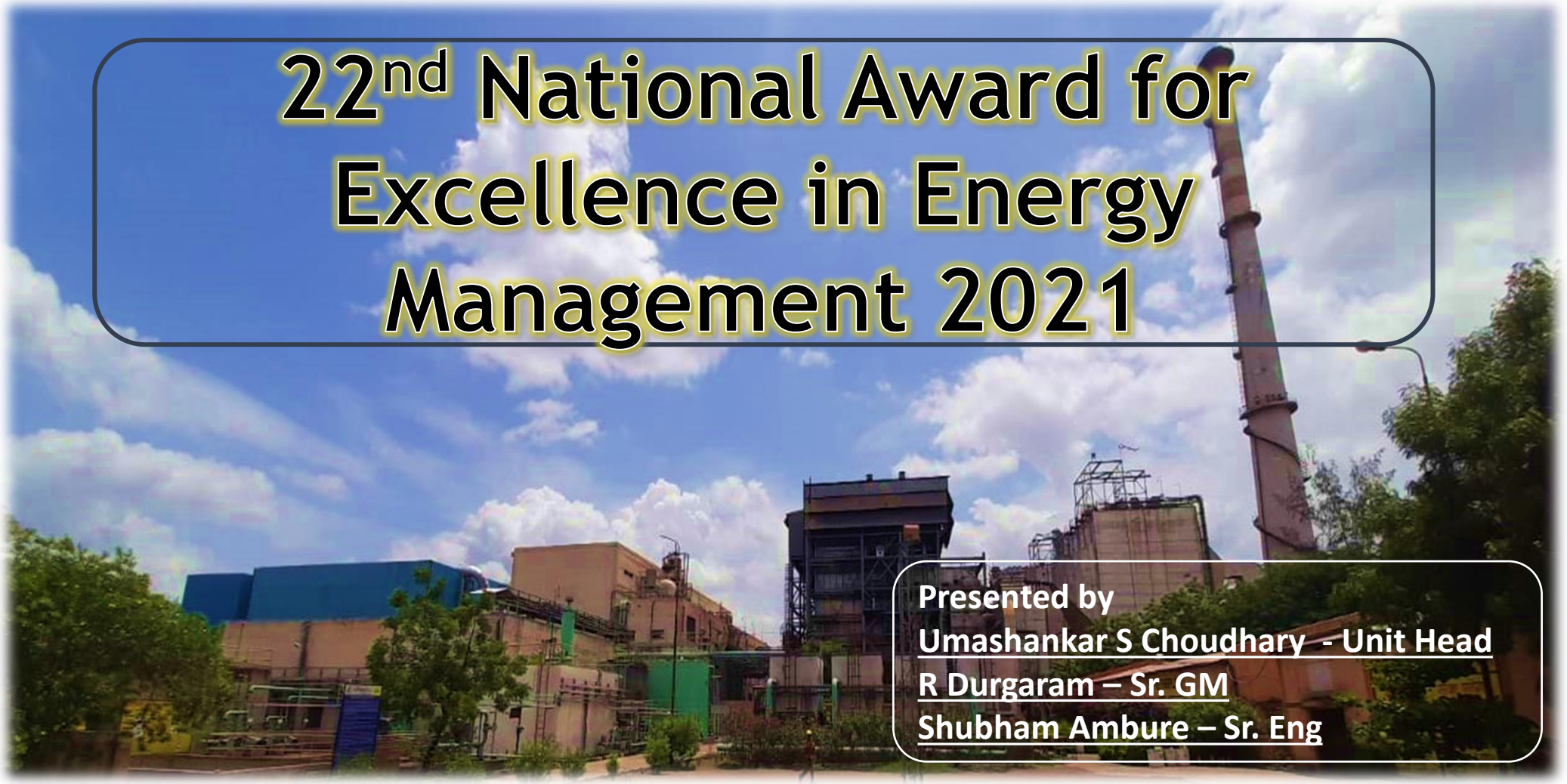
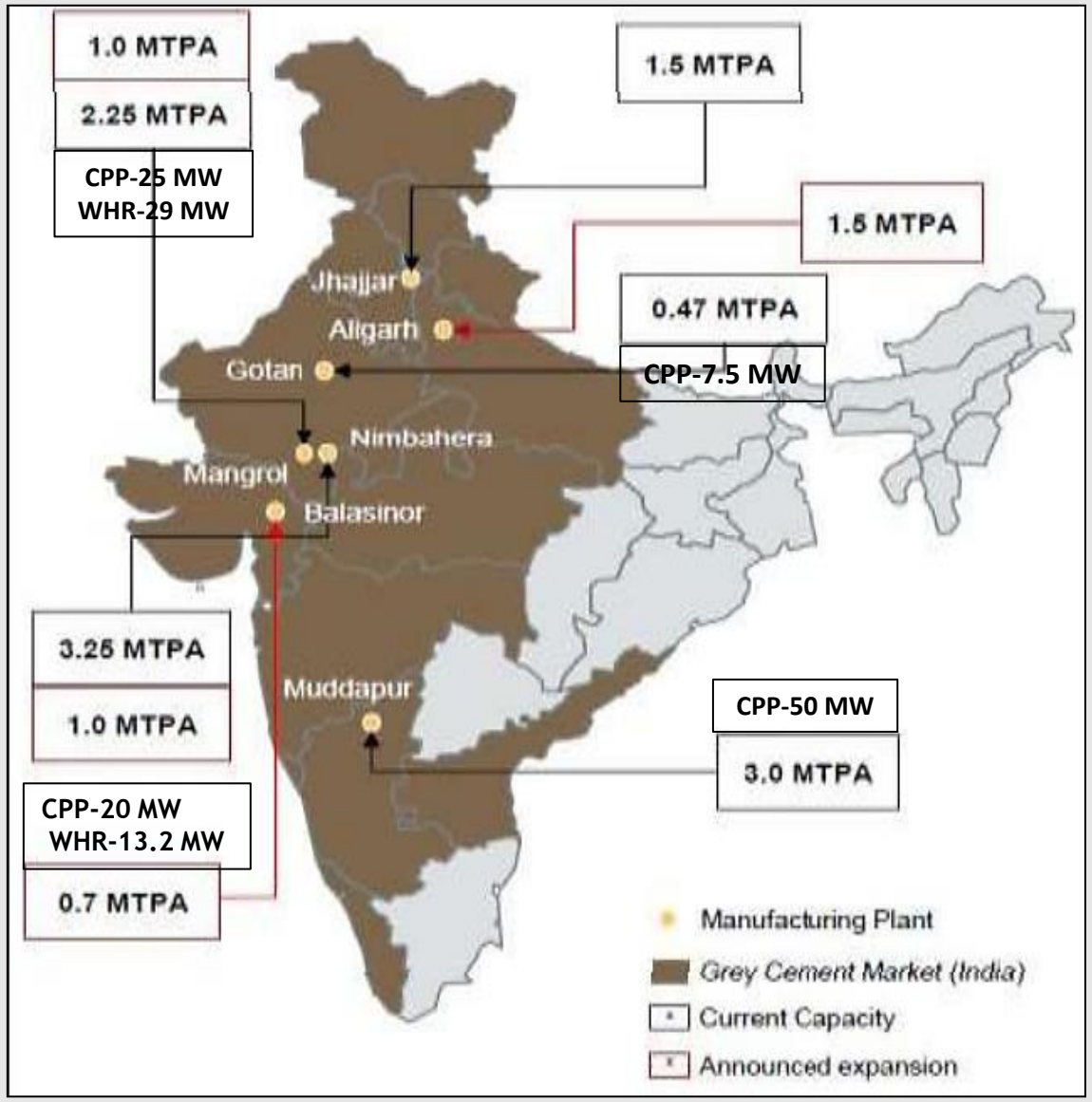
JK Cement Works Muddapur

22nd National Award for Excellence in Energy Management 2021



Presented by
Umashankar S Choudhary - Unit Head
R Durgaram – Sr. GM
Shubham Ambure – Sr. Eng

ABOUT JK CEMENT LIMITED



J.K. Cement Ltd. is a part of Industrial conglomerate JK Organization. The Company is promoted by Late Mr. Yadupati Singhania.

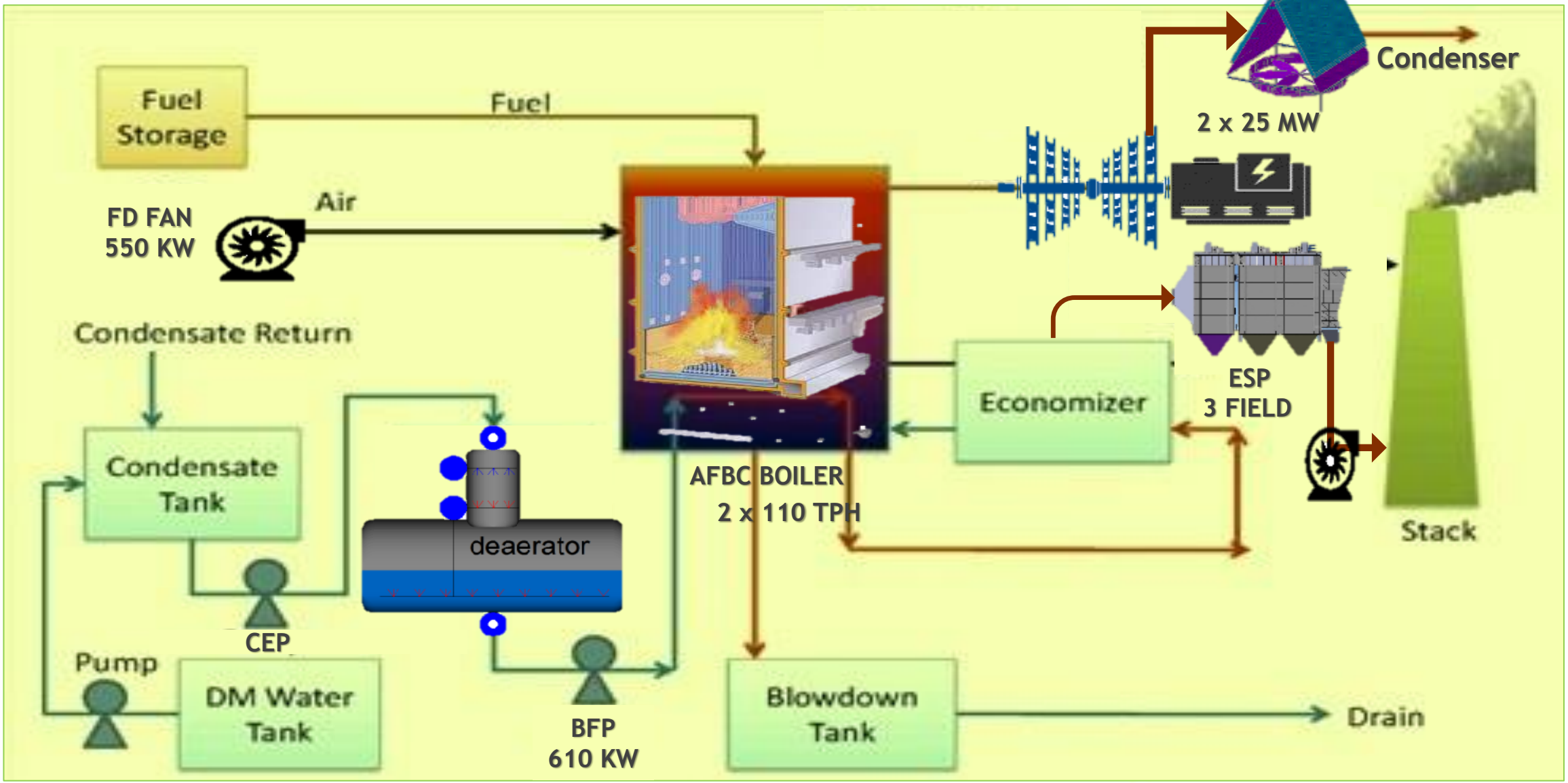
The group entered the cement manufacturing business in 1975. Grey cement capacity of 14.7 MTPA & White cement capacity of 1.2 MTPA

JK Cement Muddapur having Capacity of 2.20 MTPA Clinkerisation & 3.50 MTPA Finished Cement grinding.

J K Cement Muddapur is certified with ISO 14001, ISO 9001, ISO 45001 & ISO 50001:2018. GreenCO Gold rating Plant, Great Place to work certified company

Captive power generation capacity of over 145 MW which includes 42 MW of waste heat recovery power plants.

PROCESS FLOW DIAGRAM



IMPACT OF COVID 19

Initially, Due to Covid-19 Lockdown imposed affected the dispatches.

Later on when Lockdown eased, as per the market demand, we managed to cater the demand with proper planning and adhering the Covid guidelines and CAB.

Following actions has been taken to minimize the Impact of Covid 19:

a) Staggered timing for Shift changeovers

b) Teams formation for Critical jobs & Roster Plan implementation

c) Plant operation with minimum required person

d) Quick Reaction Team formed with Response Mechanism

e) Set up Surveillance Team with Dedicated Control room

f) Maximizing Social Distancing

g) Disinfection & Sanitization

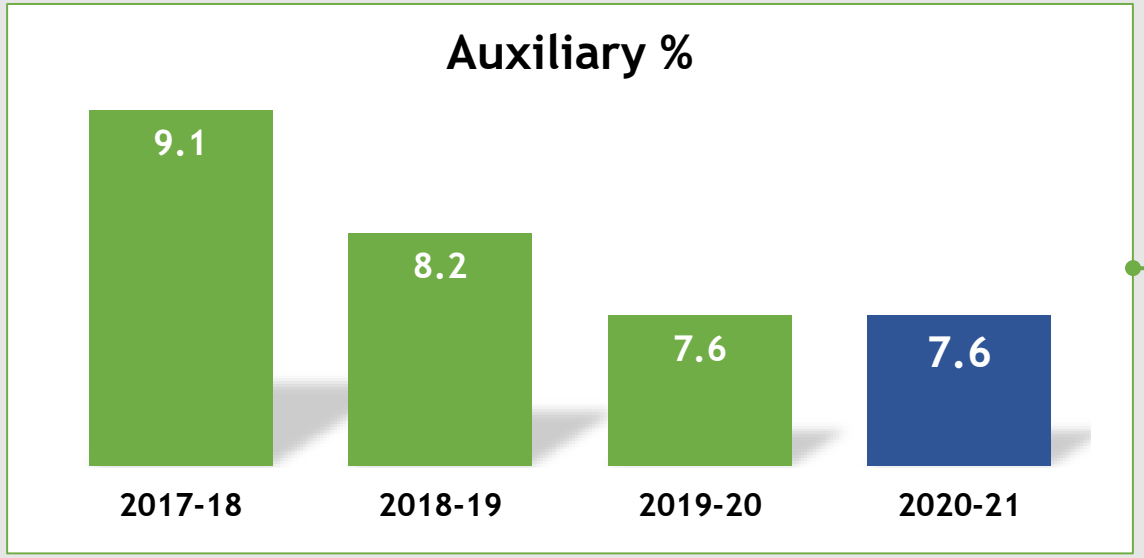
h) Entry of outsiders to Plant prohibited

i) Paper less initiative taken to mitigate the risk of transmission

ENERGY CONSUMPTION OVERVIEW

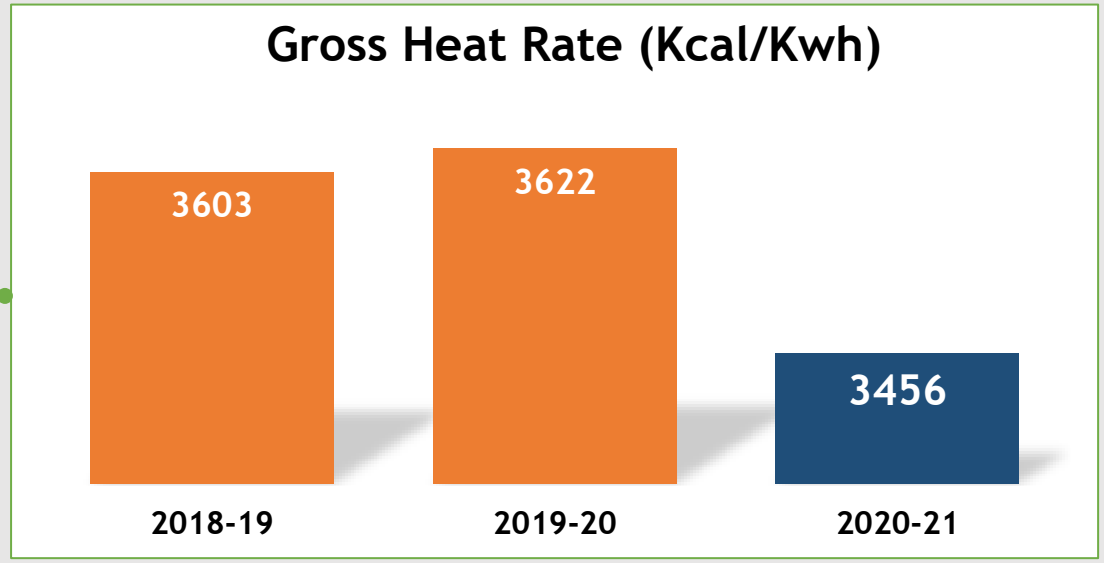
Sr. No	Performance	Unit	2019-20	2020-21
1	ANNUAL GENERATION	MWH	111503	126598
2	AVG. AUX. CONSUMPTION	%	7.60	7.60
3	PLANT AVAILABILITY FACTOR	%	**99.91**	**99.81**
4	PLANT LOAD FACTOR	%	80	81
5	GROSS HEAT RATE	Kcal/KWH	3622	3456
6	DM WATER CONSUMPTION	%	0.90	0.90
7	SPECIFIC RAW WATER CONSUMPTION	M^3/MWH	0.39	0.33

ENERGY CONSUMPTION SCENARIO

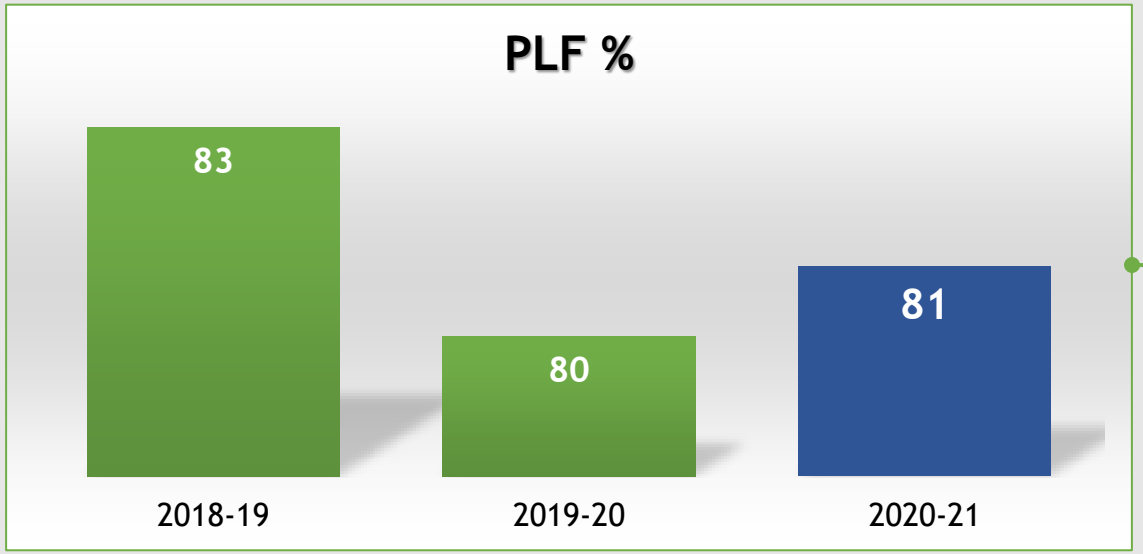


- Auxiliary power consumption has been maintained
- Various steps on reduction is under progress

- Previous two years Station heat rate on higher side due to consumption of high moisture Indonesian Coal.
- Achieved **166 Kcal/Kwh reduction** by increased consumption of different biomass fuel mix-up with Indonesian Coal.

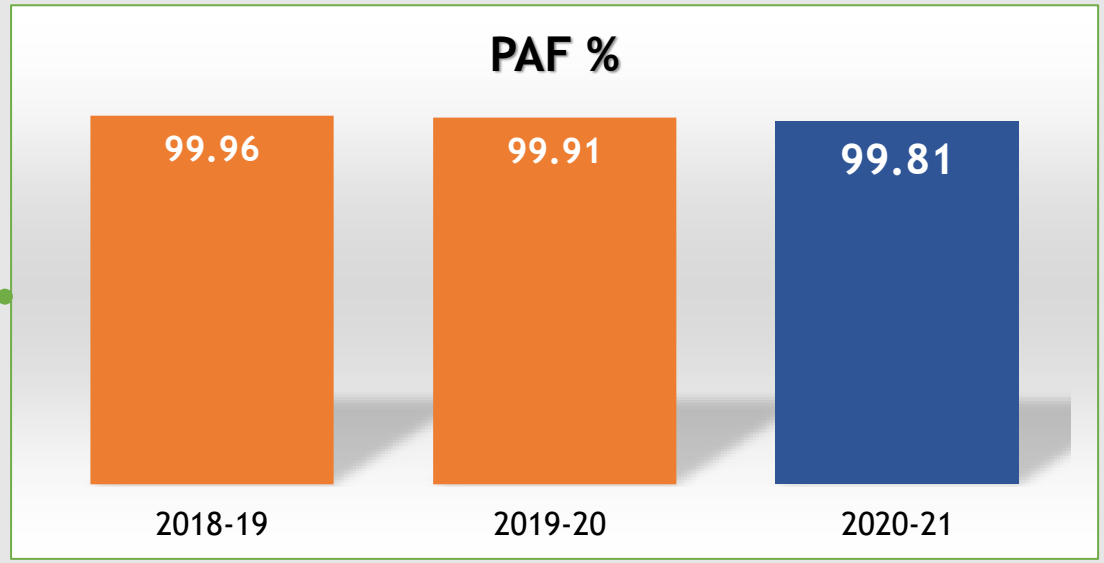


ENERGY CONSUMPTION SCENARIO



❖PLF of the Plant is around 80 %.

❖PAF (3 years) is around 100 %.



ENERGY BENCHMARKING

OUR ACHIEVEMENTS		
Lowest Auxiliary %	DTD basis	**6.28 %**
	MTD Basis	**6.75** %
	YTD Basis	**7.60** %
Station Heat Rate	MTD Basis	**3110**

	Competitor 1	Competitor 2	Competitor 3
Aux power consumption %	8.5	8.7	7.5
Gross heat rate (Kcal/kWh)	3327	3124	3174

ROAD MAP TO ACHIEVE BENCHMARK

Internal Benchmark

- Goal set by Management
- KPI

Kaizen

- Tool for Improvement
- Employee Motivation

Innovative Projects

- For cost reduction
- MTBF improvement

Brainstorming

- Involvement of Employee
- Development of ideas

Process Audit

- Third party audits
- Internal Audit

Technology Upgradation

- For plant improvement
- Sustainability

PROPOSED ENCON PROJECTS - FY 2021-22

Sr.No	Title of project	Expected Savings (Kwh)	Expected Saving (Rs Lacs)	Investment (Rs. Lacs)
1	**Utilization of FD Fan No.1 (Idle) VFD for FD Fan-2 (Running)**	300000	80	0.2
2	Unit -1 PA FAN VFD (idle) used for Unit I ACC Fan no. 06 (Running) (Change over switch method is applied).	60000	8	Nil
4	**Replacement of Old model ACC Fan-7 fan set (Aerodynamic tech. light weight energy efficient Epoxy FRP Fan set)**	60000	4	4
3	Improving TG vacuum by installing water Fog system below ACC	10000	0.7	0.4
5	Increasing the elevation of ID fan duct for Tunnel 1 & 2 for dust extraction by natural draught	23000	1.6	0.1

MAJOR ENCON PROJECTS - FY 2020-21

Sr. No	Project Description	Savings per Annum (Rs. in Lacs)	Investment (Rs. in Lacs)
1	Unit -2 PA FAN VFD (Existing idle) used for Unit I ACC Fan no. 06 (Boiler-1 running) (change over switch method is applied).	4	0.3
2	Charging of PMCC-2 by PMCC-1 enabling turning OFF of all and keeping only one transformer turning ON condition during shutdown.	2	Nil
3	ACC Fan no. 01 to 06 (All Fans on VFD mode) common vacuum control Logic development	0.7	Nil
4	**Installation of energy meters on each Compressor unit**	Enhanced Energy Monitoring	Nil
5	GI sheet covering the underground ETP water tank top end open portion. **Evaporation loss quantity is reduced.**	Water vapour losses reduced	0.15
6	**Reduction of low speed set point of all ACC fans VFD from 42% to 36 %**	0.76	Nil
7	Removal of **ACC Fans suction bird screen**, improvement in air velocity & reduction in power	2.5	Nil
8	**Lube oil temp was reduced (42 Deg C to 35 Deg C)** during barring gear mode	Reduction in heater operation hours and Power saved	Nil

MAJOR ENCON PROJECTS OF FY 2019-20

Sr. No	Project Description	Savings per Annum (Rs. in Lacs)	Investment (Rs. in Lacs)
1	VFD installation in ACC Fan no. 03	5	Nil
2	**VFD installation in FD Fan motor**	18	95
3	Optimization - FD Fan and PA fan process air flow	6	Nil
4	Single service air compressor is being run to cater the entire air requirement. (instead of both instrument & Service air compressor).	6.8	Nil
5	**ACC Fan Set replacement by Aerodynamic tech energy efficient FRP Fan Set (06 nos.)**	70	25
6	**VFD low speed optimization in ACC Fan (05 Nos) (50 % to 42 %)**	2.3	Nil
7	CEP operation under Auto cascade logic	1	Nil
8	Muffle furnace and Hot Air Oven Switching OFF practice	2.3	Nil
9	**Boiler Feed pump operation under auto mode**	5.3	Nil
10	Replacement of ACC 07th cell Fan motor 132 KW by 110 KW	0.8	Nil

MAJOR ENCON PROJECTS OF FY 2018-19

Sr. No	Project Description	Savings per Annum (Rs. in Lacs)	Investment (Rs. in Lacs)
1	**Replacement of ACW old pump (110 KW) by new energy efficient pump (75KW)**	6	0.4
2	Replacement of the existing Attemperator feed control valve by latest designed one	10.4	2
3	**Installation of VFD For Unit I ACC Fans (4 No's)**	18	18
4	**ECO/APH ash conveying system discharge taken into Boiler-1.** (instead of ASH SILO as a recycling method for LOI reduction in fly ash)	22	1
5	**Installation of new ARC Valve in Boiler feed pump**	5.4	6
6	Installation of Turbo Ventilator in TG hall roof.	2.5	1.5
7	LT Transformer (3 Nos) turning off during the plant shutdown	1.6	Nil
8	**Installation of VFD for Bucket Elevator motor**	1	1
9	Both Service & Instrument Compressor loading & unloading pressure reduction	3	Nil
10	New pump installed in Centralize AC room, to reduce load on ACW pump (VFD)	3	Nil

INNOVATIVE PROJECT-1

UTILIZATION OF UNIT-2 PA FAN VFD FOR UNIT-1 ACC FAN-6

Observation

Idle VFD (PA Fan 2) during Boiler-1 Operation.
VFD requirement for ACC Fan No.6 (Running)

Problem

- VFD installation for ACC fans (5 Nos)
- **Fan No-6 was running on DOL mode.**

Modification

- Decision taken to utilize the idle VFD for running ACC fan No. 6.
- **Provided changeover switch**
- New cable connection (VFD to ACC-6).

Benefits & Results

- **Overall ACC performance optimisation achieved.**
- All VFD operation in PID mode.
- PA FAN-2 VFD(Idle) was utilised.

Savings Achieved

- **Aux Power - ₹ 4.2 lacs/Annum**
- **New VFD and cable cost - ₹ 4 Lacs**
- **Total Cost Saved - ₹ 8.2 lacs/Annum**

INNOVATIVE PROJECT-2

REDUCTION OF MINIMUM SPEED LIMIT FOR ACC FANS

Observation

Dual Speed ACC fan motors were running at minimum speed limit of 50% only during part load condition.

Problem

- No clearance from OEM to run the motor on VFD mode below 50%.
- This resulting in **high auxiliary consumption in part load condition as well as low ambient temperature.**

Modification

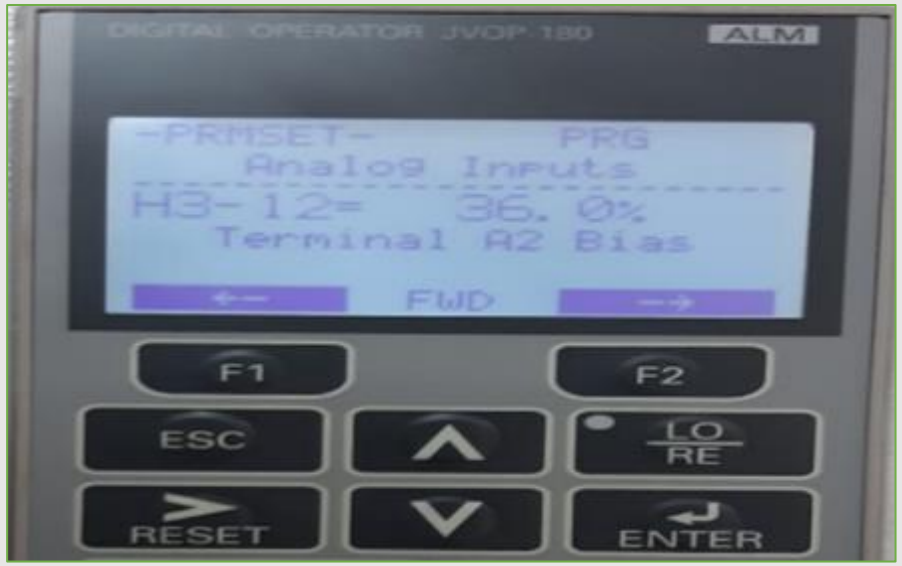
- Decision taken to decrease the minimum speed set point from 50% to 42 % in single VFD for trial in phase manner.
- After further successful trials, the minimum speed set points lowered to 36 % in all VFDs.

Benefits

- Optimized operation of ACC fans in maintaining vacuum.

Savings Achieved

- **Daily Power savings of around 300 KWh.**
- **Annual Savings of around Rs. 5 Lacs achieved.**



50% → 45% → 40% → 36%

Minimum speed limit done in phase manner and safely achieved

INNOVATIVE PROJECT-3

CHARGING OF PMCC-2 FROM PMCC-1

Observation

During plant stoppage, two transformers running at low loads.
Power import was on higher side.

Problem

- No common interconnection between two PMCCs available.
- Increased import power due to **transformer losses(150 KWH/Day)**

Modification

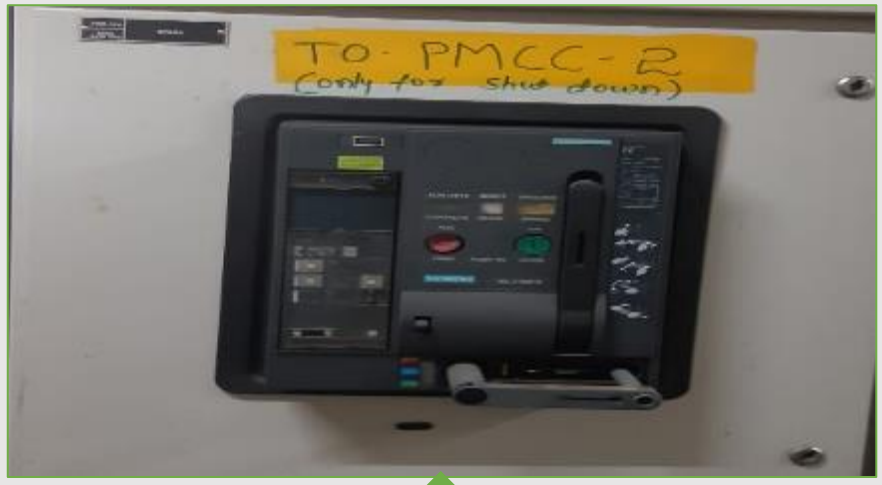
- Decision to interconnect two PMCCs using by using two available spare feeders and only one single transformer will be running.
- New interconnecting cable laid.

Benefits

- The fixed losses of a transformer totally avoided.

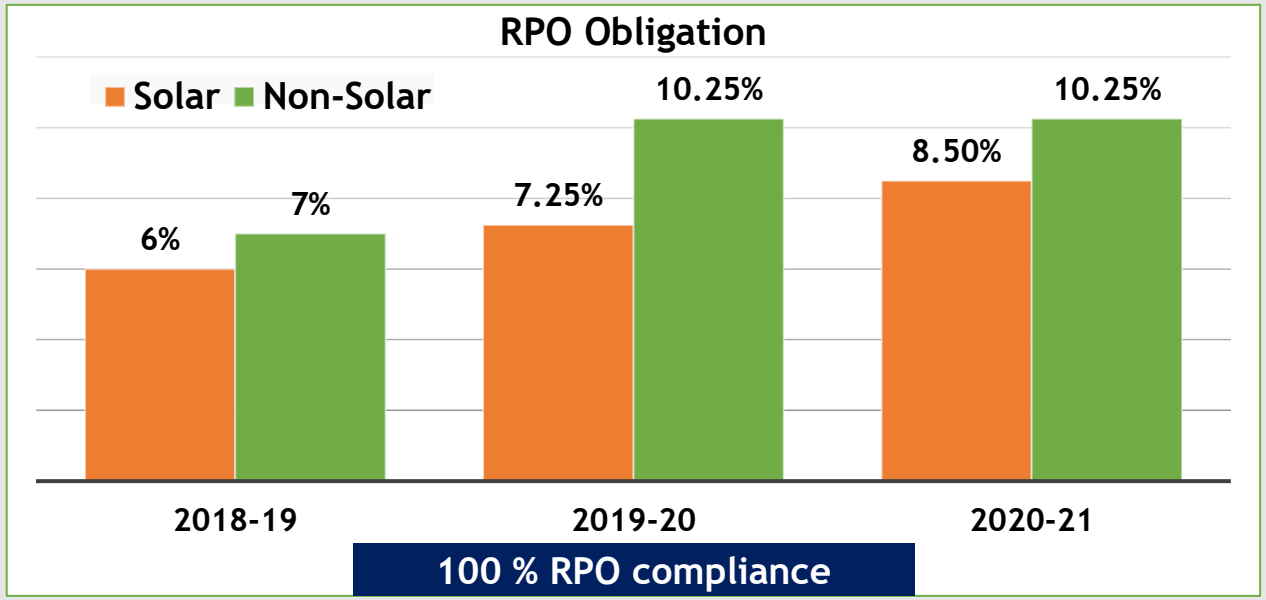
Savings Achieved

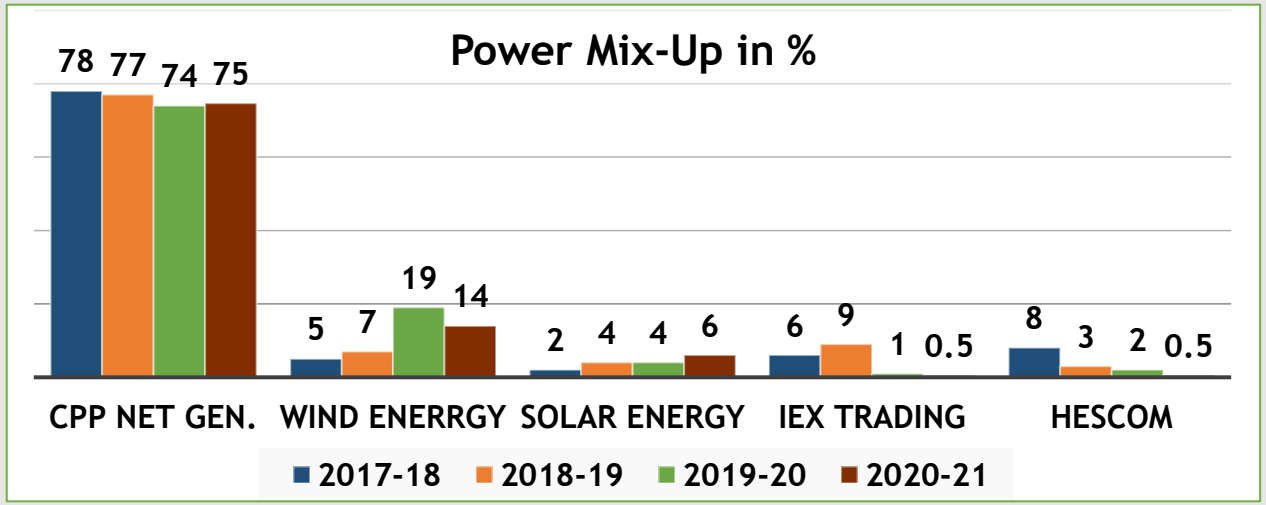
- **Daily Power savings of 150 KWh.**
- **Annual Savings of around Rs. 2 Lacs achieved.**



Interconnecting Cable

UTILISATION OF RENEWABLE ENERGY





Year	Type of Energy	Consumption (Million Kwh)	% of Overall Energy
2018-19	Wind	10.5	7
	Solar	6	4
2019-20	Wind	26	19
	Solar	6	5
2020-21	Wind	19	14
	Solar	8.5	6

RENEWABLE ENERGY PROJECTS

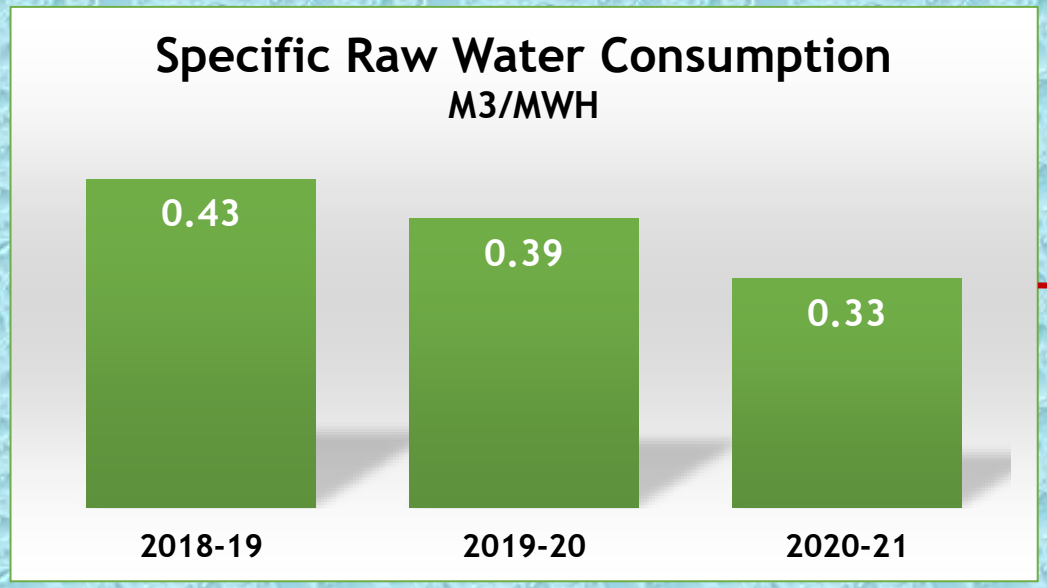
- **5 MW On-site Solar Power Plant** is under completion stage.
- Presently, solar power requirement is being met by purchasing the same from various power producers.

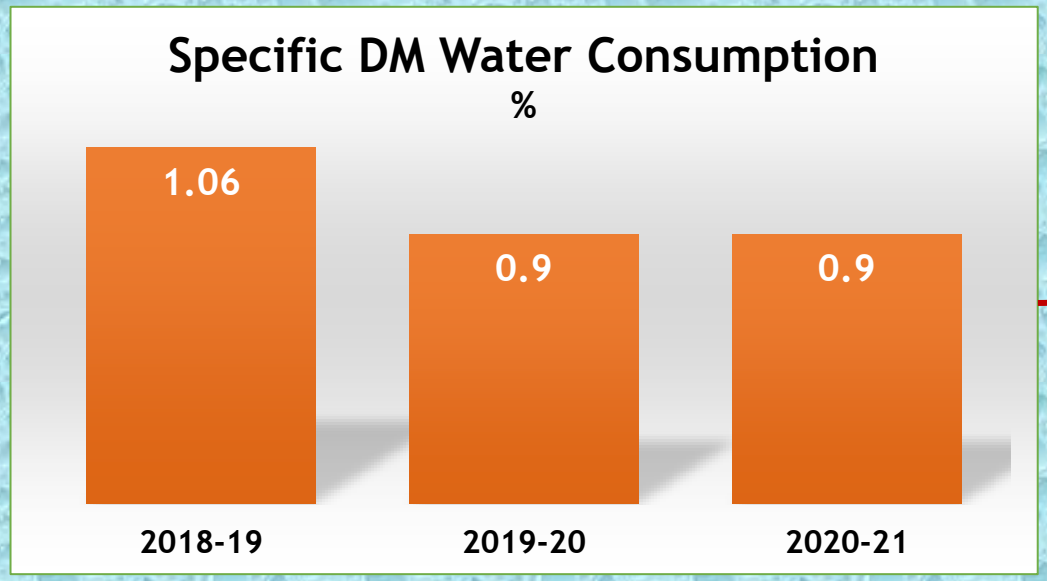
Solar street lights are being installed in phase manner.

- Wind power PPA established **with M/s ATRIA Wind Power Project** at Chitradurga, Karnataka with Rs.46 million investment.
- 20 Lacs units per month.

Solar heaters are installed at colony guest houses and apartments.

ENVIRONMENT MANAGEMENT – WATER

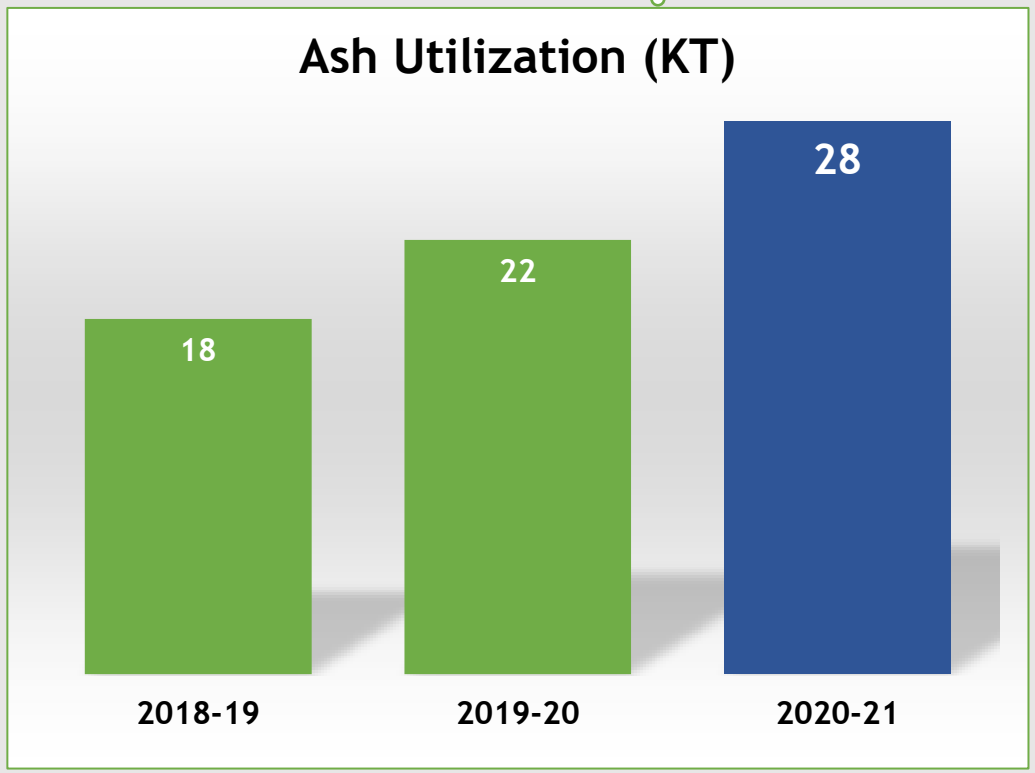




- Modification of Fire Hydrant Lines. (Underground to over ground)
- Water Storage tanks wall leakages have been arrested by water proof internal coating.
- Rain water is being collected in open pit, then used for dust suppression, ash draining, fire and smoke quenching at coal stock pile.
- In each quarter, cooling tower sump water is being shifted into effluent pit before sump cleaning activity.
- Zero Liquid Discharge Plant.
- External water audit conducted by third party.

ENVIRONMENT MANAGEMENT – ASH UTILIZATION

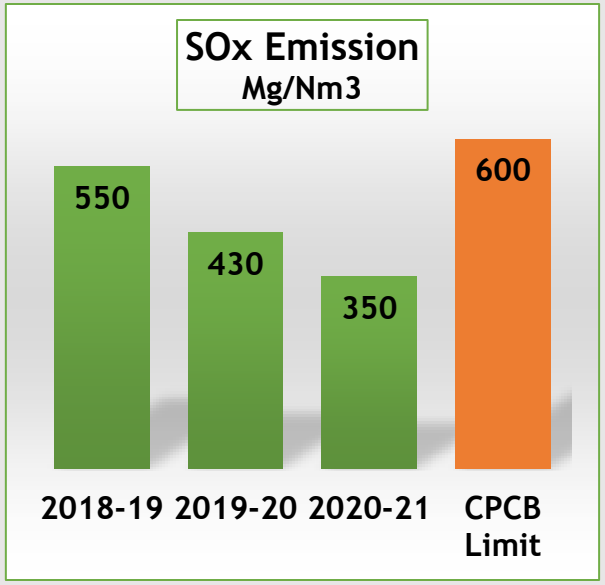
100 % Ash Utilization in Cement Manufacturing

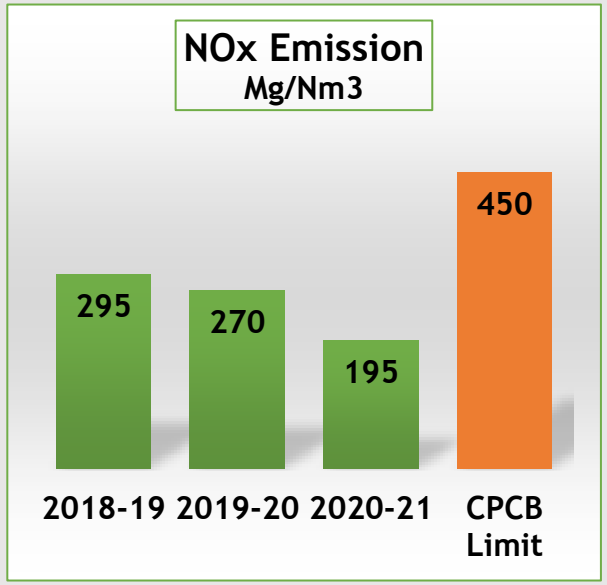


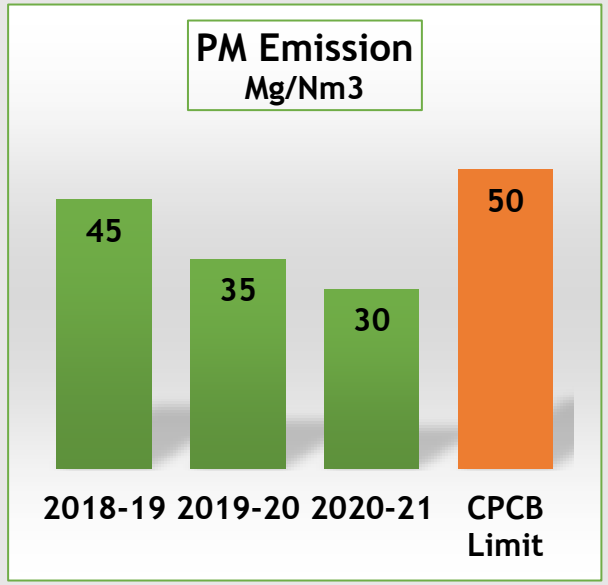
Ash handled and transported by dry method through Bulkers only.

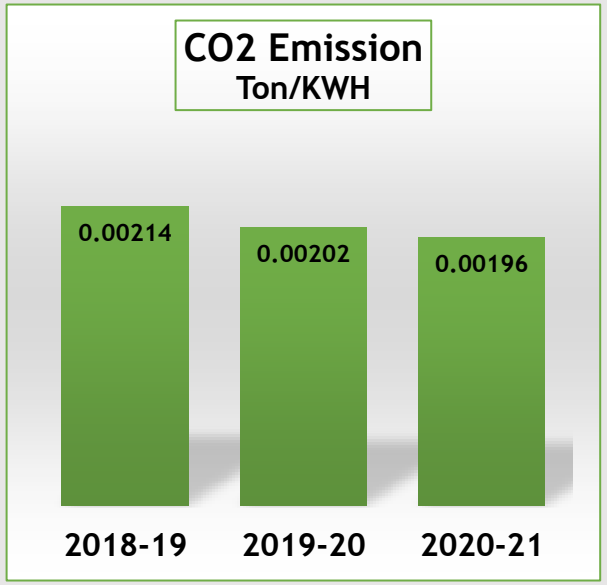
Ash conveyed through **Pneumatic Ash Conveying System**

ENVIRONMENT MANAGEMENT – EMISSIONS









Over-bed limestone dosing system	Selective Non-Catalytic Reduction (SNCR)	Upgradation of ESP transformer and controller set	Energy Saving and Fuel Consumption reduction

- Emission measurement and control done through Continuous Emission Monitoring System.
- All Emission parameters are maintained well below the CPCB standard limits
- External party verification is also being carried out at intervals.

BEST PRACTICES – ENERGY MONITORING

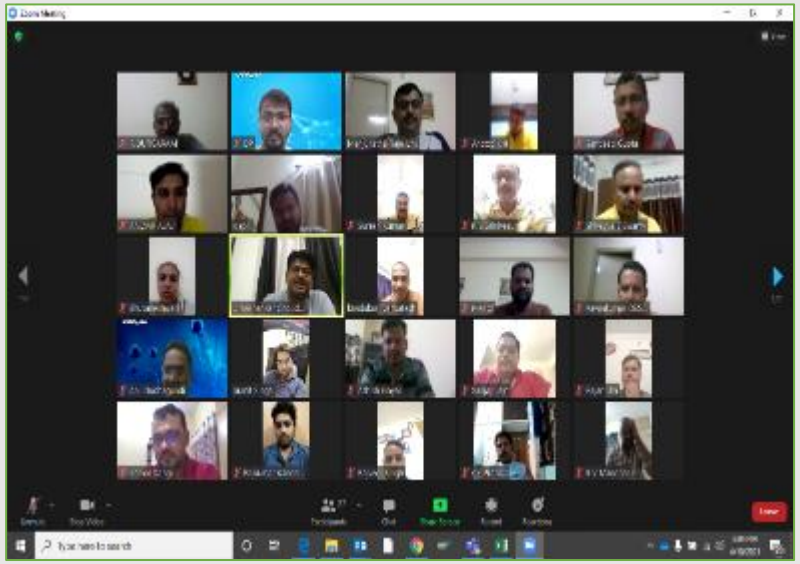
JK Cement Works Ltd. Muddapur											
2 X 25 MW Daily MIS Report For the Period June of Year 2020-21											
Sr. No.	Particulars	Unit	Target	1-Jun	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun	7-Jun	8-Jun
(A)	POWER GENERATION										
1	Total Power generation	KWH		499237	543535	540407	437014	523639	396629	540730	442117
2	Auxiliary Power consumption as per LT Room	KWH		38197	41435	40747	34524	40749	33129	42670	36017
3	% of Aux. Power consumption at LT Room	%	7.50%	7.65	7.62	7.54	7.90	7.78	8.35	7.89	8.15
4	Power import to CPP from Grid	KWH		–	–	–	–	–	–	–	–
5	Export from CPP	KWH		–	–	–	3000	–	–	–	–
6	Net power Generation	KWH		461040	502100	499660	402490	482890	363500	498060	406100
7	Average Load(Gross)	MW		20.8	22.6	22.5	18.2	21.8	16.5	22.5	18.4
(B)	SPECIFIC PARAMETERS										
8	STG load Max	MW		24.7	24.1	23.6	23.5	24.3	23.5	25.0	23.6
9	STG load Min.	MW		13.2	17.2	19.4	1.6	13.8	9.8	12.1	13.4
10	Plant Running Hours	Hours		24	24	24	24	24	24	24	24
11	Stoppage Hours due to no load demand.	Hours		0	0	0	0	0	0	0	0
12	Specific fuel Consumption Coal	Kg/KWH		1.11	1.11	1.09	1.10	1.06	1.09	1.07	1.08
13	Specific steam Consumption	Kg/KWH		4.27	4.26	4.27	4.28	4.25	4.33	4.25	4.29
14	Specific steam Generation	Kg/Kg of coal		3.98	3.81	3.92	3.90	4.00	4.11	3.93	4.10
15	Plant Availability Factor(PAF)	%		100	100	100	100	100	100	100	100
16	Plant Load Factor(PLF)	%	85%	83.2	90.6	90.1	72.8	87.3	66.1	90.1	73.7
17	Gross Station Heat Rate	Kcal/Kw	3100 / 3600	3465	3445	3426	3439	3336	3390	3349	3384
18	Net Heat Rate	Kcal/Kw		3752	3729	3705	3734	3618	3700	3636	3684
19	Station Heat after Unburnt Discount	Kcal/kwh		3400	3375	3360	3330	3268	3316	3309	3292
(C)	BOILER										
20	Steam Generation	MT		2210	2302	2313	1877	2225	1772	2275	1965
21	ECO O/L Feed water temp.	°C		282	286	286	271	282	276	284	280
22	Average O2 in Flue gases	%		4.1	4.2	4.1	4.5	4.1	4.5	4.1	4.3
23	ESP I/L Flue gas temp.	°C		135	138	137	133	137	133	140	139
24	Boiler Efficiency	%		79	79	79	79	79	80	80	80
(D)	TURBINE										
25	TG steam Consumption	MT		2169	2270	2285	1842	2203	1746	2252	1943
26	TG Vacuum	Kg/cm2		-0.780	-0.781	-0.781	-0.782	-0.780	-0.781	-0.780	-0.781
27	TG Exhaust Temp ost	oC		62.5	62.3	62.1	61.9	62.4	62.2	62.5	62.3
28	TG 1 Inlet Pressure	Kg/cm2		84.9	86.1	86.6	86.5	86.2	86.1	85.9	86.2
29	Ambient Temperature	°C		26.2	27	24.8	27.6	28.3	28.8	29.1	29.2

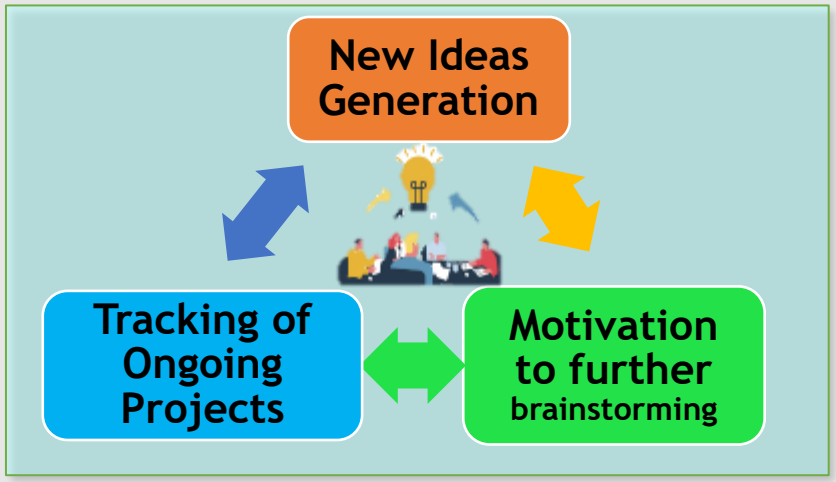
Daily Performance Monitoring

Date	01-07-2020	02-07-2020	03-07-2020	04-07-2020	05-07-2020	06-07-2020	07-07-2020	08-07-2020
FUEL - INDIAN COAL	100%	100%	100%	100%	100%	100%	200%	100%
GEN	250.03	280.44	426.69	551.25	558.21	532.72	541.88	487.09
Avg Gen.	10.42	11.69	17.78	22.97	23.26	22.20	22.58	20.30
Aux	24.91	24.78	33.70	42.05	43.56	42.13	41.42	37.34
Aux	9.96	8.84	7.90	7.63	7.80	7.91	7.64	7.67
PLF	41.67	46.74	71.12	91.88	93.04	88.79	90.31	81.18
R.Hrs.	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
Ambient Temp	27.90	27.00	26.80	26.10	26.50	26.90	26.40	24.40
ID Fan	0.85	0.82	1.92	2.87	3.03	2.79	2.52	2.28
PA Fan	1.15	0.91	1.70	2.07	2.04	2.03	2.05	2.07
FD Fan	6.56	6.59	8.64	10.23	10.82	10.89	10.47	9.94
BFP	7.20	7.35	9.70	12.35	12.67	12.05	12.09	11.09
CEP	0.65	0.68	0.79	0.91	0.93	0.91	0.90	0.85
ACC	1.05	0.90	2.72	4.27	4.59	4.03	4.06	2.24
AHP	1.37	1.52	1.67	1.98	2.03	2.10	2.34	2.16
ESP	1.53	1.52	1.58	1.67	2.16	1.92	1.62	1.67
CHP	0.73	0.73	0.94	1.16	1.24	1.01	0.99	1.08
ACW	1.18	1.17	1.16	1.17	1.21	1.20	1.17	1.17
AC & VENT	0.89	0.90	0.92	0.90	0.89	0.94	1.05	0.96
WTP	0.22	0.13	0.16	0.30	0.12	0.17	0.29	0.16

Daily Auxiliary Monitoring

INVOLVEMENT OF EMPLOYEES IN PLANT PERFORMANCE





Performance Dialogue (PD)

Management By Walk Around - MBWA.

Manufacturing Excellence drive: Vishwakarma

BEST PRACTICES - OPERATION

SR.NO	DESCRIPTION
1	Technical PD is being conducted on daily basis.
2	**ACC fins cleaning by high pressure water jet (Internal & External).**
3	**Periodical Tripping Interlocks checking during every stoppage.**
4	Screen/Crusher & Tunnel inspection in each shift
5	**High LOI fly ash conveying system is being recycled into furnace.**
6	SILO fly ash is being mixed up with Indonesian coal at Coal Stock yard.
7	Adopted island operation during rainy and bad weather conditions.
8	**Periodical IR thermography testing of electrical panels and Boiler.**
9	Periodical watering at earth pits & checking of earth resistance values.
10	**Effective preservation of plant** during stoppage every month for 10 to 12 days.
11	Adopted cement mills manual tripping system during emergency
12	**Often Bucket Elevator boot end open inspection.**
13	Often Operating vibrators at coal feeding chutes.

BEST PRACTICES - MAINTENANCE

SR.NO	DESCRIPTION
1	**Bed Coil thickness mapping & refractory inspection** in every stoppage
2	**Periodical bearing clearance & inspection** in all fans during stoppage
3	Vibration monitoring – ✓ Shift wise (Hand held vibrating Pen) ✓ Fortnight (PM cell) ✓ Quarterly (external).
4	CHP area all bearings inspection & greasing once (3 months) **Both coal and lime crusher hammers replacement once** (3 months) Gearbox oil replacement once (6 months)
5	DCF chain links & locking pins checking (weekly)
6	ACC Gearbox oil level checking (weekly)
7	**UPS battery inspection and redundancy testing**
8	**ESP Cleaning and Air Load test** in every stoppage
9	Periodical checking of Insulation condition and replacement as and when required.
10	**PLC server redundancy checking** in every stoppage.

BEST PRACTICES – SAFETY

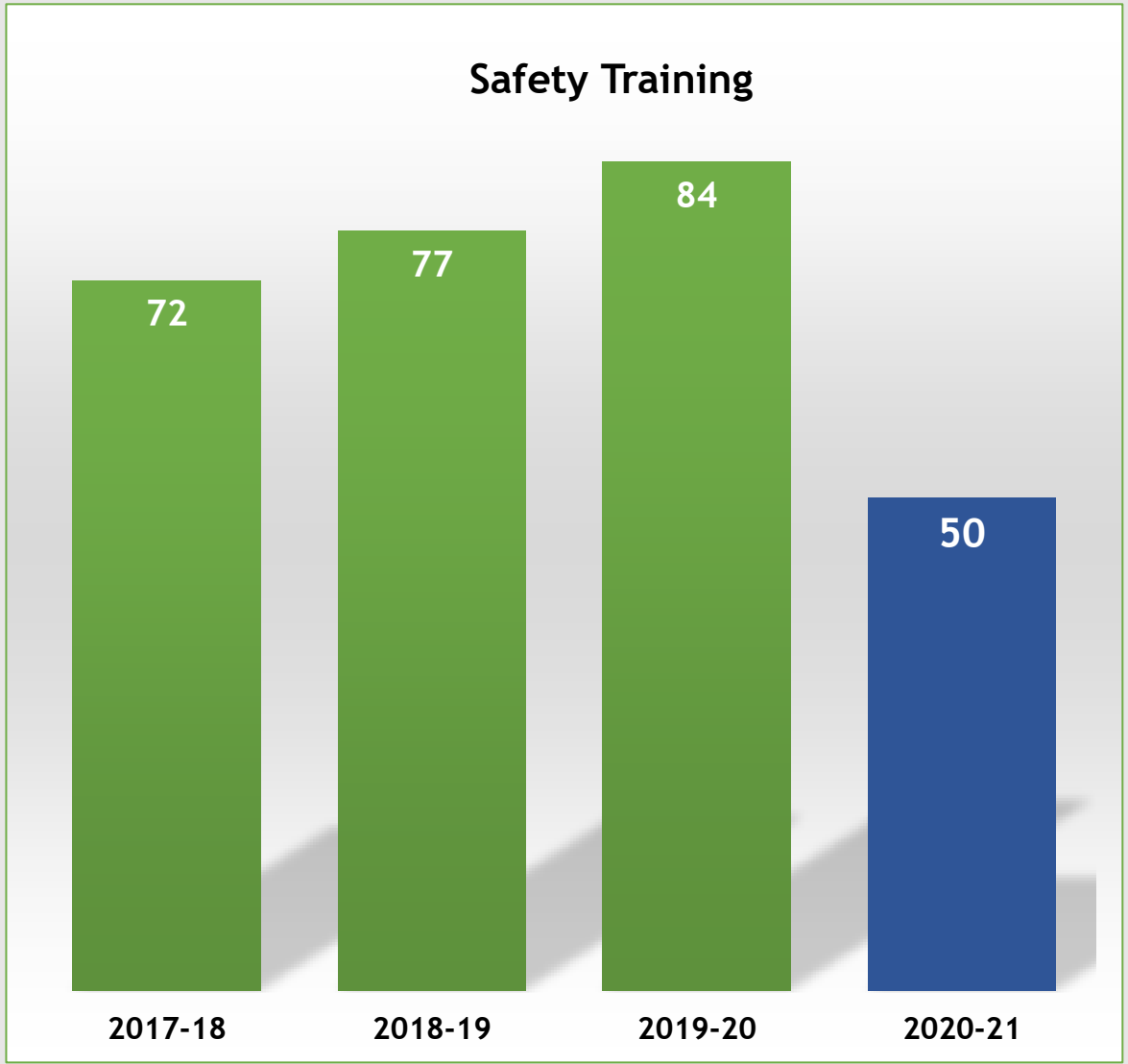
“National Safety Week Celebration”

Daily Toolbox Talk

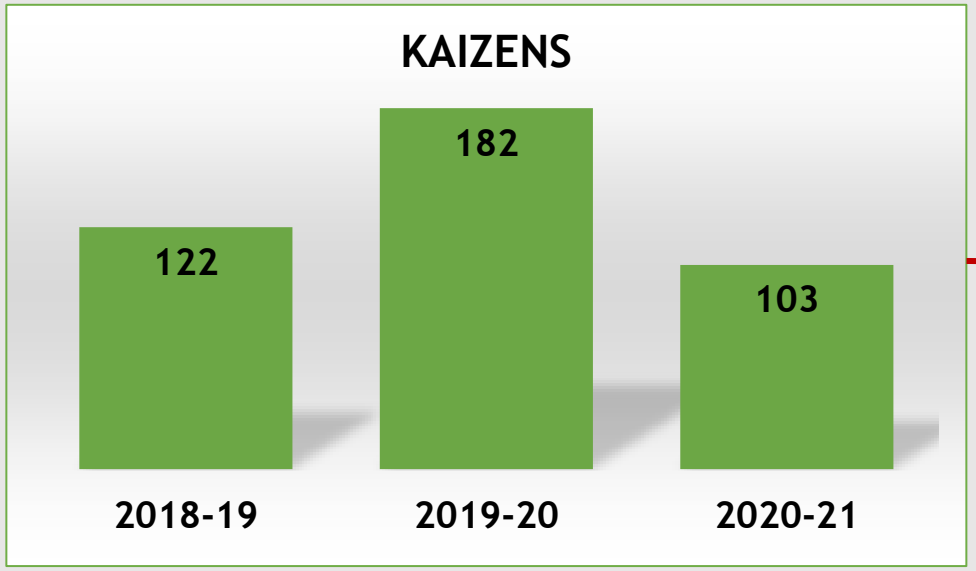
Monthly Motivational program

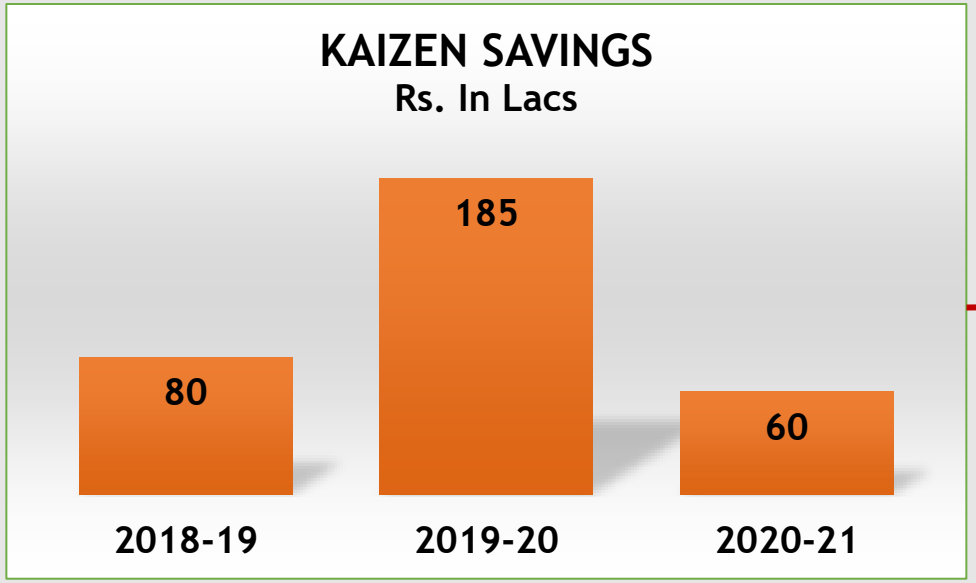
BEST PRACTICES – SAFETY

- **5S implementation** Completed.
- Checking of power tools, gas cutting set & etc. (monthly)
- Mechanical and Electrical LOTOTO system implemented
- Internal Safety audit is being conducted (monthly)
- **Safety Review meeting** is being conducted (monthly)
- **Motivational gifts** are being conducted (monthly).
- **50 safety training classes** conducted in FY 2020-21.
- **Emergency mock drills** are being conducted (quarterly).
- Consistently recognised as best department (safety practices and maintain housekeeping)



KAIZEN IMPLEMENTATION

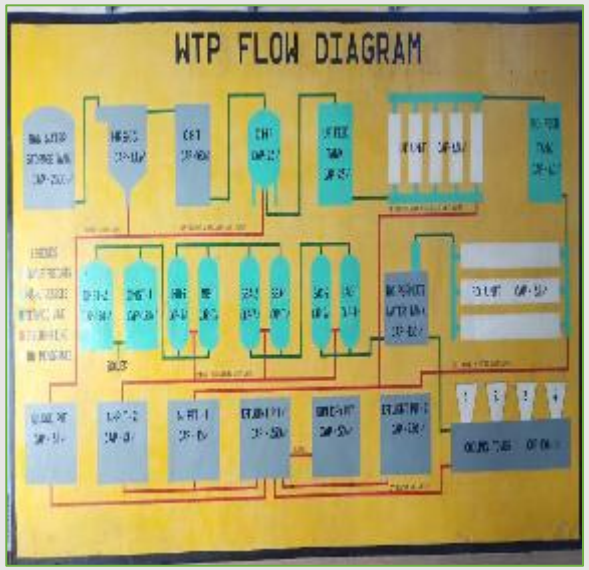


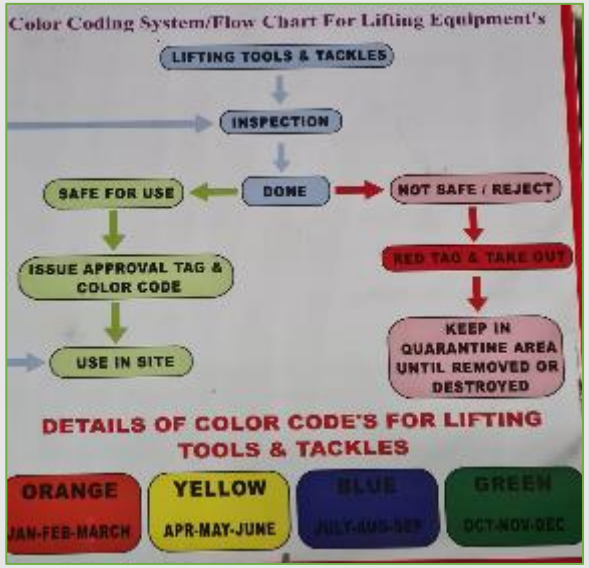


- **KAIZEN scheme was first implemented by 2017-18.**
- Good improvement and savings achieved.
- **Kaizens (427 Nos) have been implemented in last 4 years.**
- Average 5 Nos of employees are involved per Kaizen.
- Submitted kaizens are thoroughly being reviewed & verified by dedicated Kaizen team.
- **Shortlisted Kaizens are being awarded in every month.**
- We have achieved:
  - **Around Rs. 330 Lacs Savings**
    - Improved safety performance
    - Increased reliability and availability

MASS HOUSE-KEEPING

5S IMPLEMENTATION





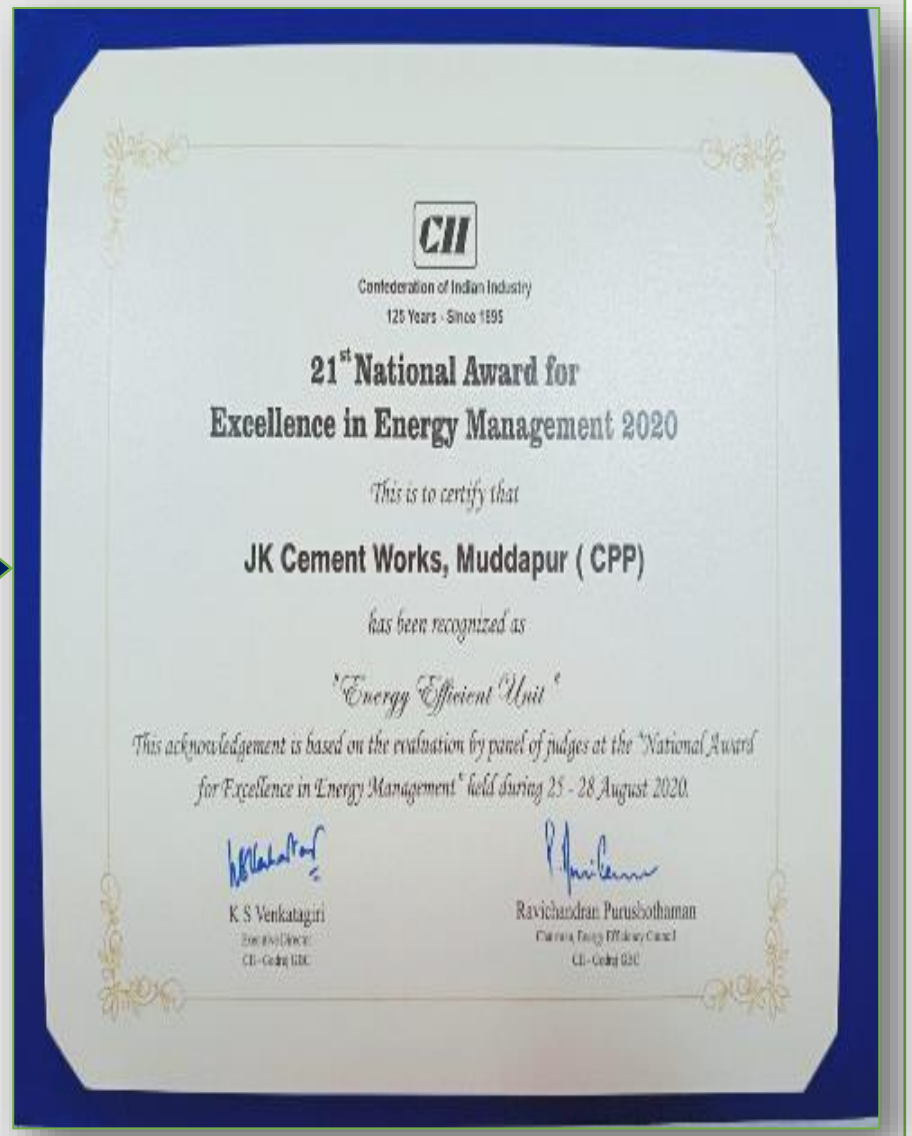
GREEN DEVELOPMENT

SAFETY ACCOLADES

50TH NATIONAL SAFETY DAY - 2021
STATE LEVEL AWARDS CEREMONY & PUBLIC FUNCTION
BEST POWER PLANT BOILER CATEGORY-1ST PRIZE
J.K.CEMENT MUDDAPUR

CII 21ST NATIONAL AWARD FOR EXCELLENCE IN ENERGY MANAGEMENT

ENERGY EFFICIENT UNIT



CII
Confederation of Indian Industry
125 Years - Since 1895

21st National Award for
Excellence in Energy Management 2020

This is to certify that

JK Cement Works, Muddapur (CPP)

has been recognized as

"Energy Efficient Unit"

This acknowledgement is based on the evaluation by panel of judges at the "National Award for Excellence in Energy Management" held during 25 - 28 August 2020.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purusothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

ENVIRONMENTAL AWARDS

CII 8TH NATIONAL AWARD FOR ENVIRONMENTAL BEST PRACTICES

"MOST INNOVATIVE ENVIRONMENTAL PROJECT"

MISSION ENERGY FOUNDATION'S AWARD

"Environmental Excellence - Existing TPPs (Winner)"

"Efficient Management of Fly Ash - CPP (Runner Up)"

GreenCo Gold Rated Plant

Created National Benchmark in Energy and Renewable energy category in GreenCo Rating

Energy Efficiency

Achieved National Benchmark ,Roadmap for 59 kwh/T Cement

Water Conservation

Targeting to become by 5 times Water Positive in FY 23

Renewable Energy

Increased the Renewable energy consumption up to 24 %.Target is 100 %

Green House Gases

Gross CO2 Emission reduced by 27% from 874 to 639 kgCO2e/MT Cement – Target : 580 kgCO2e/MT Cement

Waste Management

Achieved TSR 15 % in FY 20-21 and targeting for 50% in coming 2 years

Material conservation

Reduction in clinker factor and using alternate raw materials

Green Supply chain

Promoting Reverse logistics & Bulk Dispatches

IMPLEMENTATION OF ISO 50001

ISO 50001

- ISO 50001-2011: STAGE -1 visit was conducted in Dec-2017
- ISO 50001-2011: STAGE -2 visit was conducted in March-2018.
- Certificate Issue Date: 4 April 2018
- ISO 50001-2018: Surveillance and transition Audit conducted in Jan'20
- ISO 50001-2018: Certificate Issue date – 3rd March'20
- Certificate Identity No. 10257092

In Last Three years total amount of **Investment Made is around Rs. 160 Lacs**
In energy saving resulting in **total savings of Rs. 270 Lacs.**

Lloyd's Register

Certificate of Approval

This is to certify that the Management System of:

J K Cement Works

(Unit of JK Cement Ltd), Muddapur, Taluka – Mudhol, District – Bagalkot, Karnataka, 587122, India

has been approved by Lloyd's Register to the following standards:

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

Approval number(s): ISO 14001 – 0060494, ISO 45001 – 0052683, ISO 50001 – 0050519, ISO 9001 – 0060495

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

The scope of this approval is applicable to:

Manufacture of ordinary portland cements and blended cements including associated mining operation at Muddapur and Hadi.

Luis Cunha

Area Operations Manager - SAMEA

Issued by: Lloyd's Register Quality Assurance Limited

UKAS

Email: R.Durgaram@jkcement.com