UltraTech Cement Works

Confederation of Indian Industry

Unit Vikram Cement Works
Welcome You!

Thermal Power Plant,
2x23 MW

CII National Energy Award for Excellence in Energy Management
24 to 27th Aug,2021

Team Presenter

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Company Profile: Unit Introduction

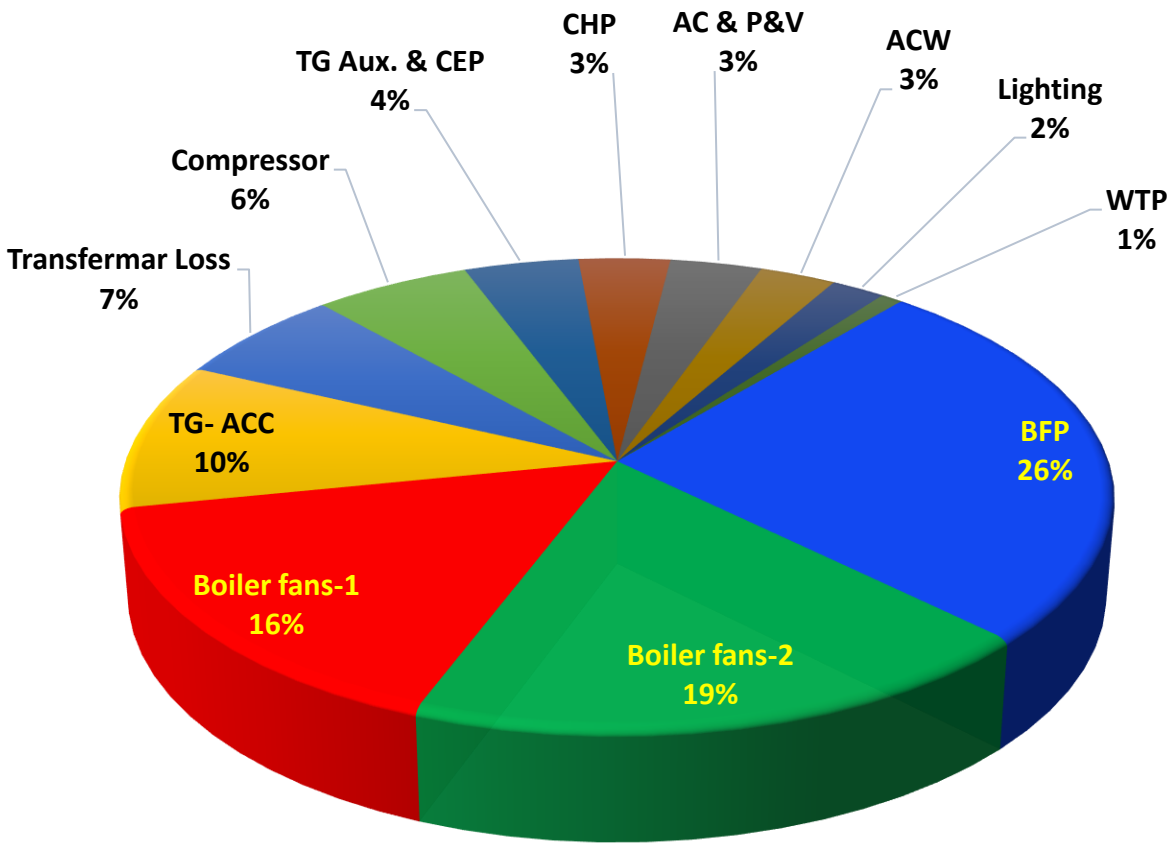
UltraTech Cement Ltd – Vikram Cement Works

- UTCL : A part of ABG which is the **best employer in India and Asia Pacific region.**
- Vikram Cement Works : **An Unit of UltraTech which is Third largest Cement producer in World (Ex-China).**
- **46 MW** Captive Thermal Power Plant (2X23MW).
- First Cement Plant in India **acknowledged as pioneer of TPM, JIPM Japan in 1995**
- First Cement plant in India ,Obtained **ISO 14001 in 1997, EMS Certification from DNV**
- Certified with ISO 9001, 14001, OHSAS 18001, ISO 50000,ISO 27001, SA8000 standards
- **Certified with ISO50001** & Implemented Energy Policy in 2013
- Adopted WCM Excellence Model & Achieved **Two times Gold award**
- **In year 2019 Sept, unit got 1st position in CII National Excellent Energy Efficiency Award.**

Energy Consumption Overview - Current year Performance

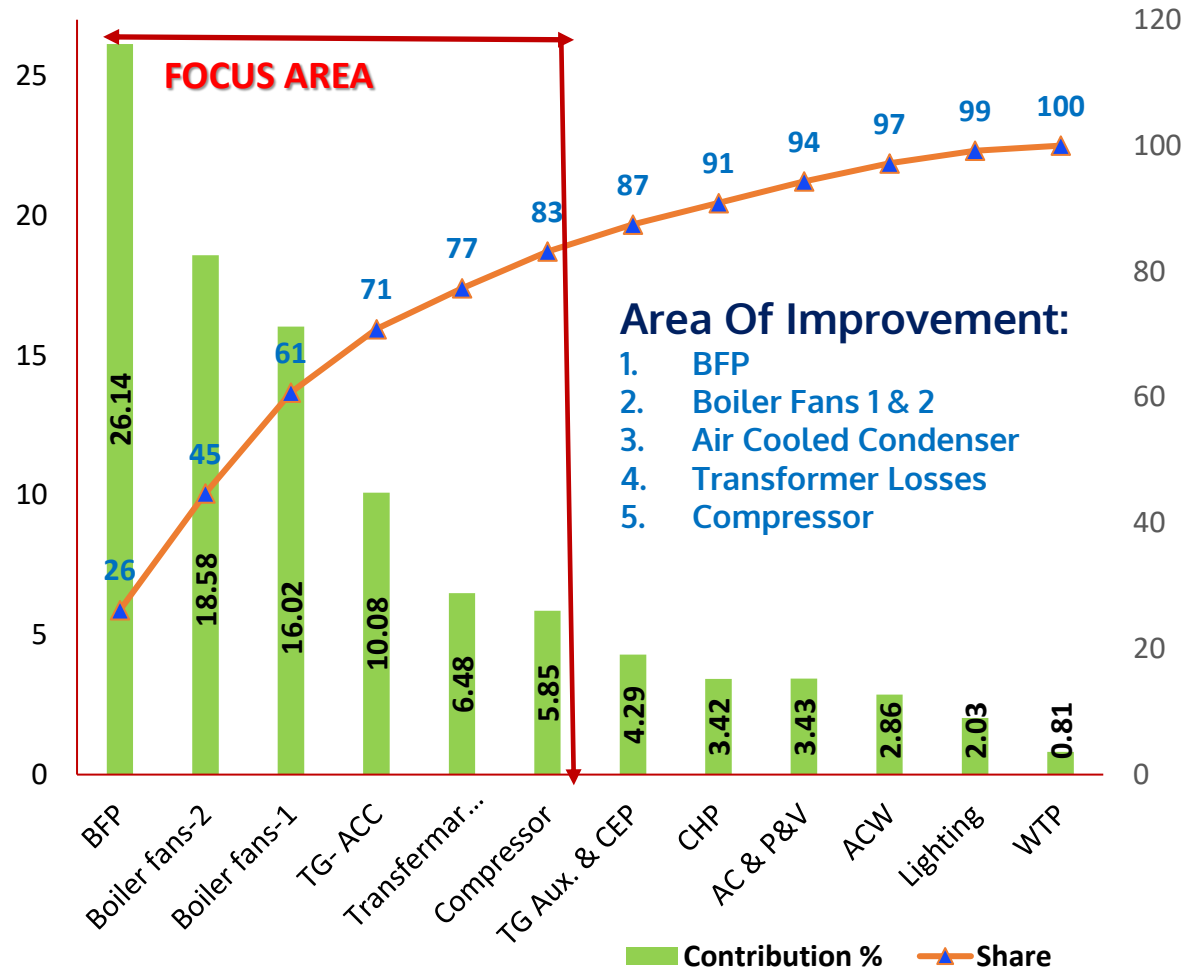
Sr. No	KPIs	Unit	FY2019-20	FY2020-21	Variance	Reason for variance
1	Annual Generation	Lac Kwh	1863.9	2416.9	553	Improved
2	PLF	%	68.9	68.11	0.79	Low Load demand
3	Availability	%	98	99.96	1.96	Improved
4	Gross Heat Rate	Kcal/Kwh	3018.1	3010.9	7.2	Improved
5	Auxiliary Power	%	8.24	7.1	1.14	Improved
6	Boiler Efficiency	%	87.46	87.61	0.15	Improved
7	TG Heat Rates	Kcal/Kwh	2640	2638	2	Improved
8	DM Water Consumption	%	2.46	1.45	1.01	Improved
9	Raw Water Consumption	M^3/Mw	0.29	0.2	0.09	Improved
10	Specific Oil Consumption	KL/Mw	0.007	0.0068	0.0002	Sustain

Energy Consumption Overview – Opportunity Identification



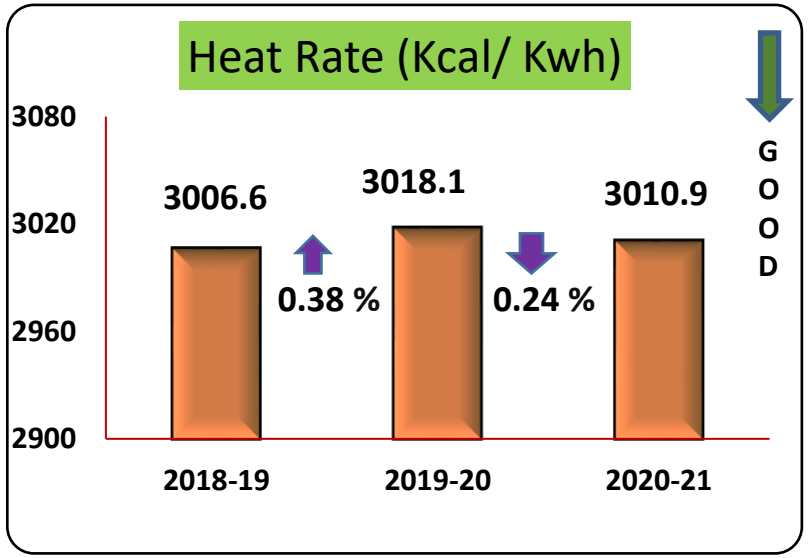
Aux. % Contribution

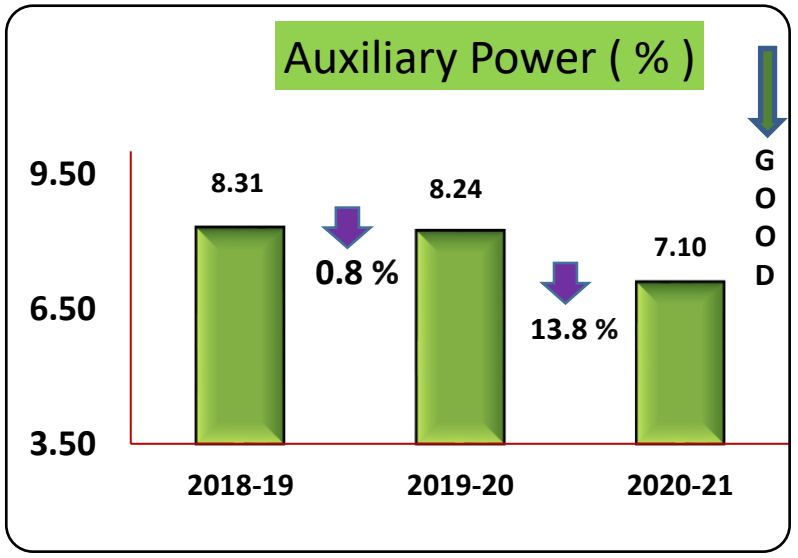
Pareto chart for area wise Power consumption plotted & Analyzed

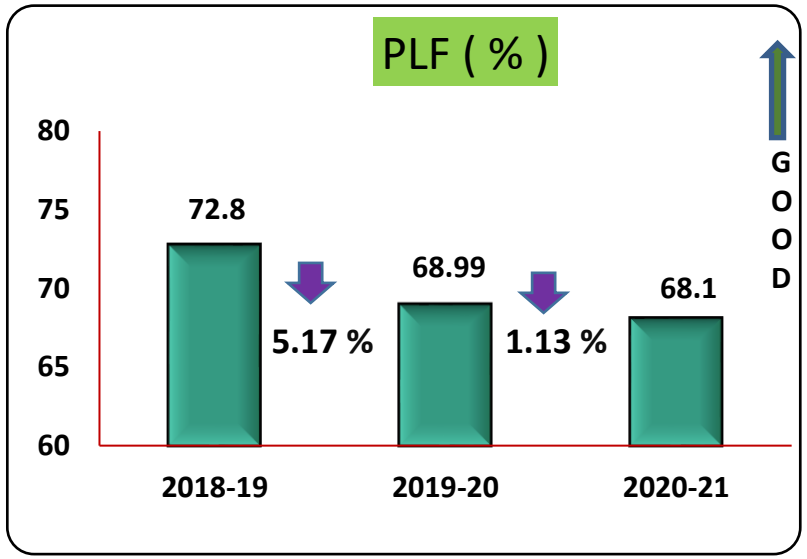


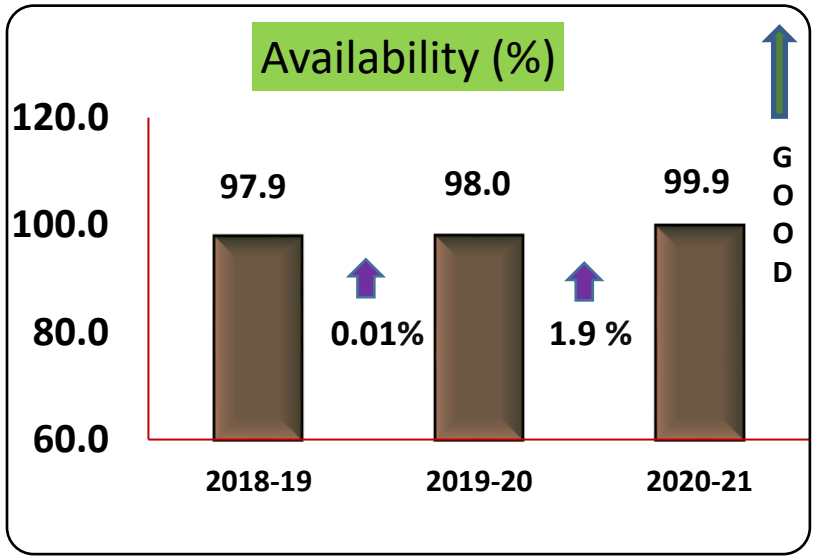
Sp. Energy Consumption Trend

Parameters	YTD Figure			
	2019-20	2020-21	Variance	Reason for Variance
Gross Heat Rate (Kcal/Kwh)	3018.1	3010.9	7.2	Improved 0.24%
Auxiliary (%)	8.24	7.10	1.14	Improved 1.14%
Plant Load Factor (%)	68.99	68.1	0.89	Due to Covid19 lockdown and low demand
Availability (%)	98	99.9	1.9	Plant Availability improve









Plant Performance & Benchmarking with UltraTech units

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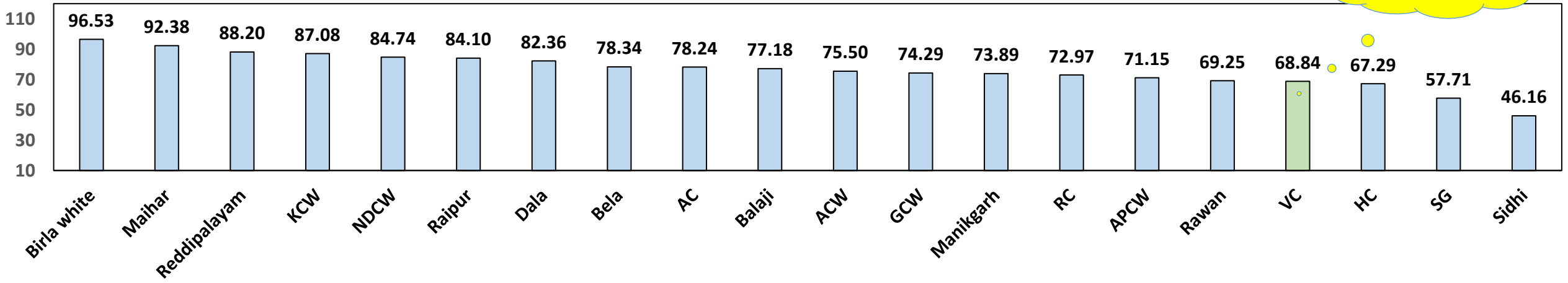
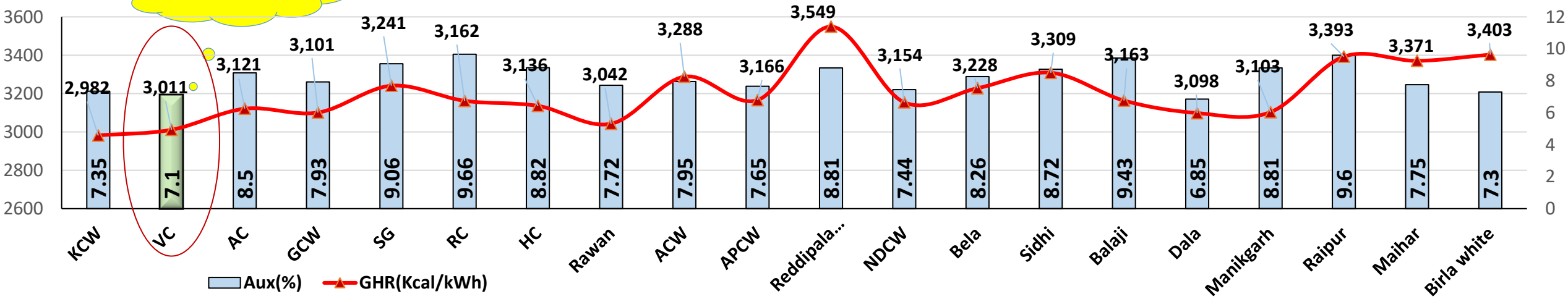
Plant Load Factor (%) FY 2020-21

17th Position



Aux. (%) & GHR (Kcal/kWh)FY 2020-21

2nd position



Energy Saving Project Implemented in Last 3 Years

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"INNOVATION = IDEA + LEADER + TEAM + PLAN"

Aux (%)	8.31
PLF (%)	72.4

2018-19

EnCon Projects
20 Nos.
Saving INR/Annum
27.17 Million Rs.

- ACC Tube bundle & fans replacement
- TG-2 Major overhauling
- HT Fans Suction Duct modification
- BFP reconditioning
- VAM System installing

Aux (%)	8.24
PLF (%)	68.99

EnCon Projects
16 Nos.
Saving INR/Annum
23.34 Million Rs.

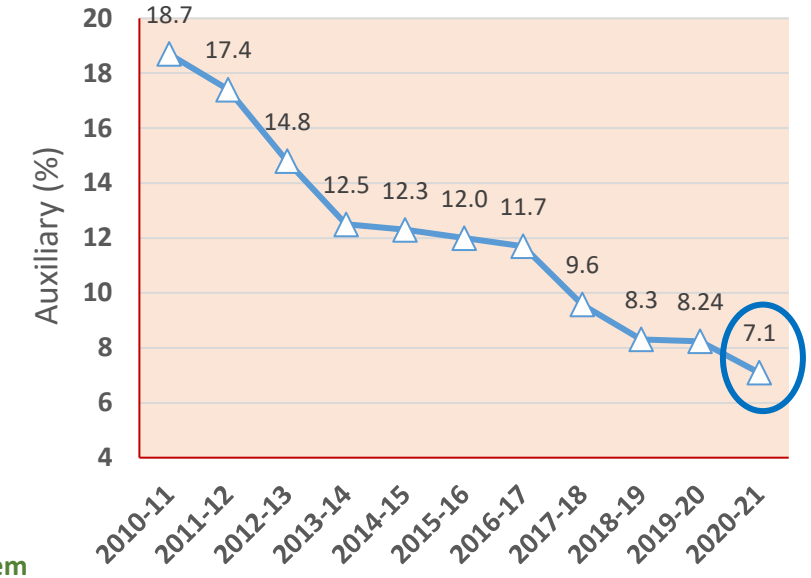
- AHU-4 Installation in MV Drive Unit-2
- BFP run in drum level control mode
- VFD in bag filters & DP mode operation
- ACC Tube bundle replacement in unit-1
- Grid Surrender to reduce billing cost.
- Air dryer operation with chilled water.
- Compressor cooing with chilled water system.

Aux (%)	7.10
PLF (%)	68.11

2020-21

EnCon Projects
23 Nos.
Saving INR/Annum
14.24 Million Rs.

- ID & PA fans in HT motor replacement
- BFP-3 HT Motor replacement.
- Logic modification inn Ash Handling system
- APC installation in Boiler's
- SOV Installation in common header of B/H.
- Auto Operation of Soot blower & BAC.
- Use cinder as a boiler fuel.



SUMMARY (FY2018-21)

Year	No of Energy Saving Projects	Investment (INR Million) Returnable Capex Sanction	Electrical Saving Million Kwh	Thermal Saving Million Kcal/MTOE	Total Saving INR Million
FY2018-19	20	70.36	1.89	1224	30.058
FY2019-20	16	50.53	2.89	0	14.82
FY2020-21	23	12.26	2.5	219.56	14.02
Total	**59**	**133.15**	**7.28**	**1443.56**	**58.9**

Strategic Action Plan Fy2021-22

Plant	Points	Action Plan	Expected Benefits	FPR	Target Date	Status
VCW TPP	Auxiliary consumption reduction (kWh)	1. ACW Pump Discharge Pressure optimization from 1.55 Kg/Cm2 to 1.48 Kg/CM2. 2.Timer based Operation of Office AC. 3. Work Shop MV Drive AHU Operating in fixed speed to be control at room temp. 4.5th Generation AHU Blower Installation at CCR AHU. 5.Increase Coal Handing plant throughput up to 150 TPH. 6.Reduction of Aux. Power consumption of Cooling tower fan by group auto logic. 7.Reduction in Compressor Aux. Power Consumption. 8.Energy Efficient pump Installed in CEP pump. 9.Installation of LED Light in Convection light. 10. Process optimization through fine tuning of APC .	900 KW/day (0.13 % reduction in APC)	HOD-TPP	31st March'22	* ACW pump replaced with Energy efficient pump and save 100 KW/day. * Optimization of ACW pressure by process optimization abd save 120 KW/day . * Installed Timer for offices of AC . * Optimization of Boiler fan power . * CHP throughput improvement under progress. * Arresting steam leakages and control passing of high pressure valves.
	Plant heat rate reduction	1.Process optimization through fine tuning of APC . 2.Air to fuel combustion improvement with APC fine tuning operation. 3. Optimization of Steam Pressure & Temp. of Turbine 4. Identification of Passing of valves and rectification. 5.Optimization of TG Exhaust Pr. & Temp. 6.Boiler-1 &2 APH Tube Replacement.	12 Kcal/kWh			
	Capex	1. High Energy Condensate Extraction Pump-Return base 2. Protection relay replacement for power system stability- Essential 3. DG PLC upgradation-Essential based 4. Silica analyzer Upgradation-Essential based 5. Boiler reliability AI-OT project-Essential based 6. Laptop Upgradation-Essential based 7. CEMS Upgradation- Statutory Requirement	Returnable/ Essential / Statutory requirement based			Rs. 51.6 Lac capex budget sanctioned
	Cost	1. Increasing of Use of Coal shale 20% by heat 2. RP costing reduction by 10% from the budgeted 3. S&S cost reduction by 10% from budgeted	**Net projected benefits Rs.5.04 Crore/Annum**			Rs. 115.28 Lac gained up to June,21 by use of Carbon shale in fuel mix

Target short term/ Long term Fy2021-22

No	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)
1	Cooling Fan Installation in GT-1 Radiator cooling to reduce losses	0.01051	0	0.05
2	Energy Efficient Motor installation in LT Drives	0.0765	0	0.3
3	Energy Efficient pump Installed in CEP pump	0.084	0	0.4
4	Energy Efficient pump installed in existing ACW pump	0.03504	0	0.15
5	Boiler-1 APH Tube Bunch Replacement (Kcal)	0	356.89	6.2
6	Solar Power Plant installation 9.0 MWp.	0	31883	85
7	Air to fuel combustion improvement with APC fine tuning operation	0	4.34	0
Total		**0.20605**	**32244.2**	**92.05**

Power cost Rs./KWH	5.06
Fuel cost Rs./KWH	3.98
Aux (%)	<6.5 %
PLF (%)	60.62%

2021-22

Major EnCon Projects Identified
18 Nos.
Saving INR/Annum
50.4 Million Rs./Annum

- Use of Australian Coal + US coal along with 20% coal shale
- ACW High energy efficient Pump with
- ACW Motor changed from 132KW to 45KW
- CHP Bucket Elevator 1or 2 Single VFD operation
- Cooling Fan installation in Main 35MVA trafo.
- LED Light installation
- Bucket elevator 1or 2 run with single VFD
- CT fan run in auto group logic

Target

Innovative Project implemented at site

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Theme:

- Innovation in Air Dryer

Problem:

- Air Dryer have refrigerant based gas R402 which is phase out due to Environmental issue declared as non green gas. Also Electric Compressor (7Kw) Type Air Dryer was used for Drying of Instrument Air and consuming very high auxiliary power

Area: Compressed Air System

For identifying possible Reasons behind

- The temperature of Chilled water was minimum 7 Deg C. and the cooler size of Existing dryer was small to deliver the required flow of air
- Connecting the dryer in Existing system online when plant is running.
- Procurement for replacement of dryer with R407 Green gas (R-22 refrigerant gas going to be banned due to environment)
- Scope in VAM TR loading (TR loading is 64TR whereas capacity is 80TR)

New System: Vapor Absorption M/c

Result & Impact achieved

Possible Solutions

- At TPP we were having a old Dryer installed in Service Air system which was not in operation and also the capacity of this dryer was 5000 CFM. This dryer can be used with chilled water to get the required flow of Dry Air.
- Procurement for replacement of dryer with R407 Green gas (R-22 refrigerant gas going to be banned due to environment)
- Procurement of New dryer with inbuilt chilled water system.

Before –After Data Comparison with Base Line Data

Comparison Data (Before- After)			
	Samples	Generation	Ash handling and Compressor system
	Nos. of Days	KWH	KWH/Day
Before	17	330824	197
After	14	431000	19
Benefit Achieved per day			**178**

Result:

Annual Projected Energy Saving	**0.65 Lac Units/Annum**
Annual Saving in terms of money	**Rs. 3.25 Lac/Annum**

Sharing: **The Success Story of same shared among our group units of**

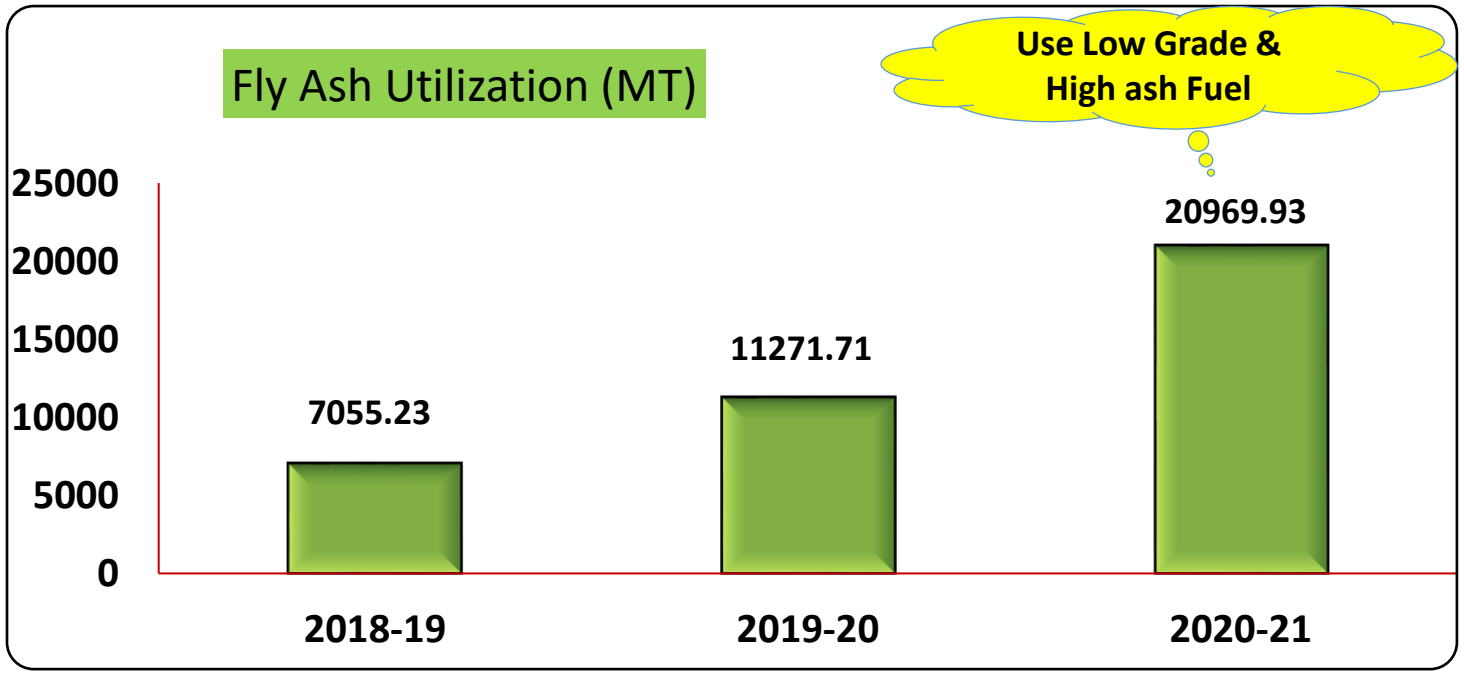
UltraTech & Idea Sharing Platform " I Love My UltraTech"

Green Township

- 9000 KWp Solar Plant inauguration done at Vikram Cement Works.
- Installation & commissioning will be done by Dec'2021.
- Colony Power requirement mainly catered through Solar power generation.

Environment Management- Ash Utilization

- Fly ash being generated from boilers are conveyed to fly ash silos.
- From Silos, fly ash is again transported through Bulker to cement mill silos where it is being consumed 100% for cement manufacturing.
- It is being used completely as a raw material for cement plant. It is added in the raw meal additive hopper for further process at cement plant.



Environment Management- Ash Utilization

S.No.	Particulars	UOM	2018-2019	2019-2020	2020-2021
1	Ash Stock in Plant (yard + pond)	Tons	0	0	0
2	Ash Generated	Tons	7055.23	11271.71	20969.93
3	Ash Utilization	%	100	100	100
4	Ash Utilized in Fly Ash Bricks	%	0	0	0
5	Ash Utilized in Mine filling	%	0	0	0
6	Ash Utilized for Roads pavements	%	0	0	0
7	Ash Utilization in Other Areas – Please mention below	%	NA	NA	NA
8	Expenditure on Ash Utilization (annual)	NR (Lakhs)	19.32	19.80	20.96

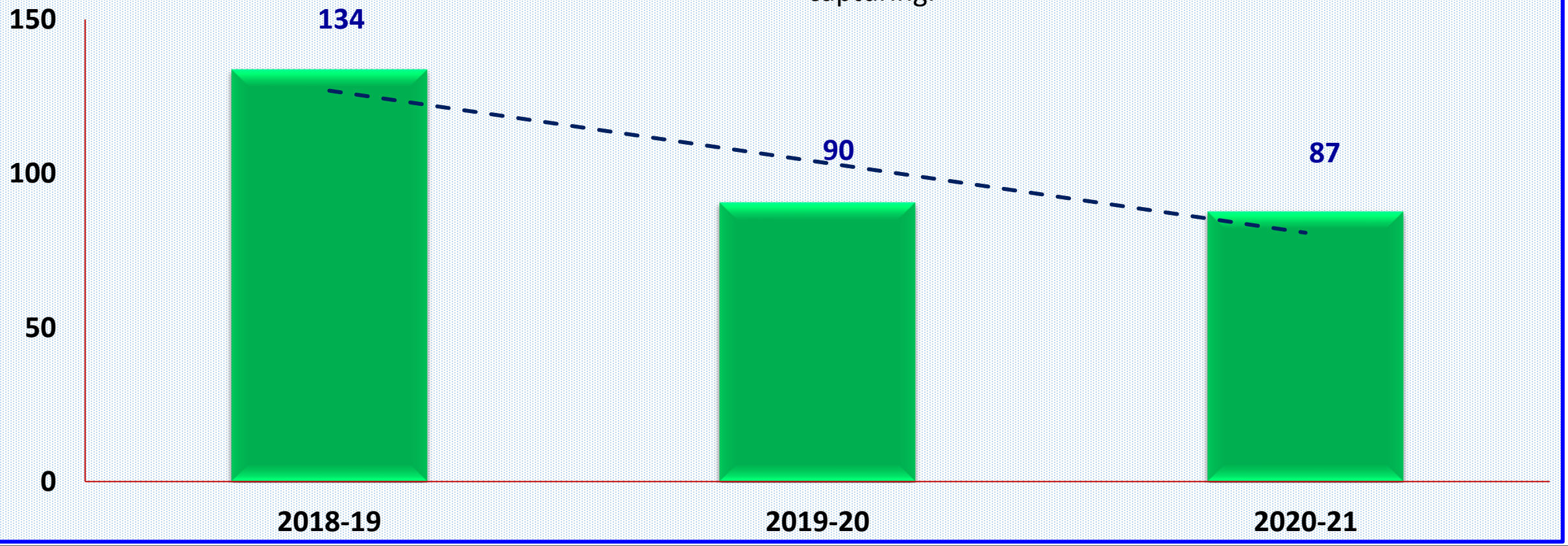
Ash Handled (Wet Method)	%	NA
Ash Handled (Dry Method)	%	100
Ash Handled (semi wet)	%	NA

100 % of Fly Ash transport to Cement Plant for Cement Production.

Environment Management- Emission

Specific CO_2 Emission of TPP (MT CO_2/MW)

1. Use low Sulphur Fuel (With blending of Different Coal).
2. Use Raw Mill Power & Crushed Lime Stone for Sulphur capturing.



Environment Management-Emission

Absolute Emission & Emission intensity

S.No	Particulars	UOM	2018-19	2019-20	2020-21
1	Total CO2 Emissions Per kW of Generation	Ton/kWh	0.00093	0.00092	0.00092
2	Current SOx Emissions at Full Load	mg/Nm3	450.1	475.2	395.2
3	Current NOx Emissions at Full Load	mg/Nm3	146.0	137.2	126.4
4	Particulate Matter	mg/Nm3	31.2	29.4	29.8
5	Mercury	mg/Nm3	<0.001	<0.001	<0.001

GHG Information and Pubic Disclosure

Detailed plan for achieving the current emission norms for thermal power plants.

- Raw Meal Powder/Limestone screen reject used and maintaining environment norms.
- Less Sulphur coal fired in Boilers.
- Use bag house in TPP for maintaining SPM less than 30 mg/Nm3
- Auto SMS alert to Concerned Persons while the Environment parameters is exceeding alarming limit before reaching the CPCB Norm.

PARAMETER	ENV NORMS	CPCB. VALUE (mg/Nm3)
SPM (mg/Nm3)	50mg/Nm3	21.40
SOX (ppm)	600mg/Nm3 205 ppm	238.52
NOX (ppm)	300mg/Nm3 146 ppm	87.30

CPCB ENVIRONMENT MONETERING SYSTEM

Environment Management- Water

❑ DM water Consumption of Plant (Unit - %)

FY	2018-19	2019-20	2020-21
%	1.82	2.46	1.45

❑ Raw Water Consumption of Plant (Unit – M^3/MW)

FY	2018-19	2019-20	2020-21
M^3/MW	0.234	0.293	0.196

❑ Weather Plant is Zero Liquid Discharge- Yes

- RO reject water & Continues Blow Down water is used in Cooling Tower Make Up.
- Rein water harvesting for reduction of water consumption.
- Use of N-pit treated water in Horticulture.
- 6+ water positive by storage at our mines and being supplied to surrounding village.

Best Practices in Water Management

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Theme	Reduction of Bulk Chemical consumption along with cost
Problem	High Consumption of bulk Chemicals (caustic and Hydrochloric acid) due to low capacity of DM Plant.
Action	Reduced 4 times caustic and Hydrochloric acid consumption by modification in RO plant & upgradation of Mixed bed.
Result	Chemical Cost Saving Approx. Rs. 6.5 Lacs/ Annum.

Theme	Elimination of Hazardous chemical for boiler water treatment.
Problem	Hydrazine hydrate is a toxic and harmful for human
Action	Replace Hydrazine hydrate with substituted of Di-Carbo hydrazanium as oxygen scavenger
Result	Reduction in Chemical hazards during chemical handling.

Theme	To Reduce Aux. Power consumption in WTP.
Problem	High Aux. Power consumption to make up water for Cooling water & Water treatment plant.
Action	Reduced auxiliary power consumption by using gravity & several modifications in pump rating of water treatment plant.
Result	Approx. power saving of 200 kWh/Day and Rs. 3.65 Lac/Annum

Best Practices in the Plant (Non-Energy Efficiency)

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Digitization

- Boiler's On line false air monitoring.

- Touch less elevator operation.

Reliability

- Bed Thermocouple (Headless)

Innovation

Equipment Safety

- Belt tear Arrangement Hook-up with DCS.

- Door Access Control to restrict unauthorised entry

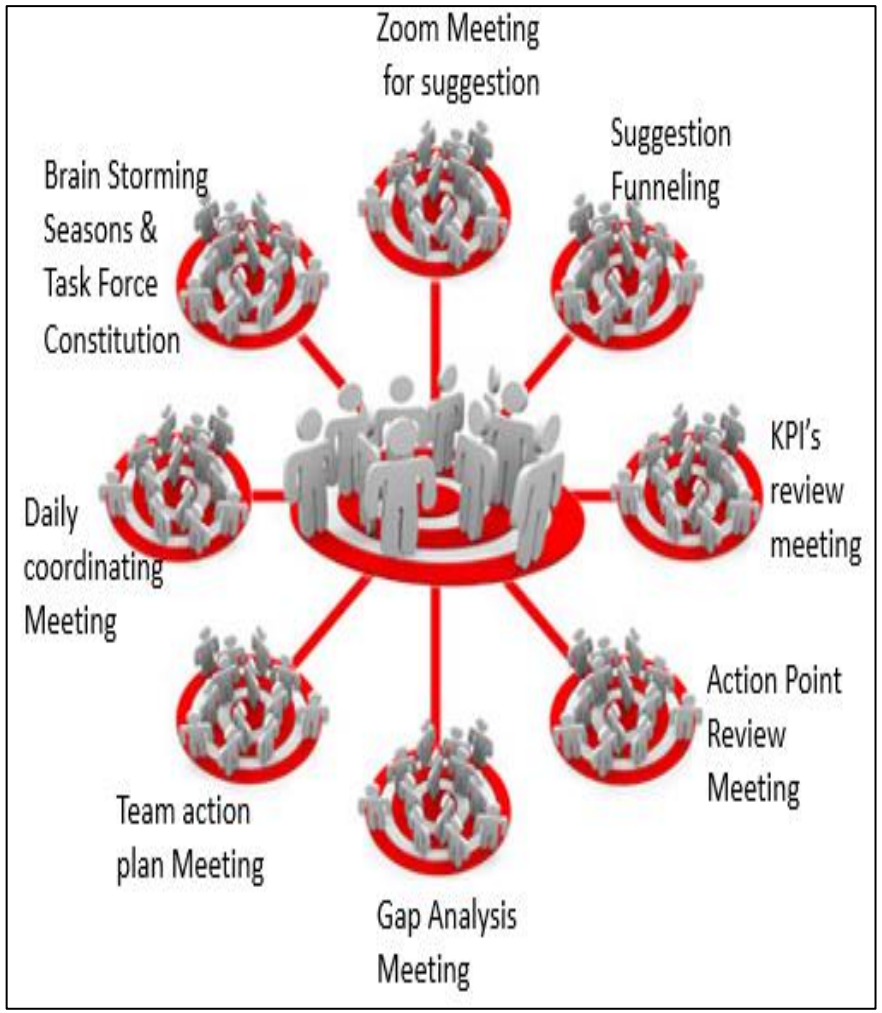
Safety

Safety

- Panic Bar installation at MCC & PCC gate.

Employee Engagement & Team Work

Energy Review and Monitoring



- Regular study of Equipment's Performance & Analysis of deviations
- Process Evaluation & Identification of Energy Conservation scope.
- Daily monitoring of Specific Energy report.
- Real time power consumption data monitoring through online Energy Monitoring System.
- Feasibility study of suggestions and preparing proposals for sanction.
- Promoting energy saving idea generation by shop floor teams and time bound implementation
- Organizing Internal and External Energy Audit.
- Benchmarking with National/International/Group Units/Cluster units and action plan for improvement.

Monitoring & Review Formats Description
Daily Co-ordination meeting on Power Planning and Performance review
Daily Review of Power Report
Daily Review of KPIs.
Energy Audit done Yearly – Internal & External.
Monthly Performance Review meeting points compliance

Employee Engagement & Team Work

Opportunity Identification……

MPR review meeting

REPORT			Today			MTD	
Area	Parameter	Ref. value / Design Value	Line # 01	ine # 02	Combined	Total	Aug
	Generation (KWH)		318000	4E-05	684000	1352000	19176000
	Auxilliary (KWH)		24400	28400	52800	104000	1515811
	Auxilliary (%)		7.67	7.76	7.72	7.69	7.91
	Auxilliary from cement plant						
	Auxilliary % (cement plant)						
	Total Steam Generation (MT)		1336	1535	2871	2871	115333
	Specific Steam Consumption(Kg/kwh)		4.20	4.19	4.20	4.21	4.19
	Shut Down power		0	0	0	0	
	Plant Load Factor (%)	100	57.61	66.30	61.96	61.23	58.8800
	Avg.Load (MW)	23	13.25	15.25	28.50	28.17	27.05
	Gross Heat Rate (Kcal/Kwh)		3017.67	####	3014.80	3016.78	3014.38
	Ambient Air Temperature (avg/max/min)		27.94/34.26/24.58				
	Power Cost (Rs./KVH)		4.60	4.63			-
	Fuel Cost (Rs./KVH)				3.73	3.75	-
	Lime Stone Cost (Rs./KVH)		0.040	0.040	0.040	0.040	
	Fix cost (Rs./KVH)						
	Electricity Duty (Rs./KVH)					0.75	
	RPM (Assumption as per flash)					0.099	
	Stores & Spares (Rs./KVH)					0.052	
	Fly ash Credit @814 Rs/MT (Rs/KVh)		0.080	0.085	0.081		
	Boiler Efficiency (%)		87.52	87.52	87.52	87.36	87.41
	Fuel Consumption (Kg/KVH)	0.421	0.452	0.451	0.452	0.4518	0.423
	Coal Consumption (MT)		154.42	154.42	308.84	610.86	8028.69
	Coal GCV (Kcal/KG)		6677	6677	6677	6677.00	7107.66
	O2 Average (%)	2.5%-3.5%	4.60	4.74			
	coal feeder status	OK / Not OK	Ok	Ok			
	Bed ash coolers status	OK / Not OK	Ok	OK			
	Wind Box pressure (mmwc)		950	900			
	LOI FA/BA (%)	<2.5	7.24	6.94			
	BLAINE FLY ASH(sqmtr/kg)					-	
	Lime Stone Consumption		20.12	25.43	45.55		
	Fly Ash Generation		31.18	38.23	69.41		
	Soot Blower status	OK / Not OK	Ok	Ok			
	Total Coal Feed (MT)		394.7				
	CHP Run Hrs		11.12				
	CHP Average Feed rate (TPH)		48.51				
		mm 8	1.52				

... | 27.08.2019 | 28.08.2019 | 29.08.2019 | 30.08.2019 | 31.08.2019

Daily Energy Review Meeting

DAILY AUXILARY POWER REPORT

Report Date

Aux. Report

KPI's review meeting

TPP Daily Report

Budget | Today | MTD | YTD

Parameter | Units | Unit-1 | Unit-2 | Total | Unit-1 | Unit-2 | Total | Unit-1 | Unit-2 | Total | Unit-1 | Unit-2 | Total

top daily Report

Action Point Review Meeting

Sr. No.	Activity escription	Responsible Person	Target date	Status	Remarks, if any
1	Structure painting and fire hydrant line painting	Milind Bawankar	14.07.2019	U/P	R1 30.09.2019
2	Area ownership board updation in TPP area	Milind Bawankar	10.07.2019	U/P	30.09.2019
3	Team formation and preparation of upcoming WCM audit on 28th & 29th	Milind Bawankar	26.06.2019	Completed	
4	Study and stabilization of ambient temperature, DCS vs manual for one week and put correction factors accordingly	Anurag Garg	04.07.2019	Completed	
5	Preparation of WFD CAPEX for CHP bag filters	Anurag Garg	27.06.2019	U/P	R1 30.08.2019
6	Display of confined space PFD and its display at site	Milind Bawankar	10.07.2019	U/P(R1-31.07.2019)	CHP Pending R1 15.09.2019
7	Feasibility of amonia dosing in boiler to be done	Naveen Dave	10.07.2019	u/i(R1-22.07.2019)	Deffered
8	PSSR of TPP 1 to be prepared	Milind Bawankar	29.06.2019	u/p R1-31.07.2019	Completed
9	Endorsement of BOE certificate and boiler attendant certificate	Milind Bawankar	10.07.2019	R1 -02.08.2019	R2 30.09.2019
10	Compilation of improvement project recived from TPP members and taskforce to be made for implementation of projects	Naveen Dave/Jati	28.06.2019	Completed on 16.08.19	R2 28.08.2019
11	Visual display of flex board at site	Milind Bawankar	14.07.2019	R1-22.07.2019	R2 23.08.2019
12	Practice to be decided to planning of daily job planning and execution in TPP whatsapp group	Anurag Garg	Immediate	R1-22.07.2019	
13	Visit of consultant to reduce NOX level of Boiler	Naveen Dave	15.07.2019	NR	
14	Barchart for activity to be made	Milind Bawankar/ Naveen Dave/ Hanumaiah Chekuri	26.06.2019	R1-20.07.2019	Completed
15	Service Order to be made for ACC CAPEX	Anurag Garg/ Naveen Dave	07.07.2019	R1-20.08.2019	PR Created. Negotiation under progress. R2 15.09.2019
16	History of shutdown jobs executed in Boiler#1 to be updated in SAP	Milind Bawankar/ Naveen Dave/ Hanumaiah Chekuri	30.06.2019	R1-27.07.2019	R2 26.08.2019
17	Cooler kept back side of compressor have needs to maintained as grass to be changed and permanent water supply with float to be provided	Naveen Dave		R1-27.02.2020	
18	Preparation of Boiler wet- preservation SOP	Milind Bawankar		R1-31.07.2019	R2 26.08.2019
19	Tools audit to be conducted and report to be submitted	Naveen Dave/ Hanumaiah		R1-31.07.2019	Completed

Pending Activity | Completed Activity

Employee Engagement & Team Work

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Planning & Prioritization of Suggestions

Category	Qty	Sources of Suggestion identification			Feasible		Investment		Priority			Status			Updated, 1st of July,21
		Manthan	GRT Suggestion	Brain storming	Yes	No	Yes	No	P1	P2	P3	Completed	U/P	Pending	
Auxiliary	35	13	9	13	32	3	11	21	17	10	5	3	8	21	Analysed the priority based on Impact, cost, Capex, Aux, shutdown, and reliability and Saving analysis under progress
Cost Control	10	8	1	1	10	0	1	9	6	0	4	2	4	4	
Reliability Improvement	29	0	9	20	29	0	18	11	18	4	7	7	12	10	
PHR	25	10	2	13	25	0	7	18	13	10	2	4	9	12	
Total	99	31	21	47	96	3	37	59	54	24	18	16	33	47	

Summarized Report

Category	Qty	Feasible		Investment		Priority			Target Date			Status			Saving Potential
		Yes	No	Yes	No	P1	P2	P3	P1	P2	P3	Completed	U/P	Pending	
Thermal Power Plant	**99**	**96**	**3**	**37**	**59**	**54**	**24**	**18**	**31.08.2021**	**30.12.2021**	**31.03.2022**	**16**	**33**	**47**	**Aux: 900 Kwh/Day PHR: 13 Kcal/Unit**

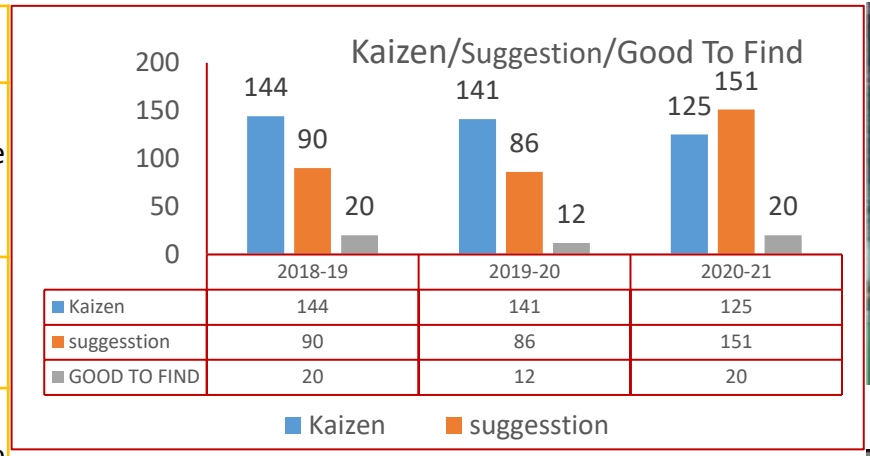
P1- High Impact with less cost /without involving any cost/Approved Capex/Reliability

P2- High Impact to be execute in shut down

P3- Required Planning and budgeting

Team Work , Employee Involvement & Monitoring

SN	EnCon idea	Team involved
1	Replacement of pump with High energy efficient pump designed to deliver 600m3/hr flow at 2kg/cm2. Earlier it was 700m3/hr at 4kg/cm2 with 132KW motor	Maintenance & E&I
2	Reduced the Aux. Cooling Water Pump Power by reducing the Pressure from 1.8 Kg/Cm2 to 1.45 kg/cm2 through VVFD.	Operation
3	Reduced ACW power through an innovation idea of replacing of low heating surface heat exchanger with higher heating surface oil cooler	Maintenance
4	CHP Bucket Elevator 1 &2 Operation with Single VFD based one selection	E&I
5	Compressor Power reduced through an innovative idea replacing refrigerant dryer with VAM supplied chilled water	Maintenance & E&I
6	BFP Power Reduced Through an innovative idea without involving any cost- BFP MV drive operated in closed loop for maintaining drum level directly	Operation & E&I
7	Energy Reduction in Compressor power using SOV with actuator at each header of bag house in Unit-1 & 2	Maintenance & E&I
8	CT Fan Power Reduction Initiatives through an innovative idea- Cooling tower water nozzles modified in house team	Maintenance



- Kaizen & Suggestions Schemes
- Annual Improvement Projects
- Organization Knowledge
- KIP Visits
- External & Internal Trainings on Energy
- Participation in Seminars
- Team competition
- Energy Conservation Week
- Awareness creating to all Colony residents for Energy Conservation
- OnlineTraining need identification through Poornata on Energy Conservation
- Reward & Recognition

Fig: Cross Functional teams

Fig: Presented ideas on Flip Cart

Implementation of ISO certification

Confederation of Indian Industry

Energy Management System Standard

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 10000379377-MSC-RvA-IND
Initial certification date: 22 March 2013
Valid: 06 January 2021 – 27 June 2021

This is to certify that the management system of

UltraTech Cement Limited (Unit: Vikram Cement Works)
Vikramnagar, P.O. Khor,District Neemuch - 458470, Madhya 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 cement

Place and date:
Barendrecht, 07 January 2021

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

MGMT. SYS. RvA C 024
The RvA is a signatory to the IAF MLA

Erie 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

Unit Turn Over (INR million) Fy2020-21	**1247**
Investment in EnCon Projects (INR million) Fy2020-21	11.38
% of Investment EnCon Projects	0.91%

Learning from CII & Other Award function

Confederation of Indian Industry

Learning :

- *Replication of various ideas and proven technology .*
- *Implementation of best practices learned from CII or other award function.*
- *Improving knowledge of the process and new technology.*
- *Avail opportunity to achieve high business benefits.*
- *Learned Project planning ,Execution and Application engineering.*
- *Enhanced uses of various QC tools, Analysis & presentation skill.*

Sharing:

The Success Story of same shared among our group units of

ABG & Idea Sharing Platform " I Love My UltraTech"

Innovative project : BFP Auto Close Loop Operation in Drum Level Mode

Confederation of Indian Industry

Theme:

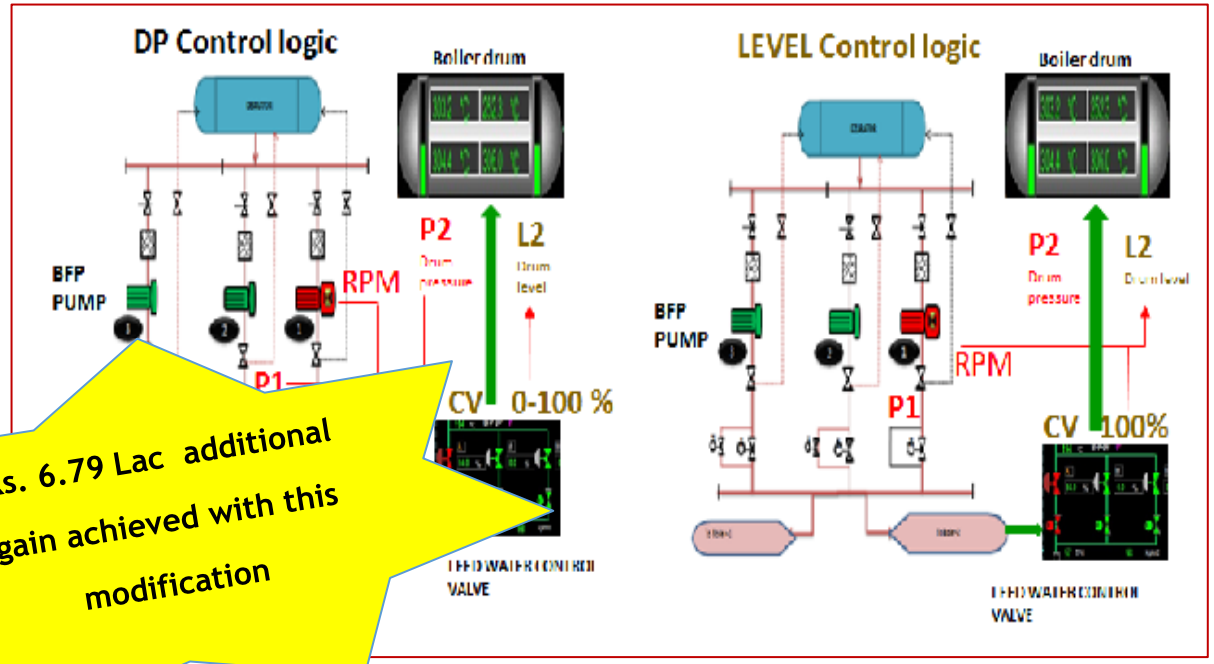
BFP Operation in Level Mode in place of DP Mode of Control

Problem:

High Specific Energy Consumption of BFP due to manual DP Set point used in controlling the BFP power.

Action Taken:

1. New Logic Prepared to run BFP in Level Mode
2. Kept Feed control valve at 100% Open
3. Operation made with respect to Drum Level instead of DP set point
4. BFP Minimum RPM Locking reduced from 85% to 80%
5. BFP Standby pump avoid started by changing Header pressure set point 103 kg/cm2 to 95 kg/cm2



Rs. 6.79 Lac additional gain achieved with this modification

Result Achieved

Ave Specific power in DP mode	2.21
Ave Specific in Drum level mode	2.08
Diff Saving in Specific	0.13
Ave Day Generation in L .KWh	695000
BFP-2 Power Saving in Drum level mode/Day in KWh	**888.1**

Annual Projected Energy Saving	**3.24 Lac Units/Annum**
Annual Saving in terms of money	**16.69 Lac Rs.**

In DP mode

- **BFP RPM will regulate according for DP Set point**
- **Feed water control valve will maintain drum level.**

In Level mode

- **BFP RPM will regulate to maintain drum level in boiler**
- **Control will be fully open (100%) to minimize pressure drop.**

12.0 Power saving of Cooling water pump by Innovation in Air Compressors.

Theme

Problem

Solution

Benefit

Theme:

- Operation of Screw Compressor with 1.8 Kg/Cm2 Cooling Water Pressure.

Problem:

- Screw Compressor trips on High Element Temperature when we reduce the cooling water pressure to 1.8 kg/Cm2 from 2.0 Kg/cm2.

Action/Solution:

- Consulted Atlas Copco but they insisted in increasing Water pressure to more than 2.5 Kg/cm2.
- Team did Brainstorming for options available and we decided to increase the heating surface area of Oil cooler. Found a spare cooler kept at DG set and installed this cooler in Compressor by modifying the Compressor Oil & Water circuit.
- Installed Big Plate heat exchanger in Oil Circuit and now we are running at Cooling water pressure at 1.8 Kg/Cm2.

Result Achieved

- Reduction in Auxiliary Cooling Water pump power by 192 KWh/Day

Original Oil Cooler

New Installed Oil Cooler

Auxiliary cooling water pump power optimisation initiatives

Confederation of Indian Industry

Theme	**ACW Auxiliary Power Optimization**
Problem	ACW pump was taking high power due to low efficiency as it was designed to deliver flow 700 M3/ hr at 4kg/cm2. Installed Motor was 132 KW and pump was operated at approx.42 KW.
Solution	**Review and brainstorming with team and below are the possible solution –** Replacement of Motor with lesser capacity (45 KW in place of 132 KW) . Replacement of Pump with energy efficient pump. Replacement of Pump and Motor . VFD configuration/setting change from 132 to 45 KW Optimization of Cooling water utilization for reduction of consumption. **Action taken :-** Replacement of pump with High energy efficient pump designed to deliver 600m3/hr flow at 2kg/cm2. Replacement of 132 KW motor with available spare motor (45 KW) and accordingly VFD configuration changed. Utilisation optimised of ACW pump and set point changed from 1.55Kg/cm2 to 1.5 kg/cm2.
Benefit	**ACW Pump Power consumption reduced from 1032 KW TO 852 KW /Day.** **Power consumption reduced by replacing pump – 100 KW/Day.** **Power consumption reduced by system optimization – 80 KW/Day .** **Monetary saving – Rs. 3.28 Lacs/Year**

Energy Efficient Pump with 45KW motor in place 132KW

Before- Pump with 132KW Motor

Running One BFP in place of Two BFPs at High load.

Confederation of Indian Industry

Theme

Problem

Solution

Benefit

Theme:

- Reduction in Specific Power of Boiler feed Pump by using one BFP (for 32 MW Capacity) at high load operation.

Problem:

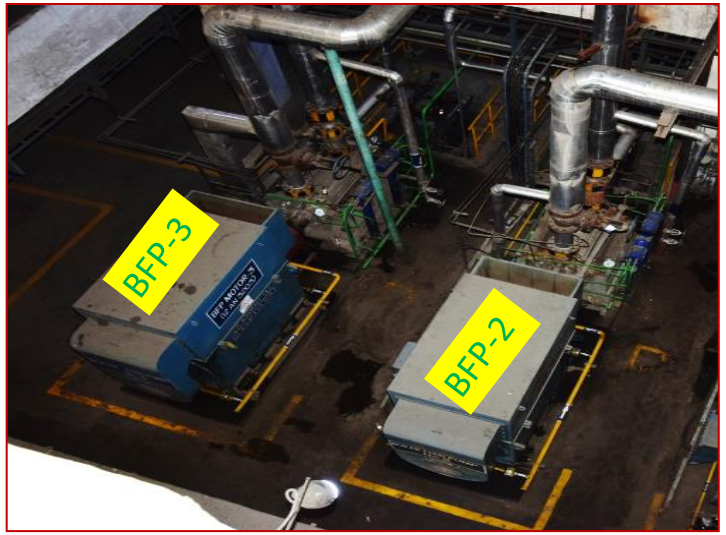
- Load demand increased to 38MW average and we had to run second BFP when load increased above 32MW. This resulted in increase of Power by 140 kwh/hour.

Action/Solution:

- Study of Boiler Feed Pump curve was done and it was accessed that we can run single BFP up to 38.2 MW load.
- Major risk was Boiler tripping due to low drum level.
- Team decided to take the calculated risk by optimizing Drum pressure & Flow.
- We successfully run the single BFP at 38 MW continuous operation.

Result Achieved

- Reduction in Boiler Feed pump power by 2800 KWh/Day.



BFP-3 11KV HT Motor Replacement with high efficient motor

Confederation of Indian Industry

Theme

Problem

Solution

Benefit

Theme:

- BFP -3 HT Motor Replacement with high efficiency indigenous Motor 97%.

Problem:

- High Auxiliary power consumption due to low efficiency 94.9%.

Action/Solution:

- Study of Boiler Feed Pump curve was done and observed that single BFP up to 38.2 MW load and taken power 596 Kw approx. hence there is a margin of power saving if same motor replaced by high efficiency motor
- Capex purposed with minor modification at motor foundation level with the same pump Motor have been replaced .

Result Achieved

- Reduction in Auxiliary BFP power by 999 KWh/Day and BFP specific power consumption reduced from 2.03 to 1.88

CHP Bucket Elevator 1 or 2 operation with Single VFD

Confederation of Indian Industry

Theme

CHP Bucket Elevator 1 &2 Operation with Single VFD based one selection

Problem

High Auxiliary Power due to Line-1 Bucket Elevator has to run in DOL mode in the following conditions……

1. Line -2 jamming condition
2. Line-2 hammer crusher problem & maintenance issue

VFD taken out from Line-2 and re installation in Line-1 for power saving purpose is very risk job, unsafe and time taking viz. rerouting of power cable , rerouting of control cable , logic modification, interlock and trial etc

Solution

Observation & Solution

- Line-2 Bucket Elevator was working in VFD as well as DOL
- Line-1 Bucket Elevator was running in DOL at fixed speed due to having no VFD option, analyzed data found that on and average 70 to 80 Hrs/Month bucket elevators-1 was running in DOL due having issue in the Line-2 Bucket Elevator was 3ph Induction motor of 15KW, 970RPM and taking average power 8.6Kw in DOL mode
- Identification of Spare feeders, drawing built and convert Bucket elevator -1 in VFD as well as DOL mode as per requirement
- Built Logic provide cross and modified sequential start stop interlock and hook with DCS to run in VFD mode as per the selection.

Benefit

- **Power saving 25kw/day**
- **100 Kwh/month (Per day running Hrs. 5Hrs.)**
- **Monetary Saving : Rs. 0.06 Lac/Annum**
- **Save Power and inventory cost of 15Kw VFD Rs. 1.05 Lac**
- **One DOL Feeder made spare for future**
- **Safety Strengthen- No VFD replacement**

VAM AHUs in Auto control loop

Theme

Problem

Solution

Benefit

Theme:

VAM AHUs to run in auto control loop with the room temp set point

Problem:

High Specific Energy Consumption of ACs & P&V system, There are 4 Nos. of AHUs working in MV drive room- BFP, UNIT-1&2 Boiler fans and CCR and each blower running in fixed speed.

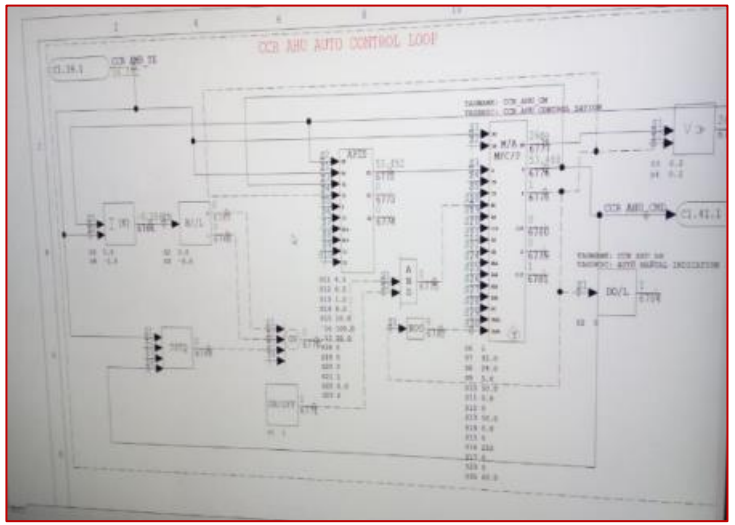
Action/Solution:

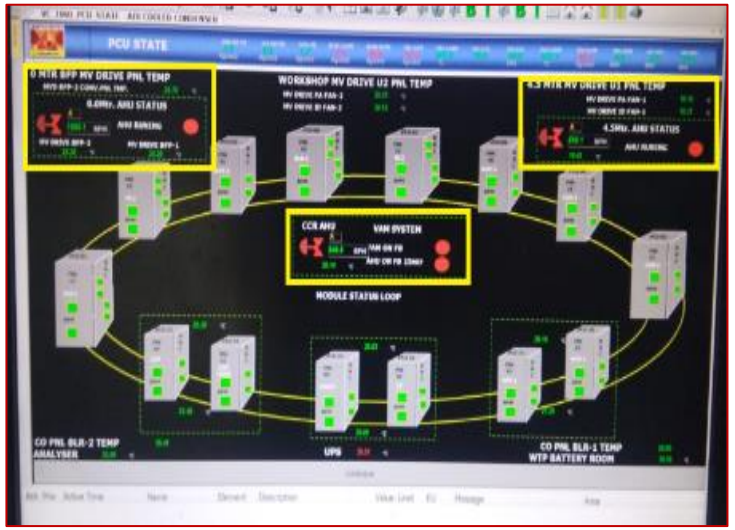
1. Ambient Room Temp RTD is available in every room where AHUs blower delivering cool air
2. Control PID logic build in DCS for operation of Each AHUs to operate in close loop operation with ambient room temp set point
3. Cabling done at AHU to hookup with DCS for control loop operation
4. Replication of Auto close loop logic for other AHUs

Result Achieved

Avg Specific power without Control Loop Operation	0.00092
Avg Specific power with Control Loop Operation	0.00070
Diff Saving in Specific	0.00022
Ave Day Generation in L .KWh	666333
VAM Power Saving in close Loop /Day in KWh	**146.59**

Annual Projected Energy Saving	**0.535 Lac Units/Annum**
Annual Saving in terms of money	**2.75 Lac Rs.**





Energy Reduction in Compressor power (without any Investment)

Confederation of Indian Industry

Theme

Energy Reduction in Compressor power using SOV with actuator at each header of bag house in Unit-1 & 2

Problem

Fluctuating demand of air and more loading power of compressor leads to high power consumption, High maintenance cost and ideal running of stand by compressor

Solution

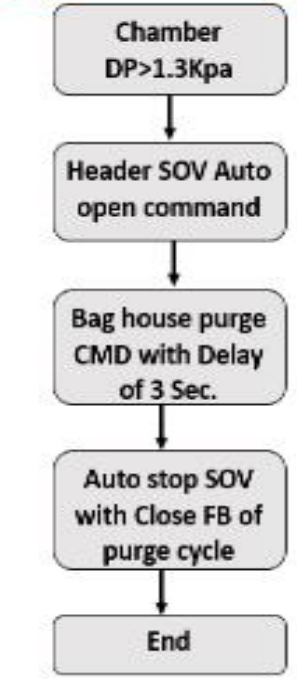
It was observed that

- One Boiler having 4 nos. of air headers which were continuously charged during shutdown.
- Sound of air leaking came from SOVs inside chamber
- One unit having 72 nos. of SOVs , it is very difficult to identify the leakage during running condition to avoid it was suggested
- To Installed SOV operated valve on Bag house purge header and interlock to be provide to open & close in auto based on DP set point

Removed Manual Isolation Valve

Installed SOV operated Valve with Actuator

Implemented DCS Logic



Benefit

- **Stopped Unidentified continuous air leakage from SOVs Kaizen done with labor cost**
- **320 Kwh/Day Compressed Power reduction observed rom 2070 Kwh/day to 1750 Kwh/day**
- **Monetary Saving : Rs. 5.04 Lac/Annum**

Energy Reduction Initiatives :Reduced ACW Power

Confederation of Indian Industry

Theme	**ACW Power Reduction Initiatives vai walk through audit**
Problem	High Auxiliary Power of ACW Pump
Solution	Team has conducted audit and identified various opportunities to reduce auxiliary power reduction at ACW pump and able to reduce ACW pressure from 1.70 to 1.55 kg/cm2 **Stopped the unused cooling water inlet valve at various locations** 1. 11TR Ductile AC not in use at MV drive Unit-1 2. 11TR Ductile AC not in use at MV drive room BFP 3. 11TR Ductile AC not in used at Unit-2 MV drive 4. Instrument Air Dryer not in used at compressor house 5. P fan HT Motor fan bearing **Throttle cooling water inlet valve at various locations** 1. Throttle valve Boiler Fans unit-1 & BFP-1 2. Throttle valve Boiler Fans Unit-2 3. 11TR Ductile AC not in used at Unit-2 MV drive 4. Bed Ash cooler
Benefit	1. Reduction in Auxiliary Cooling Water pump power by 415 KWh/Day. **2. Monetary Saving : Rs. 6.92 Lac/Annum**

Unused Water Valve Closed & throttle at various Location

High Energy Efficient 11KV HT Motor Replacement (5Nos.)

Theme	High Energy Efficient motor Replacement in BFP-3, Boiler Fans unit1 & 2 (5Nos.)
Problem	High Auxiliary power consumption due to low efficiency
Solution	A study has been conducted and observed that single BFP was running up to 38.2 MW load and taken power 1361 Kw approx. hence there is a margin of power saving if same motor replaced by high efficiency motor Capex purposed with minor modification at motor foundation level with the same pump Motor have been replaced .
Benefit	Reduction in Auxiliary In BFP power saving achieved as 740 KWh/Day Unit-1 Boiler Fans saving Achieved as 755 Kwh/Day Unit-2 Boiler Fans saving Achieved as 1197 Kwh/Day **Saving Achived : Rs. 44.5 Lac/Annual**

Major Energy Conservation Projects (FY2021-22)

Confederation of Indian Industry

Sl.No	Activities Detail	FPR	Completion Month	Status
1	CHP Bucket Elevator 1&2 to be Run with Single VFD	SH- E&I	Apr,21	Completed
2	Increase OEE of CHP i.e thru put 150 TPH	SH-Maint.	Dec,21	U/P
3	Cooling Fan Installation in GT-1 Radiator cooling to reduce losses	SH- E&I	Apr,21	Completed
4	Air to fuel combustion improvement with APC fine tuning operation	SH- E&I SH-Operation	Aug,21	U/P
6	Utilisation of low cost fuel blending with High GCV coal for Cost rection	SH-Operation	Mar,22	U/P
7	Energy Efficient Motor installation in LT drives	SH- E&I	Mar,22	U/P
8	Installation of energy efficient ACW pump with 45Kw Motor	SH-E&I SH-Maint.	Apr,21	Completed
9	All CHP belt conveyor Electrical feeder modification from rack out to Fixed type to improve the availability safety.	SH- E&I	Sept,21	Under Progress
10	Installation of energy efficient CEP pump	SH-Maint.	July,21	Under progres
11	Both boiler and TG insulation so many place damage identified and rectified. Thermal heat losses to be reduced by strengthen insulation	SH-Operation	May,21	Partially completed

Improvement Project Completed Improvement Project Under Progress Improvement Project Partially Completed

Major Energy Conservation Projects (FY2021-22)

Sl.No	Activities Detail	FPR	Target Month completion	Status
12	Guard protections hook-up to DCS and ,Belt tear Protection hook up to DCS	SH- E&I	July,21	Material Under procurement
13	Oil Centrifuge controller to be taken in DCS	SH- E&I	June,21	Logic Under preparation
14	1)Bed ash cooler Input Inst. & service air charging by SOV , 30 sec before BAC Start command & SOV close after 30sec of BAC stop command . 2)DCS Interlocking of Bed ash cooler Input Inst. & service air charging by SOV , 30 sec before BAC Start command & SOV close after 30sec of BAC stop command . 3) Auto Operation of Bed ash cooler as per the bed height	SH-Operation SH-Maint. SH- E&I	May,21	Partially Completed
15	Boiler-1 APH jammed tube to be removed in flue gas path .	SH-Operation	May,21	Completed
16	Both TG Mist fan discharge line height to be increased	SH-Maint.	Dec,21	Under review
17	LT drives Energies efficient Motors installation (SA, CEP)	SH- E&I SH- Maint.	Aug,21	Under progress
18	Exploration and utilization of low cost fuel like cinder, agro waste and AFR	SH-Operation	Continuous	Under progress
19	Heat exchanger installation after baghouse and improve the FW temp	SH-Operation SH-Maint.	Mar,22	Under review
20	Thermography to be done for boiler and turbine pipe lines	SH-Operation	Regular	Under progress
21	WHRB project of 12 MW.	FH-Tech, HOD-TPP	Mar,22	Under review

Improvement Project Completed Improvement Project Under Progress Improvement Project Partially Completed

Major Energy Conservation Projects (FY2020-21)

S. No.	Title of Project	Annual Electrical Saving (kWh)	Annual Thermal Saving (Kcal)	Total Annual Savings (Rs. million)
1	Process optimization through changes in Logics and implementation of innovative idea (e.g. . Avoid variation in loading , by process optimizer and minimum deviation in design parameter	0	1776278400	2.2
2	Innovative Idea: Energy Reduction in Cooling Tower fan without any Investment	19200	0	0.09
3	Reduced ACW Power, identified various OFIs via walk through audit Viz Stopped unused cooling water by closing I/L valve and throttle various valve as per the need	132800	0	0.61
4	Reduced ACW Power: Oil cooler replacement with higher heating surface at Inst. Compressor-1 & Instrument Compressor-2	64000	0	0.29
5	Cyclic timer installed in 4 nos. of bag filter RAV to optimized CHP power	640	0	0.0029
6	All package AC power optimization as per the room condition	28800	0	0.13
7	Modification in Bed Ash cooler and logic prepared to save ACW power	51200	0	0.23
8	Out of 6Nos. DT transformer 3nos. Stopped and save losses	80000	0	0.37
9	Optimization of Boiler FAN Power viz, bed height reducing, SA fan pressure reducing, lime stone feeding	409600	0	1.87
10	Innovative Idea: Energy Reduction in Compressor power without any Investment	102400	0	0.47
11	Boiler-2 Indigenous Energy Efficient 11KV HT motor installed in PA & ID	447040	0	2.04
12	Boiler-1 Indigenous Energy Efficient 11KV HT motor installed in PA & ID	305280	0	1.4
13	Indigenous Energy Efficient 11KV HT motor installed in BFP-3	319680	0	1.46
14	Heat Exchanger provided at Instrument Compressor Oil cooler for Maintain the Element Temp	2700	0	0.01
15	ACW Pump Power reduced from 1300 to 1023 Kwh/day by optimizing the water valves at different locations.	24840	0	0.11
16	Operation of Screw Compressor with 1.8 Kg/Cm2 Cooling Water Pressure	10260	0	0.05
17	Bed ash cooler operation done by using VAM chilled outlet water in Boiler-1	17550	0	0.08
18	Reduction In Auxiliary Cooling water (ACW Pump) Power from 2.0 to 1.8 kg/cm2	19440	0	0.09
19	CHP bag filter RAL's Operation through timer base for power saving (30min delayed)	2160	0	0.01
20	Process optimization- running of single BFP (lower capacity) upto 39MW	420000	0	1.92
21	SOV Installed in Bag house -2 all purge header	12960	0	0.06
22	BFP stand by MV Drive Transformer and cooling fan stopped	51200	0	0.23
23	Total 18 no Steam line drain valve IBR valves replaced	0	419328000	0.5195
Total		**2521750**		**14.2424**

Major Energy Conservation Projects (FY2019-20)

S. No.	Title of Project	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)
1	Spare drain valves provided at Common steam header drain line for avoid steam passing.	3.24	16.69
2	BFP Auto Close Loop Operation in DP Mode (No Investment)		
3	VAM AHUs in Auto control loop	0.535	2.75
4	Reduction In compressor Power	1.42	7.3
5	Reduction In Auxiliary Cooling water (ACW Pump) Power	0.66	3.42
6	Reduction In CT Fan Power	0.04	0.2
7	VFD Installation in Jockey Pump	0.08	0.413
8	AHU-4 Installation in Workshop MV drive	1.16	5.97
9	SA Fan-1 Power Optimization	0.48	2.44
10	Screw Conveyor Installation for Raw Mill Powder to control Sox	1.09	18
11	ACC Tube Bundle replacement in unit-1 (HDG Multi row to SRC Al Fins)	0.42	2.24
12	Reduction in Transformer Loss	3.54	17.87
13	VFD In bag Filters Blower BC-4, T2 Tower and Crusher & Close Loop Operation	0.32	1.6
14	Chilled water Dryer for compressed air system	0.65	3.25
15	CHP Operation from CCR and Through put increasing initiatives	0.33	1.65
16	Grid Surrender (TMC saving)	15	101.27
Total		**28.9**	**185.03**

Major Energy Conservation Projects (FY2018-19)

No	Title of Project	Annual Electrical Saving (kWh)	Annual Thermal Saving (Kcal)	Total Annual Savings (Rs. million)
1	Reduced DG auxiliary power by stopping the heater of Day tank	17280	0	0.0029
2	Installed of new LED lights in place of HPSV / HPMV lights at TPP in phased manner	9220	0	0.0415
3	Resized the pump of de gasser pump with the existing ultra filter backwash pump	2190	0	0.101
4	Stopped MGF pump to eliminate the filter feed pump and fed directly raw-water from reservoir to MGF feed line at WTP	2608	0	0.01
5	Resized the pump of RO booster with existing ultra filter backwash pump	6022.5	0	0.003
6	CHP power optimized by replacing motorized RAV with in house fab. flap gate self operated by gravity.	450	0	0.002
7	Stopped the running of effluent transfer pump by direct transferring through N-pit transfer pump	2520	0	0.0097
8	Optimized auto purging time in APH & bag house conveying system	3576	0	0.0009
9	Bag filter running optimized during pet coke feeding	640	0	0.003
10	Optimized the running of P&V water pump during night hrs. considering the ambient temperature	810	0	0.003
11	Sealing air of coal feeder at Unit-1 Given from SA Fan air instead of PA Fan air, Thus loading on PA fan reduced and Gain in power saving achieved	5399	0	0.02
12	SA main Combustion air Damper 2Nos. removed from both units, thus pressure drop reduced and flow increased at same loading	2240	0	0.11
13	Optimized the load distribution transformer (11KV/415V) & stopped 3 no's of distribution transformer which is running under low load.	49000	0	0.19
14	LT drive installed In ACC	264001	0	0.153
15	Lime Stone Circuit Modified	68000	0	0.29
16	Turbine #2 overhauling and replaced all interstate fins.	0	5760000000	7.89
17	Installation of Vapour Absorption Machine (VAM)	595000	0	3.1
18	Installation of Y duct in PA fan for reducing pressure drop in fan suction	187704	0	2.3
19	Reduction in the power consumption for RO booster pump.	12045	0	0.6
20	Unit#2 ACC HDG tube bundles replacement with ALE-SRC bundles	669615.26	6480000000	12.34
Total		**1898320.76**	**12240000000**	**27.17**

Thanks for Your Sincere & Kind Attention

Presented By:

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UltraTech Cement Ltd.
Vikram Cement Works
Captive Power Plant