UltraTech Cement Limited
(Unit: Kotputli Cement Works-Power Plant)

Welcome to CII

19th National Award for Excellence in Energy Management 2018

Participants

- ***Pintoo Dodiya (Assistant Manager)***
- ***R.N.Tripathi (Assistant Manager)***
- ***Harish Mittal (Assistant Engineer)***

Contents

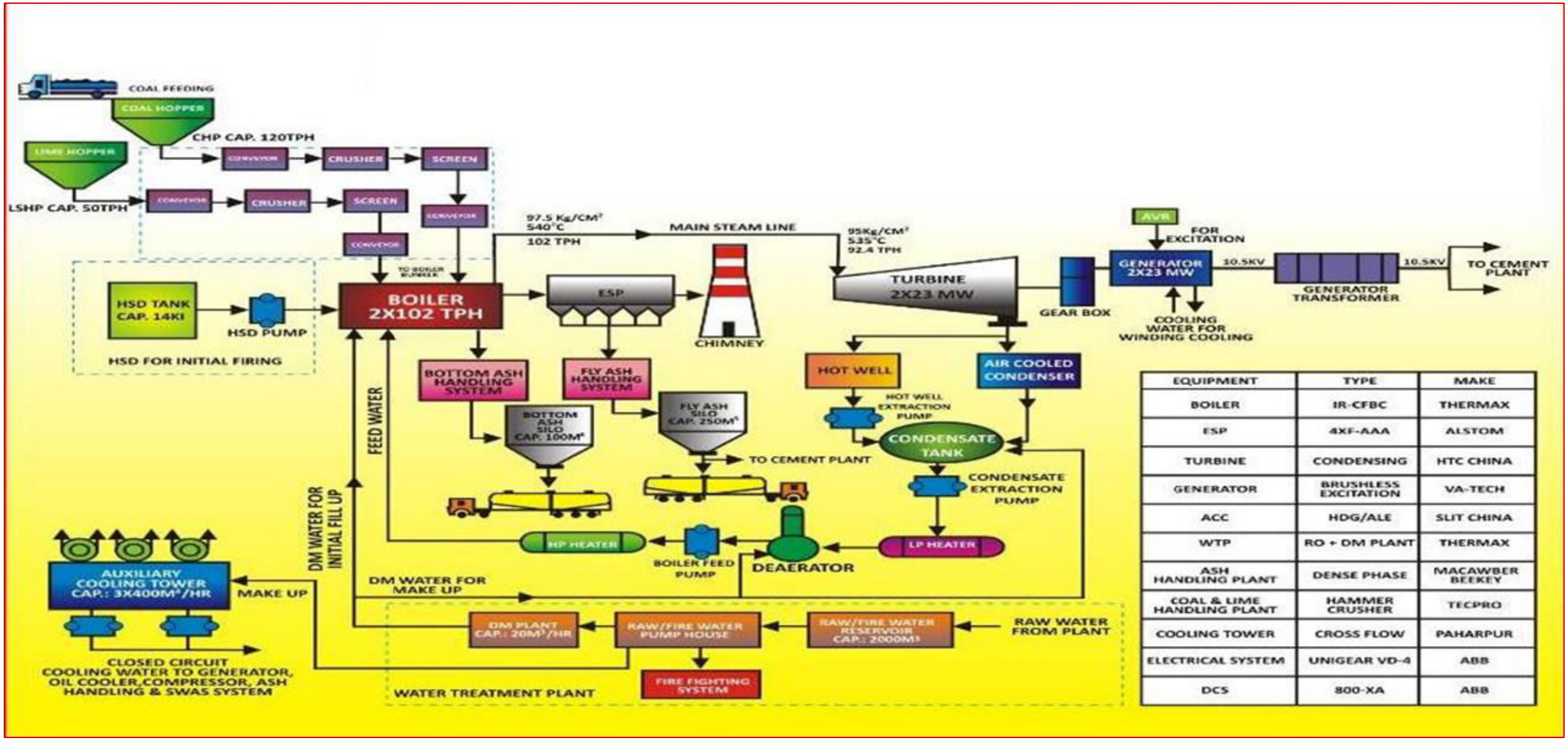
- Company profile and Flow diagram
- Specific energy consumption data in last 3 years
- Information on competitor and Bench marking
- Energy saving projects implemented in consecutive 3 years
- Major innovative projects implemented in FY'17-18
- Utilization of renewable energy
- GHG Inventorisation
- Team work employee involvement & monitoring
- Implementation of ISO 50001
- Awards & Accolades

Profile

- UltraTech Cement……

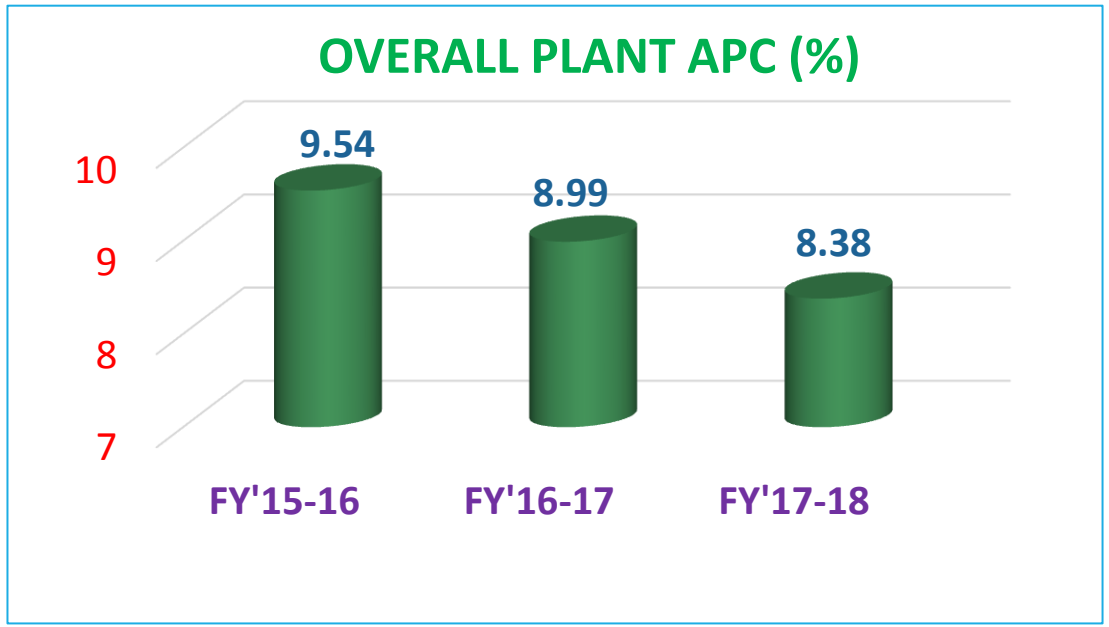
- ❑ Kotputli Cement Work
- ❑ An Aditya Birla Group Company.
- ❑ 2X23 MW Captive Power Plant
- ❑ 3.3 MTPA capacity Green field Cement plant.
- ❑ Certified with ISO 9001, 14001, OHSAS 18001 , ISO 27001, ISO 50001 & ISO 17025.
- ❑ UltraTech-Kotputli TPP won First prize in “National Energy Conservation Award- 2017” by Ministry of Power 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 four years at CII –Hyderabad
- ❑ Adopted World Class Manufacturing Excellence Model

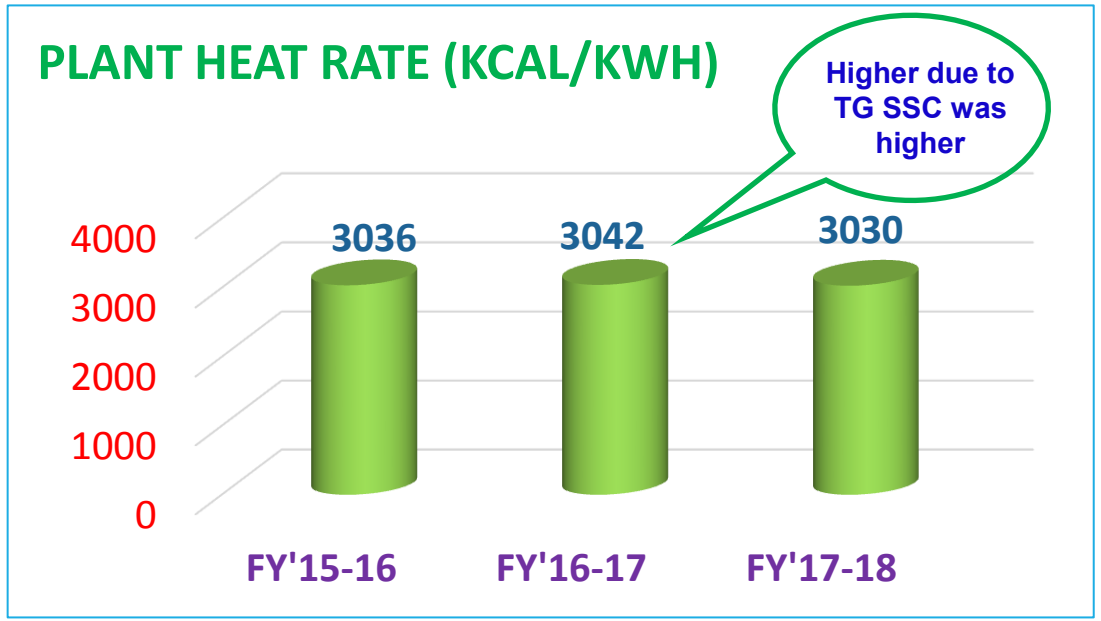
Process flow diagram

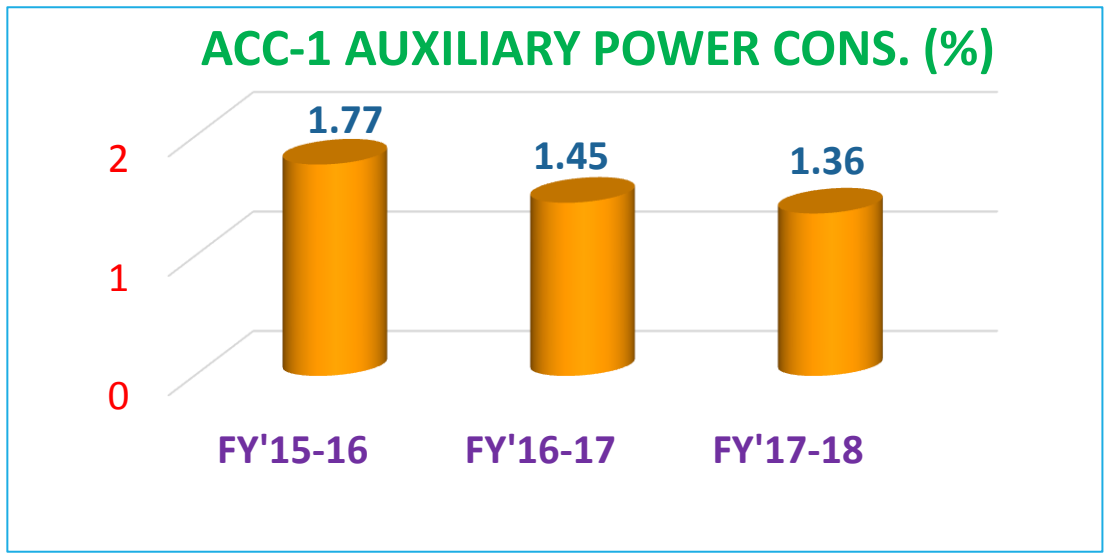


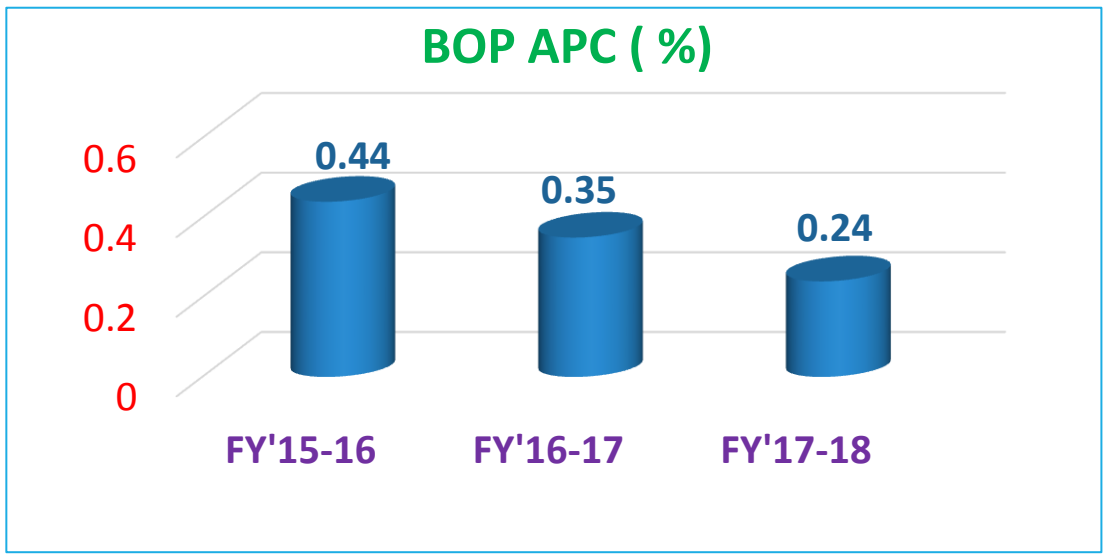
EQUIPMENT	TYPE	MAKE
BOILER	IR-CFBC	THERMAX
ESP	4XF-AAA	ALSTOM
TURBINE	CONDENSING	HTC CHINA
GENERATOR	BRUSHLESS EXCITATION	VA-TECH
ACC	HDG/ALE	SLIT CHINA
WTP	RO + DM PLANT	THERMAX
ASH HANDLING PLANT	DENSE PHASE	MACAWBER BEEKEY
COAL & LIME HANDLING PLANT	HAMMER CRUSHER	TECPRO
COOLING TOWER	CROSS FLOW	PAHARPUR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

Specific Energy consumption









National Benchmarking

ADITYA BIRLA UltraTech

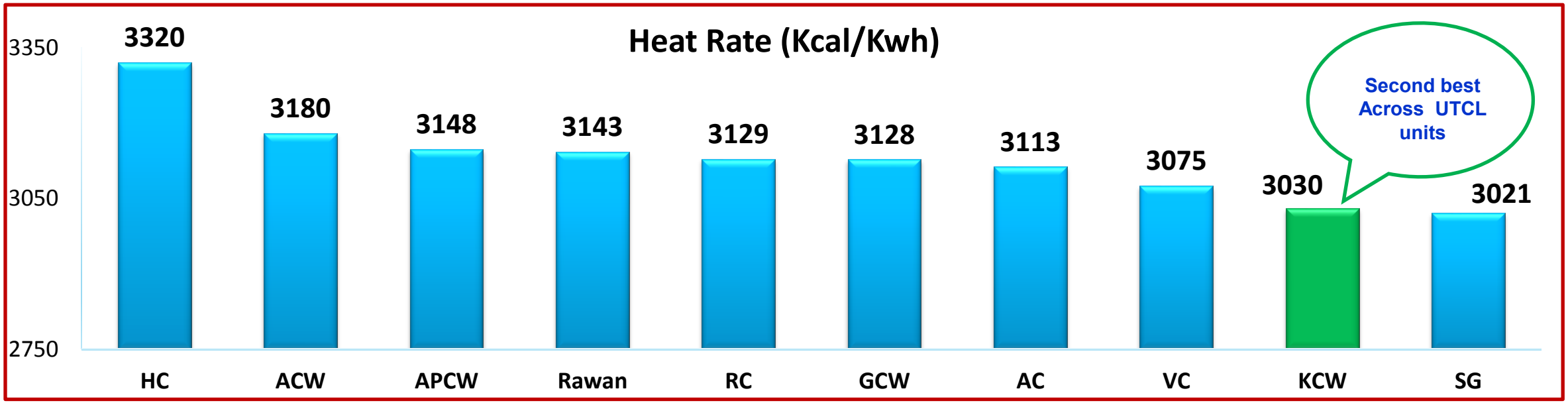
3.15 CAPTIVE POWER PLANT

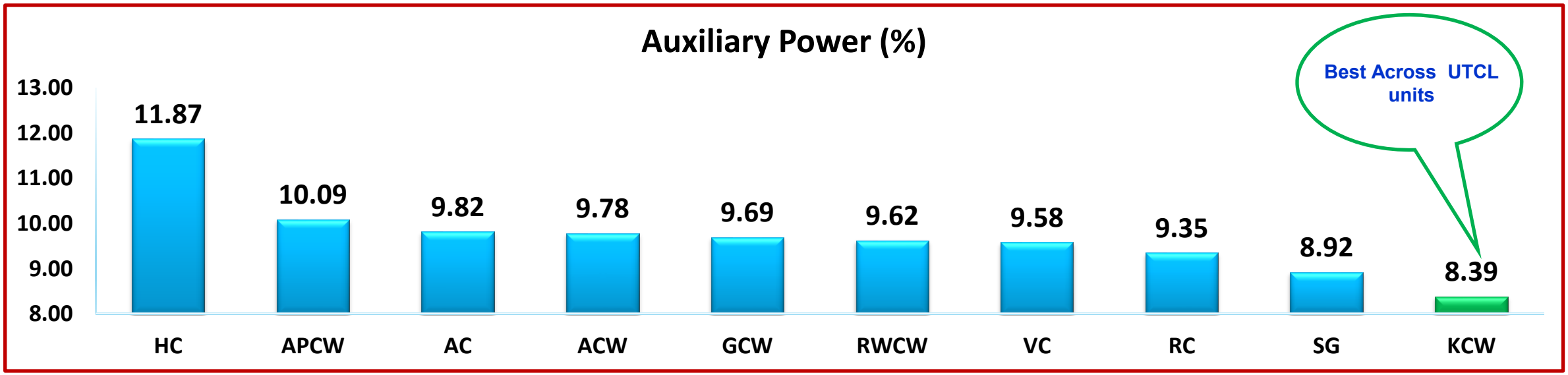
Parameter	Unit	Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6	Plant 7	Plant 8	Plant 9	Plant 10	KCW
Installed capacity	MW	15	30	9	15	17.5	12.5	25 x 2	15	17.5	17.5	2X23
Type		AFBC	AFBC	AFBC	AFBC	AFBC	AFBC	CFBC	AFBC	AFBC	AFBC	CFBC
PLF	%	82.3	68.5	88.5	65	84	88	97.4	64	77.8	85	80.8
Heat rate	Kcal/kWh	3250.36	3127	3040	3148	3018	3490	2932	3495	3035	3074	3030
Coal CV	Kcal / kg	5268.83	5503	3204	4062	3213	Petcoke +Lignite (NCV): 4940	6475	4981	3175	3205	7562
LOI – Bed ash	%	20.1	19.42	<1	5.12	<1	0.4-0.5	3.73	14.21	<1	<1	2.5
Inst header pressure	Bar	5.5	5.5	6	5.2	6	6	6.4	5.5	6	6	5.5
Fly ash tpt pressure	Bar	4.5	4	5	3.5	5	4.5	5.2	4	5	5	4.5
APC	%	7.97	8.53	8.96	9.1	9.3	9.5	9.51	9.56	9.56	9.69	8.38

Ref- For International Benchmark BEE presentation during interactive workshop on normalization factor in Ahmedabad

Ref. For National Benchmark Data Best Thermal energy efficiency award by NCCBM for FY2014-15.

Benchmarking With UTCL Units 2017-18





Road map for Benchmarking

- ***Plant Digitalization and installation of Optimax software for boiler efficiency improvement (saving in HR 26 kcal/kwh).***
- **Overhauling of TG-1 for Heat Rate improvement (saving in HR 67 kcal/Kwh)**
- **Improvement of PLF by power wheeling to other sister units in group.**
- **Existing ETP Pump replacement with Grundfos make energy efficient pump.**
- **Installation of Energy efficient 3 phase rectifiers for ESP.**
- **Installation of VAM in place of existing package AC.**
- **ACC-1 all fan replacement with Energy efficient fan blade (Encon.)**

Energy Savings Projects with No Investment (2015-16)

SN	Energy Saving Projects	Saving Achieved		
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)
1	Improved heat rate of TG-2 by operating with higher vacuum	-	313	1.65
2	Intermittently stopped service air compressor to avoid idle running during pet coke usage & DP level in ESP hoppers.	340.5	-	1.25
3	Developed a logic (Auto set point calculation) for BFP discharge pressure w.r.t. steam drum pressure.	320.2	-	1.19
4	Developed a logic (Auto set point calculation) for CEP discharge pressure w.r.t. deaerator pressure.	268.6	-	0.96
5	Reduction of both boiler ESP field power by changing charging ratio with respect to fuel types.	278	-	0.93
6	Adiabatic cooling system for inlet air of ACC Fans in unit-1	216	-	0.73

Energy Savings Projects with No Investment (2015-16)

SN	Energy Saving Projects	Saving Achieved		
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)
7	Through put increased & run hours reduction of CHP by using Belt power feedback display on DCS.	164.3	-	0.55
8	Indigenous development of auto import -export logic during power export.	150.7	-	0.50
9	Reduced Instrument air pressure set point from 6.5 kg/cm2 to 5.8 kg/cm2 (gradually in two phase).	72.6	-	0.26
10	WTP running hours reduction by commissioning & utilising dump steam system.(Savings of 06 Months)	48.4	-	0.16
11	Reduction in BAC fan air flow from 22 to 19 TPH	46.2	-	0.15
12	Reduction in idling hours by implementing remote operation of Fly ash compressors.	18.2	-	0.06

Energy Savings Projects with Investment (2015-16)

SN	Energy Saving Projects	Saving Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	Rs. Million		
1	Up keepment of steam turbine-2 to improve heat rate	-	1342	7.07	2.61	4
2	Reduction in power consumption of air conditioners by using Nano technology & installing water cooled condensers	203.6	-	0.69	0.20	4
3	Installation of separate energy efficient side stream filter pump (Grundfos Make) for cooling tower to reduce power from existing ACW pump.	17.3	-	0.06	0.05	10
4	Usage of renewable (solar)energy for lighting at HSD area .	5.6	-	0.02	0.14	88

Energy Savings Projects with No Investment (2016-17)

SN	Energy Saving Projects	Saving Achieved		
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)
1	Reduction of BFP power by developing discharge pressure biasing.	330		1.09
2	Reduction in Boiler PA Fan KW by optimizing the PA Air flow according the boiler load	264		0.87
3	Condensate interconnection to reduce heat loss (From Aug-16 to Mar-17)		4.12	0.03
4	Reduction in SAC running hours through ESP hopper level by Draft transmitter.	165		0.54
5	Utilising lower CFM & KW compressor for Fly ash conveying	66		0.22
6	Usage of 90% Pet coke in fuel mix & Reduction in CHP power by increasing through put	66		0.22

Energy Savings Projects with No Investment (2016-17)

SN	Energy Saving Projects	Saving Achieved		
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)
7	Reduction in AC & lighting power	33		0.11
8	Reduction in ID fan power consumption due low bed ash cooler running hour	33		0.11
9	Reduction in BLR SA fan KW by optimizing the SA air pressure.	31.68		0.10
10	Reduction in instrument air compressor power by optimizing the air flow in BLR MDC sealing	31.68		0.10
11	Silo bag filter purging air pressure reduction	26.4		0.09
12	CEP power cons. reduction by inter connecting condensate line during unequal loads on TG.	8.25		0.03

Energy Savings Projects with No Investment (2016-17)

SN	Energy Saving Projects	Saving Achieved		
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)
13	Reduction of RO Degasser transfer pump power consumption by utilising old CT sump as storage	3.56		0.01
14	Reduction of raw water pump running hours by continuous make up of cooling tower	1.81		0.01
15	ACW pump power reduction by optimizing the CW flow of equipment's according the ambient temp.	39.6		0.13
16	Use of Raw Mill dust to reduce sensible heat loss due to bed drain & Usage of High GCV fuel in the boiler to achieved higher boiler efficiency.		81.22	0.52
17	Reduction in import of Grid power (Diff. @ Rs 2.8 in Power generation cost against Grid Power)	896		2.50
18	Power Sale to other group units (Difference @ Rs 1.86 in Power generation cost against Grid Power)	5257		9.78

Energy Savings Projects with Investment (2016-17)

SN	Energy Saving Projects	Saving Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	Rs. Million		
1	TG 1 ACC fan 2 VFD installation	115.5		0.38	0.42	13
2	Replacement of TG 1 MOP with high efficiency pump	79.2		0.26	0.16	7
3	Bed ash cooler fan outlet duct inter connection	69.3		0.23	0.1	5
4	Boiler-1 BAC fan VFD installed	69.3		0.23	0.42	22
5	Cooling tower fan VFD installed	33.99		0.11	0.15	16
6	Power reduction by Installation of submersible pump in main effluent pit for transfer to mines.	11.88		0.04	0.038	12

Energy Savings Projects with Investment (2016-17)

SN	Energy Saving Projects	Saving Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	Rs. Million		
7	Utilisation of TG-2 1st extraction steam in PRDS for ejector (From Nov-16 to Mar-17)	4.8	50.05	0.33	0.45	16
8	Lighting power optimisation.	6.6		0.02	0.02	11
9	LOI reduction in fly ash by U beam straightening to improve ash circulation rate & by MDC replacement		307.31	1.96	0.63	4

Energy Savings Projects with No Investment (2017-18)

SN	Energy Saving Projects	Saving Achieved		
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	(Rs. Million)
1	Cooling tower fan temperature control PID set point increased from 30 to 30.5 deg C for power saving.	10.35		.05
2	Boiler feed pumps pressure biasing set point reduction from 7 kg/cm2 to 6.3 for power reduction.	99.36		.45
3	Stopped root blower for fluidizing in fly ash silo & used its service air for silo fluidization.	12.42		.06
4	CHP bag filter damper throttling for power reduction.	27.60		.12
5	CEP discharge Condensate line interconnection to reduce heat loss due to make-up water.		16	.15
6	Installation of low pressure compressor for feeding Raw meal powder in to bunker.	20.7		.09

Energy Savings Projects with Investment (2017-18)

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SN	Energy Saving Projects	Saving Achieved			Investment (Rs. Million)	Pay back Month
		Electrical Energy (MWH)	Thermal Energy (Ton/Year)	Rs. Million		
1	Replacement of ACC-1 HDG tube bundles with SRC tube bundles & Improved heat rate of both TG by operating with higher vacuum. (Commissioned in the month of Dec-17)	296.78	256	3.64	42	32
2	Installation of VFD in Bed ash cooler fan of Unit-2	113.85	-	0.51	.42	10
3	02 Nos Fan blade change in ACC-2 with energy efficient fan blade(Encon.)	183.9	-	0.83	.95	14
4	Interconnection of Instrument Air with service air & utilizing instrument air compressor with VFD	345.0	-	1.56	0.02	1
5	Fly ash recycle to bunker line erection of ESP -1 filed in both boilers.		184	1.68	0.5	4
6	Energy efficient lube oil pump	33.12		0.15	0.16	13

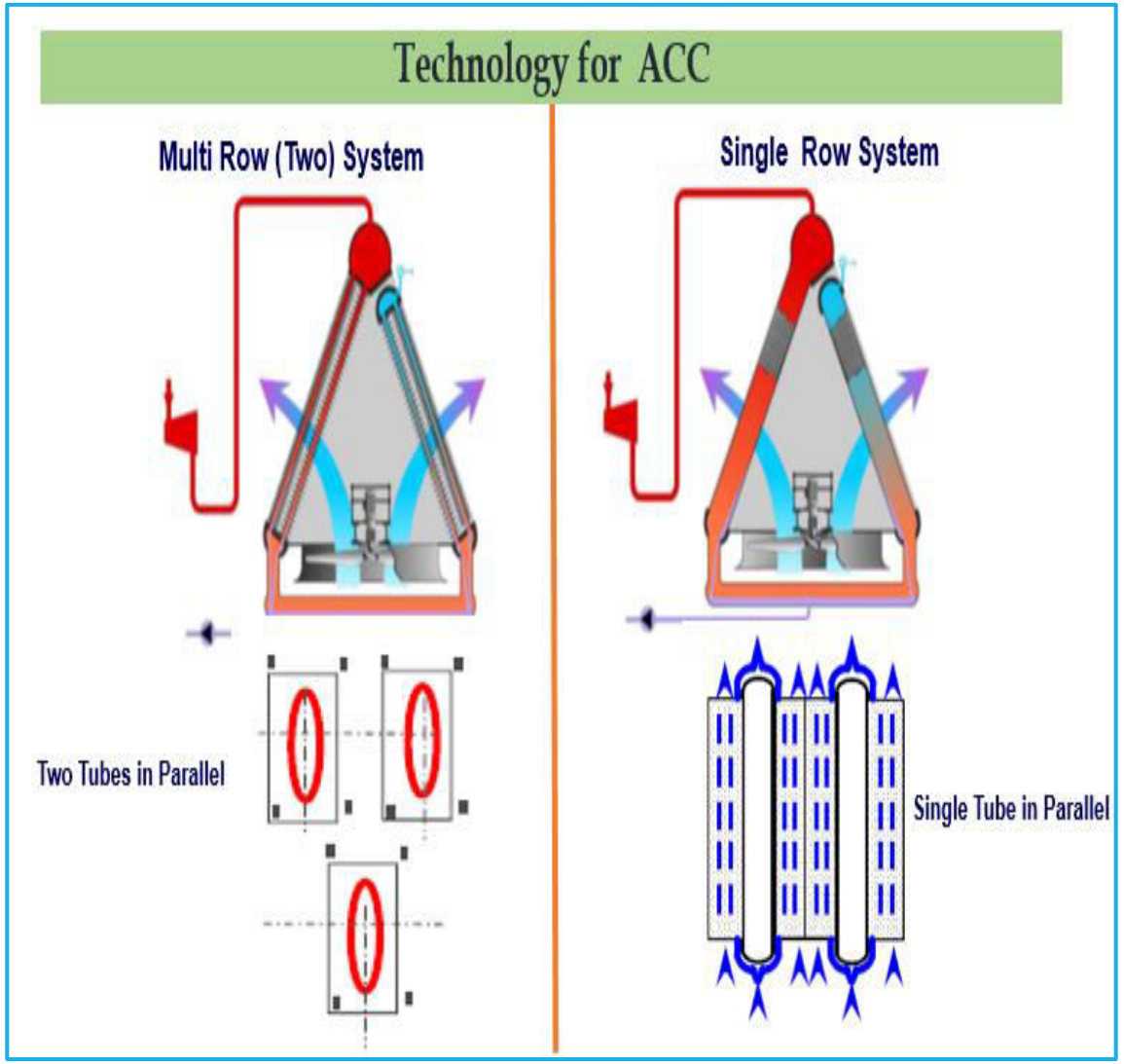
Project -1# ACC HDG Tube bundle replacement with SRC bundle

Approach:

- Brainstorming within team & explored opportunity for low cost & efficient alternative technology within & outside India.

Technology Adoption:

- Approached new technology supplier having ACC-Single Row Condenser (SRC) technology at low cost & high heat transfer efficiency resulting lesser heat & power consumption.
- Heat transfer co efficient:
- MRC-HDG- 26.79 Kcal/M2 Hr deg
- SRC ALE- 36.18 Kcal/M2 Hr deg



Project -1# ACC HDG Tube bundle replacement with SRC bundle

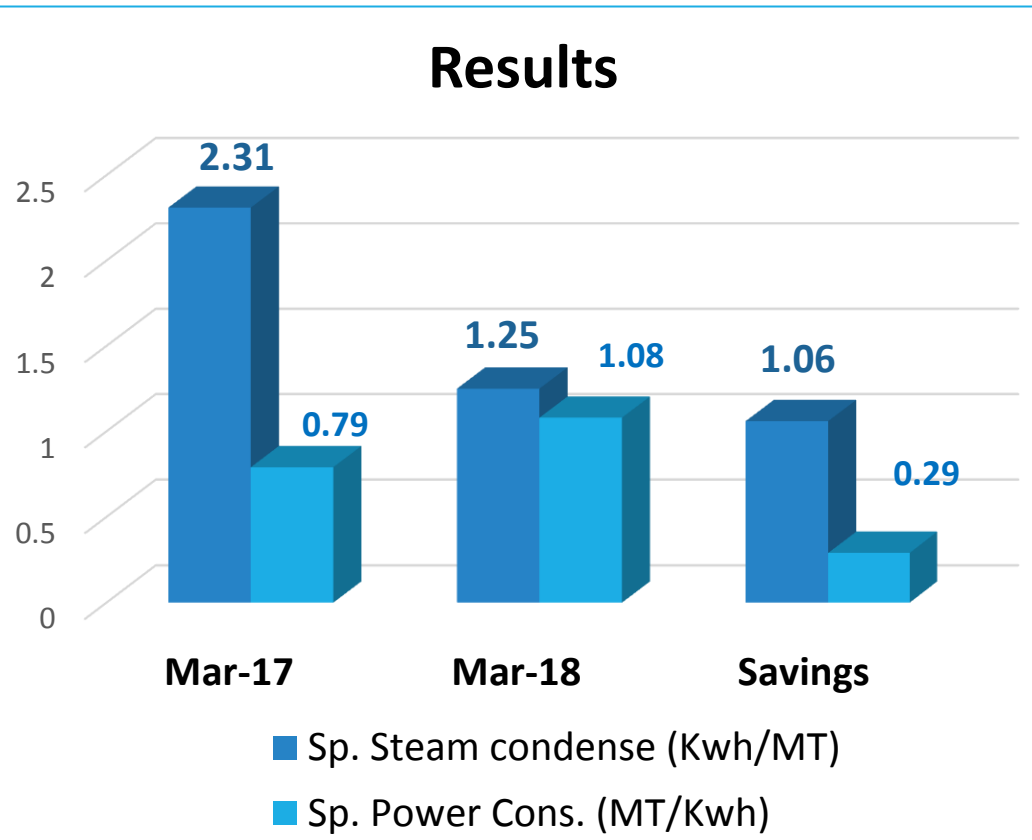
❑ Result Achieved:

Tangible Benefits-

- Savings of Rs. 24.25 Lacs due to savings in Fuel(for 3 month Jan-March).
- Savings of Rs. 5.26 Lacs due to savings in Aux. Power.

Intangible Benefits-

- Able to run TG on full load at Peak ambient temperature.
- Capable to fulfil the power requirement of Customer.
- Wheeled Power to Sister Unit.
- Higher Vacuum operation of Turbine.



- Power requirement for Steam condensing reduced **by 1.06 Kwh/MT**.
- Steam condensation increased **by 0.29 MT/Kwh**.

Project-2 # Instrument and service air Inter connection for Utilization of maximum VFD drive compressor.

- Theme: Capacity Utilization of VFD drive compressor instead of DOL operated service air compressor .

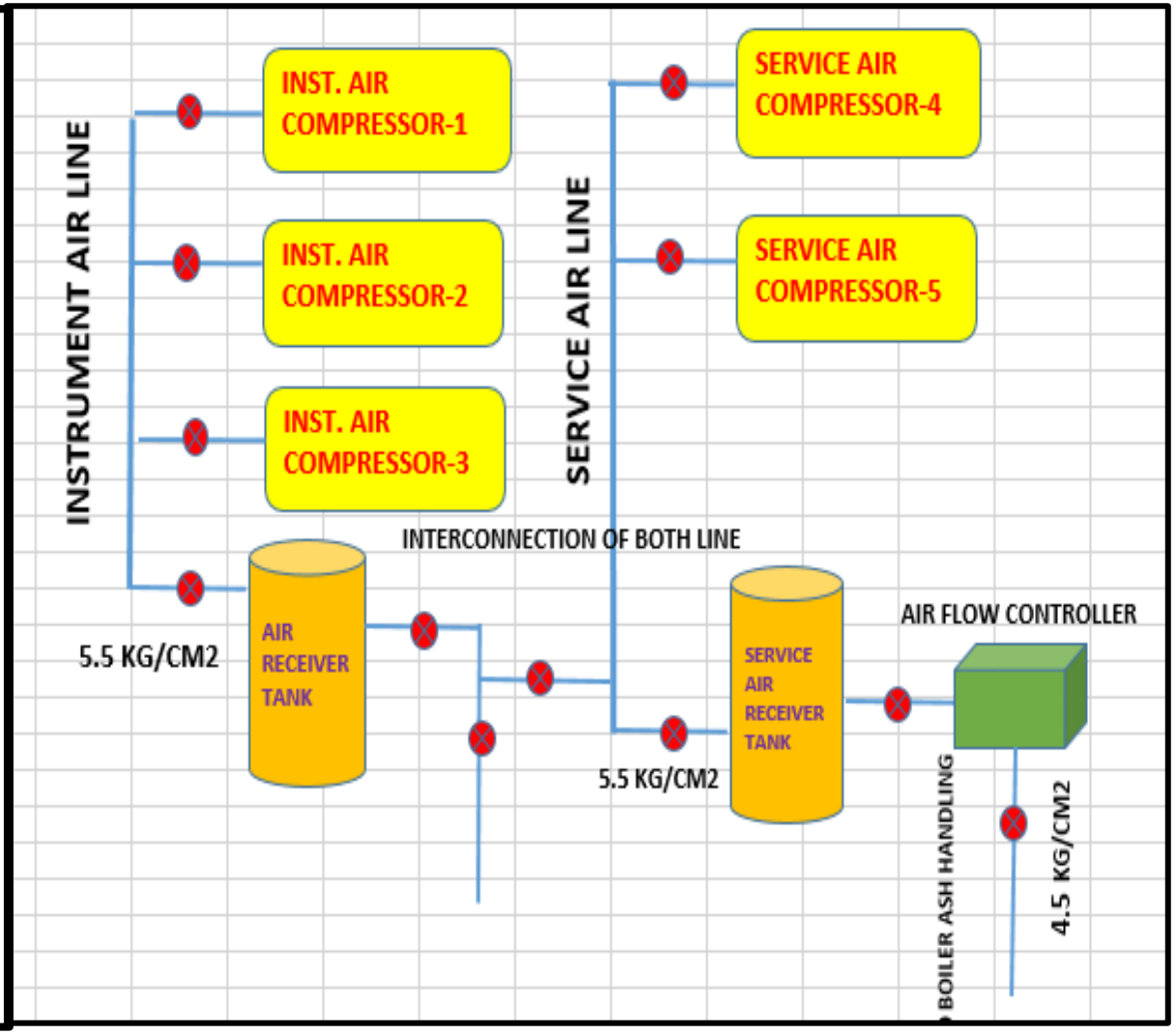
- **Approach:**

  Brainstorming within team & explored opportunity for:

  - Change DOL drive compressor with VFD drive.
  - How can get maximum out put of VFD operated and partial loaded instrument compressor.

- **Technology Adoption:**

  Inter connected both air supply line with control valve and further air pressure obtained for both by individual smart flow controller as according to required process.



Project-2 # Instrument and service air Inter connection for Utilization of maximum VFD drive compressor.

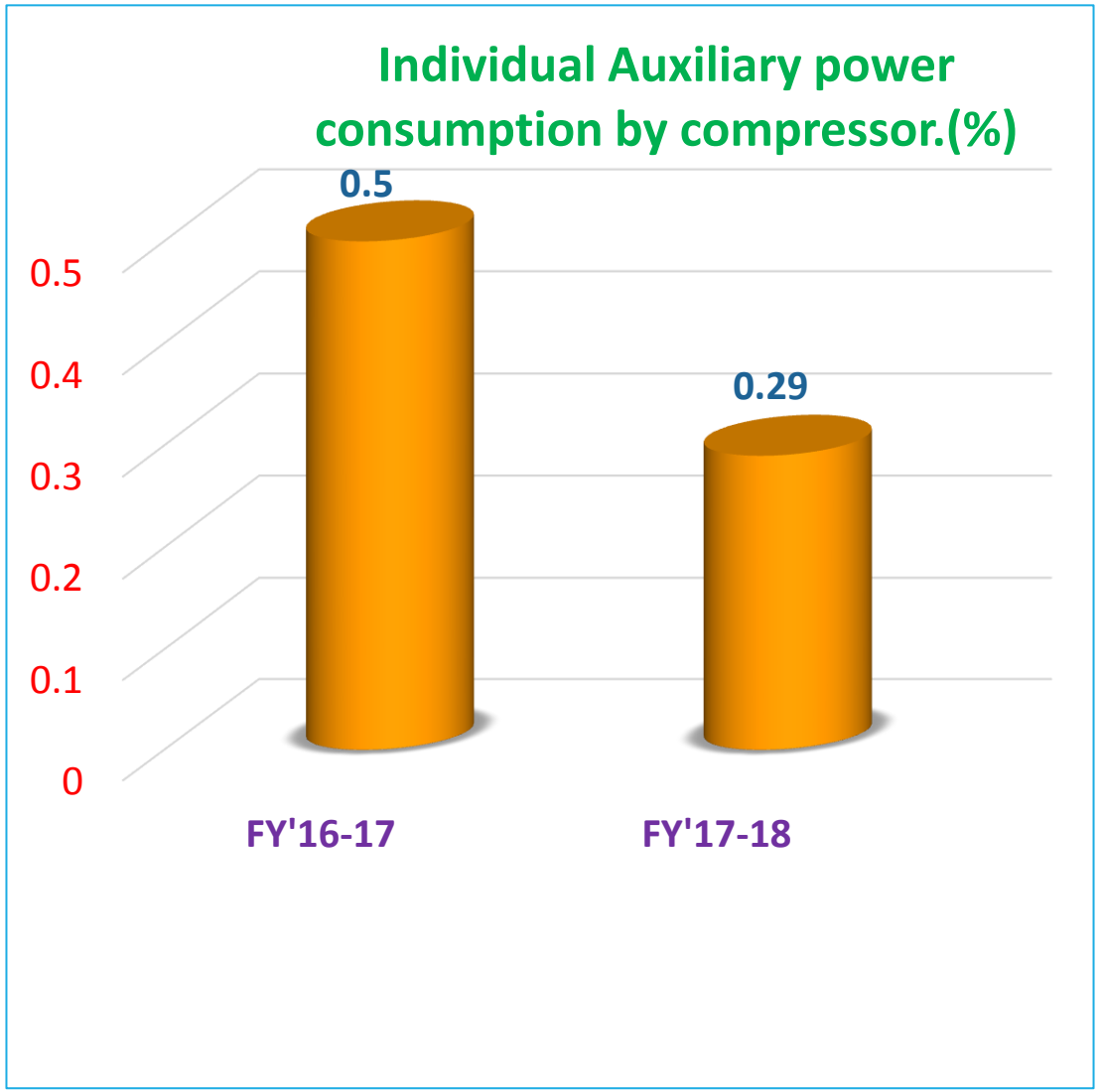
❑ ***Result Achieved:***

Tangible Benefits-

- Savings of Rs. 15.6 Lacs due to savings in auxiliary power.

Intangible Benefits-

- Able to minimize surrounding area noise by running single compressor instead of two.



Project-3 #ACC fan blade replacement with energy efficient fan blade

- **Theme: ACC fan replacement with energy efficient fan.**
  - **Approach: by Optimizing Fan dia. & no. of Blades**
  - **Efficiency** η = Q x TP

    Q = Airflow (M3 / Second)

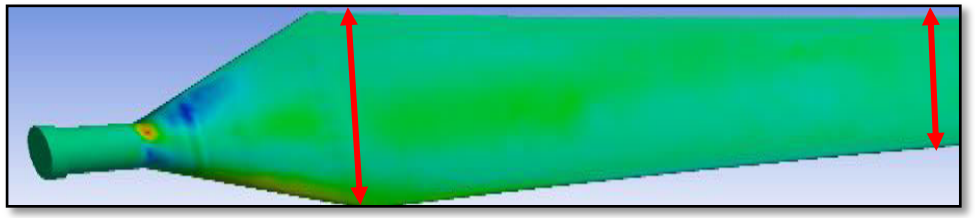
    TP = Total pressure (Pascal)
- **Technology Adoption:**

1-Selection of High-Grade FRP

2- UV Degradation (Epoxy Resin) Composites

3-Higher dampening property

4-Uniform air flow causing less turbulence and avoid flickering forces on the structure



Old Design:

- **Dimensions of Fan blades at shoulder (590mm), Tip (590mm)**
- **The blade Tip angle (31 Deg), shoulder (45 Deg)**

New Design:

- **Dimensions of Fan blades at shoulder (820 mm) and Tip (290 mm)**
- **The blade Tip angle (20 Deg), shoulder (40 Deg)**

Project-3 #ACC fan blade replacement with energy efficient fan blade

ADITYA BIRLA
UltraTech

❑ ***Action Taken:***

- Replaced Existing ACC Fan blades with new energy efficient fan blade in Fan - 1 and 4 of Unit-1.

❑ ***Benefit Achieved:***

- Conducted Pre and post flow measurement of ACC Fan in which blades replaced.
- Achieved power consumption reduction by 25% and improvement in flow by 10 % at full speed.
- Resulting saving of Rs. 1.68 Lacs per annum per ACC fan.

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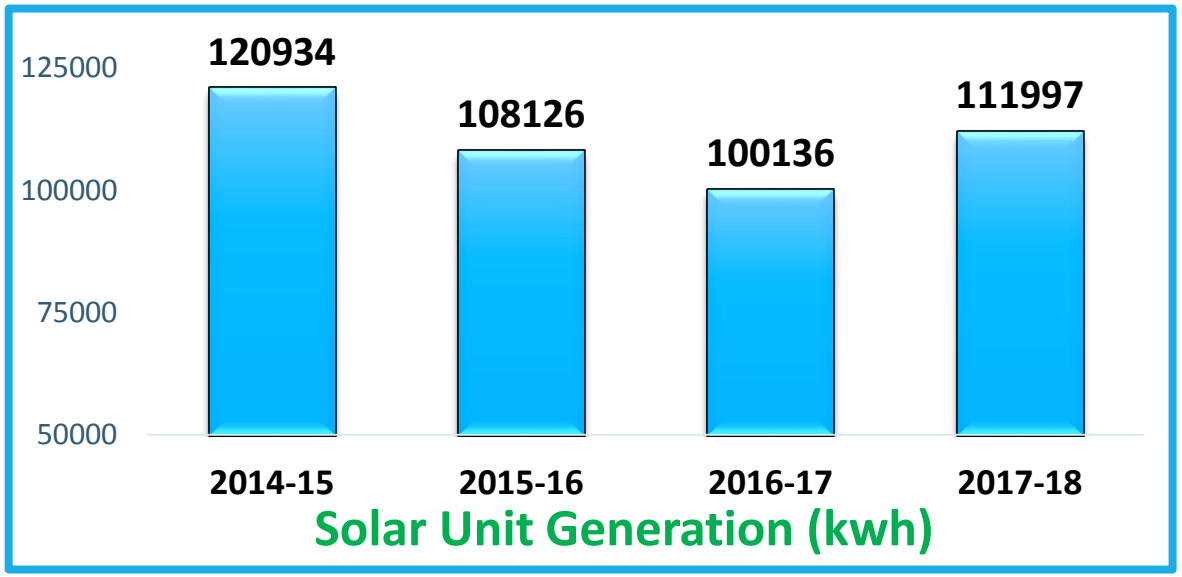
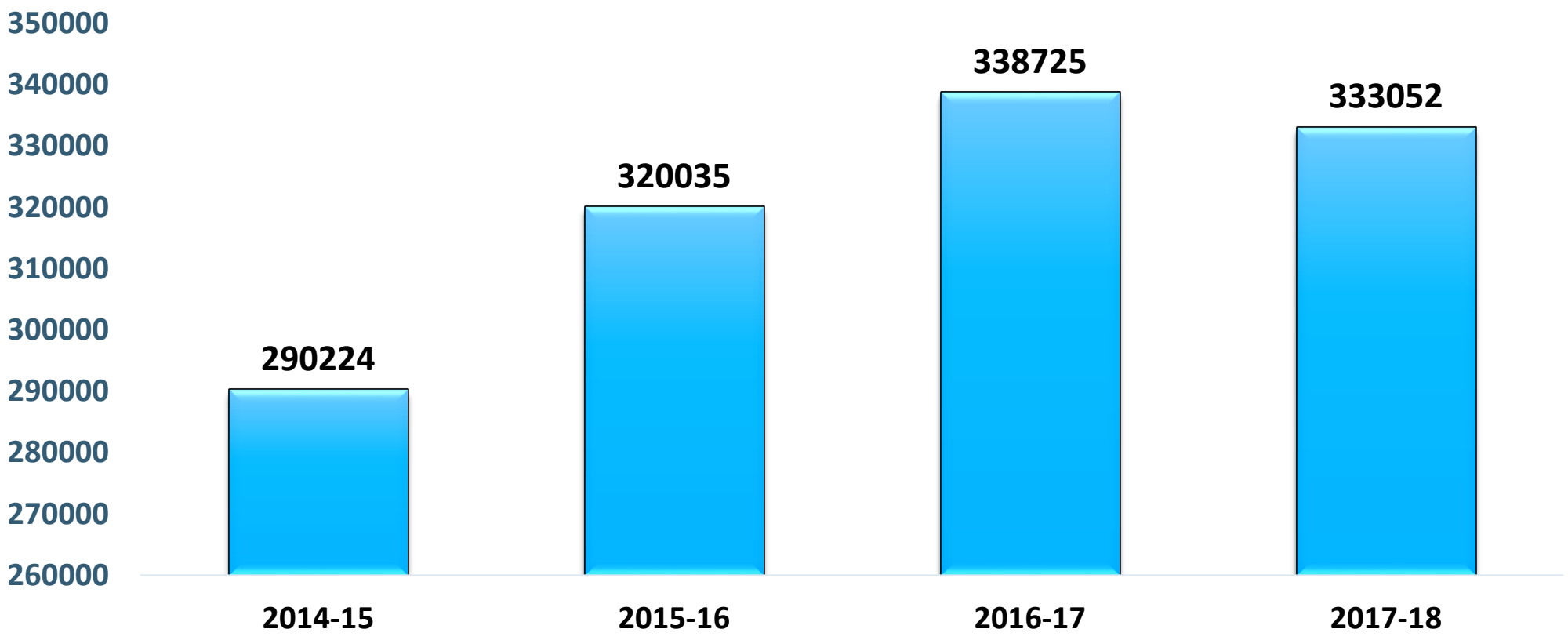
Utilization of renewable energy sources

Usage of renewable energy for lighting at TPP HSD Area:

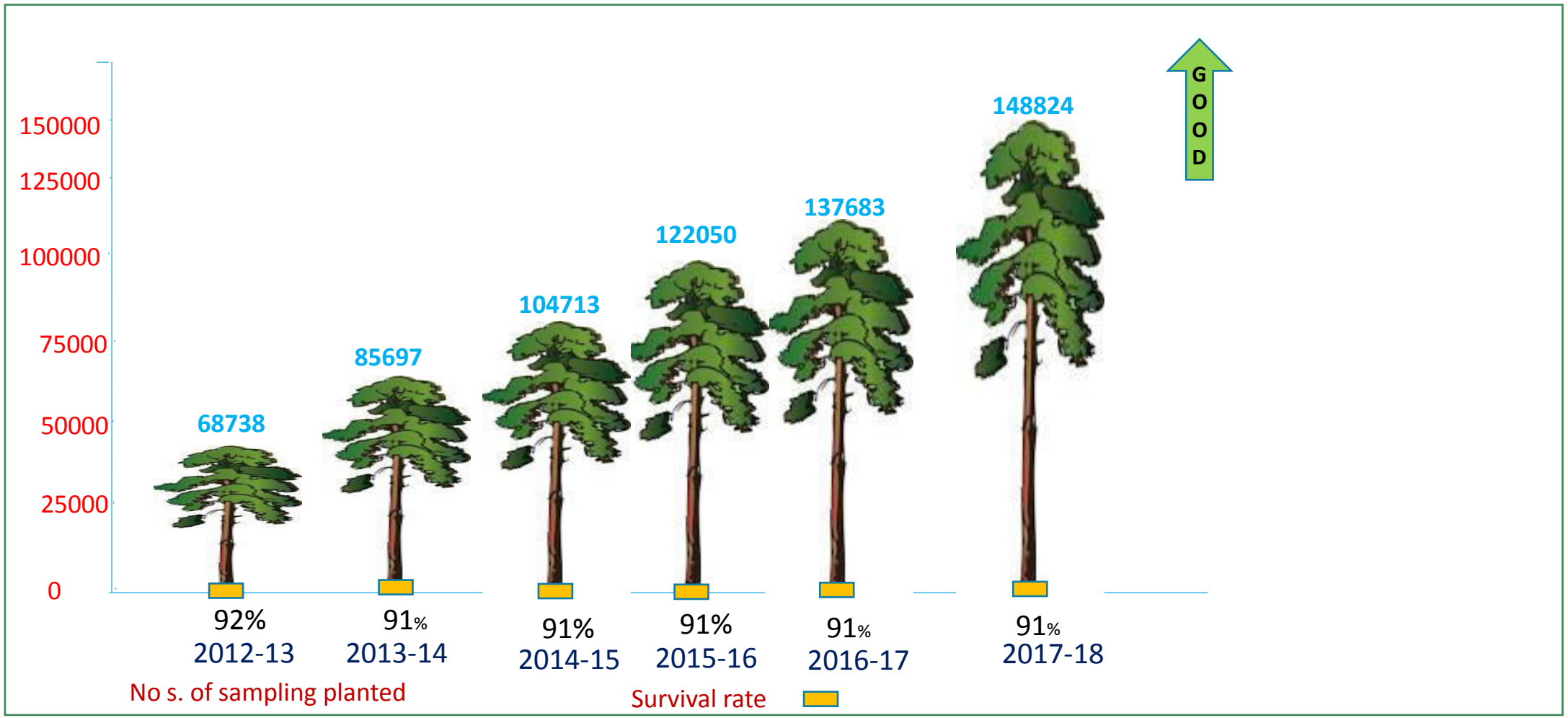
- *Installed Solar Power Generation at HSD area : 1000Watts*
- *Solar energy : 0.04 % of total power share*



GHG Inventorisation



Green Belt Development (Plant, Colony & Mines)



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

Green Belt Development & environment initiatives

Sapling Distribution to Villagers

Green Belt Development

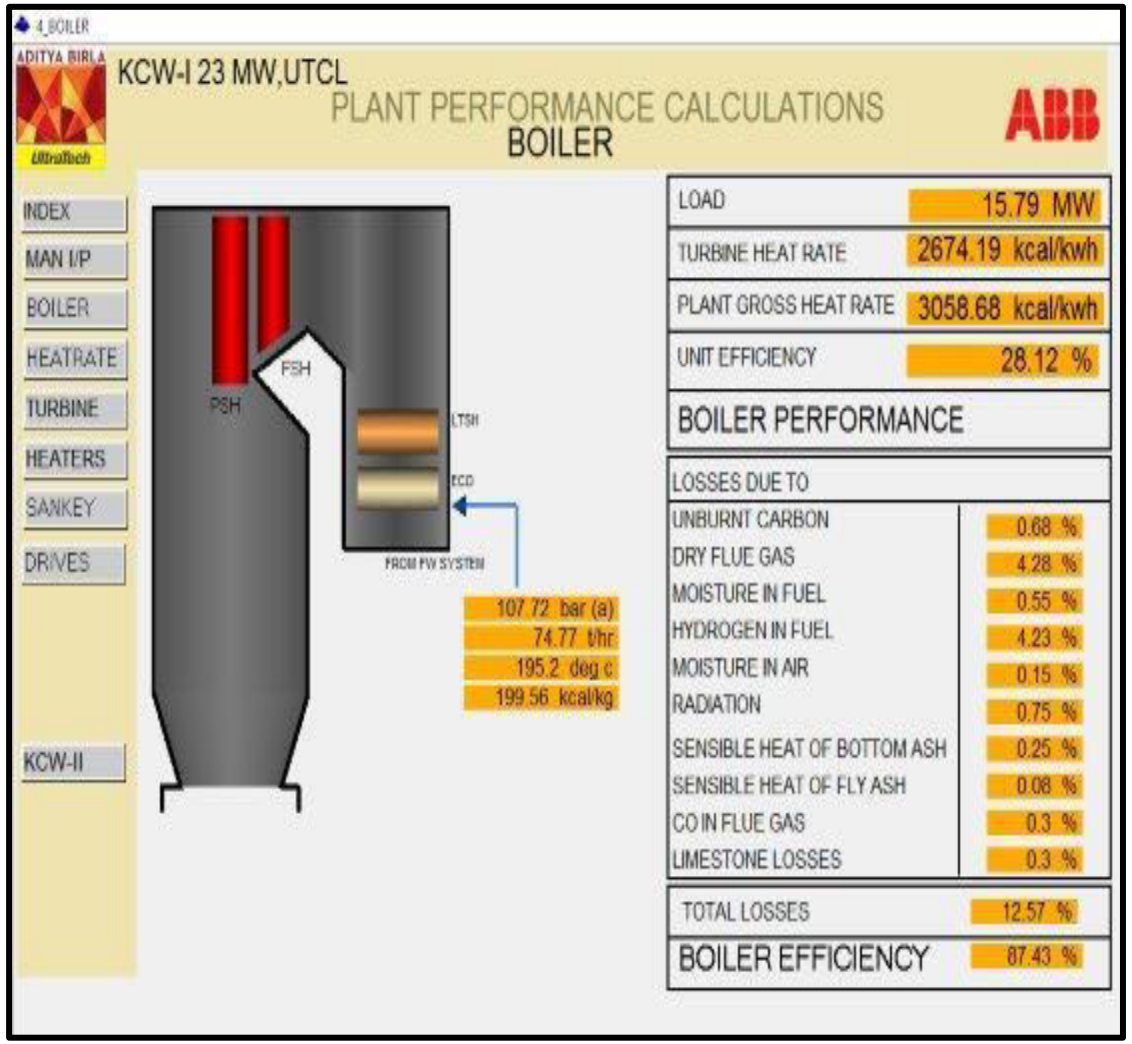
Ground water recharging through injection well

Recognition of student by UH on occasion of Environment day

Daily monitoring system

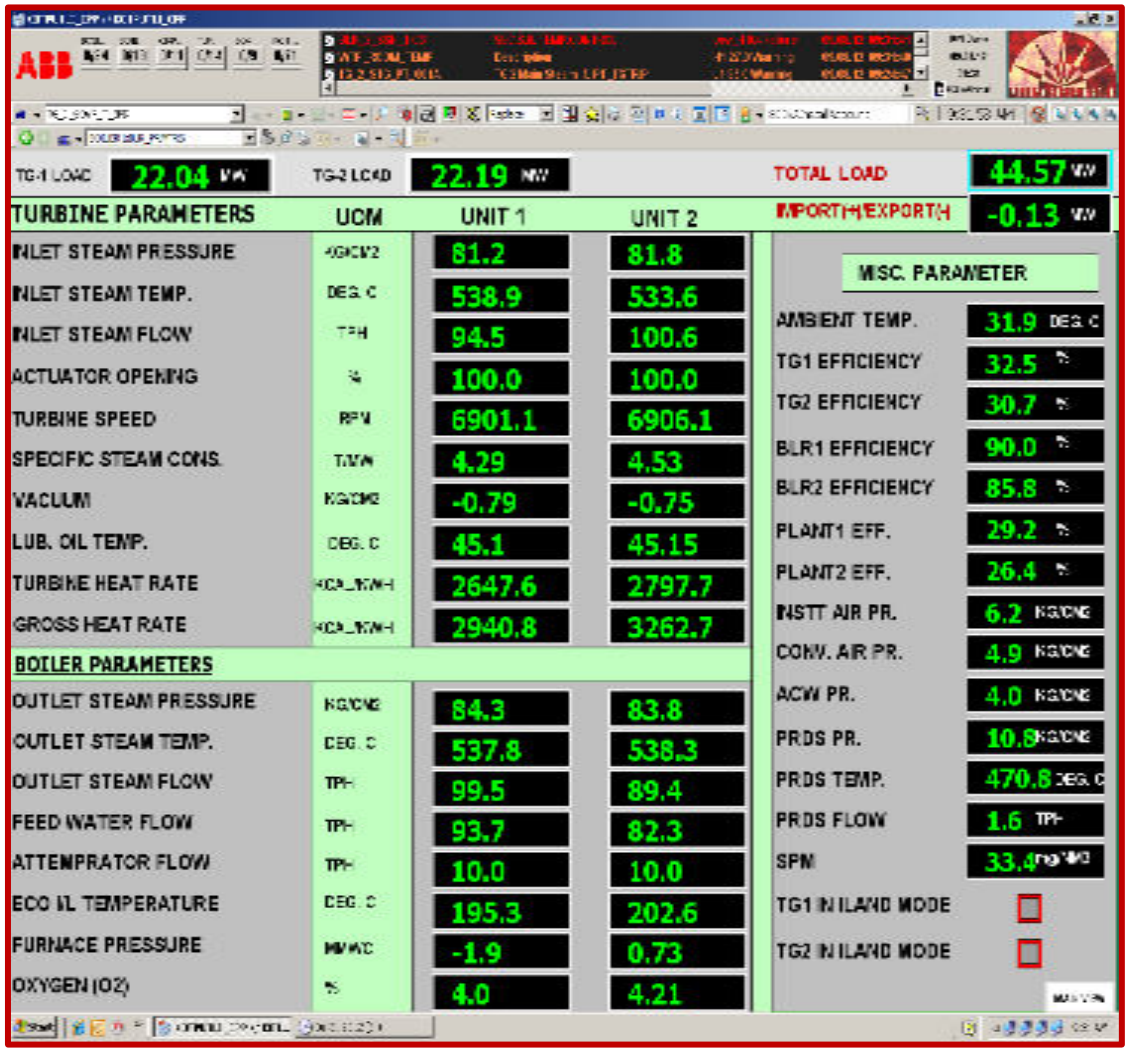
KCW TPP Daily Report												
									Date	15-Aug-18	4/1/2018	
			Budget		Today						YTD	
Parameters		Units	Unit-1	Unit-2	Unit-1	Unit-2	Total	Unit-1	Unit-2	Total	Unit-1	Unit-2	Total
A	Plant Performance												
1	Avaialbility Factor	%	75.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	84.7	95.0	89.9
2	STG Running Hours	Hrs	744	744	24.00	24.0	48.0	360.00	360.00	720.0	2786.0	3009.8	5795.8
3	Plant Load Factor	%	81.0	78.0	83.97	79.18	81.57	90.17	79.29	84.73	79.46	77.41	78.44
4	Gross Generation	KWh	13868966	13347360	463488	437064	900552	7465921	6564872	14030793	50919425	53587663	104507088
5	Aux Consumption	KWh	1241272	1161220	35408	32928	68336	548361	516762	1065123	4284396	4637403	8921799
		%	9.0	8.7	7.65	7.55	7.60	7.34	7.87	7.591	8.38	8.62	8.502
6	Shut Down Power	Kwh			0	0	0	0	0	0	129726	75680	205406
7	Aux. Power from Cement Plant	Kwh			65	65	130	-28	-28	-56	-18183	-18183	-36366
8	Aux. power including SD				7.65	7.55	7.60	7.34	7.87	7.591	8.63	8.76	8.699
9	Net Generation	MWh	12627694	12186140	428015	404071	832086	6917588	6048138	12965726	46523486	48892763	95416249
10	Average Load	MW	18.64	17.94	19.31	18.21	37.52	20.74	18.24	38.97	18.28	17.80	36.08
11	TG I/L Steam	MT	60191	56326	1960	1853	3813	31626	27941	59567	219289	226812	446101
a	Steam from Boiler-1	MT			1960	0	1960	31626	0	31626	219289	13987	233276
b	Steam from Boiler-2	MT			0	1853	1853	0	27941	27941	0	212825	212825
12	Sp. Steam Cons	Kg/Kwh	4.34	4.22	4.23	4.24	4.23	4.24	4.26	4.25	4.31	4.23	4.27
13	Turbine Heat Rate	Kcal/KWH	2643	2612	2632	2647	2639	2622	2653	2636	2674	2631	2652
14	Station Heat Rate	Kcal/KWH	3015	2980	3001	3017	3009	2990	3024	3005.68	3053	3000	3026
15	SFC	Kg/Kwh	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.43	0.42	0.43
16	Vacuume	Kg/Cm2	-0.8	-0.81	-0.82	-0.81	-0.82	-0.80	-0.60	-0.71	-0.78	-0.77	-0.78

Energy calculation sheet

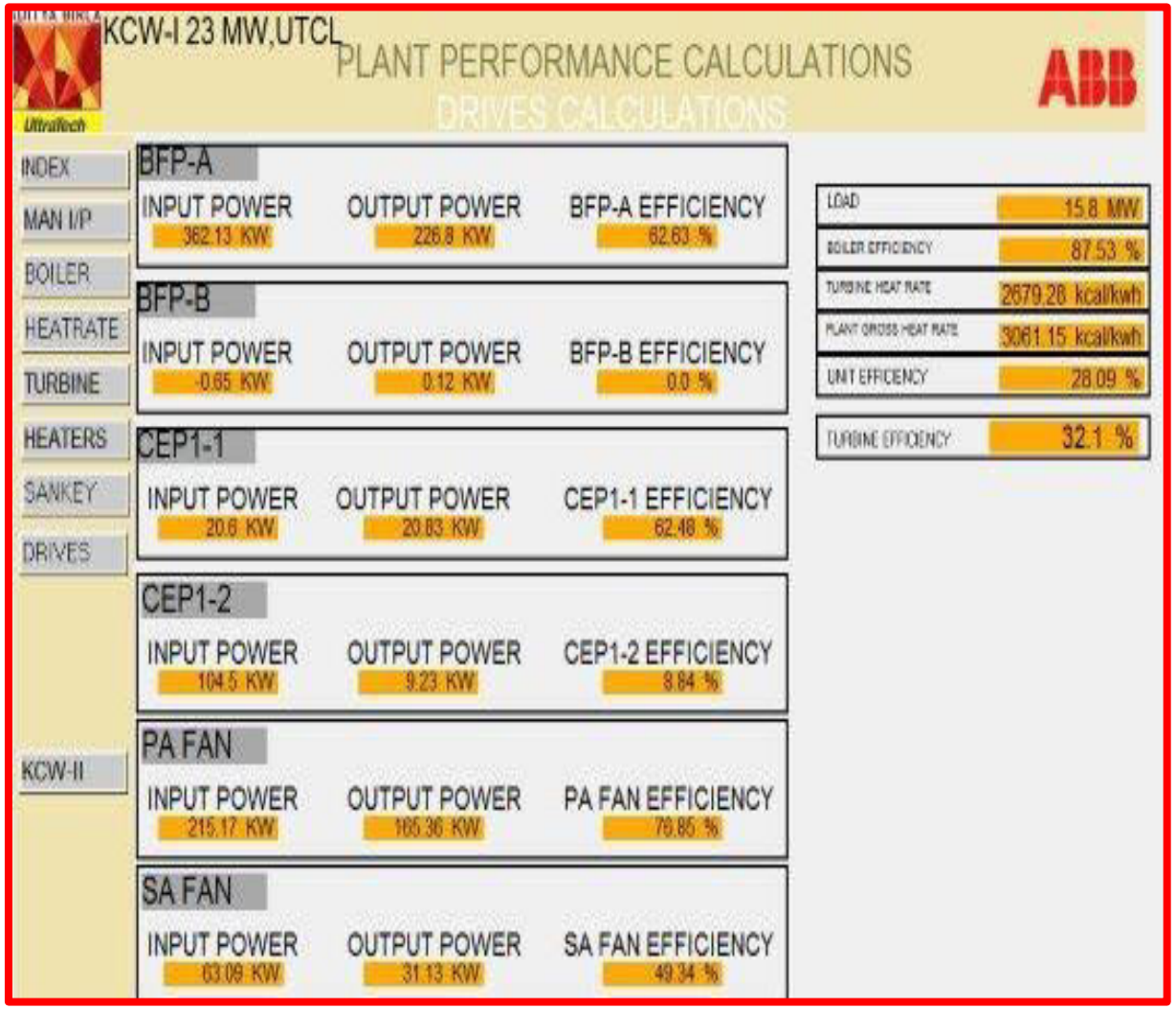


On line boilers losses calculation

Daily monitoring system



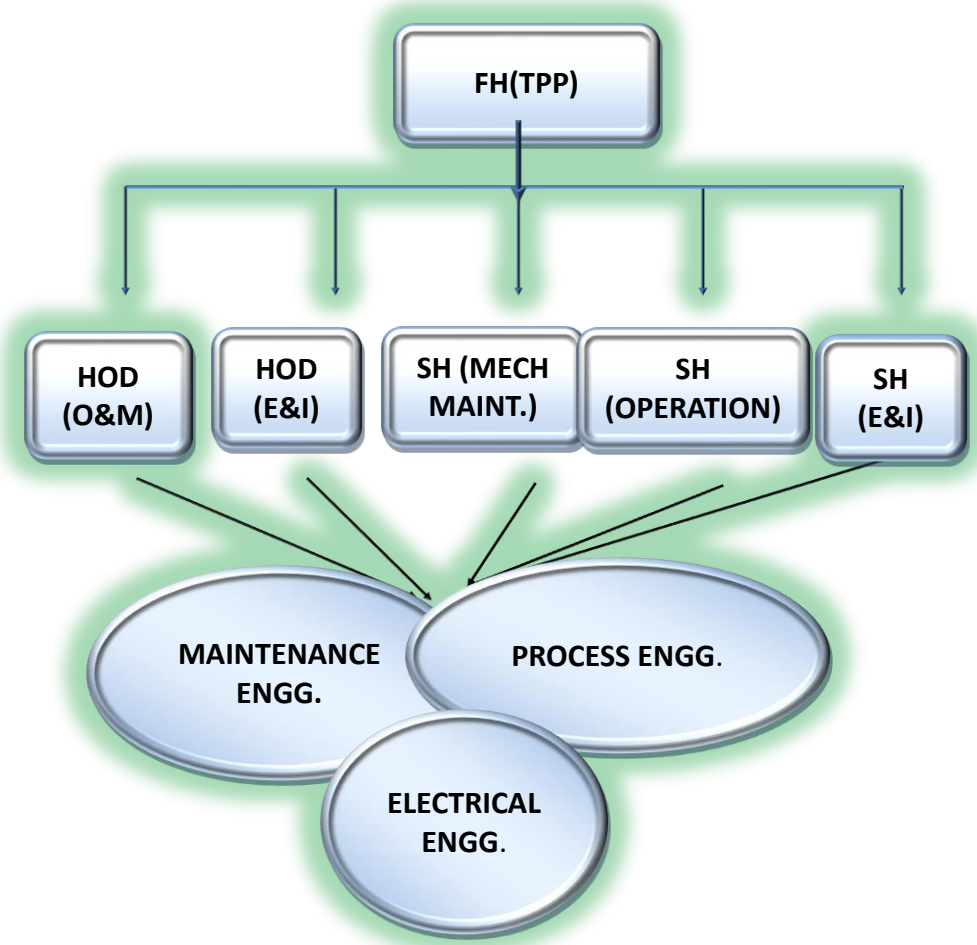
On line Efficiency monitor



On line drive efficiency calculation

Review meeting chaired by

- Well Established energy management cell headed by FH-TPP.
- Daily monitoring of Heat rate and Aux. power deviation report.
- Analysis of equipment performance for deviation.
- Identification of energy conservation scope.
- 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.



DAILY MEETING STRUCTURE

Methodology for identification of improvement projects

Opportunity identification

Energy mapping

Bench marking

Lost cost matrix

Suggestion

Idea generation

Idea screening

Feasibility study

Team formation and allocation of project team

Project Execution & review of progress

- ***Result Achieved***
- ***Reward & Recognition***

Project implementation through Kaizen

FIELD OPERATOR AND WORK MAN → CONCERN (dpt) ENGINEERS → EVALUATION TEAM → APPROVER COMMITTEE

Suggestion and kaizen steps

Manthan program for idea sharing

Kaizen Award

Kaizen Submission

Project Implemented through workers and supervisor

SN	Idea	Status
1	Reduction of boiler bottom ash loss by provided extra air pressure to spreading air for uniform fuel spreading in to furnace.	Completed
2	MDC RAV shaft sealing cold air provided by PA fan out let in place utilization of compressed. So power saving of compressor.	Completed
3	Coal circuit stand by stream suction damper isolation during running of main circuit. Power saving of bag filter.	Completed
4	Pushing air provided to Fly ash conveying system for avoiding line jamming and avoiding continuous utilisation of service air.	Completed
5	Utilization of ESP fist field Ash to coal bunker for recycle and reduction of LOI	Completed

Implementation of ISO 50001

ISO 50001

2015

Energy Management

DNV

DNV BUSINESS ASSURANCE
MANAGEMENT SYSTEM CERTIFICATE

Certificate No. 172280-2015-AE-IND-RvA

This is to certify that

UltraTech Cement Limited
(Unit : Kotputli Cement Works)
Village: Mohanpura, Tehsil: Kotputli,
Dist. Jaipur, 302002, Rajasthan, India

has been found to conform to the Energy Management System Standard:

ISO 50001:2011

This Certificate is valid for the following Scope:

Manufacture of cement and clinker.

Initial Certification date:
9 March 2015

This Certificate is valid until:
9 March 2018

The audit has been performed under the supervision of:
Hitesh Dhandhusaria
Lead Auditor

MGMT. SYS
RvA C 024

Place and date:
Barendrecht, 9 March 2015

For the issuing office:
DET NORSKE VERITAS CERTIFICATION B.V.,
Zwolseweg 1, 2994 LB Barendrecht, The Netherlands

B. Poldermans
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
Accredited Unit:Det Norske Veritas Certification B.V. Zwolseweg 1, 2994 LB Barendrecht, The Netherlands, TEL: +31 10 2922 688 - www.dnvba.com

Energy Management System 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

Awards & Accolades

Awards & Accolades

"National Energy conservation Award " In year 2017.

"Excellent Energy Efficient Unit" In year 2017.

"Excellent Energy Efficient Unit" In year 2016.

"Noteworthy water efficient unit" In year 2017.

"Excellent Energy Efficient Unit " in year 2015.

"Noteworthy water efficient unit" In year 2016.

Awards & Accolades

"Rajasthan Energy Conservation" in year 2014.

"Energy Efficient Unit " In year 2013.

"Water Efficient Unit" in year 2012.

"Excellent Energy Efficient Unit " In year 2014.

Commendation Certificate by the Ministry of Power, Government of India in recognition of efforts made to conserve the energy for year 2012-13

The less you burn, the more you earn.

Sincere Thanks..

UltraTech Cement Ltd
Kotputli Cement Works
Power Plant