Introduction

National Award for Excellence in Energy Management

Ultratech Cement Limited

Unit :- Kotputli Cement Work's

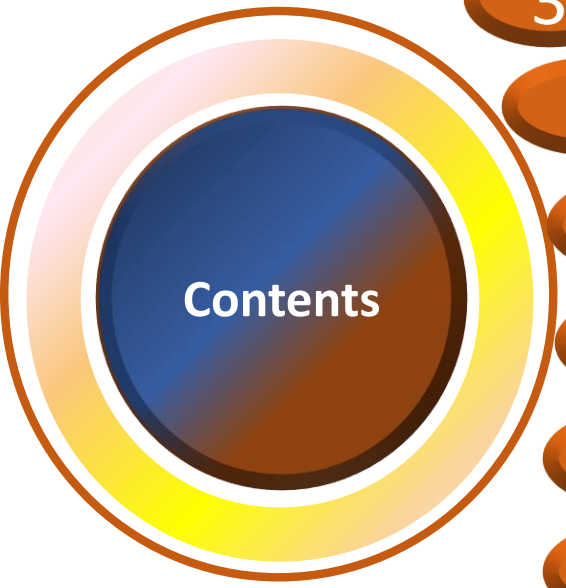
Team Leader

- Hari. K. Chaturvedi — Assistant Vice president
- Pinto Dodiya — Manager
- Shailendra Pandit — Manager
- Manjunatha S — Deputy Manager
- Mukesh Saini — Asst. Manager

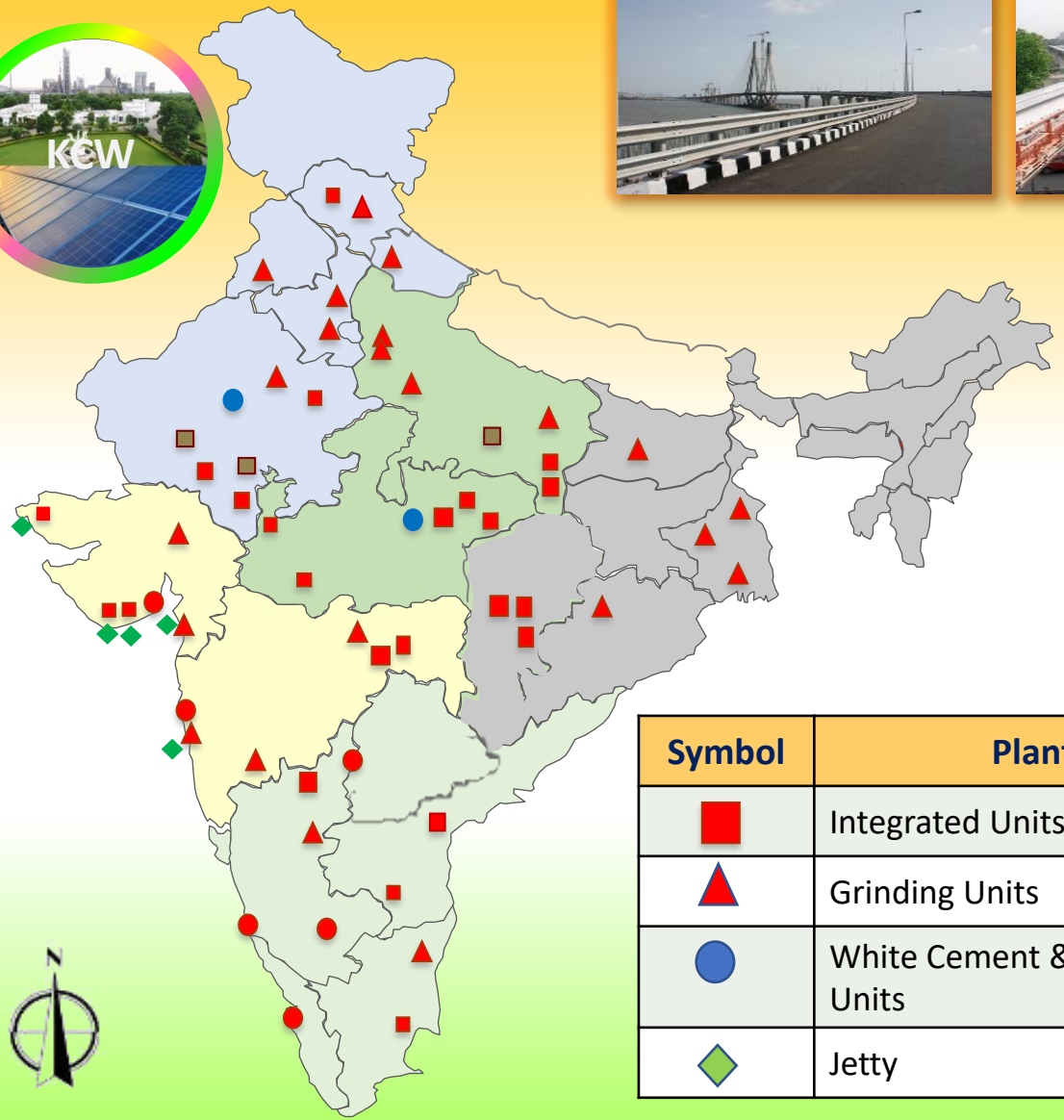
Padharo Mhare Desh

Rajasthan

Contents



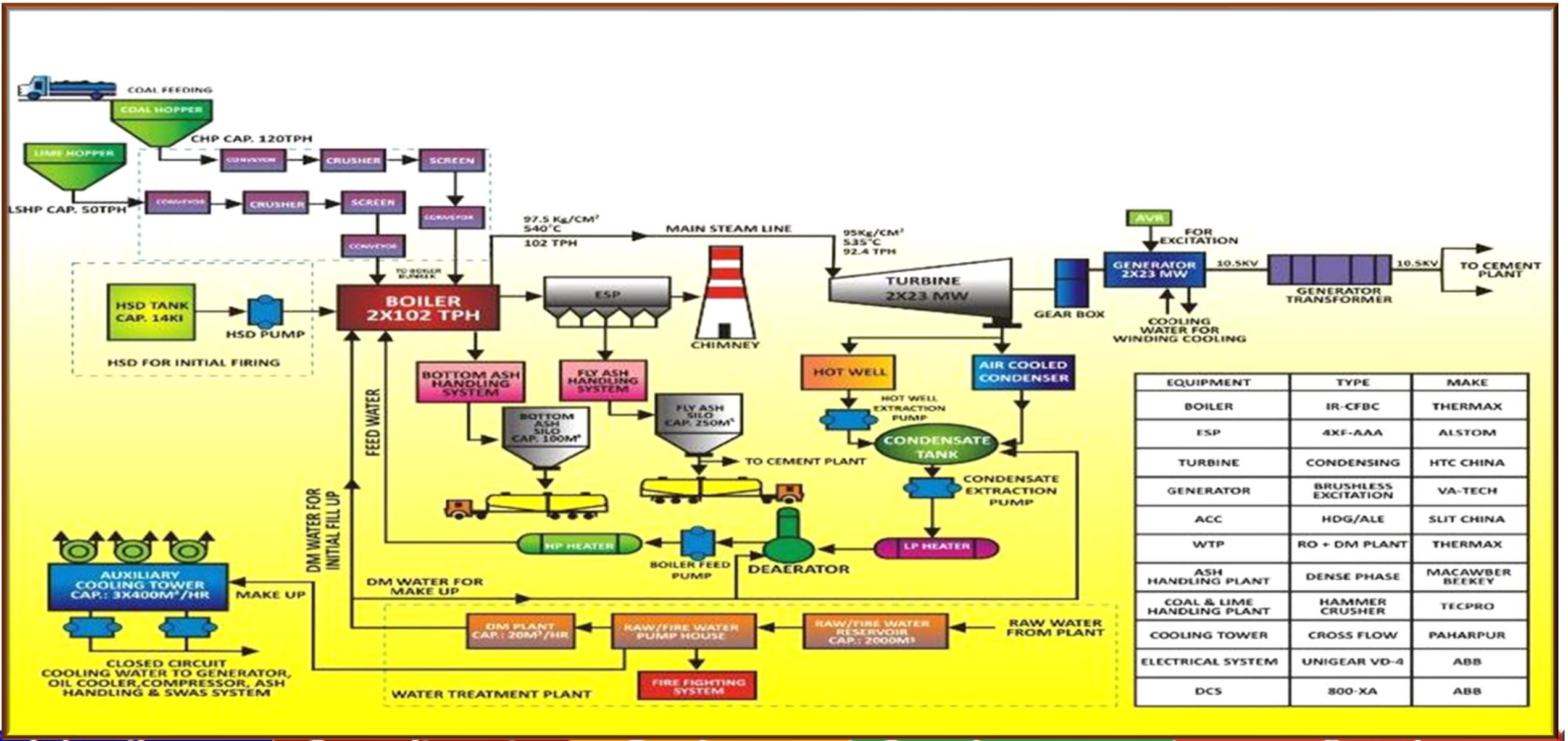
Introduction of Organization



Symbol	Plant	Nos
■	Integrated Units	23
▲	Grinding Units	27
●	White Cement & Putty Units	03
◆	Jetty	

- UltraTech Cement Limited
- Kotputli Cement Work Unit :- Ultratech Cement limited
- 3.3 MTPA capacity Green field Cement plant
- 2X23 MWH Captive Power Plant
- 12.9 MWH Waste Heat Recovery System
- 7.0 MWH Solar System
- Certified with ISO 9001, 14001, 45001 , ISO 27001, ISO 50001 & ISO 17025.
- UltraTech-Kotputli TPP won First prize in “National Energy Conservation Award- 2017” Awarded by honourable President of India.
- The continual Energy improvements by KCW TPP have been recognized by awarding “CII – Excellence Energy Efficient Unit award” for last consecutive five years at CII –Hyderabad
- Adopted World Class Manufacturing Excellence Model

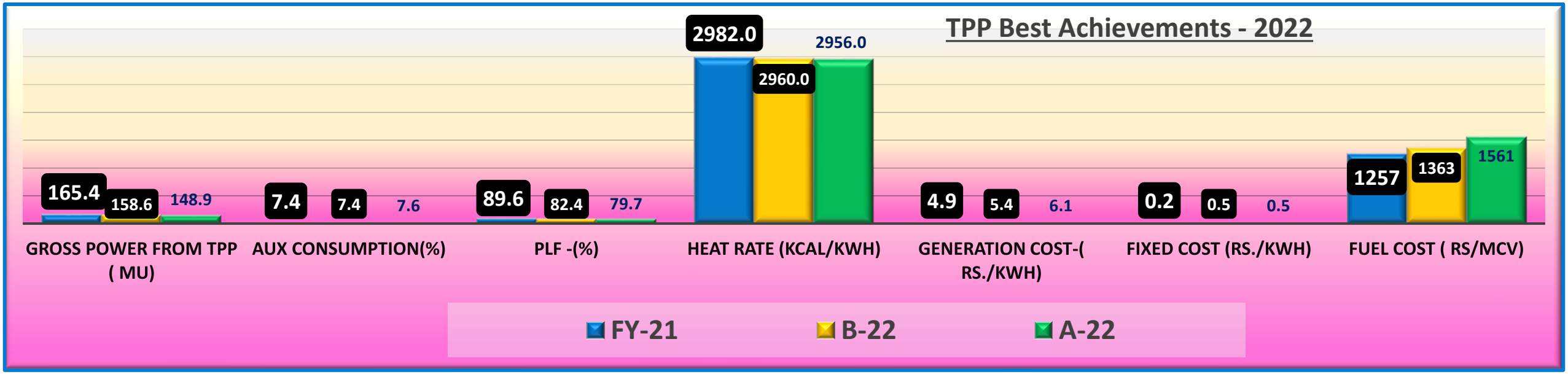
Thermal Power Plant



EQUIPMENT	TYPE	MAKE
BOILER	IR-CFBC	THERMAX
ESP	4XF-AAA	ALSTOM
TURBINE	CONDENSING	HTC CHINA
GENERATOR	BRUSHLESS EXCITATION	VA-TECH
ACC	HDG/ALE	SLIT CHINA
WTP	RO + DM PLANT	THERMAX
ASH HANDLING PLANT	DENSE PHASE	MACAWBER BEEKEY
COAL & LIME HANDLING PLANT	HAMMER CRUSHER	TECPRO
COOLING TOWER	CROSS FLOW	PAHARPUR
ELECTRICAL SYSTEM	UNIGEAR VD-4	ABB
DCS	800-XA	ABB

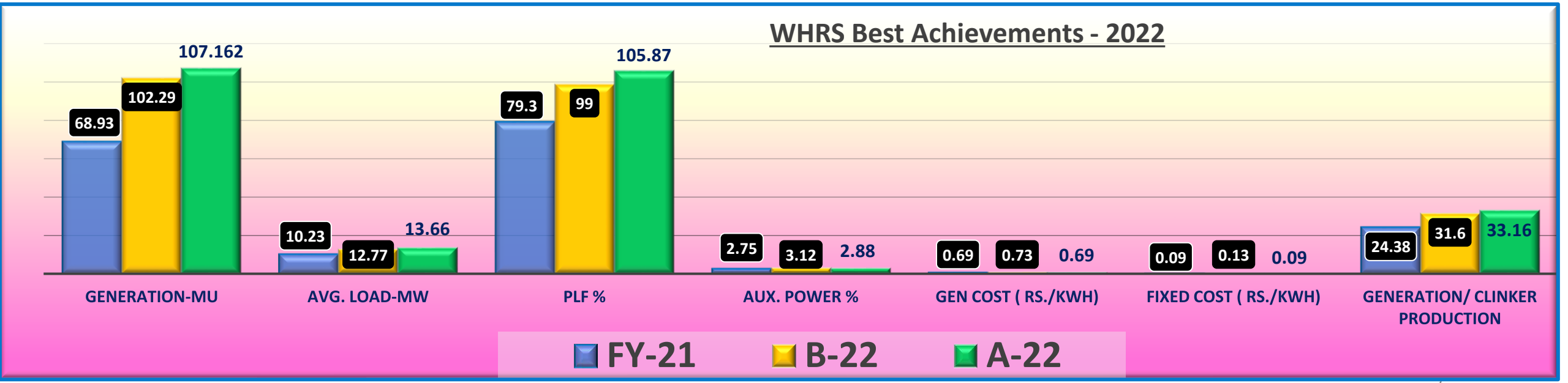
TPP Energy Consumption FY-22

Power Generation	UOM	FY 21	FY 22	
Particulars		Actual LYTD	Budget	Actual
Gross Power From TPP	Lacs KWH	1653.87	1586.44	1488.89
Aux Consumption	%	7.35	7.40	7.31
PLF	%	89.55	82.4	79.7
Heat Rate	Kcal/Kwh	2982	2960	2956

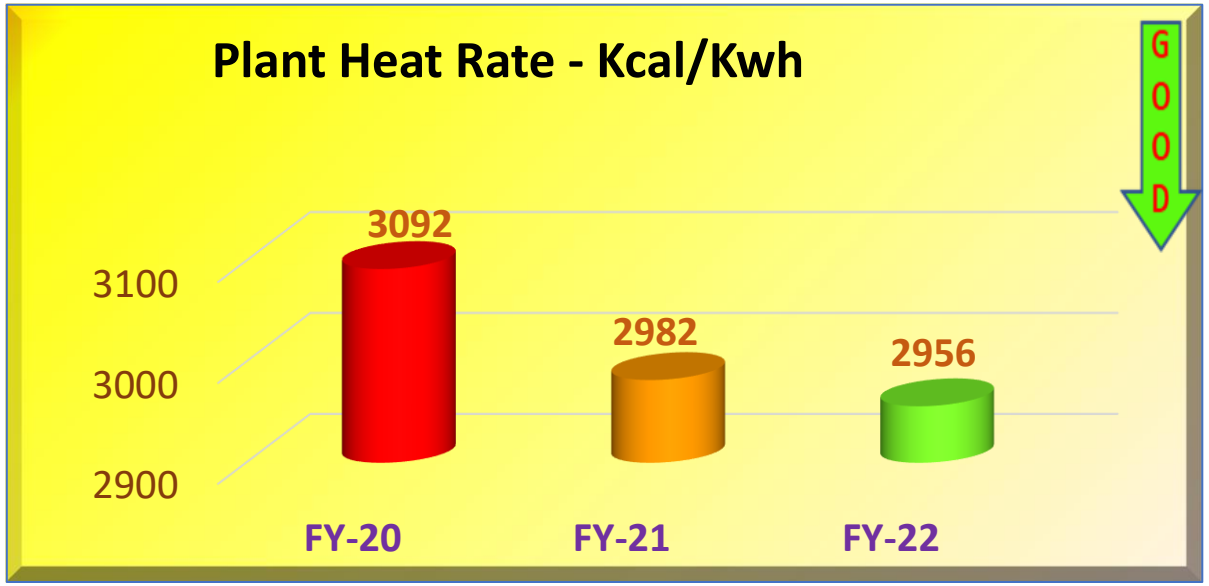


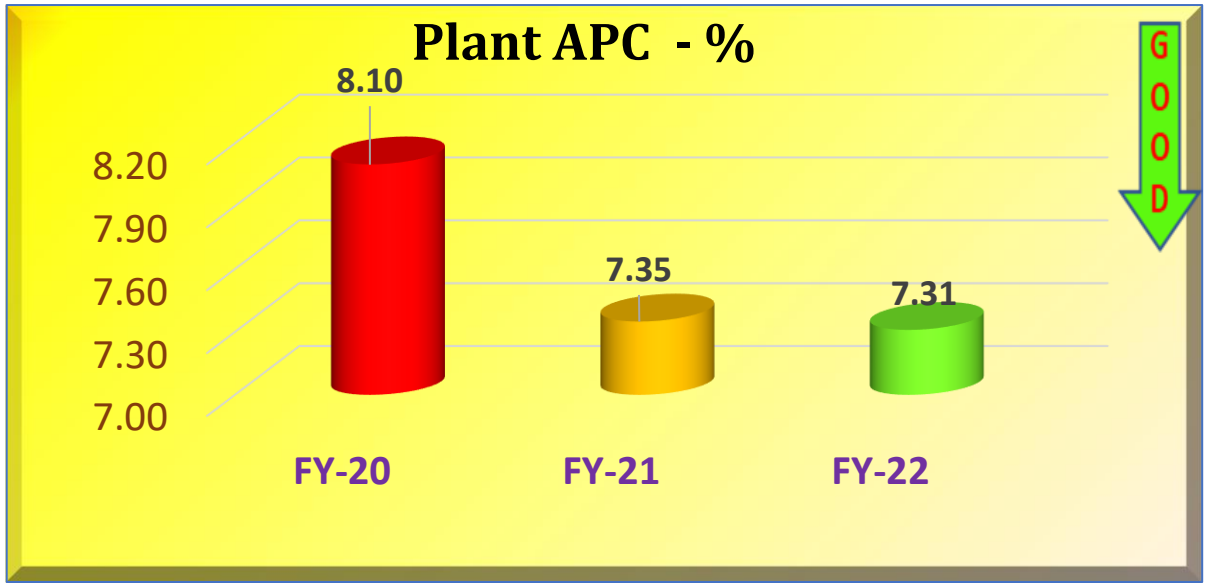
WHRS Energy Consumption FY-22

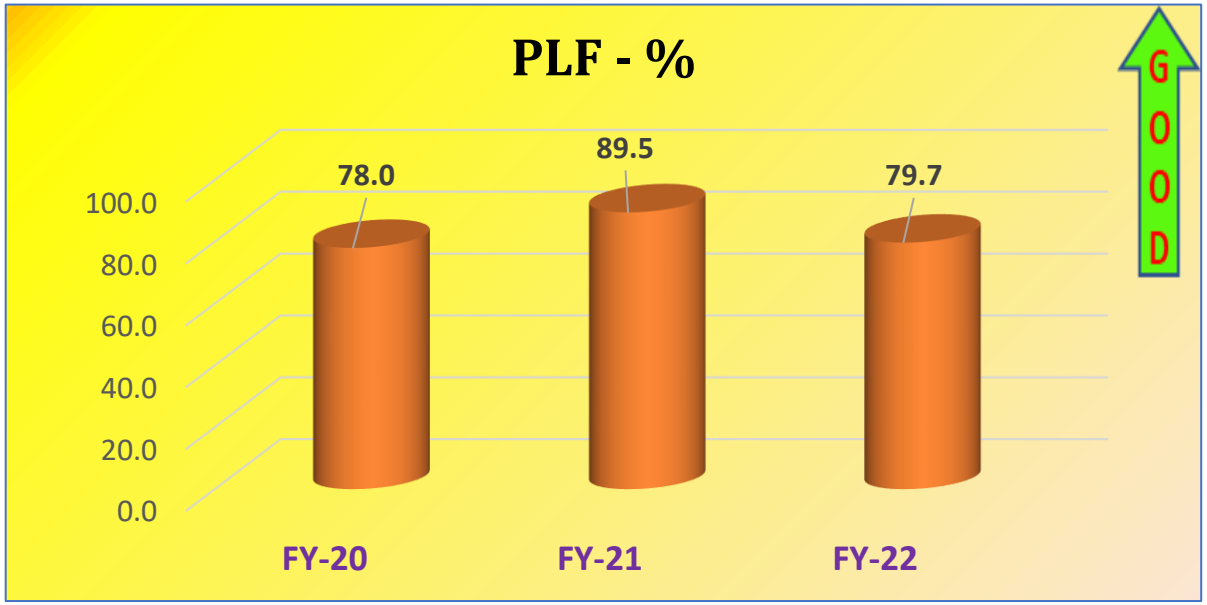
Power Generation Particulars	UOM	FY 21 Actual LYTD	FY 22 Budget	FY 22 Actual
Gross Power From WHRS	Lacs KWH	689.3	1022.90	1071.62
AVG Load	MWH	9.91	12.77	13.66
PLF	%	76.84	99.0	105.87
Aux Consumption	%	2.75	3.12	2.88
Gen Kwh/MT Clinker	Kcal/Kwh	24.38	31.6	33.0



Specific Energy Consumption Last Three Year



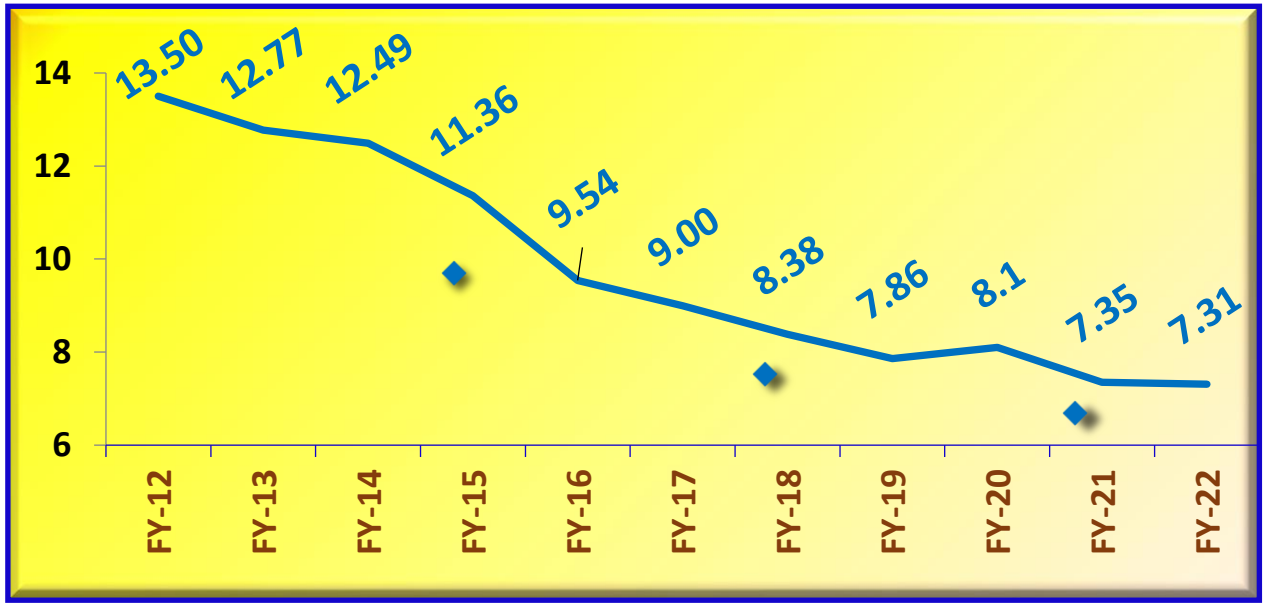




Specific Energy Consumption Variance

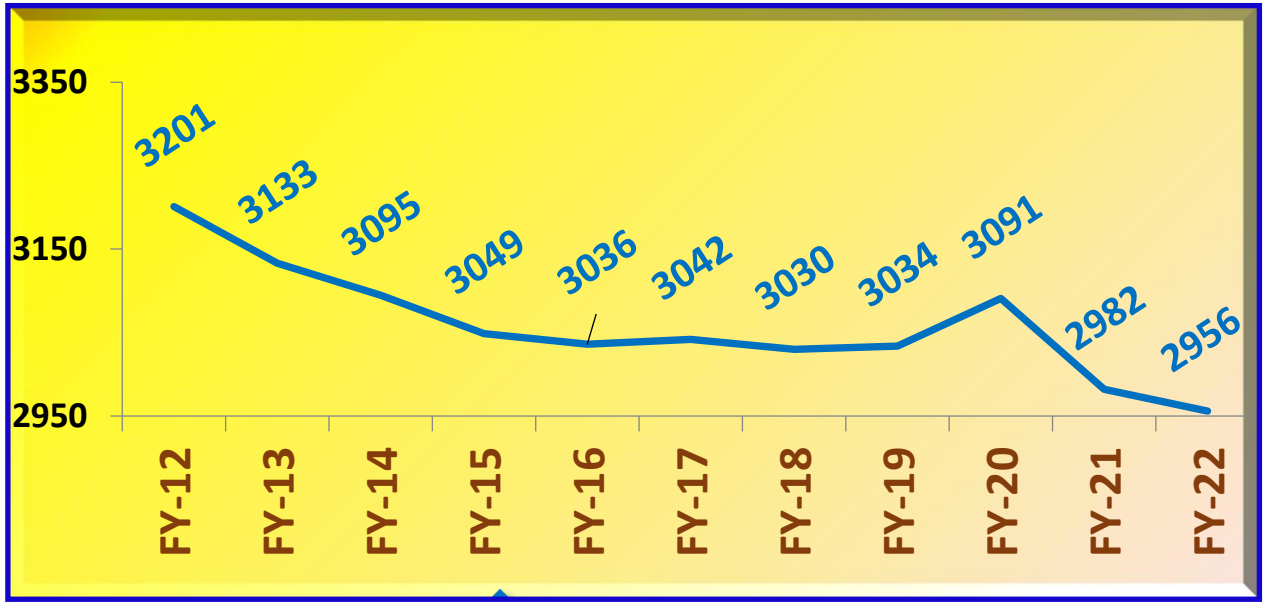
TPP Auxiliary Power Consumption In %

- Excellence Journey of energy management Achieved Continual decreasing trend of TPP auxiliary power consumption.



Plant Heat Rate Kcal/Kwh

- Excellence Journey of energy management Continuous decreasing trend of plant heat rate heat rate.



Benchmarking with group Unit FY-22

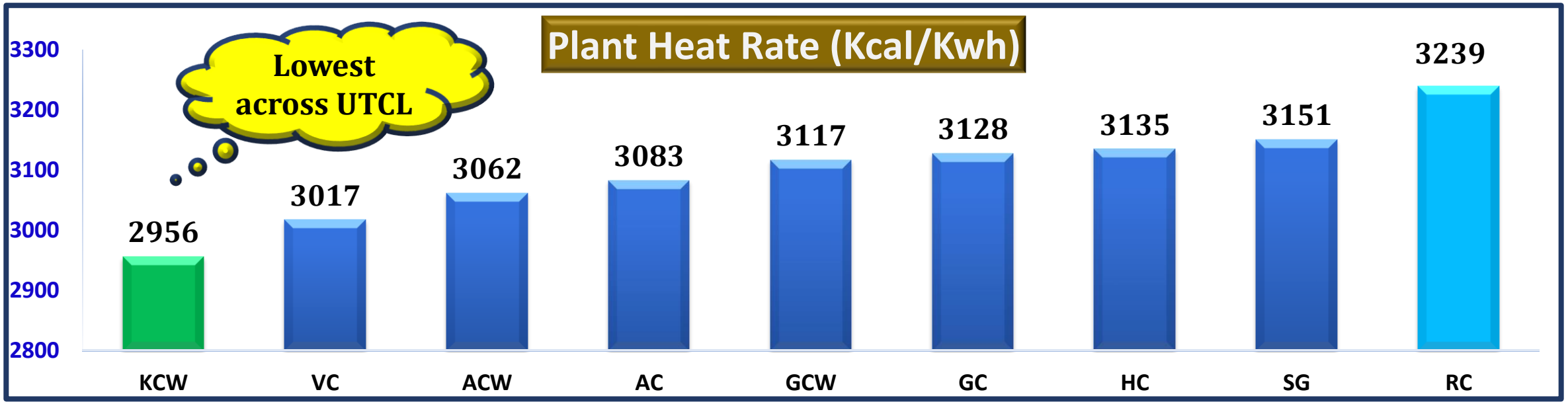
Parameter	Unit	HC	APCW	AC	ACW	GCW	GC	VC	RC	SG	KCW
Installed Capacity	MWH	46	100	73	71	92	55	46	108	57.5	**46**
Type		CFBC	CFBC	CFBC & AFBC	CFBC & AFBC	CFBC	CFBC	CFBC	CFBC & AFBC	CFBC & AFBC	**CFBC**
PLF	%	61.47	70.77	84.34	88.44	64.93	66.18	68.83	78.71	60.13	**79.7**
Plant Heat Rate	kcal/kwh	3135	3256	3083	3062	3117	3128	3017	3239	3151	**2956**
APC	%	9.04	7.36	7.79	7.40	8.06	7.64	7.06	9.74	9.13	**7.31**

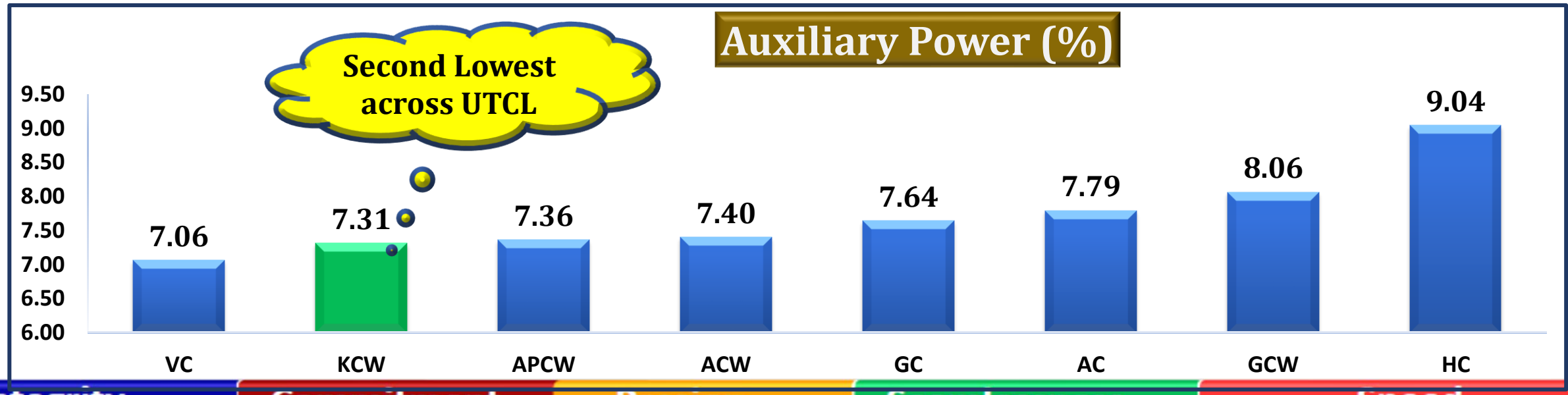
National Benchmarking

3.15 CAPTIVE POWER PLANT

Parameter	Unit	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7	Plant 8	Plant 9	Plant 10	KCW
Installed capacity	MW	15	30	9	15	17.5	12.5	25 x 2	15	17.5	17.5	2X23
Type		AFBC	AFBC	AFBC	AFBC	AFBC	AFBC	CFBC	AFBC	AFBC	AFBC	CFBC
PLF	%	82.3	68.5	88.5	65	84	88	97.4	64	77.8	85	79.7
Heat rate	Kcal /kWh	3250.36	3127	3040	3148	3018	3490	2932	3436	3035	3074	2956
Coal CV	Kcal / kg	5268.83	5503	3204	4062	3213	Petcoke + Lignite (NCV): 4940	6475	4981	3175	3205	5972
LOI – Bed ash	%	20.1	19.42	<1	5.12	<1	0.4-0.5	3.73	14.21	<1	<1	2.5
Ind. header pressure	Bar	5.5	5.5	6	5.2	6	6	6.4	5.5	6	6	4.5
Fly ash tpt pressure	Bar	4.5	4	5	3.5	5	4.5	5.2	4	5	5	4.0
APC	%	7.97	8.53	8.96	9.1	9.3	9.5	9.51	9.56	9.56	9.69	7.31

Benchmarking With UltraTech Plant's FY -2021-22





Road Map - Plant Heat rate

1. ACC SRC bundle and energy efficient fan blade replacement
2. Optimize Specific Steam Consumption by TG Overhauling
3. Single unit TPP Operation
4. Boiler erode " U" beam Replacement.
5. Digitalization – Optimax

Road Map -Auxiliary Power

1. ACC SRC bundle and energy efficient fan blade replacement
2. Replaced boiler feed pump with energy efficient
3. Operation excellence
4. Digitalization – Optimax
5. CHP & LHP Ideal running optimization

Way Forward -Major Encon Project

1. Replacement of Boiler Fan's with energy efficient
2. Both ACC duct interconnection
3. Replacement of Auxiliary cooling tower pump with energy efficient
4. Improve WHRS MW Generation
5. Water Conservation

Energy Savings Projects FY-2019-20

SN	Energy Saving Projects	Saving Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)		
1	Installed Waste heat recovery Power plant.	28964.68		131.62	1180	33
2	Power wheeling & Power selling.		490.05	4.93		
3	Reduction in steam dumping.		428.79	4.31		
4	Reduction in Loss of ignition in boiler (LOI).		214.4	2.15	0.50	3.0
5	Compressed air optimization.	543.15		2.82		
6	Boiler Wind box pressure reduction.	457.95		2.38		
7	Boiler feed pump Differential pressure reduction.	155.33		0.81		
8	Boiler Secondary air (SA) fan header pressure reduction.	117.86		0.61		
7	Air conditioning power optimization.	46.86		0.24		
9	Cooling tower pump pressure optimization.	39.05		0.2		
Total		**30324.88**	**1133.24**	**150.07**	**1180.5**	

Energy Savings Projects FY-2020-21

SN	Energy Saving Projects	Savings Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)		
1	Installed Waste heat recovery Power plant.	67050.53		281.2	1180	33
2	Single unit TPP Operation.	82.5	3590	37.60	0	0
3	TG #1 & 2 major over hauling.	382.77	1720	18.54	4.0	2.59
4	Digitalization – Optimax		129.0	1.25	10	72
5	Steam Dumping reduction		473	4.57		
6	Turbine vacuum improvement.		301	2.91		
7	ACC bundle cleaning.		2.89	1.87		
8	Boiler wind box pressure reduction.	330.33		1.62		
Total		**67846.13**	**6215.89**	**349.56**	**1194**	

Energy Savings Projects FY-2021-22

SN	Energy Saving Projects	Savings Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)		
1	Boiler Efficiency Improved by erode "U" beam replacement	287.18	536.69	8.163	20.5	30.14
2	Replaced the Boiler feed pump with energy efficient	495.0	0	2.7	2.6	11.4
2	Optimize the RO plant power consumption	29.94	0	0.117	0.2	20.50
3	Optimize ACC power and Plant heat rate by adiabatic cooling system	88.31	126.28	2.005	0.17	1.02
4	Optimize the ACC ingress air and improve vaccum and PHR	0.00	63.14	0.830	0.002	0.03
5	Optimize the dumping through the digitalization	31.68	110.49	1.574	0	0.00
6	Improve the TG inlet steam enthalpy	0.00	55.24	0.720	0	0.00
7	Optimize the ACC power and PHR by ACC fins foam cleaning	27.72	31.57	0.518	0.064	1.48

Energy Savings Projects FY-2021-22

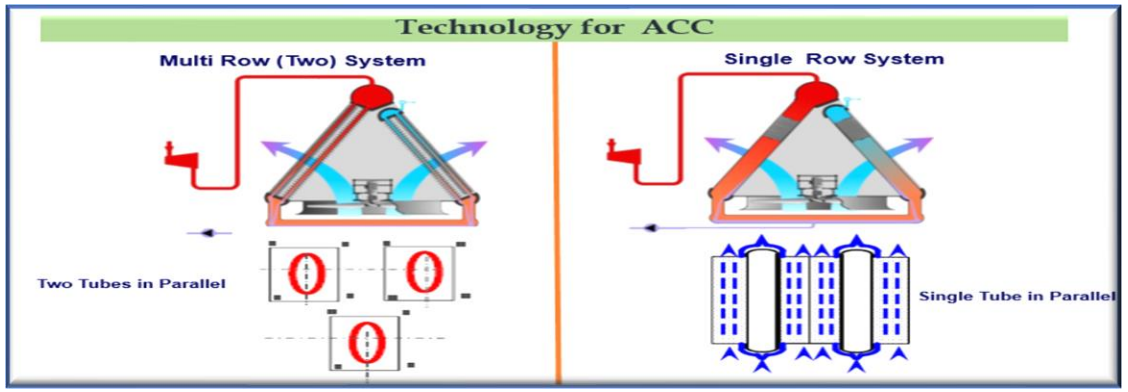
SN	Energy Saving Projects	Savings Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)		
9	Optimize Cooling water pump power by optimize the flow and pressure	174.24	0	0.681	0	0.00
10	Optimize the BFP power by reduction BIAS DP up 05 Kg/cm2	151.80	0	0.594	0	0.00
11	Optimize Condensate extraction pump power by optimize the line rustication pressure from 14 to 09 kg/cm2	104.54	0	0.409	0	0.00
12	Optimize the CHP power by installing transparent sheet in gallery	55.44	0	0.217	0	0.00
13	Optimize the compressor power By optimize the pressure up to 4.5 Kg/cm2	198.00	0	0.774	0	0.00
14	Optimize the boiler SA fan by pressure optimization	131.23	0	0.513	0	0.00
15	Optimize the Boiler fan's power by reduction false air from 5 to <2%	36.43	0	0.142	0	0.00

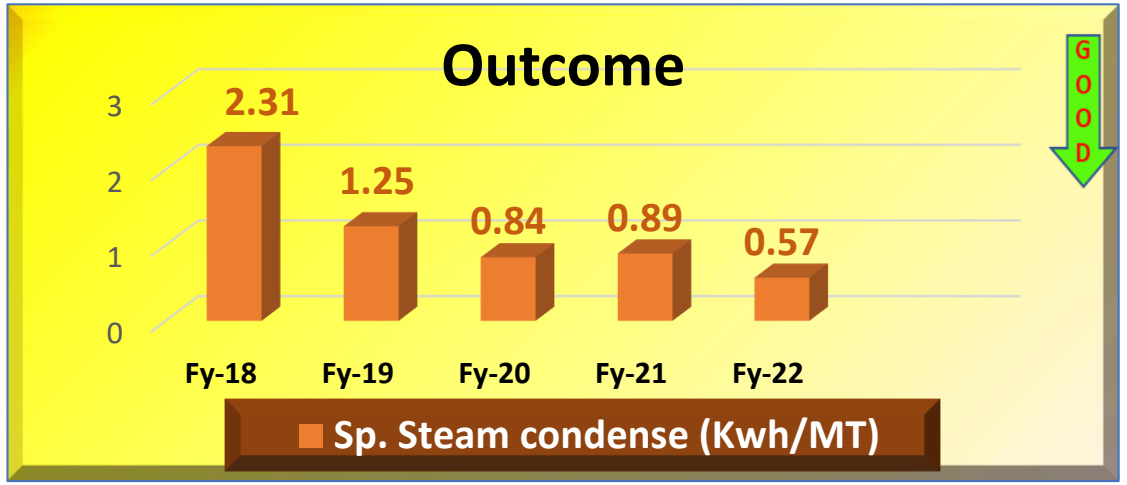
Energy Savings Projects FY-2021-22

SN	Energy Saving Projects	Savings Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)		
15	Optimize conveying system power through installed a transmitter in Hooper	51.48	0	0.201	0.07	4.17
16	Reduction the boiler feed pump power through replacement passing ARC	118.80	0	0.465	0.45	11.63
17	Reduction the CHP and LHP power by optimization ideal running hours	148.50	0	0.581	0	0.00
18	Reduction the cooling tower fan's through the auto logic temperature control	15.02	0	0.059	0	0.00
19	Optimize the Howell pump Power	15.84	7.89	0.162	0.02	1.48
20	Increased the WHRS generation from 12.90 to 13.66 MWH to by Research analysis and innovation , saving the power mix cost	5544.00	0	29.827	0	0.00
21	Reduction the ESP conveying system power through installed a transmitter in Hooper	51.48	0	0.201	0.07	4.17
Total		**7210.65**	**931.30**	**51.27**	**24.08**	

Encon Project # 1 :- Single Row Air Cooled Condenser

- **Theme:-** Technology Up gradation of Unit-1 Air Cooled Condenser.
- **Problem Statement:-**
  - Higher auxiliary power consumption of TPP.
  - Higher plant heat rate.
  - ACC contributes about 8-10 % of the total APC of TPP.
- **Complexity:-**
  - The Capital for new ALE multi row tube bundle replacement had higher cost (10 Cr).
- **Approach :-**
  - Change of metallurgy of fin material.
  - Exploring the low cost & efficient alternative technology.
- **Technology Adoption:-**
  - Approached new technology Single Row Condenser (SRC)
  - **Installed at KCW first time in India.**





- **Outcome :-**
  - Fuel saving :- 1230 MT/annum.
  - Auxiliary Power :- 11.27 Lacs Kwh/annum.
  - Cost Saving :- 148.23 Lacs/annum.

Encon Project # 2 :- ACC Fan blade replacement

❑ **Theme:-**of Air Cooled Condenser

- Technology Up gradation fan blade.

❑ **Problem Statement:-**

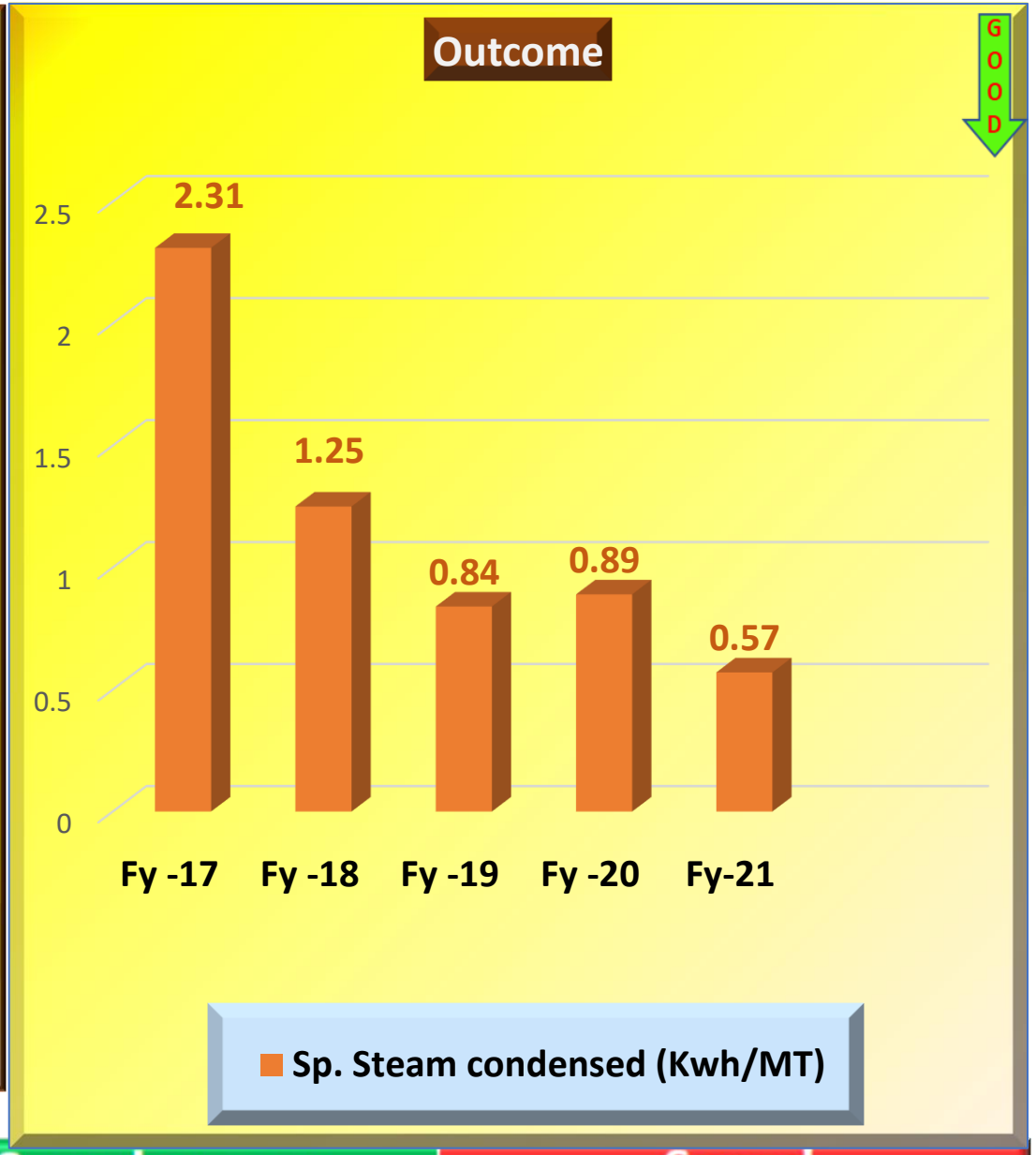
- Higher power consumption of ACC fan's
- ACC contributes about 8-10 % of the total APC of

❑ **Solution:-**

- Replaced new design of ENCON make aerodynamic design high efficiency energy saving E-Glass Epoxy FRP Fan Blades.

❑ ***Out Come***

- Power Saving:-1.84 Lacs Kwh /annum.
- Cost Saving- :- 8.34 Lacs/annum.



Encon Project # 3 :- Boiler Feed Pump Replacement

❑ **Theme:-**

- Boiler Feed pump replacement with energy efficient .

❑ **Problem Statement:-**

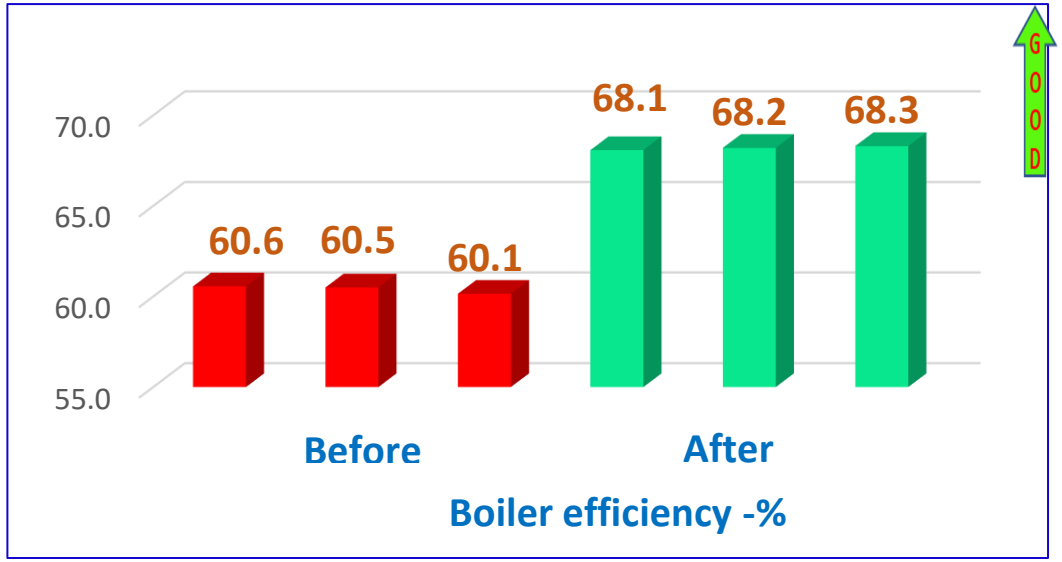
- Higher power consumption of BFP
- BFP contributes about 25-30% of the total

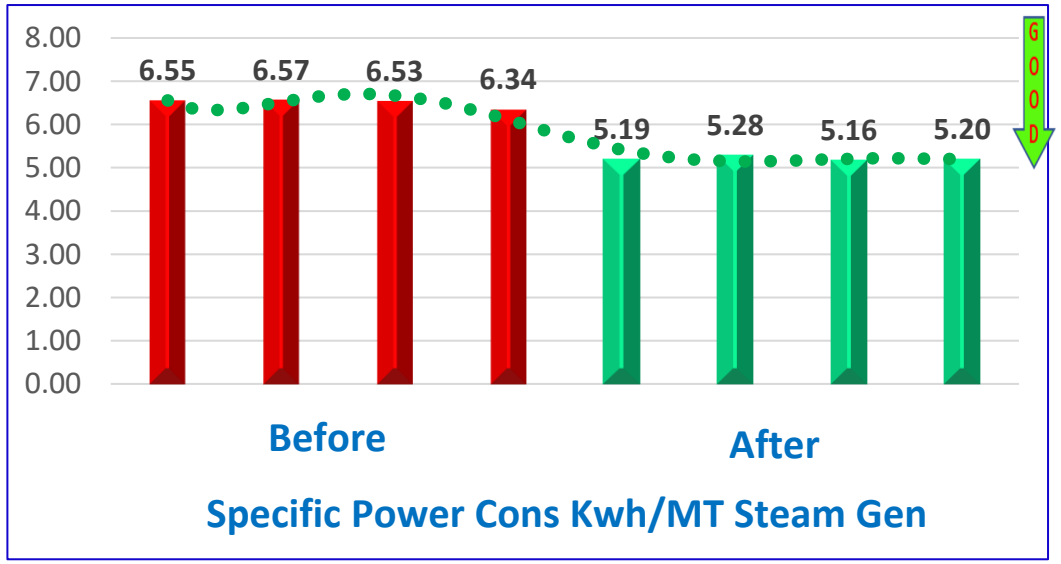
❑ **Solution:-**

- Replaced new design of KSB make
- higher efficient boiler feed pump .

❑ ***Out Come***

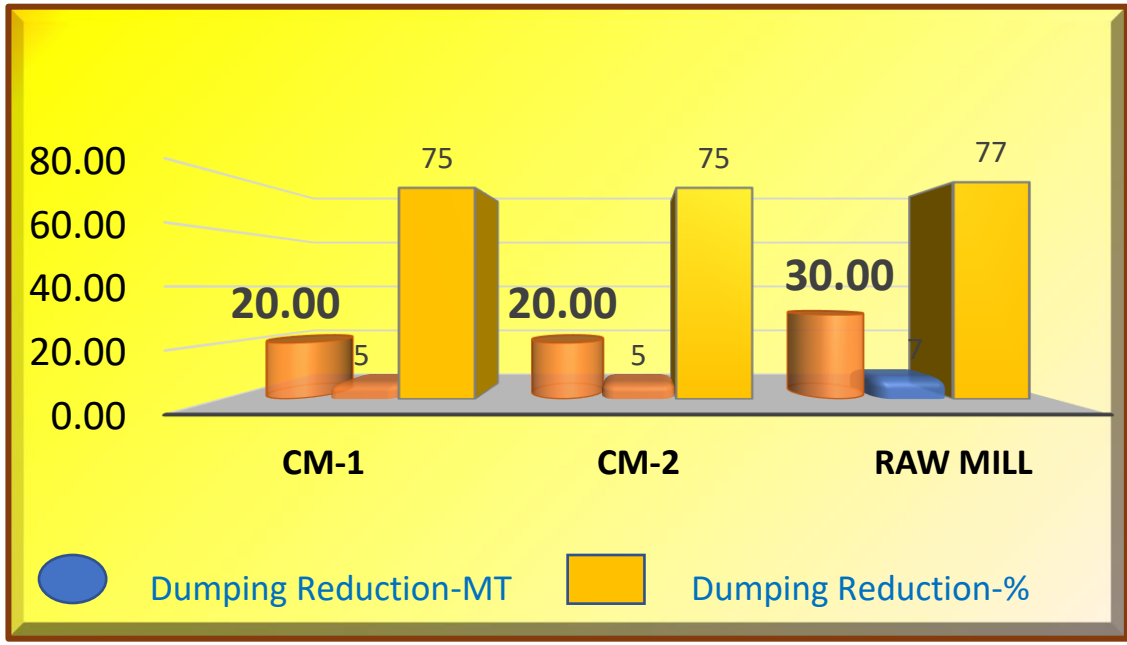
- Power Saving:-4.95 Lacs Kwh /annum.
- Cost Saving- :- 27.23 Lacs/annum.

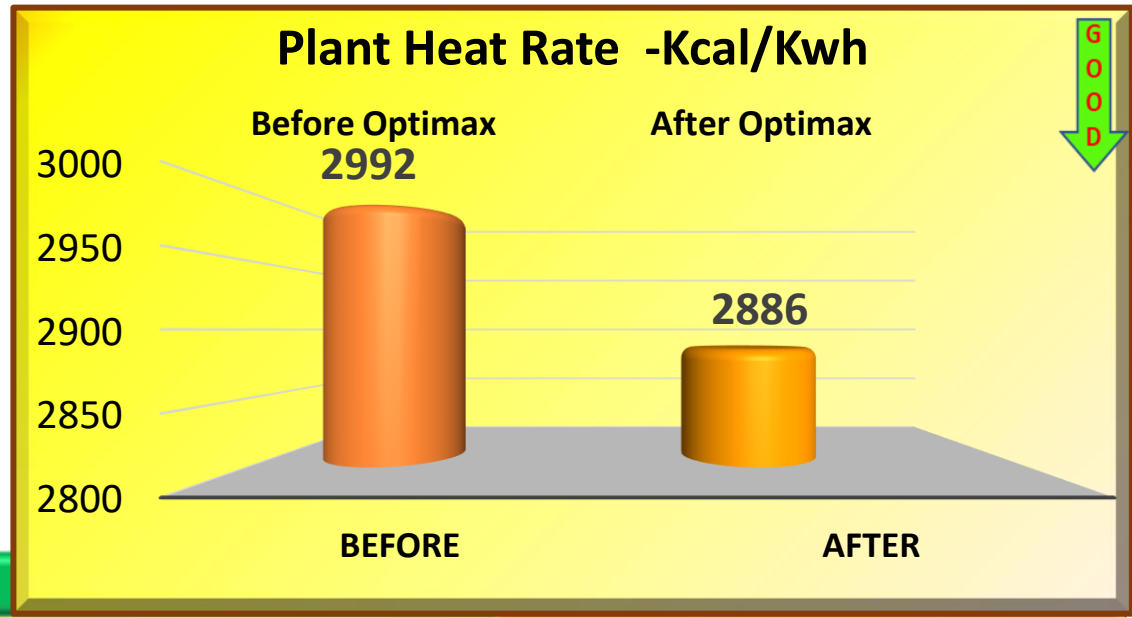




Encon Project #4 :- Digitalization

- **Theme:-**
  - TPP Process Digitalization by Technology Up gradation.
- **Problem Statement:-**
  - Fluctuating equipment stability with operational demand
  - Efficiency & output disparities, these tracking & corrective systems unavailable.
  - Higher steam dumping during the cement plant drive load deviation
- **Solution :-**
  - Installed ABB-Optimax system for process evenness & automation.
- **Out Come :-**
  - Coal Saving :- 405.92 MT
  - Cost Saving :- 35.21 Lacs.
  - CO2 reduction :- 1253.27





Project # 5 Waste Heat Recovery Boiler

❑ **Theme:-**

- Waste heat recovery .

❑ **Problem Statement:-**

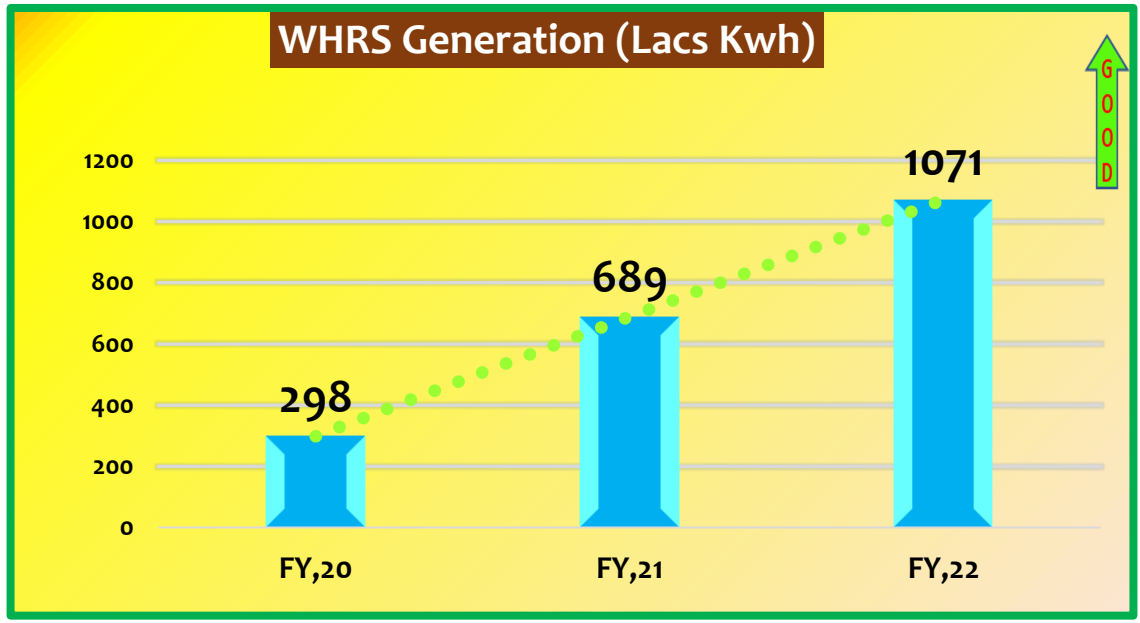
- Preheater and Cooler waste heat account for more than 35.5% of that heat loss.
- In the past few global warming conservation of energy have been given major importance

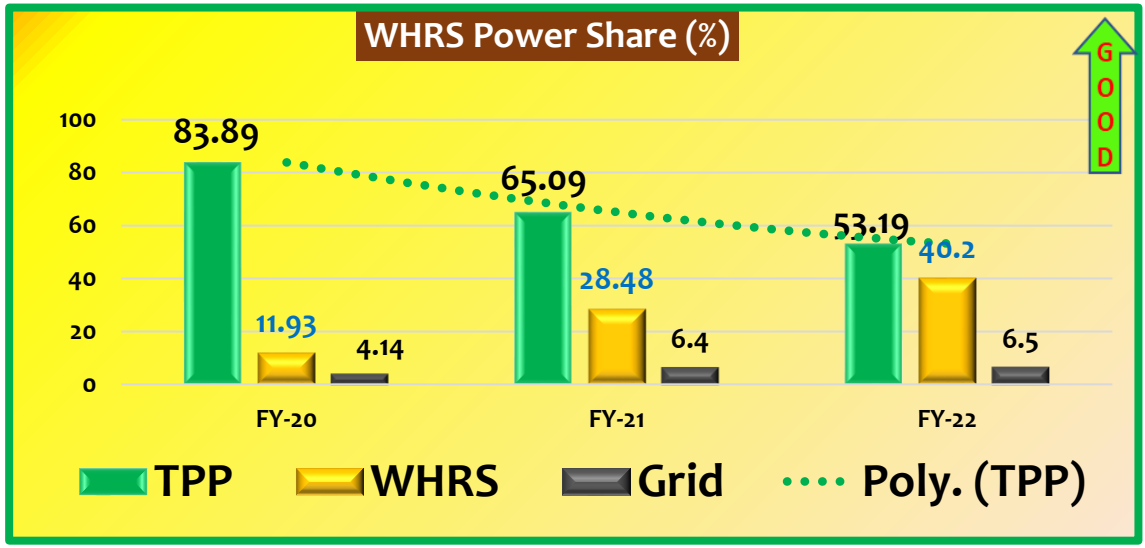
❑ **Solution :-**

- Installation of waste heat recovery boiler in cooler and Pre heater

❑ **Out Come**

- TPP Fuel Saving :- 51512 Lac/ Annum
- Power Generation saving :- 5590 Lac/Annum
- TPP Auxiliary power Saving :- 47.41 Lac/Annum
- Raw water Saving :- 9200 KL/Annum.
- Reduction in CO2 emission :- 131838 MT.

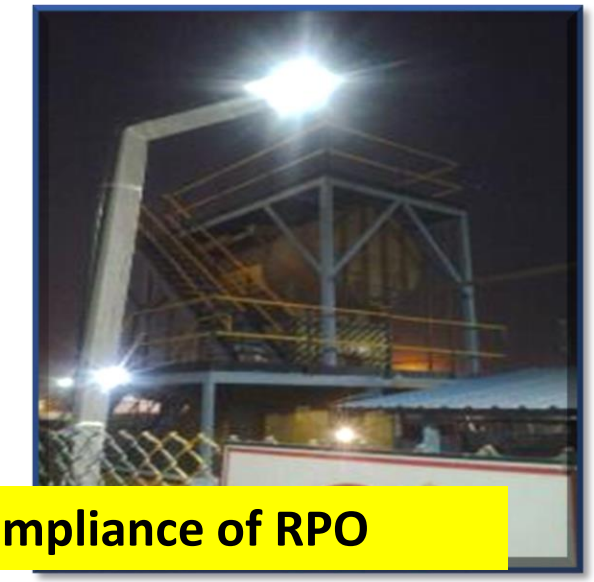




Utilization of renewable energy Resources

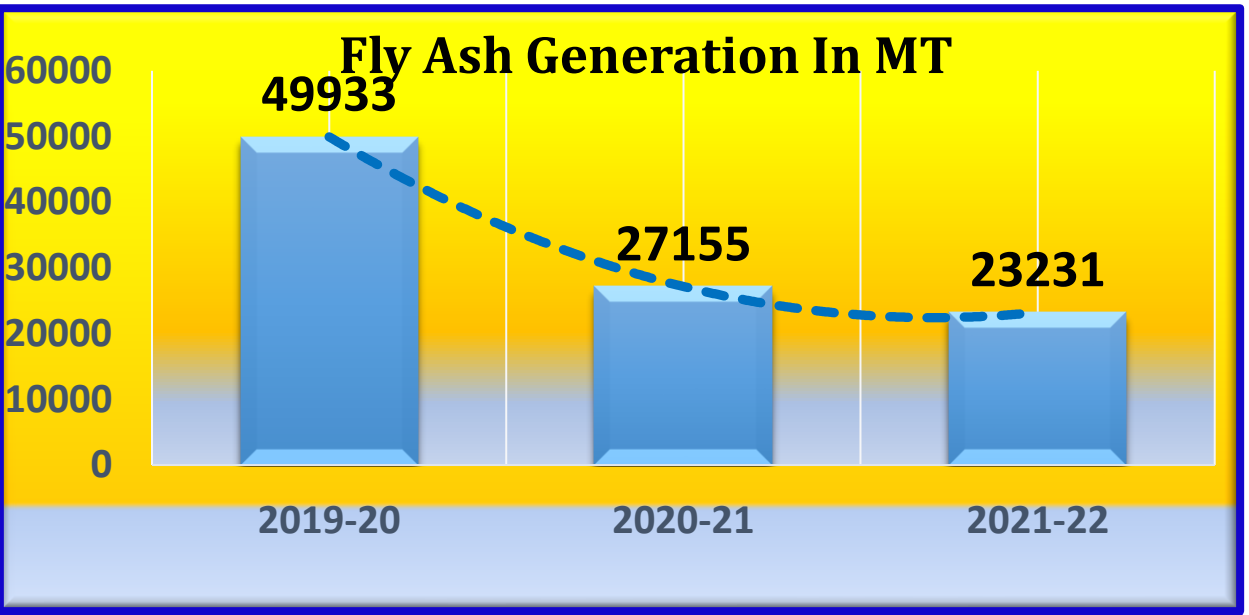
Capacity Of renewable energy @ Plant and Colony

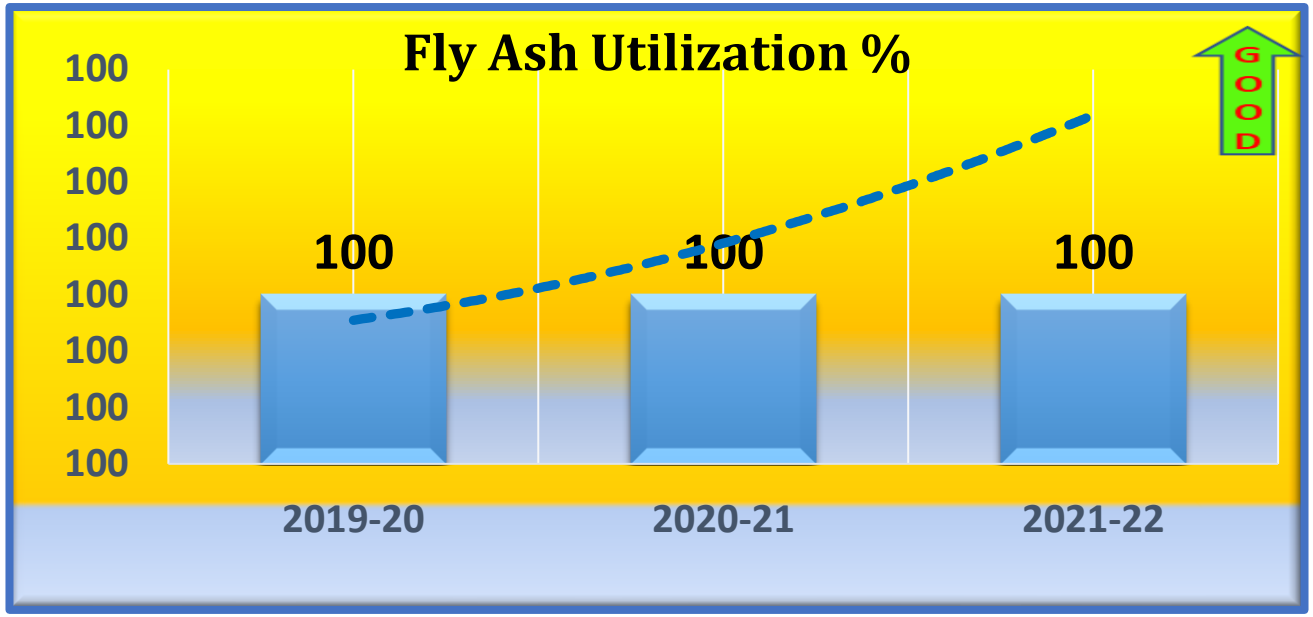
- *Installed solar power generation 7000 KWH.*
- *Installed Solar Power Generation 100 KWH*
- *Installed Solar Power Generation at TPP area : 1 KWH*

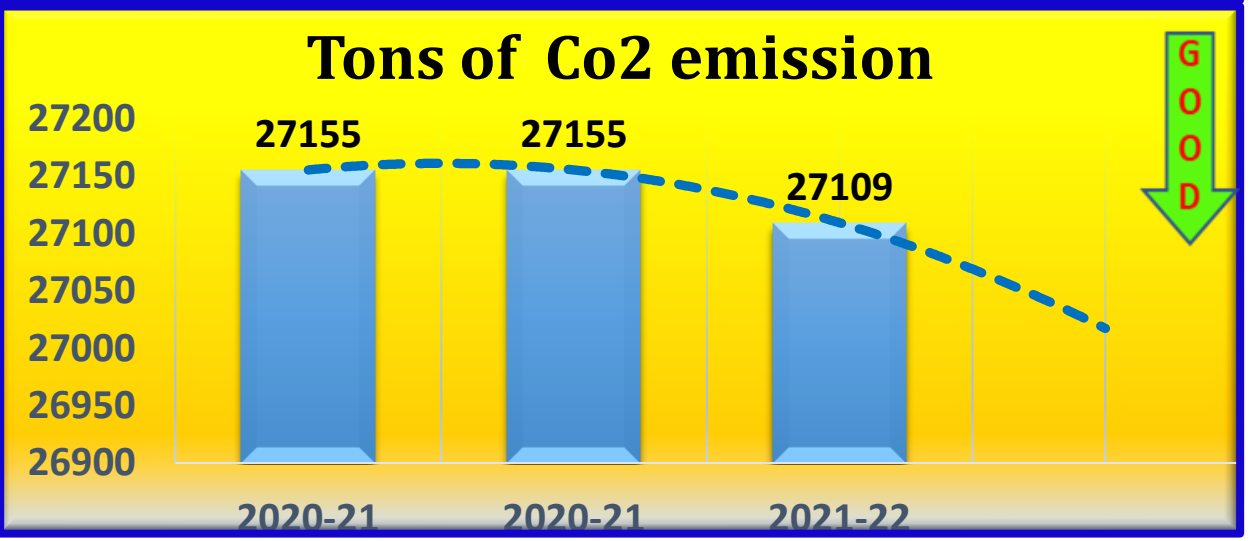


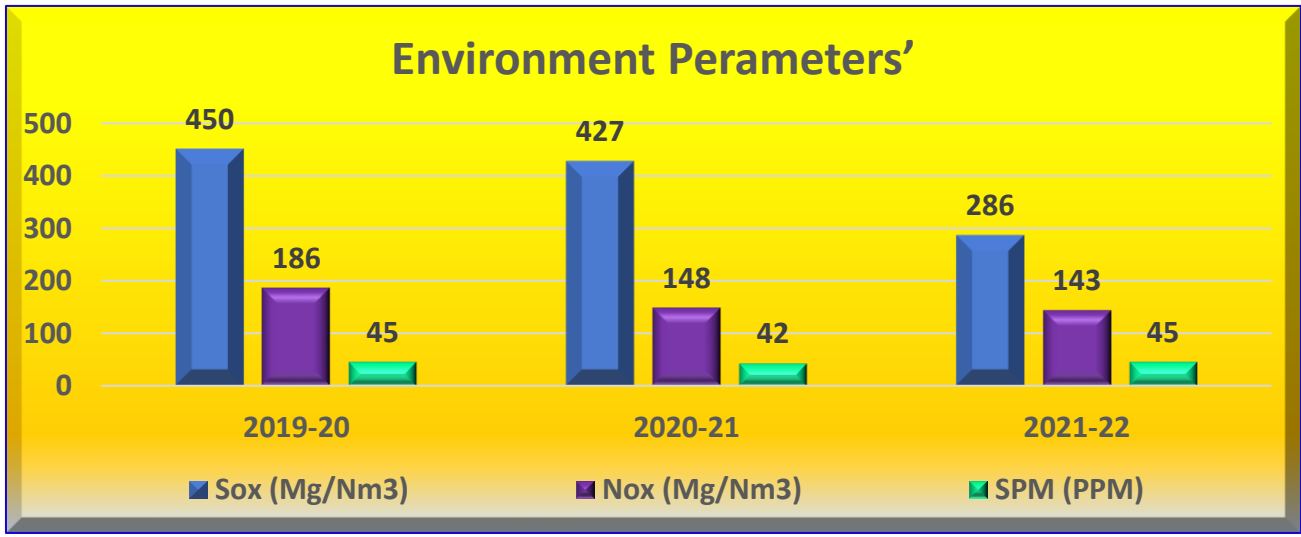
100% Compliance of RPO

Fly Ash Generation & Utilization GHG Inventorisation and Sox, Nox and SPM





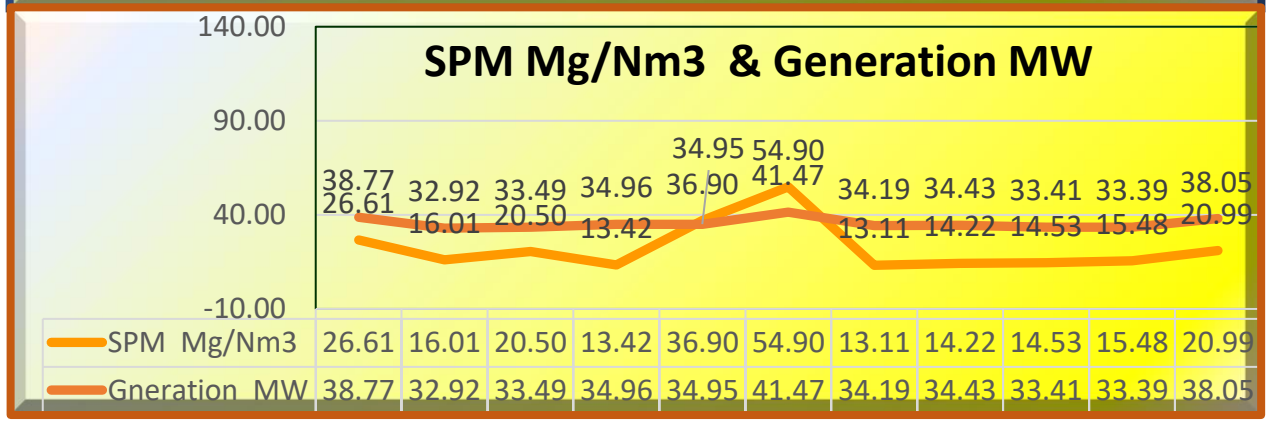


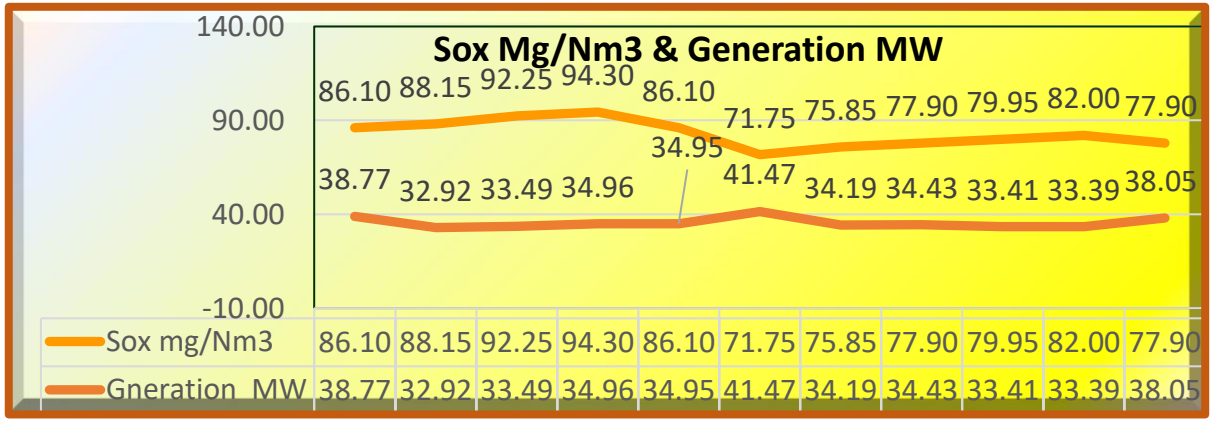


Best Practice for Emission Control & Monitoring

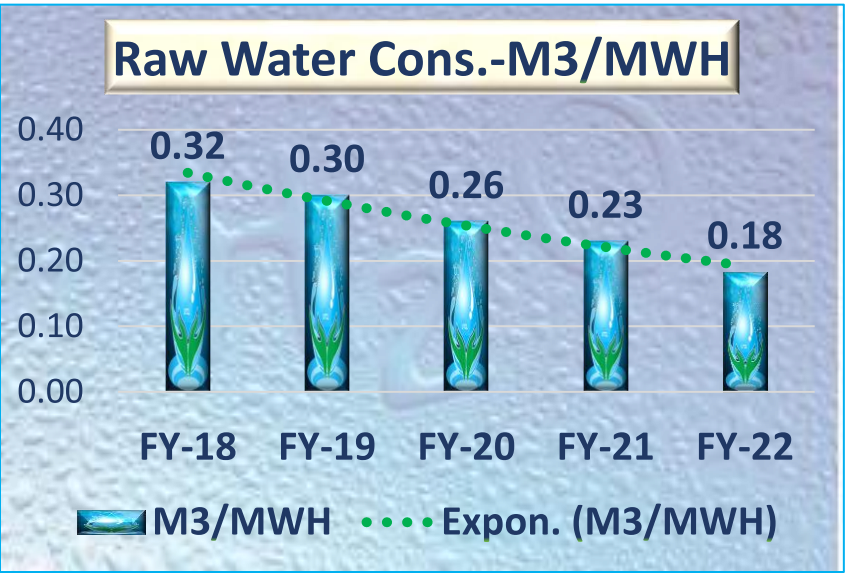
- **Theme :-**
  - Stack emission control
- **Project Title :-**
  - ESP -Panel UP-Gradation from SCR to IGBT Based for emission control .
  - Project Cost :- 61.98 Lacs
- **Outcome :**
  - Even control of stack SPM according to boiler load.

- **Theme :-** Control of sox
- **Project Title :-**
  - Best Controlling of Sox by feed lime stone in boiler with auto control logic
- **Outcome :-** Boiler separate sox analyzer for visual monitoring at CCR.
  - Feed lime stone in boiler by rotary air lock for controlling the Sox.
  - Close loop control from Boiler sox analyzer & Lime stone RAV.



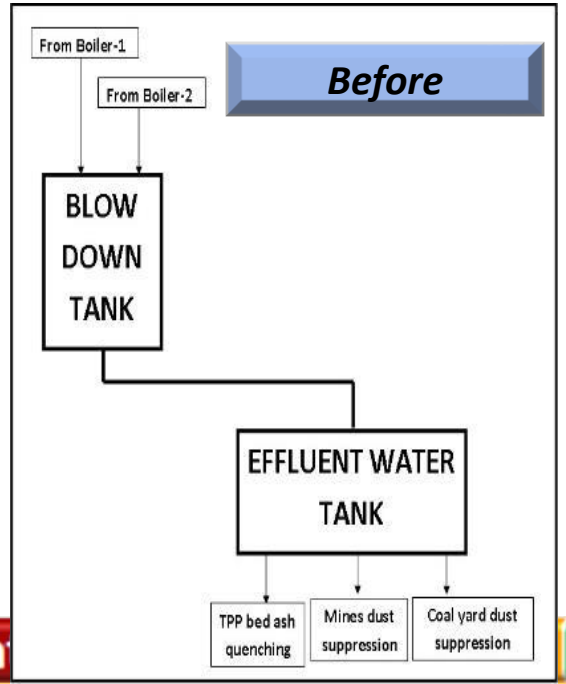


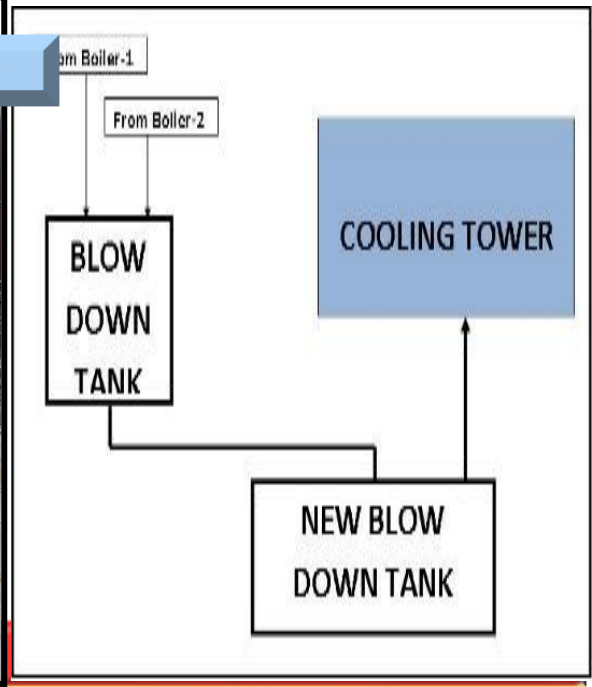
Environment - Water Management



- **Theme:-** Rain water collecting arrangement
- **Approach:-**
  - During Rainy season, large amount water goes in to open trench and wastage.
- **Solution :-**
  - Arrangement done for rain water collection above raw water tank.

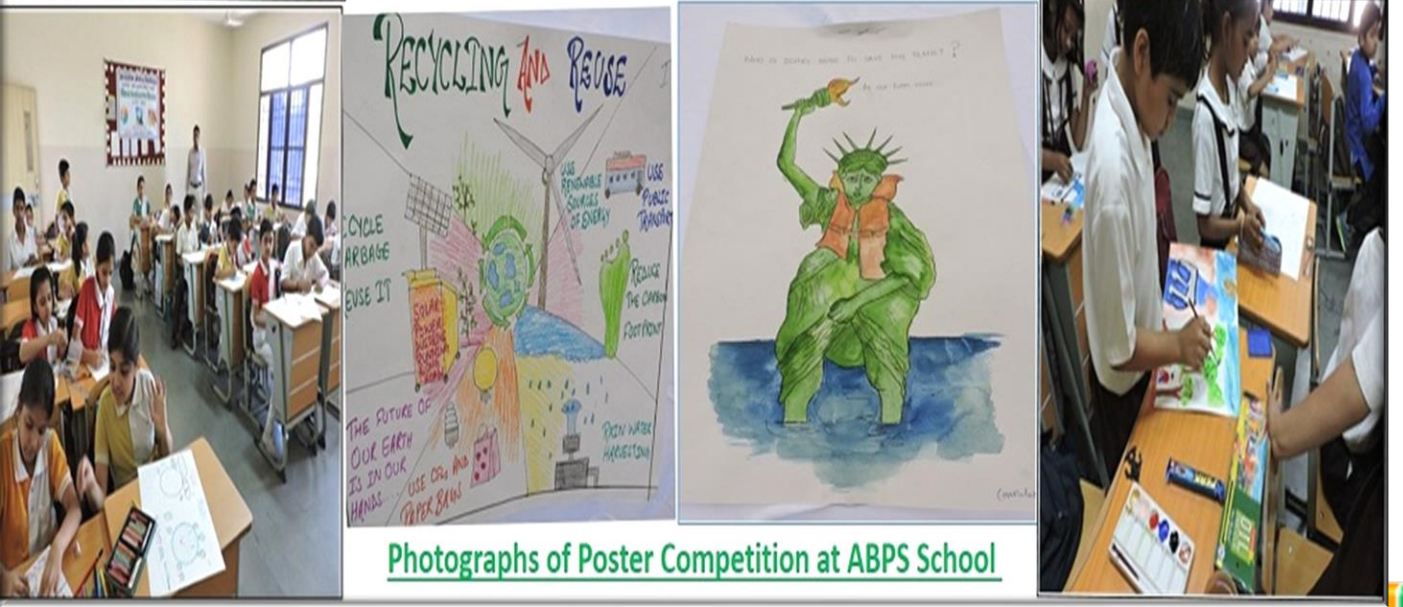
- **Theme:-** Reutilization of boiler blow down Water
- **Approach:-**
  - Earlier boiler blow down water was collected in effluent pit-no use of that water.
- **Solution :-**
  - Provision made for re-use of the blow down water



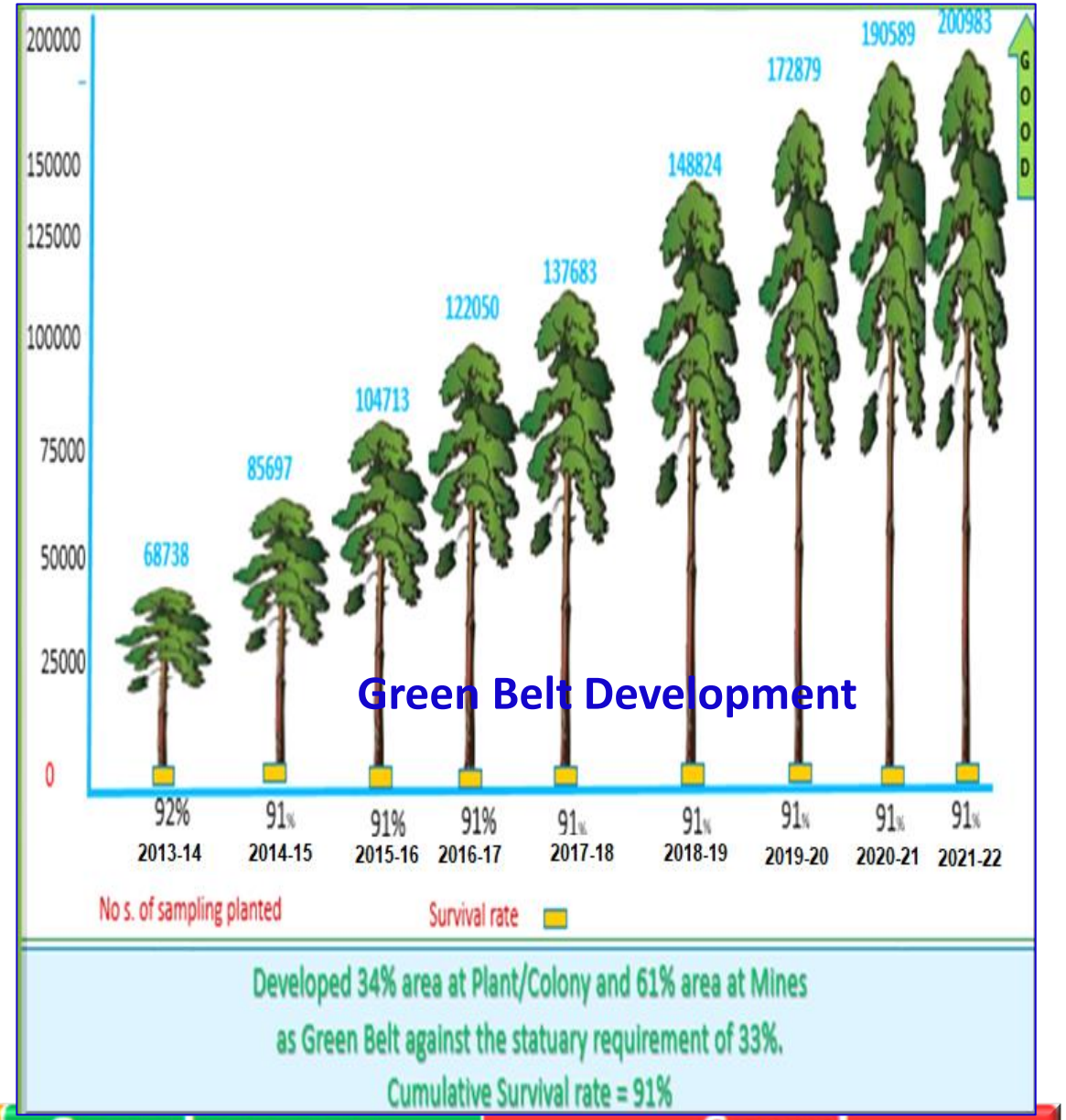


Green belt development

Photographs of Plantation Programme



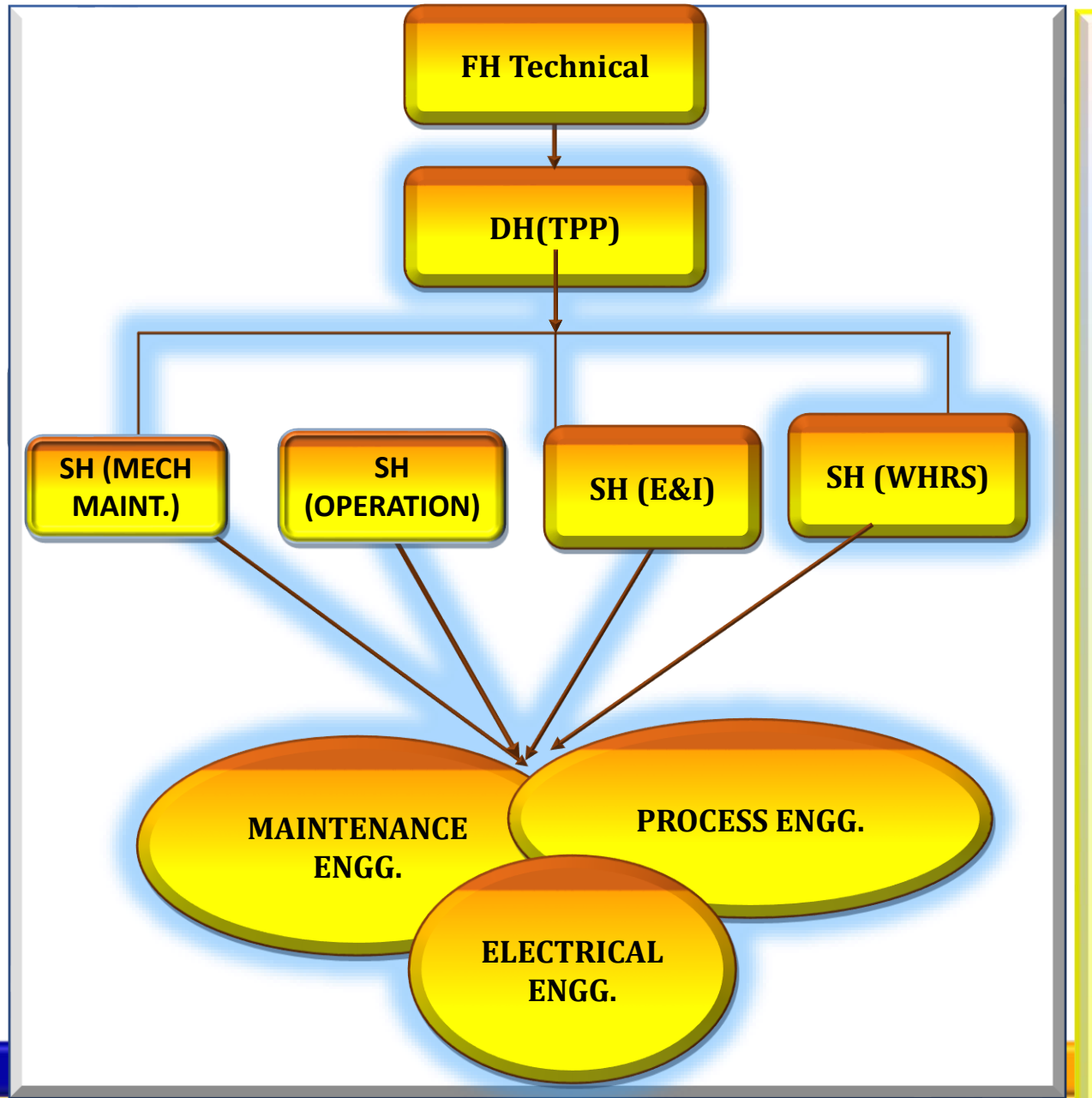
Photographs of Poster Competition at ABPS School



Green Belt Development

Developed 34% area at Plant/Colony and 61% area at Mines as Green Belt against the statuary requirement of 33%.
Cumulative Survival rate = 91%

Teamwork, Employee Involvement & Monitoring

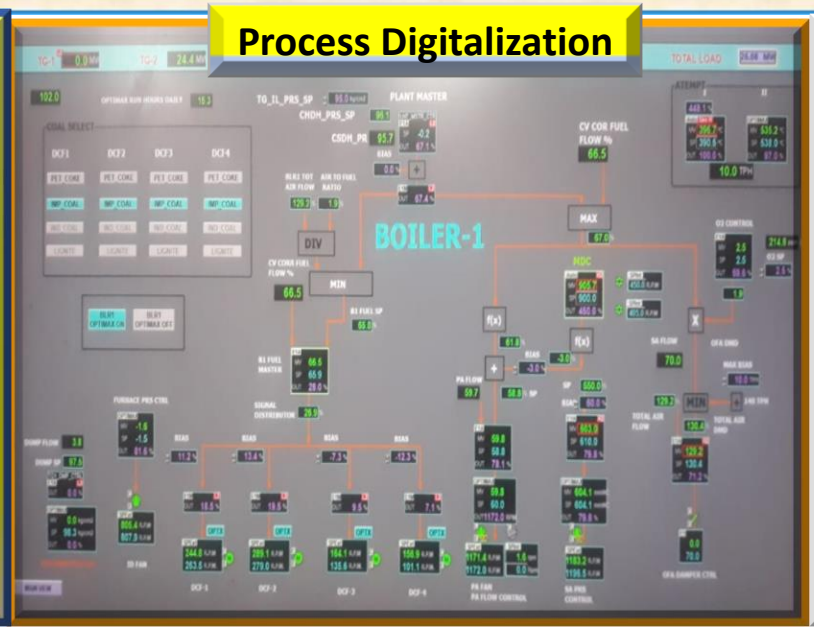


- Well Established energy management cell headed by FH Technical and DH TPP(Certified EM).
- Daily monitoring of Heat rate and Aux. power deviation report.
- Analysis of equipment performance for deviation.
- Identification of energy conservation project/work.
- Theme base suggestions/Kaizens scheme under "Energy Saving ".
- Feasibility study of suggestions & submit proposal for sanction.
- Preparation of detail action plan.
- Benefits analysis after project implementation.

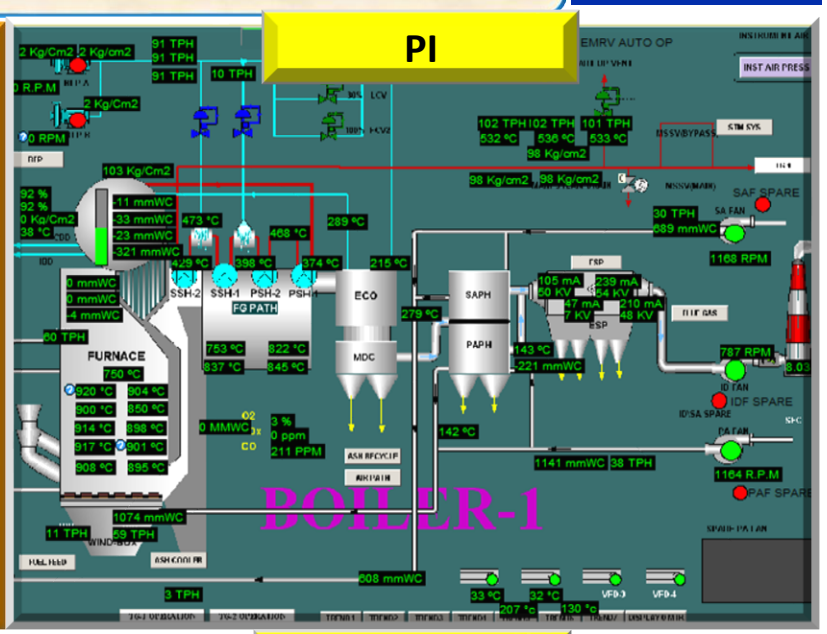
Teamwork, Employee Involvement & Monitoring

- **Process Digitalization (optimax):-** Improve the plant performance
- **PI Server :-** For online data monitoring
- **Asset Vista :-** Analysis parameters and generate the alarm
- **KM :-** For monitoring operation and retrieve video.
- **SCADA :-** Monitoring & Synchronization

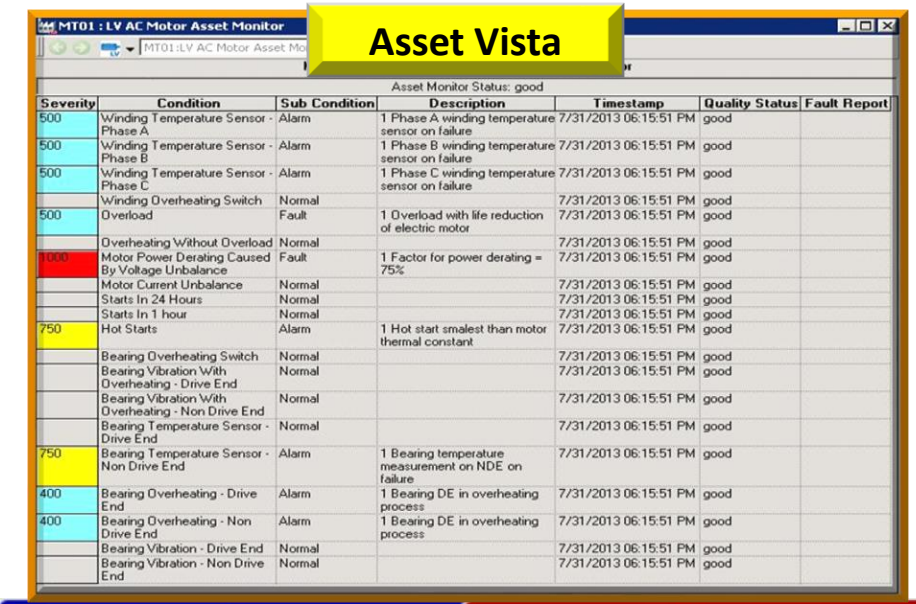
Process Digitalization



PI

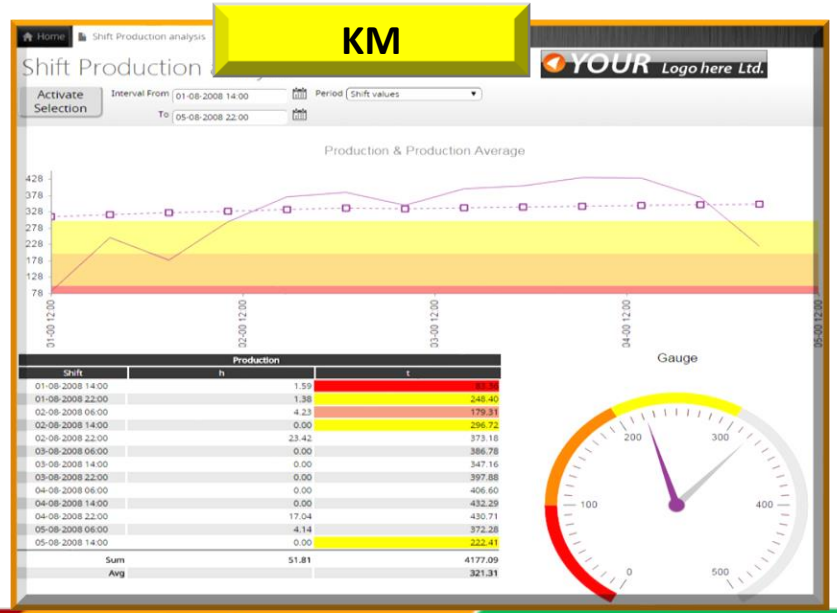


Asset Vista

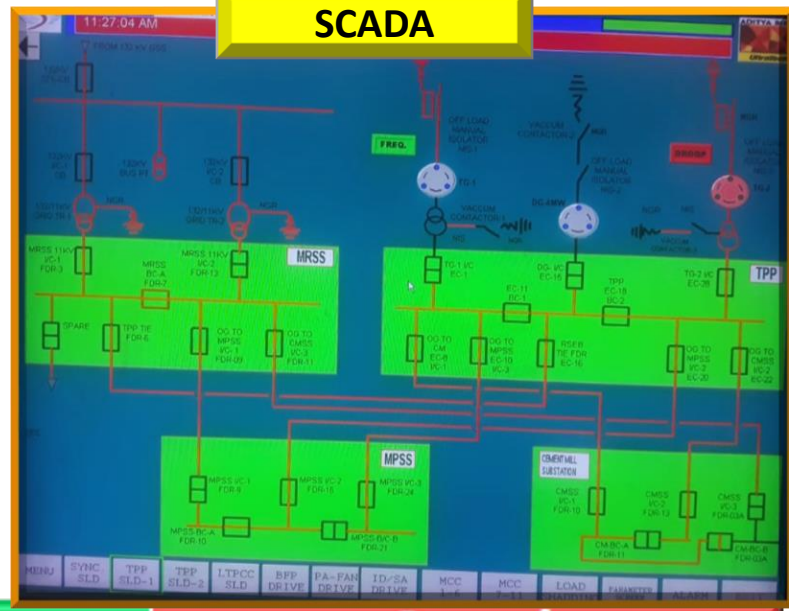


Severity	Condition	Sub Condition	Description	Timestamp	Quality Status	Fault Report
500	Winding Temperature Sensor - Phase A	Alarm	1 Phase A winding temperature sensor on failure	7/31/2013 06:15:51 PM	good	
500	Winding Temperature Sensor - Phase B	Alarm	1 Phase B winding temperature sensor on failure	7/31/2013 06:15:51 PM	good	
500	Winding Temperature Sensor - Phase C	Alarm	1 Phase C winding temperature sensor on failure	7/31/2013 06:15:51 PM	good	
	Winding Overheating Switch	Normal		7/31/2013 06:15:51 PM	good	
500	Overload	Fault	1 Overload with life reduction of electric motor	7/31/2013 06:15:51 PM	good	
	Overheating Without Overload	Normal		7/31/2013 06:15:51 PM	good	
1000	Motor Power Derating Caused By Voltage Unbalance	Fault	1 Factor for power derating = 75%	7/31/2013 06:15:51 PM	good	
	Motor Current Unbalance	Normal		7/31/2013 06:15:51 PM	good	
	Starts In 24 Hours	Normal		7/31/2013 06:15:51 PM	good	
	Starts In 1 hour	Normal		7/31/2013 06:15:51 PM	good	
750	Hot Starts	Alarm	1 Hot start smalest than motor thermal constant	7/31/2013 06:15:51 PM	good	
	Bearing Overheating Switch	Normal		7/31/2013 06:15:51 PM	good	
	Bearing Vibration With Overheating - Drive End	Normal		7/31/2013 06:15:51 PM	good	
	Bearing Vibration With Overheating - Non Drive End	Normal		7/31/2013 06:15:51 PM	good	
	Bearing Temperature Sensor - Drive End	Normal		7/31/2013 06:15:51 PM	good	
750	Bearing Temperature Sensor - Non Drive End	Alarm	1 Bearing temperature measurement on NDE on failure	7/31/2013 06:15:51 PM	good	
400	Bearing Overheating - Drive End	Alarm	1 Bearing DE in overheating process	7/31/2013 06:15:51 PM	good	
400	Bearing Overheating - Non Drive End	Alarm	1 Bearing DE in overheating process	7/31/2013 06:15:51 PM	good	
	Bearing Vibration - Drive End	Normal		7/31/2013 06:15:51 PM	good	
	Bearing Vibration - Non Drive End	Normal		7/31/2013 06:15:51 PM	good	

KM



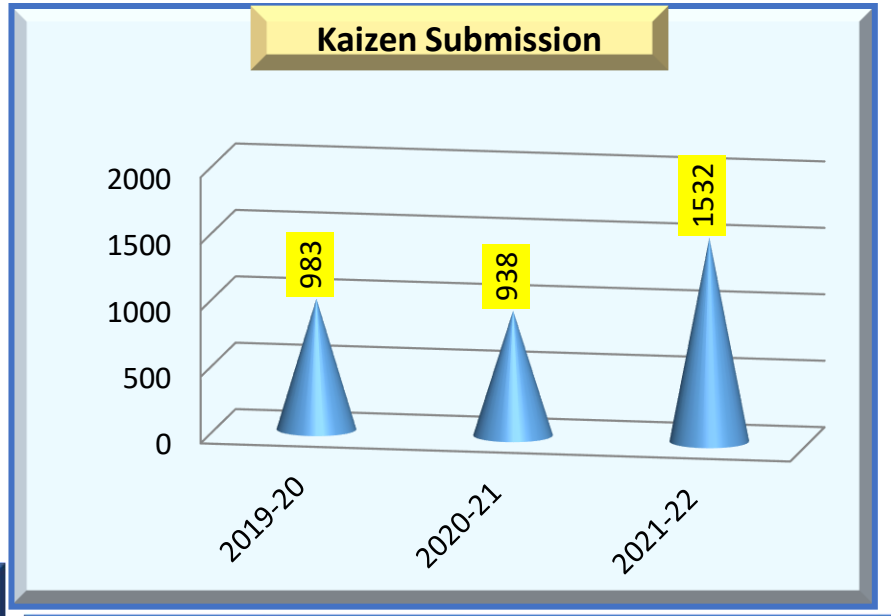
SCADA



Integrity | Commitment | Passion | Seamlessness | Speed

Project implementation through Kaizen

SN	Energy Conservation Idea	Status
1	Reduction the auxiliary cooling water pump pressure from 2.7 kg/cm2 to 2.5 kg/cm2	Completed
2	BFP replacement with energy efficient for saving the power	Completed
3	Single time start the Coal handling plant for filling the boiler bunker	Completed
4	Single compressor running by instrument and service air interconnection.	Completed
5	Utilization of ESP fist field Ash to coal bunker for recycle and reduction of LOI	Completed



"Energy Conservation Month" -August'22

Subject: "Energy Conserva

Dear KCWites,

I am happy to announce

- **"Energy conservation"** is the process of reducing energy use through changes in everyday behaviors and optimizing processes and operations.
- **"Energy efficiency"** is the goal of efforts to reduce the amount of energy required to provide products and services.

1. Energy Conservation suggestions by individual *(O&S, Wage Board and Contract Workmen)*
2. Energy Conservation suggestions by team *(GRT Team)*
3. Awareness campaign on Energy Conservation.
4. Energy Audit
5. Reward and recognition for High saving potential and feasible suggestions.

"By working together, we can contribute towards the cleaner and sustainable growth with help of short term and long term Energy conservations goals."


Kaizen Award

ISO Certification & Development on energy efficiency

Certificate ISO 50001

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the management system of

Ultratech Cement Limited

Unit: Kotputli Cement Works, Village: Mohanpura, Tehsil: Kotputli,District: Jaipur - 303108, Rajasthan, 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 and clinker

Certificate ISO 9001

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the management system of

UltraTech Cement Limited (Unit: Kotputli Cement Works)

(Unit: Kotputli Cement Works), Village & Post : Mohanpura, Tehsil: Kotputli, District: Jaipur - 303 108, Rajasthan, India

has been found to conform to the Quality Management System standard:

ISO 9001:2015

This certificate is valid for the following scope:

Manufacture of clinker & cement

UTCL IMS Policy

ADITYA BIRLA

UltraTech

ULTRATECH CEMENT LIMITED

UNIT: KOTPUTLI CEMENT WORKS

ENERGY MANAGEMENT POLICY

We are committed to demonstrate excellence in Energy performance in all our activities of manufacturing of cement and clinker on a continual basis so as to make our operations environmentally sustainable for future.

We shall achieve this by :

- *Monitoring and control of energy consumption through effective energy management system and periodic energy audit.*
- *Continuous up-gradation of process with energy efficient and ecofriendly technology, support the purchase of energy efficient product, services and design, for continual improvement of Energy performance.*
- *To ensure the availability and providing information & resources to promote and propagate energy awareness among all employees to achieve objective and targets.*
- *Recognizing efforts of our employees in energy conservation initiatives.*
- *Benchmarking our performance with best and starving to beat the best.*
- *Meeting all statutory & legal requirements and other requirements.*

Unit Head

Revision No.: 02 *Date: 10/11/2014*

- Energy Conservation related projects impacting and contributing for natural resources conservation are being approved immediately by the management.
- Conduct the training for awareness of energy conservation.

Awards & Accolades

National Energy Conservation Award 2017

We have been honoured by the Honourable president of India for energy conservation in 2017

Awards & Accolades

UltraTech Cement Limited, Kotputli Cement Works, CPP

Nitin Duraphe

Unit head

Excellent Energy Efficient Unit

"Energy conservation" is the process of reducing energy use through changes in everyday behaviours and optimizing processes and operations

Team Members

Unique Achievements

- TPP Heat Rate from -3201 to 2982 Kcal/Kwh
- TPP Auxiliary power From 13.50 to 7.35 %
- TPP raw water consumption from 0.24 to 0.19 m3/MW
- Renewal Power share –WHRS initiated from -0.0 to 40 %

Excellence Energy Efficient unit award in Fy-21

- ❑ Energy Efficient Unit Award In year 2014 to 2017.
- ❑ Water Efficient Unit Award in year 2012.
- ❑ Water efficient unit award In year 2016 & 2017.
- ❑ Commendation Certificate by the Ministry of Power, year 2012-13.

ADITYA BIRLA
UltraTech

The less you burn, the more you earn

CII

Kotputli Cement Work's
Unit :- Ultratech Cement Limited
Hari Kishore Chaturvedi
Assistant Vice Precedent

Thanks'

Integrity | Commitment | Passion | Seamlessness | Speed