0
Indonesian Coal	MT	8200	0	270	24556	15	1493	16372	8185
Indian Coal G5	MT	0.00	0.00	0.00	2040.89	0.00	0.00	2041	0
Indian Coal G13	MT	3081.28	247.09	7121.95	95582.79	360.00	9427.00	97587	2968
Australian Coal	MT	0	0	0	3166	0	0	3166	0
South African Coal	MT	0	0	0	143	0	0	143	0
Biomass fuels	kL	0	0	0	652	0	29	652	0
Specific Energy Consumption	**UoM**	**Natnl. Best**	**OTD**	**MTD**	**YTD**	**Dept PM's %**	**OTD**	**MTD**	**YTD**
Pumps	Kwh/MWh	18.2	22.033	23.64	24.03	Mech.	100%	100%	100%
Fans	Kwh/MWh	15.5	19.862	20.88	23.64	Electrical	100%	100%	100%
ACC	Kwh/MWh	14.6	11.239	7.28	6.41	C&I	100%	100%	100%
Compressor & AC	Kwh/MWh	2.8	3.939	10.58	8.33	**Loading %**	**OTD**	**MTD**	**YTD**
CHP	Kwh/MWh	NA	1.652	1.92	1.86	IAC # 1	0.00%	0.00%	57.89%
WTP	Kwh/MWh	NA	0.724	0.46	0.43	IAC # 2	78.26%	78.26%	62.39%
Compressor & AHP	Kwh/MWh	NA	2.042	3.61	4.00	SAC # 1	0.00%	0.00%	84.81%
Turbine MCC	Kwh/MWh	NA	1.663	1.80	1.51	SAC # 2	95.00%	95.00%	82.49%

Efficiency Parameters	Bench Marking	O/D	MTD	YTD
Plant Load Factor- PLF (%)	100%	0.00%	76.92%	83.74%
Auxilary Consumption (%)	7.50%	7.62%	7.58%	7.67%
Sp. Steam Cons. (MT/MWh)	4.09	4.12	4.20	4.17
Sp. Coal Cons. (MT/MWh)	N/A	1.01	1.10	1.01
Station Heat Rate(Kcal/KWh)	3069	3027	3100	3119
Turbine Heat Rate(Kcal/KWh)	2540	2564	2632	2674
Run Hours	**UoM**	**O/D**	**MTD**	**YTD**
Turbine (Hrs)	Hrs	0	719	8048
Boiler (Hrs)	Hrs	0	720	8097
CHP (Hrs)	Hrs	0	209	2558
Production Rate	**BEST**	**O/D**	**MTD**	**YTD**
Boiler steam Gen. (TPH)	74.23	#DIV/0!	59.44	64.14
DM water Gen. (M3/Hr)	11.00	0.00	9.85	9.90
CHP Production (TPH)	85.00	#DIV/0!	51.97	47.64
Sp.DM Water Cons. (M3/MWh)	0.03	0.03	0.04	0.06
SP Water Consumption	**Nat.Best**	**OTD**	**MTD**	**YTD**
Sp.RW Cons.(m3/Mwh)	0.25	0.48	0.23	0.19
Sp.CT W Cons. (m3/MWh)	0.06	0.14	0.11	0.06
Effluent Generation	0.06	0.00	0.00	0.05
EMISSIONS	**Nat.Best**	**OTD**	**MTD**	
SPM (mg/Nm3)	10	10.75	10.85	
SOX (PPM)	600	302.04	231.91	
NOX (PPM)	300	93.88	146.62	
Fly ash Silo LOI (%)	<5%	7.92	7.53	

Root Cause failure analysis


ROOT CAUSE FAILURE ANALYSIS

OEG/KCP-CPP-04 doc ID

Sr.No	Particulars	Description
1	Work Permit Number	
2	Equipment	Boiler
3	Area	Boiler Bed Coil Zone
4	Name of Employee Reporting	Veera Reddy/R.Venkata Rao.
5	Equipment Stoppage Date and Time	10/07/2022/Sunday/ 17.25 Hrs.
6	Equipment Resumes Date and Time	15/07/2022/Sunday/04.12 Hrs.
7	Total Stoppage Time (Hrs)	58:47:00 Hrs.
8	Reason For Stoppage (Details description of what happened)	1).At 16.57 hrs suspected boiler tube leakage as furnace temp dropped from 940 to 450 deg. 2).At 16.42 hrs Leakage confirmed as bed ash chemical sound observed from furnace. 3).At 16.55 hrs load reduction as CPP started from 44 MW. 4).At16.25 hrs load as CPP reduced up to 2 MW. 5)At 17.25.25 hrs Turbine tripped manually and boiler cooling started. 6)On 15.07.2022, at 04.00 hrs Boiler Take shut welding work started. 7)On 12.07.2022 at 08.00 hrs all 8 joints welding completed. 8)On 15.07.2022 at 08.45hrs Boiler Lighting done. 9)At 02.42 hrs MSSV opened. 9)At 15.51 hrs TG rolling started and full speed reached at 04.04 hrs. 10)At 04.12 hrs Tg synchronized with grid. 11)At 04.24 hrs load increased up to 5 mw. 12)At17.38hrs TG reached 5.8 Mw.
9	Probable Causes of Failure (Root Cause Analysis)	
10	Root Cause Identified	1)Expansion of Boiler RMS ring header hanger tube between 48 & 49 bed coil as refractory patch got removed in running condition 2)Continuous washout of tube with fluidizing bed material initiated corrosion and reduction in thickness which led to tube failure.
11	Corrective and Preventive Action Planned	ACTION PLANNED: Once in 6 months/Opportunity maintenance time, complete inspection and pickwork of refractory and phosnel. RESPONSIBILITY: GM/Plant Manager. TARGET DATE: 10.05.2022. Status: Pending. Polish work of refractory by experienced/competent Mason for durability of polish. GM/Plant Manager. 11.05.2022. Status: completed.
12	Corrective and Preventive Action Follow-up and Closure	STATUS: Inspected all the refractory walls, pickup work done by all required material, hanger tubes and phosnel applied under the shield and area level of the bed walls which are more all read monitor. Once in 6 months/Opportunity time complete inspection and pickwork of refractory and phosnel will be done by experienced mason. DONE BY: Kiran Kumar N. DATE: 16.07.2022
	Verified By	HOD KCP

Deviation Report

The KCP Limited, Cement Production Unit - II, Ramakrishnapuram,Muktyala (V), Jaggayapet (M),Krishna District, Andhra Pradesh-521178, INDIA

DEVIATION REPORT DATED 03.06.2022

Equipment	Name of the parameters	UoM	24.06.2019	03.06.2022	Variance	Reason
GEN	Turbine Running Hrs	Hours	24	24.00		Generation less due to Line -2 in stop condition
	Generation	MVH	274554	268856		
	Avg.Load	**MVH**	11.44	11.20		
	Aux.Consumption	MVH	22802	24158	-1356	
	PLF	%	63.55%	62.24%		
	Aux%	%	8.31%	8.99%	-0.68	
Plant	**Station Heat Rate**	Kcal/KWH		3223		
TURBINE	**Turbine Heat Rate**	Kcal/KWH		2745		
STEAM & WATER	Boiler Steam Generation	MT	1186	1171		
	Turbine steam Consumption	MT	1150	1136		
	Feed water Consumption	MT		1193		
	DM Make Up(production)	M3	30	36		
	TG inlet Pressure	Kgf/Cm2	83.8	83.09	84.60	
	TG inlet Temperature	Deg.C	504.2	507.20	516.50	
	Specific Steam Consumption	**T/MVh**	4.19	4.23		
	Specific Steam Consumption	**T/MVh**	4.32	4.36		
ACC	Vacuum pressure	Kgf/Cm2	-0.87	-0.867		First comp Bottom-1, Third comp-1 bottom-1 dropped up to 150 Deg.Later First comp got normalized at 13.30 hrs and again dropped at 14.00 hrs. Mining given to first & third comp was abnormal from 14.00 hrs. By increasing airflow intermittently to raise the bed temp.
	WBT	Deg.C				
	DBT	Deg.C	31.68	37.6		
	Steam Exhuast Temperature	Deg.C	53.11	52.82		
	ACC Power Consumption	**KVH**	1102	4263	-3161	
	Specific Power Consumption	**KWH/M3**	4.01	15.86		
WTP	DM Plant Run Hours	Hours	3	3.50		Avg air Flow:69.0 tph;Avg O2:5.89%;Avg CO:208 mg/N-m3; Windbox pr:548mmwc.ESP DP:63.4mmwc.
	Raw water Consumption	M3	105	131		
	DM Water Consumption	M3	22	11		
	Soft water Consumption(CT Makeup)	M3		60		
	WTP Power Consumption	KWH	234	211	23	
	Specific Power Consumption	**KWH/M3**	0.85	0.78		
Fans	ID Fan Average RPM	RPM	582	565		
	ID Fan Power Consumption	KWH	1253	1157	96	
	ID FAN Specific power consumption	**KWH/M3**	4.56	4.30		
	FD Fan Average RPM	RPM	1052	1082		
	FD Fan Power Consumption	KWH	3375	3440	-65	
	FD FAN Specific power consumption	**KWH/M3**	12.29	12.79		
	PA Fan Average RPM	RPM	1106	1126		
	PA Fan Power Consumption	KWH	1210	1180	30	
	PA FAN Specific power consumption	**KWH/M3**	4.41	4.39		
	Specific Fan power Consumption	**KWH/M3**	21.26	21.49		
	BFP Suc/Disc pressure & temp	Kgf/Cm2		4.2/89.9/135		
	BFP Flow	M3/Hr		5673		
	Boiler Feedpump power	KWH	6466	5666	800	
	BFP Specific Power	**KWH/M3**	39.65	31.87		

Team work employee involvement & Monitoring

KCP AIR PRE HEATER PERFORMANCE 02/Aug/22 17:37:05

FLUE GAS IN 2 Deg.C

PARAMETER	APH-A
ACTUAL EFFI.(AIR SIDE)	5 %
DESIGN EFFI.(AIR SIDE)	6 %
DEVIATION	-2.9 %
ACTUAL EFFI.(GAS SIDE)	4 %
DESIGN EFFI.(GAS SIDE)	5 %
DEVIATION	-10.0 %
ACTUAL X RATIO	0.69 FRACT
XRATIO DEV	-0.1 FRACT

1 Deg.C 20.8 KG/SEC AIR OUT

3 Deg.C 20.8 KG/SEC AIR IN

1 Deg.C FLUE GAS OUT

KCP HP & LP HTR PERFORMANCE 02/Aug/22 17:41:50

166 Deg.C 88.85 KG/CM2 33.79 TPH

132 Deg.C 88.88 KG/CM2 33.79 TPH

192 Deg.C 2.24 KG/CM2 2.70 TPH

EXT 2

84 Deg.C 4.08 KG/CM2 37.64 TPH

TO ECONOMISER

HPH

DEAERATOR STORAGE TANK

LPH

59 Deg.C 4.20 KG/CM2 37.64 TPH

CEP DISC

EXT 1

137 Deg.C 2.00 TPH

288 Deg.C 7.16 KG/CM2 2.00 TPH

TO DEAERATOR

BFP

EXT-3

TO CONDENSER

63 Deg.C 1.66 TPH

89 Deg.C -0.25 KG/CM2 1.66 TPH

PARAMETER	HPH	DEA	LPH
TERMINAL TEMP DIFF (TTD)	4.51 Deg.C		8.09 Deg.C
DRAIN COOLER APPROACH(DCA)	5.02 Deg.C		4.10 Deg.C
HEATER TEMPERATURE RISE	33.88 Deg.C	50.22 Deg.C	25.19 Deg.C

KCP BOILER PERFORMANCE 25/MAY/22 09:15:57

BOILER LOSSES		
Dry Gas Loss	3.04	%
Water from H2 Fuel	5.59	%
Water from H2O Fuel	3.86	%
Moisture in Air	0.12	%
Unburned Carbon	0.20	%
Unmeasured Heat Loss	1.50	%
Fuel Related Loss	0.00	%
Surface Radition & Convection	0.61	%
Summation Of Losses %	14.91	%

TO TURBINE 506 °C 85 KG/CM2 51 TPH

178 °C 91 KG/CM2 48 TPH FEEDWATER

BOILER

AIR FLOW 74170.4 KG/HR

12.73 TPH COAL FEED

BOILER EFFICIENCY (%) HT LOSS		
ACTUAL	85.09	%
DESIGN	82.90	%
DEV	2.19	%

BOILER EFFICIENCY (%) I/O METHOD		
ACTUAL	64.05	%

AIR HTR | FW HTRS | TURBINE | CONDENSER | TURB/UNIT HEAT RATE | OPRTR ENTRY | HOME

MOTORS EQUIPMENT CONDITION & MONITERING TURBINE

	PA	FD	ID	BFP1	BFP2
MTR R1 WDG TEMP.	58.07	64.70	60.62	76.45	32.97
MTR R2 WDG TEMP.	57.44	60.24	60.11	77.09	32.72
MTR Y1 WDG TEMP.	57.95	59.86	59.98	76.96	32.85
MTR Y2 WDG TEMP.	58.45	59.98	59.73	79.01	32.85
MTR B1 WDG TEMP.	57.82	60.87	59.47	76.96	32.72
MTR B2 WDG TEMP.	58.96	60.49	59.09	77.86	32.97
MTR NDE BRG TEMP.		43.09	43.85	51.72	31.96
MTR DE BRG TEMP.		46.64	47.65	56.04	32.59
FAN NDE BRG TEMP.	38.79	35.25	41.06	53.75	31.20
FAN DE BRG TEMP.	42.33	42.58	43.85	50.70	31.20
FAN DE BRG VIB.	0.30	0.18	0.22	1.14	-0.03
FAN NDE BRG VIB.	0.04	0.16	0.16	0.95	0.10

GENERATOR

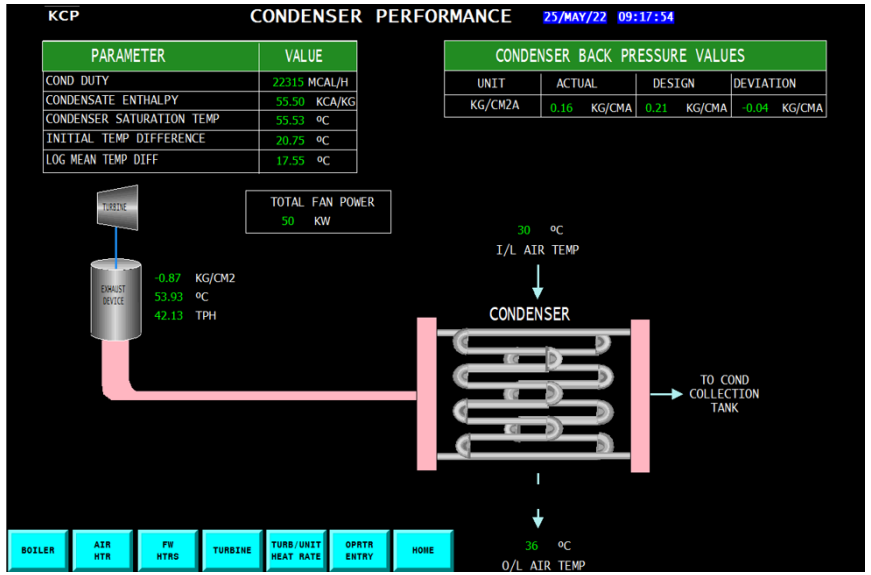
56.00	Front Brg Temp	37.00	Inlet Air Temp-1
72.00	Rear Brg Temp	49.00	Outlet Air Temp-1
68.00	Wdng Temp-U1 Phase	36.00	Inlet Air Temp-2
71.00	Wdng Temp-V1 Phase	54.00	Outlet Air Temp-2
72.00	Wdng Temp-W1 Phase	67.00	Core-1 Temp
53.00	Wdng Temp-U2 Phase	73.00	Core-2 Temp
55.00	Wdng Temp-V2 Phase	70.00	Core-3 Temp
72.00	Wdng Temp-W2 Phase	55.00	Exiter Filed Temp

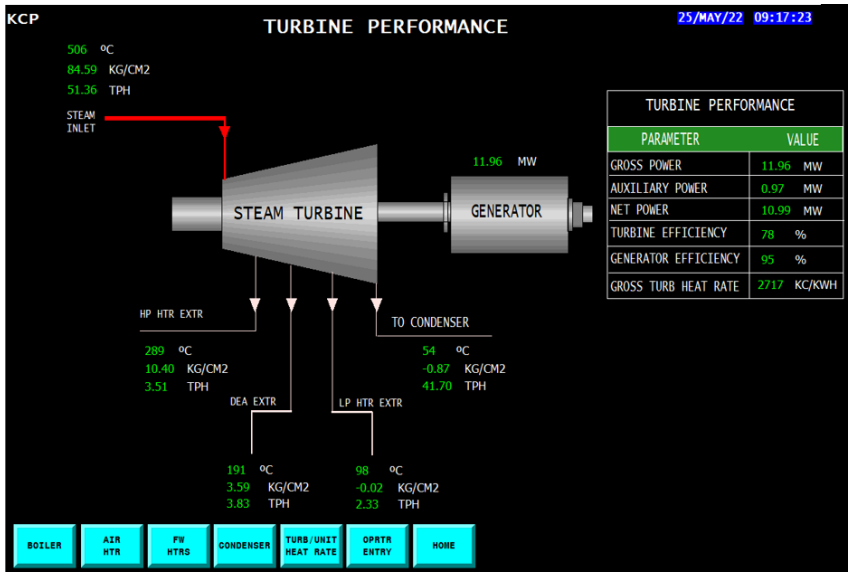
TEMPERATURES		VIBRATIONS	
57.06	TG thrust temp Non ActSide top	8.70	Turbine front shaft X Vib.
72.61	TG thrust temp.Active Side top	9.05	Turbine front shaft Y Vib.
58.71	TG thrust temp.Non ActSide Bot	23.06	Turbine rear shaft X Vib.
69.04	TG thrust temp.Active Side Bot	18.74	Turbine rear shaft Y Vib.
91.58	TG front bearing temp	8.69	GB HS DE shaft X Vib.
86.70	TG rear bearing temp.	15.51	GB HS DE shaft Y Vib.
87.98	GB HS Brng DE Side Temp	18.05	GB HS NDE shaft X Vib.
77.86	GB HS Brng NDE Side Temp	19.02	GB HS NDE shaft Y Vib.
52.73	GB LS Brng NDE Side Temp	14.78	GB LS NDE shaft X Vib.
49.81	GB LS Brng DE Side Temp	23.05	GB LS NDE shaft Y Vib.
		21.37	GB LS DE shaft X Vib.
		25.21	GB LS DE shaft Y Vib.
		29.67	Gen.front shaft X Vib.
		27.69	Gen.front shaft Y Vib.
		34.00	Gen.rear shaft X Vib.
		40.69	Gen.rear shaft Y Vib.
		0.15	Rotor axial disp-1
		0.19	Rotor axial disp-2
		5.70	Casing expansion

TURBINE LOAD(MW) 11.97

Temparatures in Deg.C
Motor Vibrations in mm/sec
Turbine Vibratons in Microns
Turbine disp in mm

Team work employee involvement & Monitoring





- Job planning at CPP:
  - Day opening with daily tool box talk, JSA, PTW's – work allocation as per plan.
  - Preparation of DGR, Deviation analysis.
  - Checking of log records, defect register and planning the jobs as per priority.
  - Daily meeting with all section heads & shift in charges in operation.
  - Compliance of long/short term goals

- Hour wise, shift wise & day wise all major KPI's are monitored in DCS by various performance sheets in online.
- The same has facilitated shift in charges to take immediate action at differed parameters.

Integrated Management System

ISO 9001:2015 | ISO 50001:2018 | ISO 14001:2015 | ISO 45001:2018

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 258117-2018-AQ-IND-RvA | Initial certification date: 08 September 1994 | Valid: 01 May 2021 – 30 April 2024

This is to certify that the management system of

The KCP Limited
Cement Unit - II (Manufacturing Division)
Ramakrishnapuram, Muktyala (V), Jaggayyapet (M), Krishna Dist - 521 457, India
and the sites as mentioned in the appendix accompanying this certificate

has been found to conform to the Quality Management System standard:
ISO 9001:2015

This certificate is valid for the following scope:
Manufacture & sale of clinker and cement

Place and date: Chennai, 13 April 2021

For the issuing office: DNV - Business Assurance, ROMA, No. 10, GST Road, Alandur, Chennai - PIN - 600 016, India

Sivadasan Madiyath, Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL Business Assurance B.V., Zwolseweg 1, 2994 LB, Barendrecht, Netherlands - TEL: +31(0)102922689. www.dnvgl.com/assurance

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 10000450431-MSC-RvA-IND | Initial certification date: 24 May 2016 | Valid: 21 August 2021 – 21 August 2024

This is to certify that the management system of

The KCP Limited - Cement Unit - II (Manufacturing Division)
Ramakrishnapuram, Muktyala Village, Jaggayyapet Mandal,Krishna District - 521 457, Andhra Pradesh, India

has been found to conform to the Energy Management System standard:
ISO 50001:2018

This certificate is valid for the following scope:
Manufacture of clinker and cement

Place and date: Barendrecht, 30 June 2021

For the issuing office: DNV - Business Assurance, Zwolseweg 1, 2994 LB Barendrecht, Netherlands

Erle Koek, Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV Business Assurance B.V., Zwolseweg 1, 2994 LB, Barendrecht, Netherlands - TEL: +31(0)102922689. www.dnv.com/assurance

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 197474-2016-AE-IND-RvA | Initial certification date: 15 April 2016 | Valid: 01 May 2021 – 30 April 2024

This is to certify that the management system of

The KCP Limited
Cement Unit - II (Manufacturing Division)
Ramakrishnapuram, Muktyala Village, Jaggayyapet Mandal, Krishna District - 521 457, Andhra Pradesh, India

has been found to conform to the Environmental Management System standard:
ISO 14001:2015

This certificate is valid for the following scope:
Manufacture of clinker and cement

Place and date: Chennai, 13 April 2021

For the issuing office: DNV - Business Assurance, ROMA, No. 10, GST Road, Alandur, Chennai - PIN - 600 016, India

Sivadasan Madiyath, Management Representative

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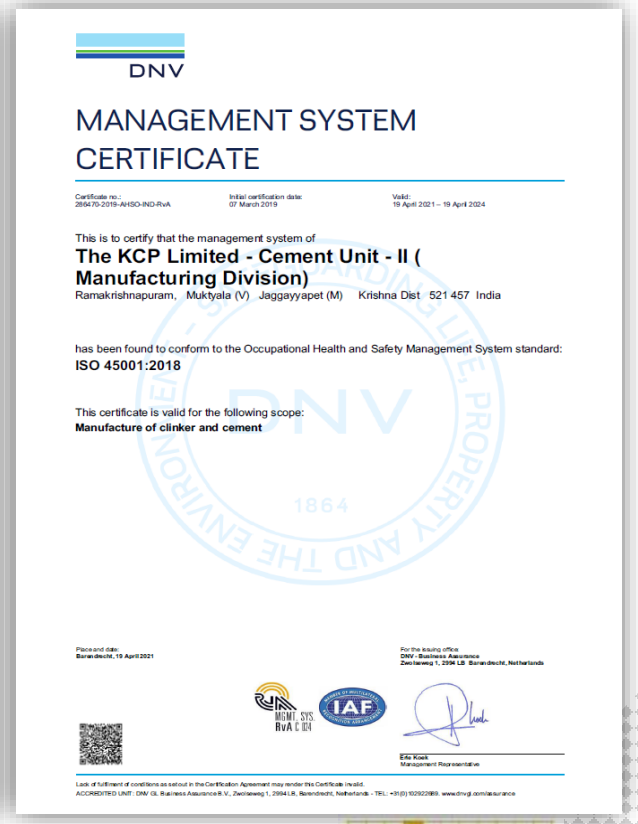

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 286470-2019-AHSO-IND-RvA | Initial certification date: 07 March 2019 | Valid: 19 April 2021 – 19 April 2024

This is to certify that the management system of

The KCP Limited - Cement Unit - II (Manufacturing Division)
Ramakrishnapuram, Muktyala (V) Jaggayyapet (M) Krishna Dist 521 457 India

has been found to conform to the Occupational Health and Safety Management System standard:
ISO 45001:2018

This certificate is valid for the following scope:
Manufacture of clinker and cement

Place and date: Barendrecht, 19 April 2021

For the issuing office: DNV - Business Assurance, Zwolseweg 1, 2994 LB Barendrecht, Netherlands

Erle Koek, Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL Business Assurance B.V., Zwolseweg 1, 2994 LB, Barendrecht, Netherlands - TEL: +31(0)102922689. www.dnvgl.com/assurance

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- To bring in recognition to the Organisation through unique innovative practices.
- Creating platform for sharing of knowledge which takes to sustainable growth through optimum utilization of resources, diversified Quality Products, Processes and Services for all our Stakeholders.
- Understand the Industry best and implement the same in our Organisation.
- Creating a competitive edge amongst the industries through right person is assigned for the right job and that they grow and contribute towards organizational excellence
- Employee engagement & belongingness increased
- Implementing the modifications done at other sites immediately which are having zero/less investments. And also considering the major modifications in the budget approvals and getting the required approvals with ROI.

Confederation of Indian Industry

1X18MW Captive Power Plant – KCP Cement Ltd

- Awards & Accolades :
  - Best Energy Efficient plant (NHR) 2021-22 – Mission Energy Foundation.
  - 5 Star excellence award 2020-21 – CII
  - National Energy management award 2019 – CII
  - National Energy management award 2020 - CII