JK Cement Mangrol

22nd National Award for Excellence in Energy Management 2021

Presented By:-
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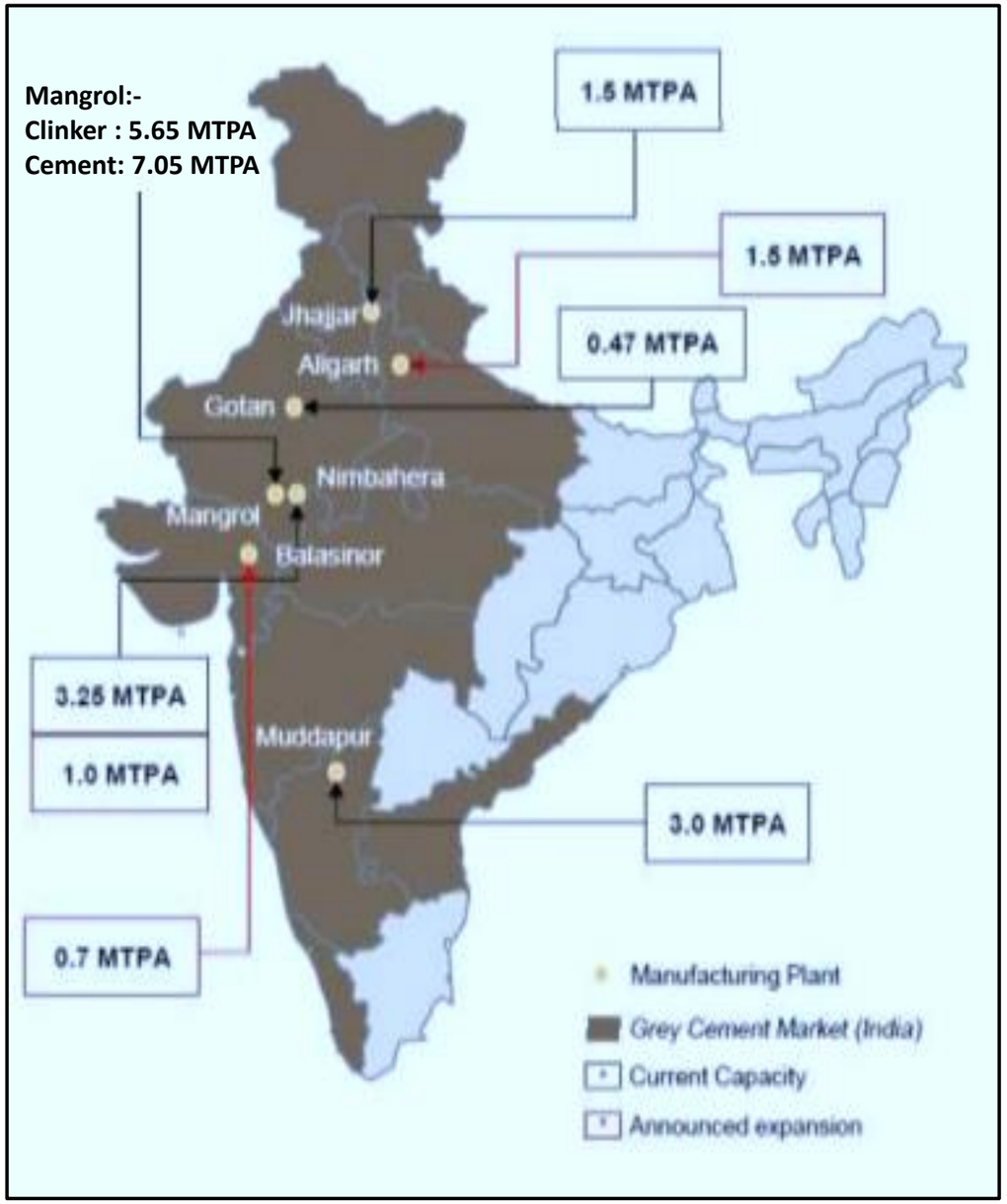
Pinaki Dutta (Production Head)
Yadvender Singh (Sr. Engineer-Process)

Brief introduction on Company

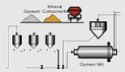
1.
   - JK Cement Ltd is an affiliate of Industrial conglomerate JK Organization, founded by Lala Kamlapat Singhania. The company is the second largest manufacturer of white cement in India (third largest in the world) & second largest producer of Wall putty in the country. First cement company to install a waste heat recovery power plant.

2.
   - JK Cement Mangrol with Total Clinker Capacity (5.65 mioTPA) and Total Cement Grinding Capacity (7.05 mioTPA).
   - Product: OPC-43, OPC-53, PPC

3.
   - JK Cement Mangrol is certified with ISO 14001, ISO 9001, ISO 45001 & ISO 50001:2018 .
   - Great Place to work certified company



Technology/Specification of sections

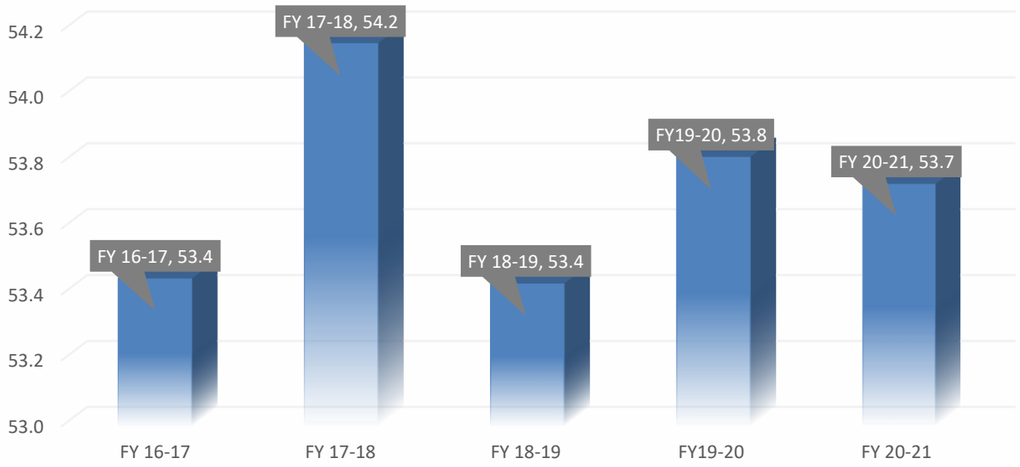
JK Cement Mangrol		Line-1	Line-2	Line-3
Stacker 	Machine type	Twin boom stacker	Luffing stacker	Luffing stacker
	Make	Promac	FLSmidth	FLS
	Capacity	350 TPH	850 t/h (wet)	1550 TPH
Reclaimer 	Machine type	Bridge type reclaimer	Bridge Reclaimer	Bridgre scraper
	Make	Promac	FLSmidth	FLS
	Capacity	200 TPH	550 t/h(wet)	800 TPH
Crusher 	Machine type	Impactor APPM 1650	Hammer Crusher with Wobbler Feeder	Impact crusher
	Make	L & T	Thyseen Krupp polysious	FLS
	Capacity	350 TPH	800 TPH	1300 TPH
Raw Mill 	Make	Promac (VRM) 02 Nos.	Thyseen Krupp Roller Press	FLS HRP-R-2.47 Sq.m (02 Nos.)
	Capacity	70 TPH	400 TPH	300 TPH
Kiln 	Make	Promac	FLSmidth	FLSmidth
	Machine type	5 Stage, ILC, Single String	5 Stage, ILC, Single String	5 Stage, ILC, Double String
		Ø3.3M*50M long, 4.17 RPM Max	Ø4.35M*67M Long	Ø4.75M*74M Long, 5.5 RPM
	Capacity	1800 TPD (Design), 2250 (Actual)	5000 TPD (Design) & 5750 TPD (Actual)	6500 TPD (Design), 7700 TPD (Actual)
	Type of cooler	Grate Cooler	Crossbar 14*47	Crossbar 18*63
	Grate area	43.848 Meter²/6 fan	129.78 M²/9 fans	190.6 mt sq./13 fans
	Burner type	Pyrojet Burner	Pyrojet Burner	Jetflex burner
Coal Mill 	Make	Promac	FLSmidth Atox 22.5 VRM	FLS Atox 32.3 RPM
	Capacity	20 TPH on coal and 10 TPH on PC	38 TPH (Indian Coal), 22 TPH (Pet coke)	35 TPH 100% PC, 70 TPH 100% Indian
Cement Mill 	Machine type	Ball Mill	Roller Press with Ball Mill (Combi circuit)	Roller Press with Ball Mill (Combi circuit)
	Make	FLS 1962	FLSmidth TriboMax & Thyssenkrupp	Thyseen Krupp Polysious
	Capacity	30 TPH	280 TPH (PPC),260 TPH(OPC)	260 TPH (PPC), 240 TPH (OPC)
Packing Plant 	Machine type	Mechanical Packer	FLS ventomatic single discharge packer (4 Nos)	Electronic Packer (Ventomatic)
	Capacity	60 TPH	120 TPH Each	150 TPH

Impact of COVID-19

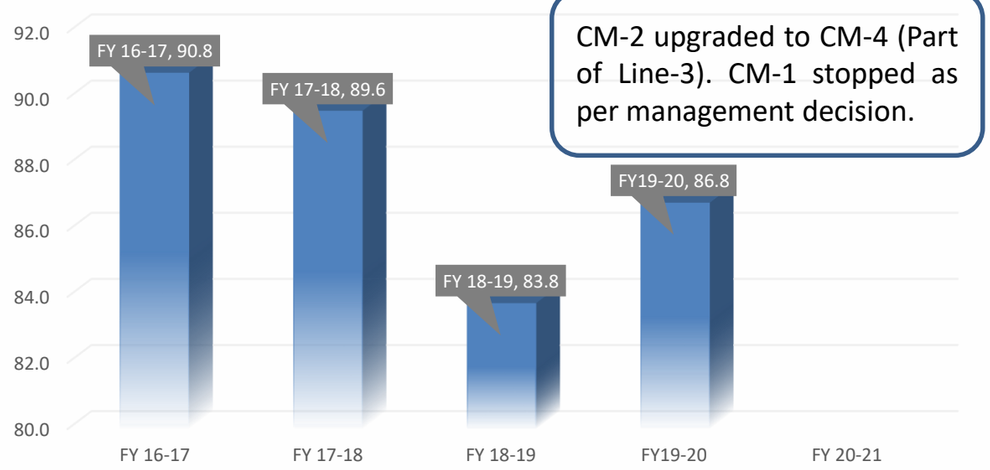
- Line-1 Production reduced by 27%, Line-2 by 13% but Line-3 increased by 4% due to stabilization.
- Line-1 SEC is approx. same, Line-2 increased by 0.29% but Line-3 decreased by 8.32% due to stabilization
- Line-1 & Line-2 Production and efficiency was reduced in that period but due to initial stabilization of Line-3 it is improved.

Specific Energy Consumption Line-1

UPTO CLINKERISATION

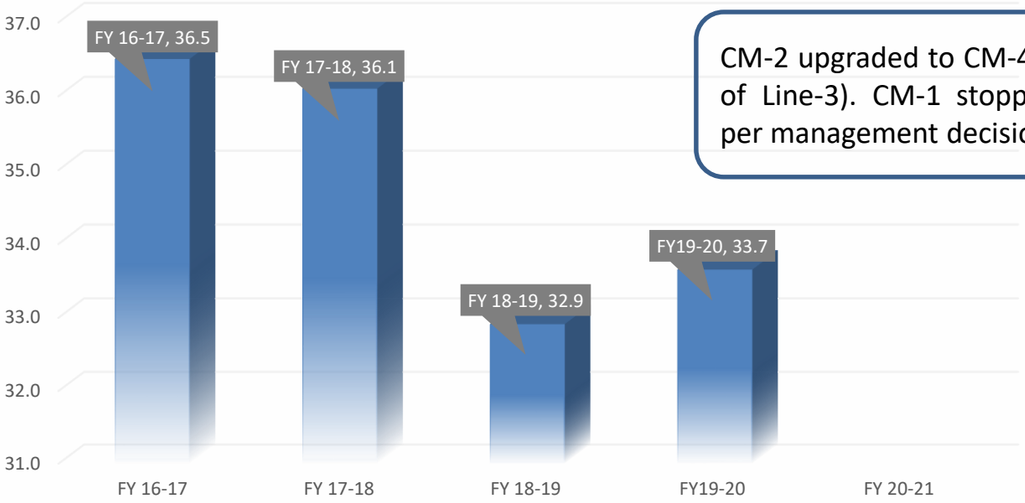


TOTAL PLANT POWER



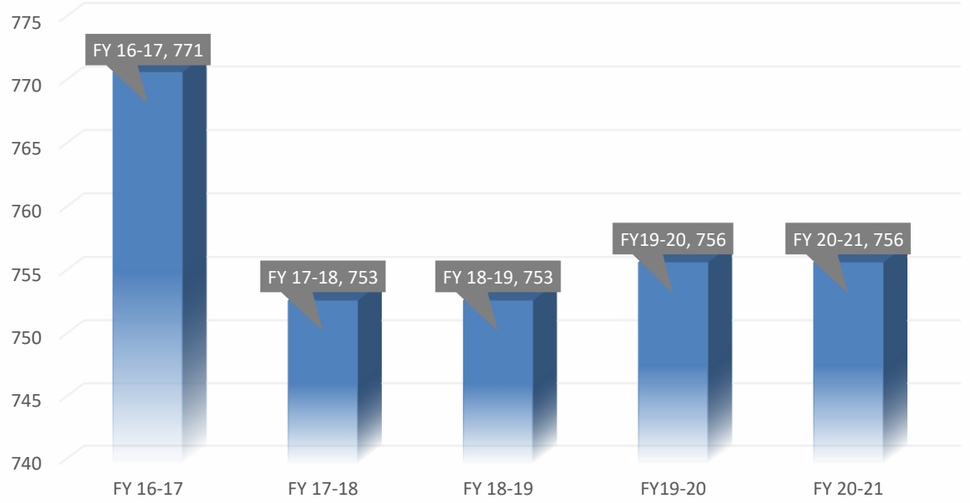
CM-2 upgraded to CM-4 (Part of Line-3). CM-1 stopped as per management decision.

CEMENT GRINDING



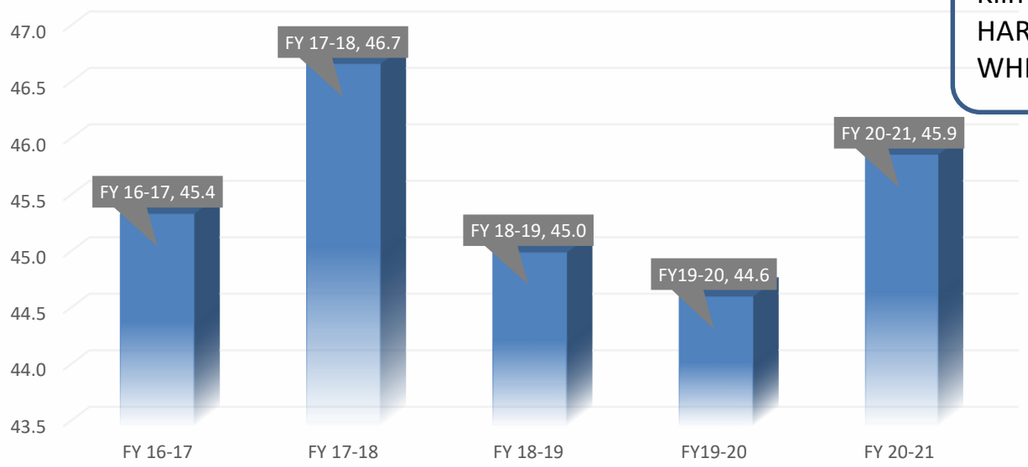
CM-2 upgraded to CM-4 (Part of Line-3). CM-1 stopped as per management decision.

THERMAL ENERGY



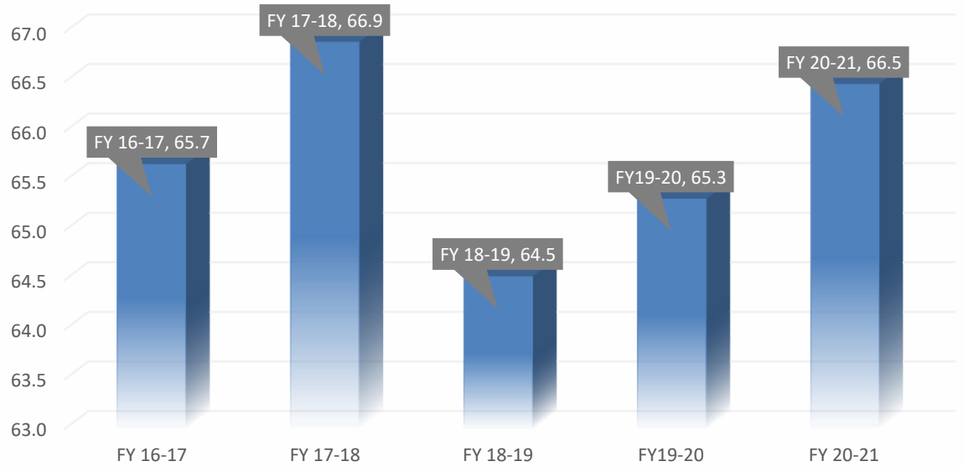
Specific Energy Consumption Line-2

UPTO CLINKERISATION

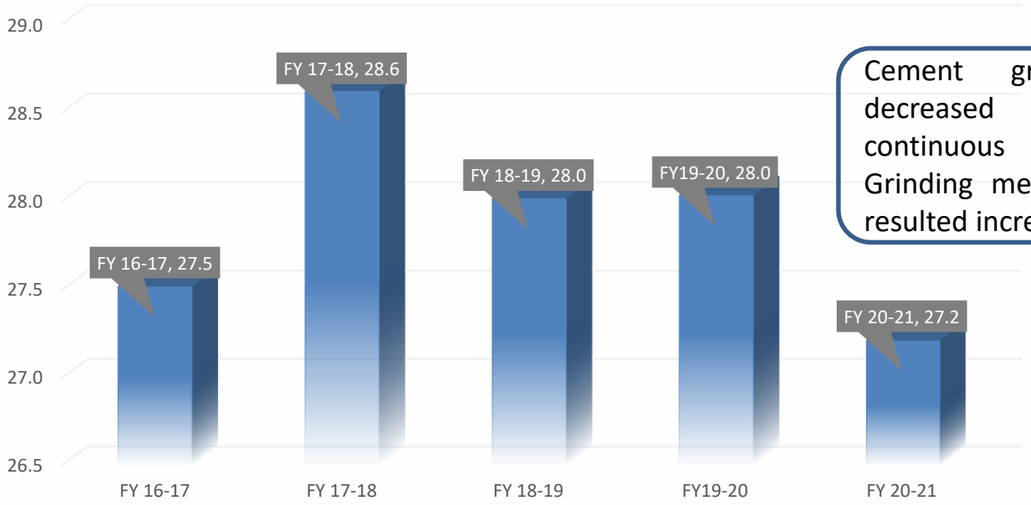


Kiln power increased due to HAR fan installed to increase WHR generation

TOTAL PLANT POWER

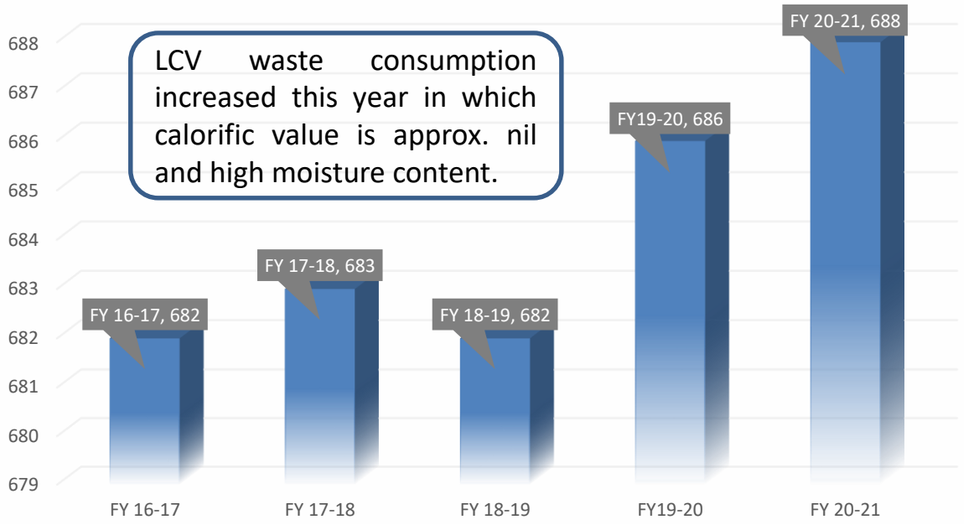


CEMENT GRINDING



Cement grinding Power decreased by 2.9% by continuous monitoring & Grinding media upgradation resulted increased output

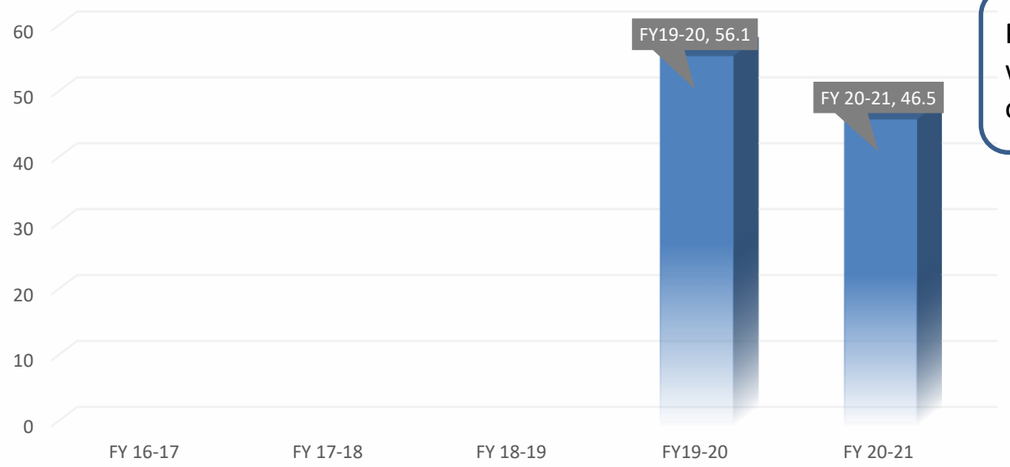
THERMAL ENERGY



LCV waste consumption increased this year in which calorific value is approx. nil and high moisture content.

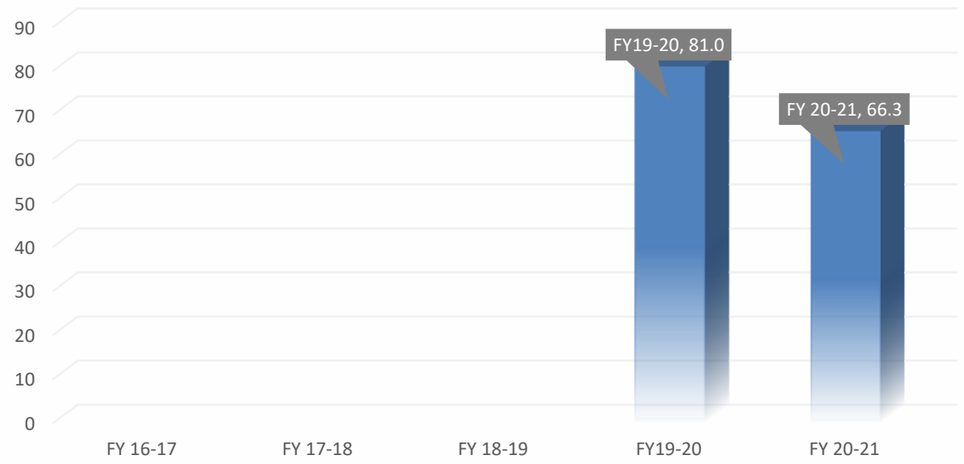
Specific Energy Consumption Line-3

UPTO CLINKERISATION

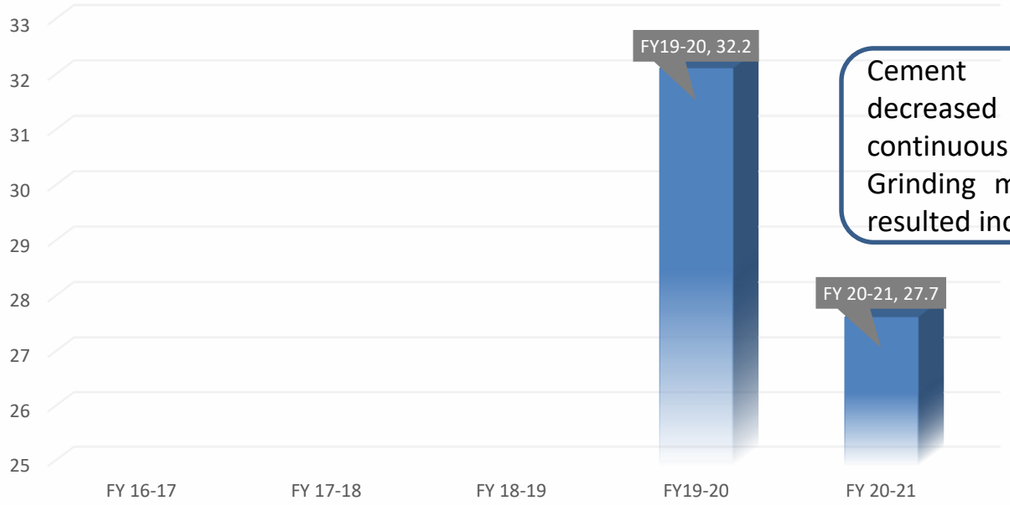


Power decreased by 20.6% with continuous process optimization & modifications.

TOTAL PLANT POWER

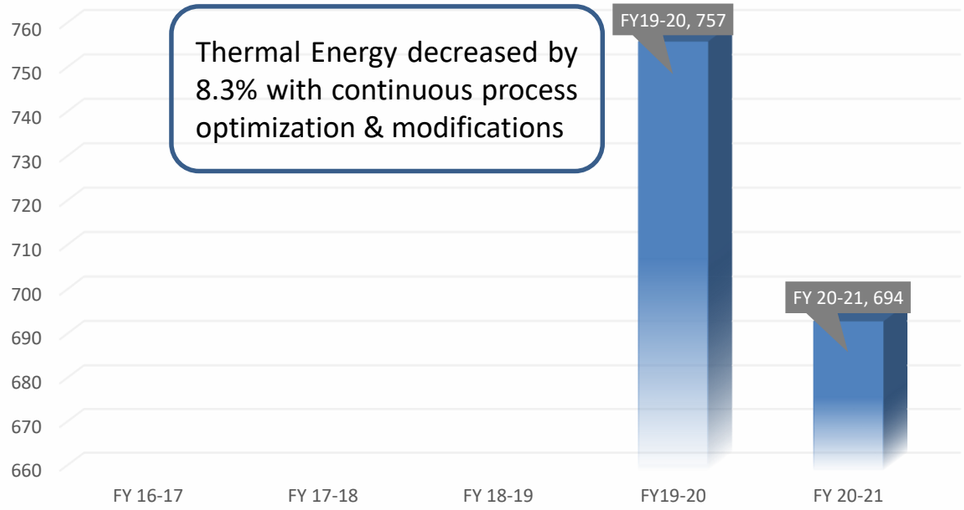


CEMENT GRINDING



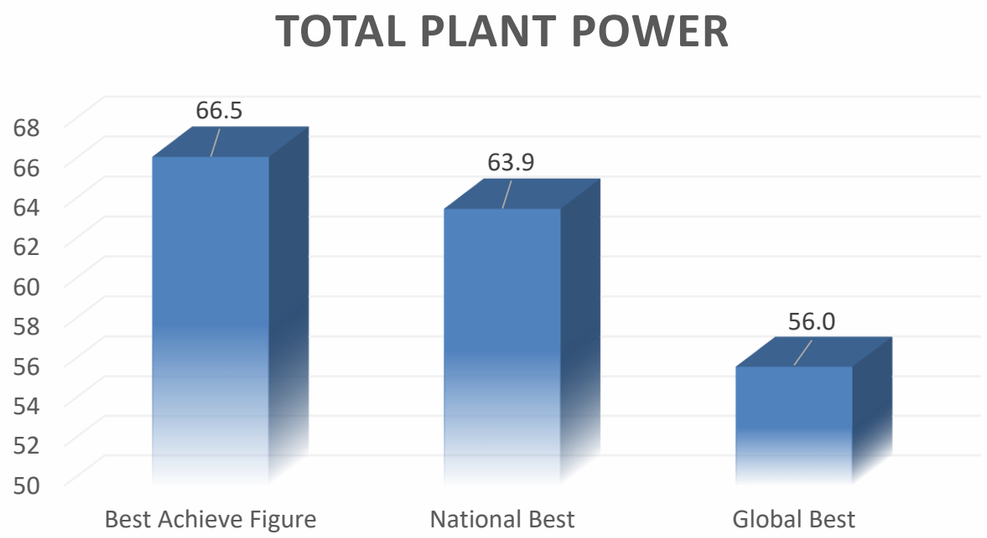
Cement grinding Power decreased by 14.0% by continuous monitoring & Grinding media upgradation resulted increased output

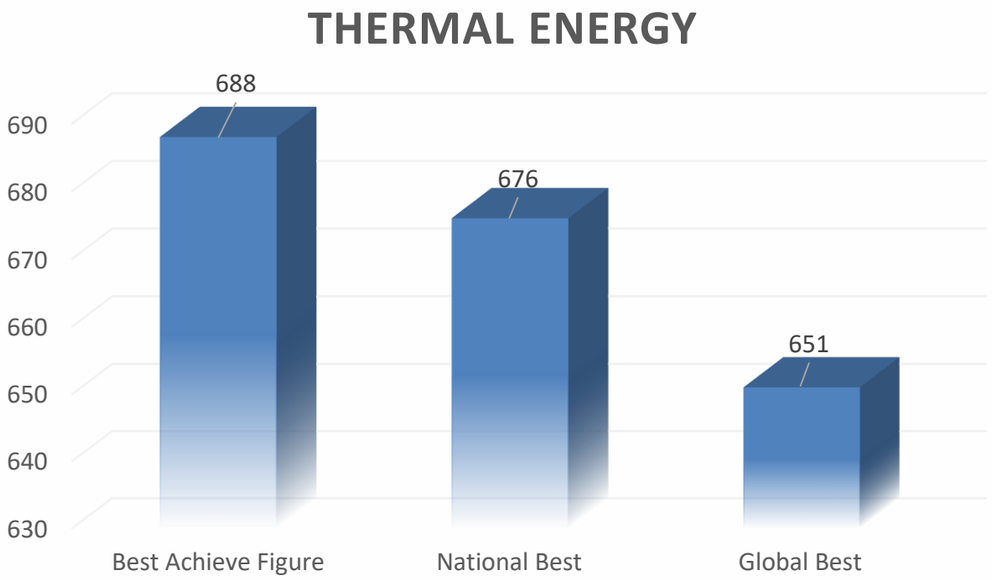
THERMAL ENERGY



Thermal Energy decreased by 8.3% with continuous process optimization & modifications

Energy Benchmarking





Higher Electrical Energy:

- Raw mill-3 power is on higher side due to low output.
- Kiln power increased due to HAR fan installed to increase WHR generation.
- Petcoke grinding & consumption.
- OPC-53 grinding in Cement Mill-3 for which higher blaine is required resulted in higher power consumption.

Higher Thermal Energy:

- High Alternative fuel usage resulted in high oxygen is being maintained.
- High moisture AF usage.
- 100% Petcoke Usage.
- LCV waste consumption increased this year in which calorific value is approx. nil and high moisture content.

Energy Saving projects planned FY 2021-22

Sl.No.	Year	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)	Remarks
1	2021-2022	Replacement of existing Coal firing system in Kiln-1 by installing Coriolis system to reduce thermal energy consumption (Replacement of old generation coal screw coal firing system in line 1 by latest Schenk Coriolis system to improve consistency in coal feed rate & stable kiln operation to reduce thermal energy)	-	337.5	50.0	Will be installed in Dec'21 end
2	2021-2022	Replacement of Old lights: Replacement of 205 Nos.70Watt HPSV Well Glass light by 40 Watt LED Well Glass.	0.045	-	0.43	-
3	2021-2022	Replacement of Old lights: Replacement of 150 Nos. 150Watt HPSV Well Glass light by 40 Watt LED Well Glass	0.095	-	0.32	-
4	2022	13 MW Solar plant installation to reduce the power plant	18.65	-	41.90	Location finalized

Energy Saving projects implemented in last three years

Year	No of Energy saving projects	Investments (INR million)	Electrical savings (Million kWh)	Thermal savings (Million Kcal/ MTOE)	Savings (INR Million)	Impact on SEC (Electrical kWh /MT cement, thermal)
FY 2018-19	14	3.46	7.81	2263.4	44.65	6.0 kwh/Ts Cem, 1.7 Kcal/Kg Clk
FY 2019-20	9	34.17	1.02	89921.5	106.64	0.4 kwh/Ts Cem, 31.4 Kcal/Kg Clk
FY 2020-21	11	10467.58*	80.69	221265.5	777.18	26.2 kwh/Ts Cem, 54.0 Kcal/Kg Clk

*Remarks:- Investment is higher in FY 2020-21 because of New upto Clinkering Unit established and Cement Mill-2 modified into Cement Mill-4 by Ball mill to Combi Circuit.

Energy Saving projects implemented FY 2018-19

Sl.No.	Description of energy efficiency improvements measure	Category	Investment (Rupees)	Verified savings (Rupees)	Verified energy savings	Units	TOE saving
1	Reduction in Power Consumption by Increasing PRI of Kiln and replacement of Burner by Low NOx type and low primary air. Reduction in upto Clinkerisation Line-1 power from 54.2 to 53.4 (kwh/Ts of Clinker).	Optimisation upto Clinkerisation Section	0	2869857	538435	Kwh	172.7
2	Reduction in Power Consumption by Increasing PRI of Kiln and replacement of Burner by Low NOx type and low primary air. Optimization of Raw Mill-3 Output reduced to optimize power consumption.Reduction in upto Clinkerisation Line-2 power from 46.7 to 45.0 (kwh/Ts of Clinker).	Optimisation upto Clinkerisation Section	0	16456712	3087563	Kwh	990.5
3	Reduction in Power Consumption by replacement of mill liners, Better maintenance practices and Process optimization. Reduction in Cement Mill-2 power 36.1 to 32.9 (kwh/Ts of Cement).	Optimisation Cement Grinding Section	0	12334964	2314252	Kwh	742.4
4	Reduction in Power Consumption by periodic roller profilling, Grinding Media sorting and process optimization. Reduction in Cement Mill-3 power 28.6 to 28.0 (kwh/Ts of Cement).	Optimisation Cement Grinding Section	0	5926938	1111996	Kwh	356.7
5	Reduction in Thermal Energy by increasing PRI of Kiln. Reduction in Thermal Energy in Line-1 from 753.4 to 752.6 Kcal /Kg Clk.	Energy Saving	0	791697	589324081	kCal	58.9
6	Reduction in Thermal Energy by increasing PRI of Kiln. Reduction in Thermal Energy in Line-2 from 683.3 to 682.4 Kcal /Kg Clk.	Energy Saving	0	2248920	1674052219	kCal	167.4
7	Replacement of 550Nos.70Watt HPSV Well Glass light by 40 Watt LED Well Glass	Energy Saving	1095600	211068	39600	Kwh	12.7

Energy Saving projects implemented FY 2018-19

Sl.No.	Description of energy efficiency improvements measure	Category	Investment (Rupees)	Verified savings (Rupees)	Verified energy savings	Units	TOE saving
8	Replacement of 350Nos.70Watt HPSV Well Glass light by 40 Watt LED Well Glass	Energy Saving	697200	67158	12600	Kwh	4.0
9	Replacement of 200 Nos. 2X36Watt Tube Light rod by LED Tube rod 2X18Watt.	Energy Saving	68000	92102	17280	Kwh	5.5
10	Replacement of 150 Nos. 2X36Watt Tube Light rod by LED Tube rod 2X18Watt.	Energy savings	51000	34538	6480	Kwh	2.1
11	Energy saver panel installation in MRSS 1 6.6 KV sub station LINE 1	Energy savings	342529	57564	10800	Kwh	3.5
12	Energy saver panel installation in Cooler LC LINE 1	Energy savings	342529	41574	7800	Kwh	2.5
13	AC Energy saver installed in 50 nos of AC.	Energy savings	360000	55965	10500	Kwh	3.4
14	Optimization of Auxiliary power Consumption. Lime system modification Saving at 25MW CPP	Energy savings	500000	3463902	649888	Kwh	208.5
			3456857	**44652960**			**2731**

Energy Saving projects implemented FY 2019-20

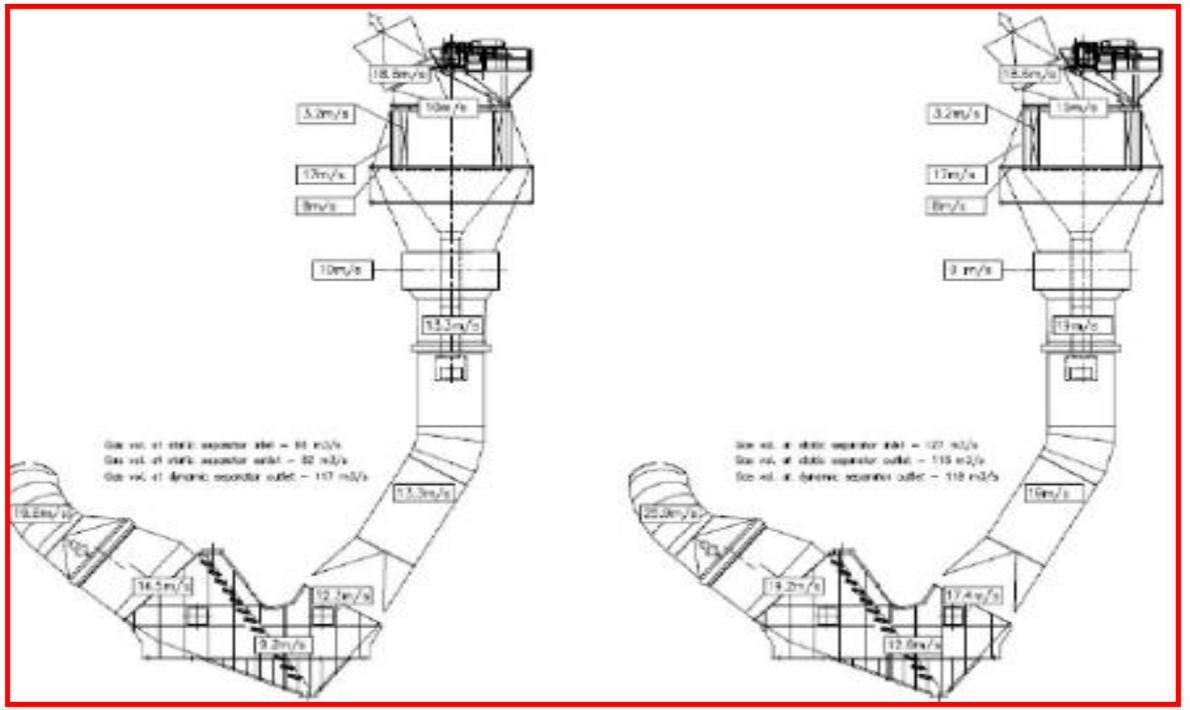
Sl.No.	Description of energy efficiency improvements measure	Category	Investment (Rupees)	Verified savings (Rupees)	Verified energy savings	Units	TOE saving
1	Continuous monoitoring of process parameters, Optimum operation of Kiln in Line-2	Energy saving	-	3659720	716188	Kwh	234.6
2	Usage of AFR in Line-1 by substituting primary fuel	Energy saving	12326457	16434126	14570036045	Kcal	1457.0
3	Usage of AFR in Line-2 by substituting primary fuel	Energy saving	13460600	84991889	75351427325	Kcal	7535.1
4	Replacement of 200Nos. 150Watt HPSV Well Glass light by 40 Watt LED Well Glass	Energy saving	400000	404712	79200	Kwh	25.9
5	Replacement of 150Nos.70Watt HPSV Well Glass light by 40 Watt LED Well Glass	Energy saving	300000	82782	16200	Kwh	5.3
6	Replacement of 200 Nos. 2X36Watt Tube Light rod by LED Tube rod 2X18Watt.	Energy saving	70000	132451	25920	Kwh	8.5
7	1000 KW DC MOTOR OF SG FAN REPLACED WITH AC DRIVE	Energy saving	7500000	883008	172800	Kwh	56.6
8	Using of LED's instead of HPSV lamps. (WHR)	Energy saving	48000	20144	3942	Kwh	1.3
9	Using of LED's instead of HPSV lamps. (CPP)	Energy saving	64000	26858	5256	Kwh	1.7
			34169058	**106635691**			**9326**

Energy Saving projects implemented FY 2020-21

Sl.No.	Description of energy efficiency improvements measure	Category	Investment (Rupees)	Verified savings (Rupees)	Verified energy savings in MTOE	Units (kWh)	Fuel (MT)
1	Usage of AFR in Line-1 by substituting primary fuel	Fuel Change	8762971	15092318	-	-	1753.6
2	Usage of AFR in Line-2 by substituting primary fuel	Fuel Change	26294341	134107740	-	-	8709.1
3	Usage of AFR in Line-3 by substituting primary fuel	Fuel Change	7622608	70195102	-	-	1727.7
4	Replacement of Old lights: Replacement of 100Nos. 150Watt HPSV Well Glass light by 40 Watt LED Well Glass	Illumination	210000	261629	20.6	63510	-
5	Replacement of Old lights: Replacement of 110Nos.70Watt HPSV Well Glass light by 40 Watt LED Well Glass	Illumination	231000	99239	7.8	24090	-
6	Preheater area lighting circuit modification, reduction in number of lights	Illumination	0	144347	11.4	35040	-
8	Reduction in Thermal Energy of Kiln-3: Optimization of Burner momentum, continuous monitoring of process parameters, Optimum operation of Kiln in Line-3	Technology Absorption	7705200000	152478941	13055.0	0	17542.7
9	Reduction in Upto Clinkerisation Power of Kiln-3: Optimization of Burner momentum, continuous monoitoring of process parameters, Optimum operation of Kiln in Line-3	Technology Absorption	0	82126034	6471.1	19935943.94	-
10	Upgradation Of Cement Mill 2: Modification of existing ball mill along with addition of new roller press for cement grinding to increase capacity & to improve grinding efficiency.	Technology Absorption	1204800000	32263226	2542.2	7831838.89	-
11	New WHR plant capacity 29.1 MW installation: New WHR plant capacity 29.1 MW installation, WHR Generation increased by 52799432 KWH (Generation in year 2019-20 was 63486739 kwh and in year 2020-21 is 116286171 kwh), plant commissioning completed in month Oct-2020.	Technology Absorption	1514435869	290396876	17138.3	52799432	-
Total			**10467585538**	**777176821**	**48319.0**	**80692614.8**	**29733.1**

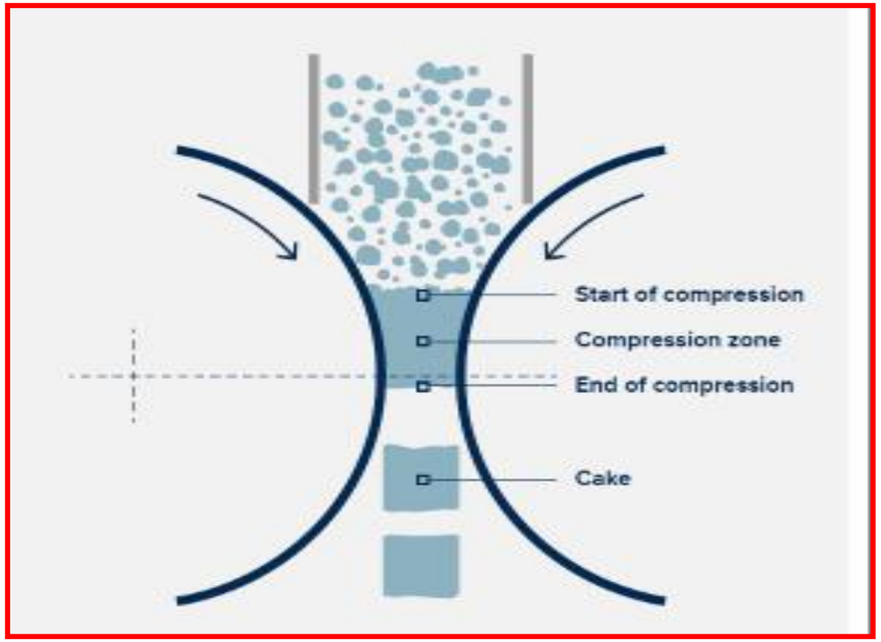
Innovative Projects

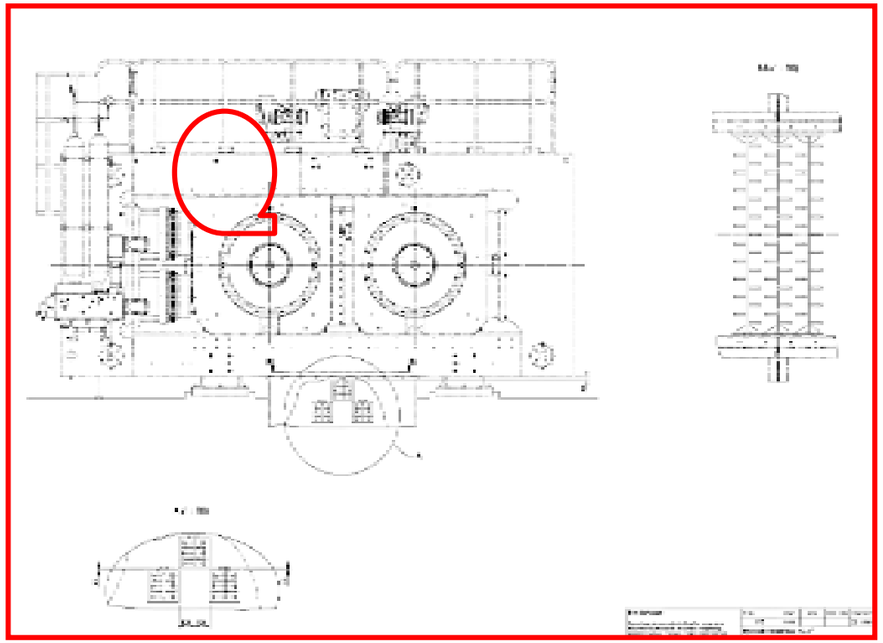
- Issue: High recirculation of material in static separator, it results lower rate of fresh feed in Cement mill-4
- Solution/Action taken:
  - Installation of Movable guide vanes (5 + 2 nos.)at gas inlet side - CRPG-S
  - Adjustable guide vanes (5 no's) - CRPG-S in the outlet side
- Benefits: Fine material recirculation reduced because of proper air distribution across the separator



Innovative Projects

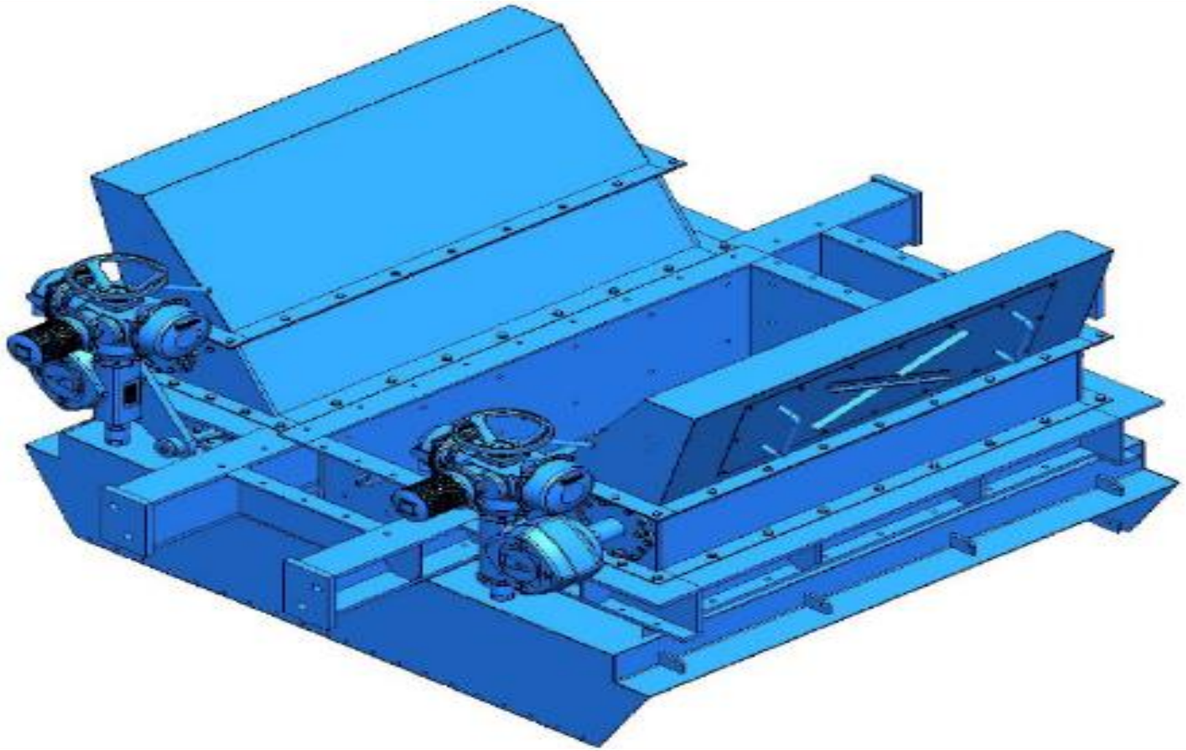
- Issue: Cake formation of HRP discharge material fed to static separator. High recirculation of material in Cement Mill-4
- Action Taken: Installation of cake breaker at roller press discharge chute
- Benefit: Homogeneous material feeding to static separator discharge belt

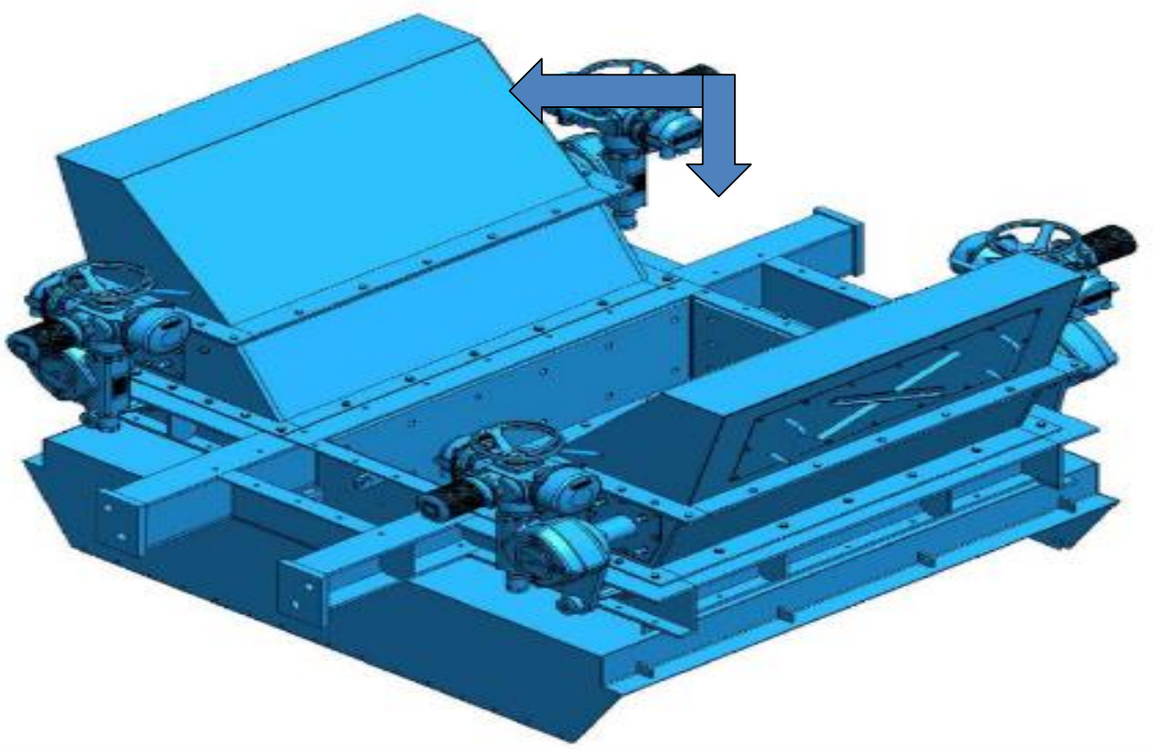




Innovative Projects

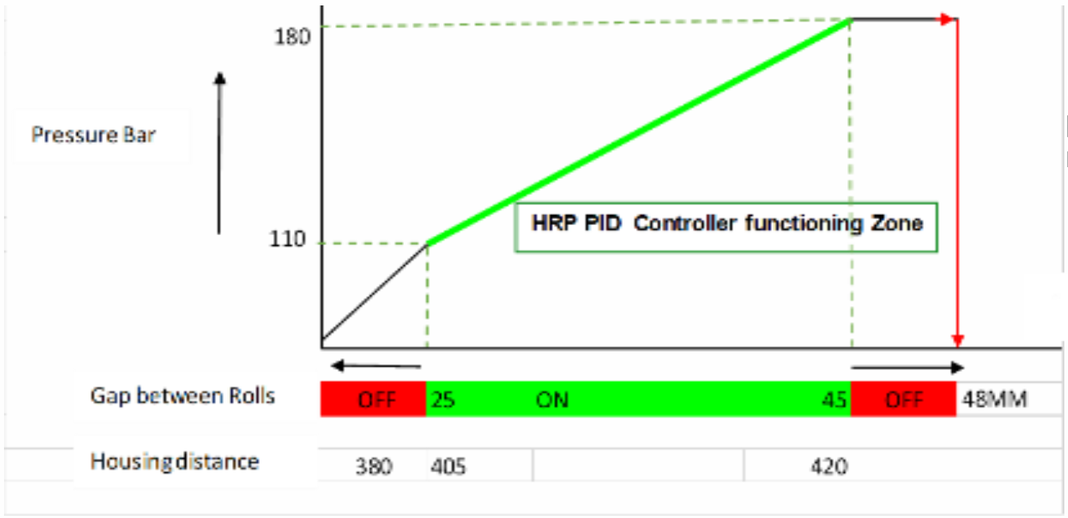
- **Issue:** Lower roller movement, higher vibration in Cement mill-4
- **Modification:** HRP Feed gate modification: converted the existing 2 gate operation to 4 gate operation at HRP. Roller press roller's movement optimization for effective grinding
- **Benefit:** Operation stability in terms of material distribution on rollers improved.



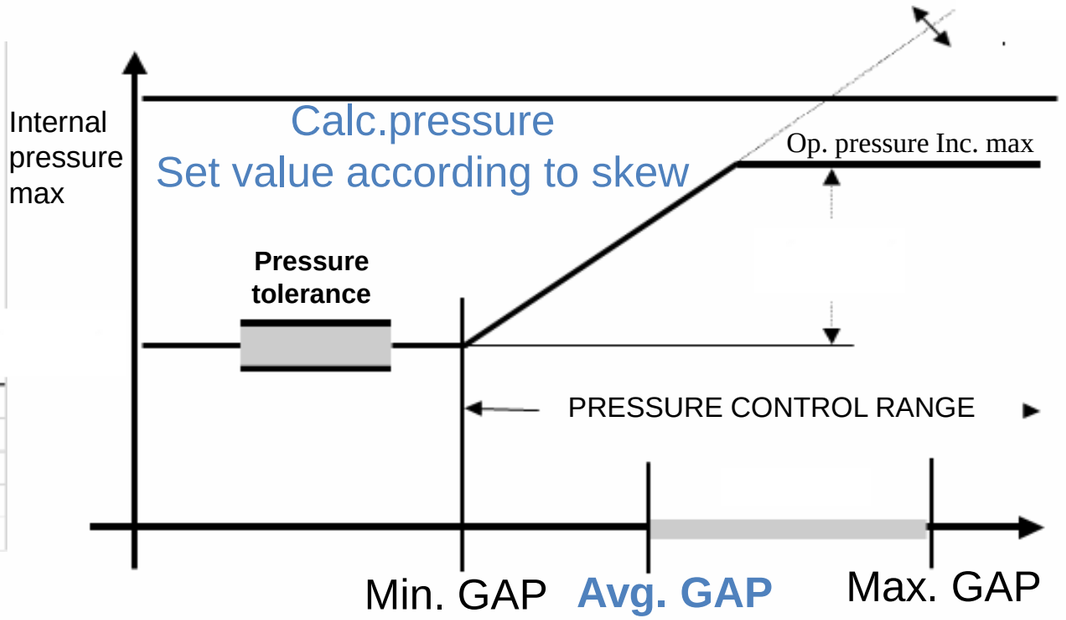


Innovative Projects

Operation of Cement Mill-4 in Auto loop

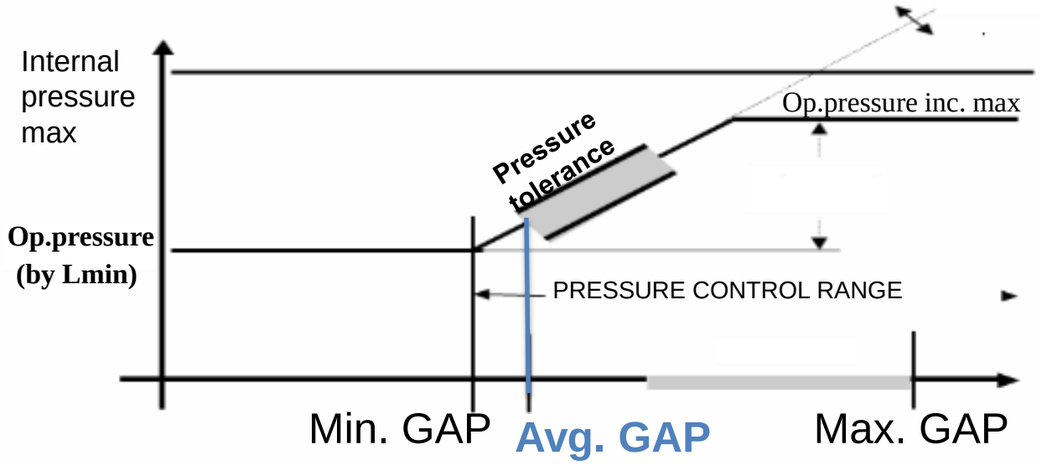


Normal functioning of logic

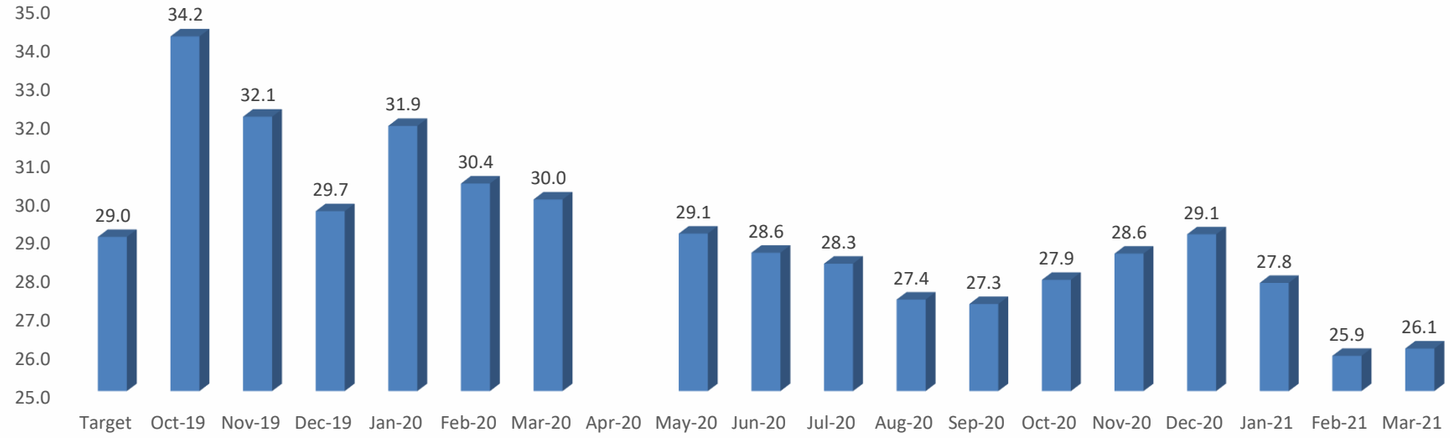


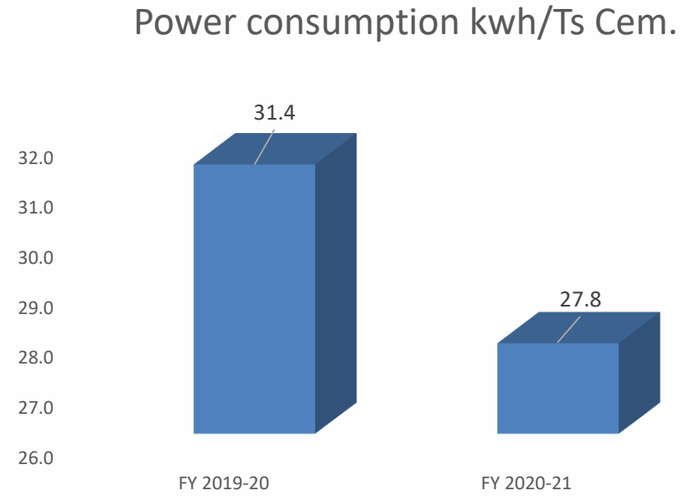
Present functioning of logic in Cement mill-4 :

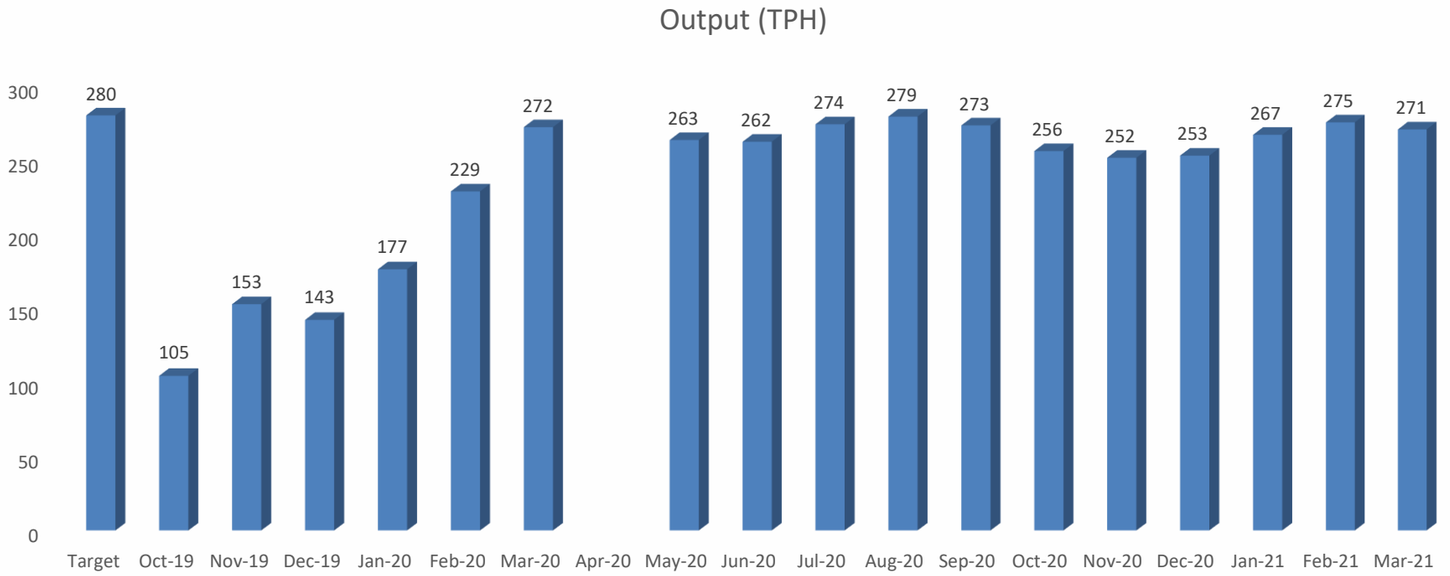
Due to NDE side operating gap slide towards the minimum gap in operation where pressure tolerance increases and auto logic function become void which works in safety band value further increase leads to flush and vibration of mill

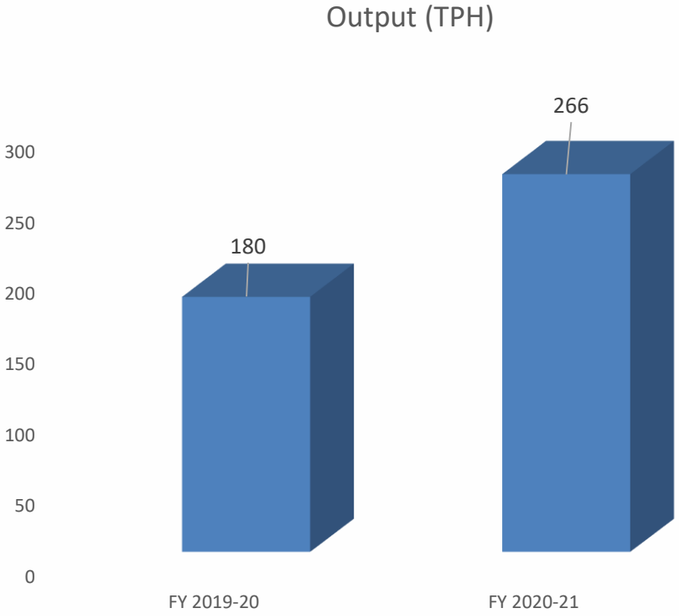


Data comparison of Cement Mill-4 Before & After



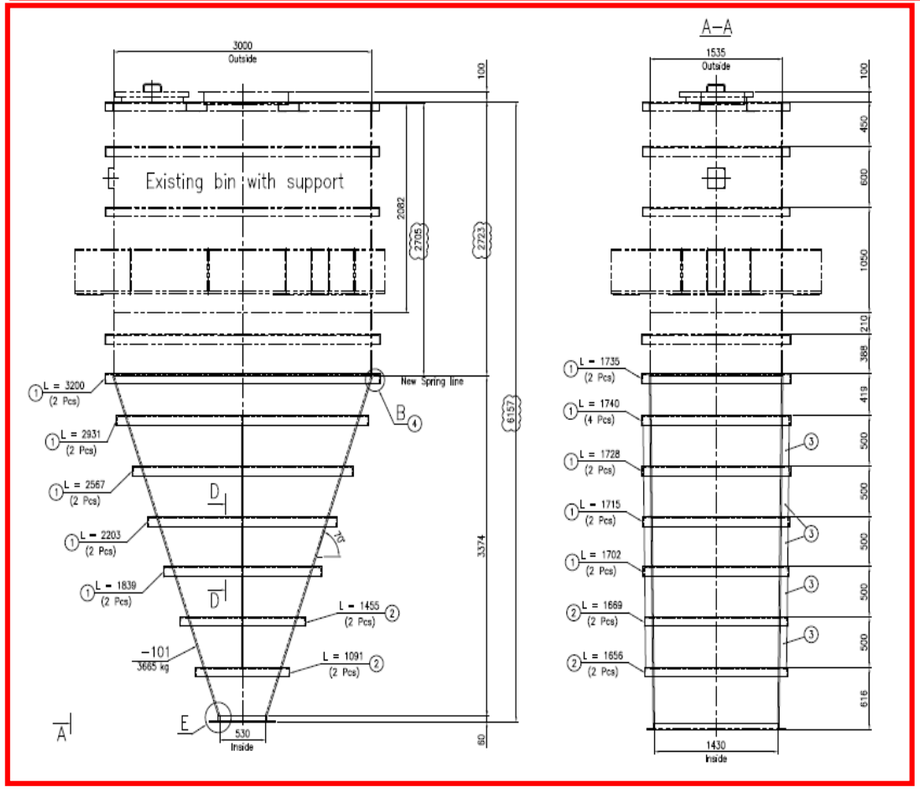


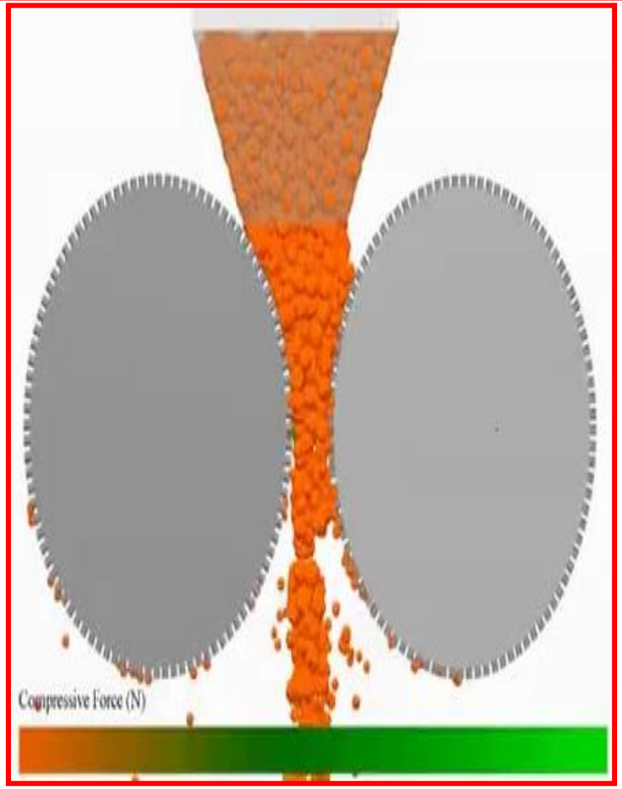




Innovative Projects

- Issue: Feed column is towards non-drive end side, No significant movement in movable roller in Raw Mill-4
- Solution/Action taken: Choke feed bin cone angle changed from 60 Deg to 70 degree
- Benefit: Slight movement in housing started and slightly reduction in vibrations

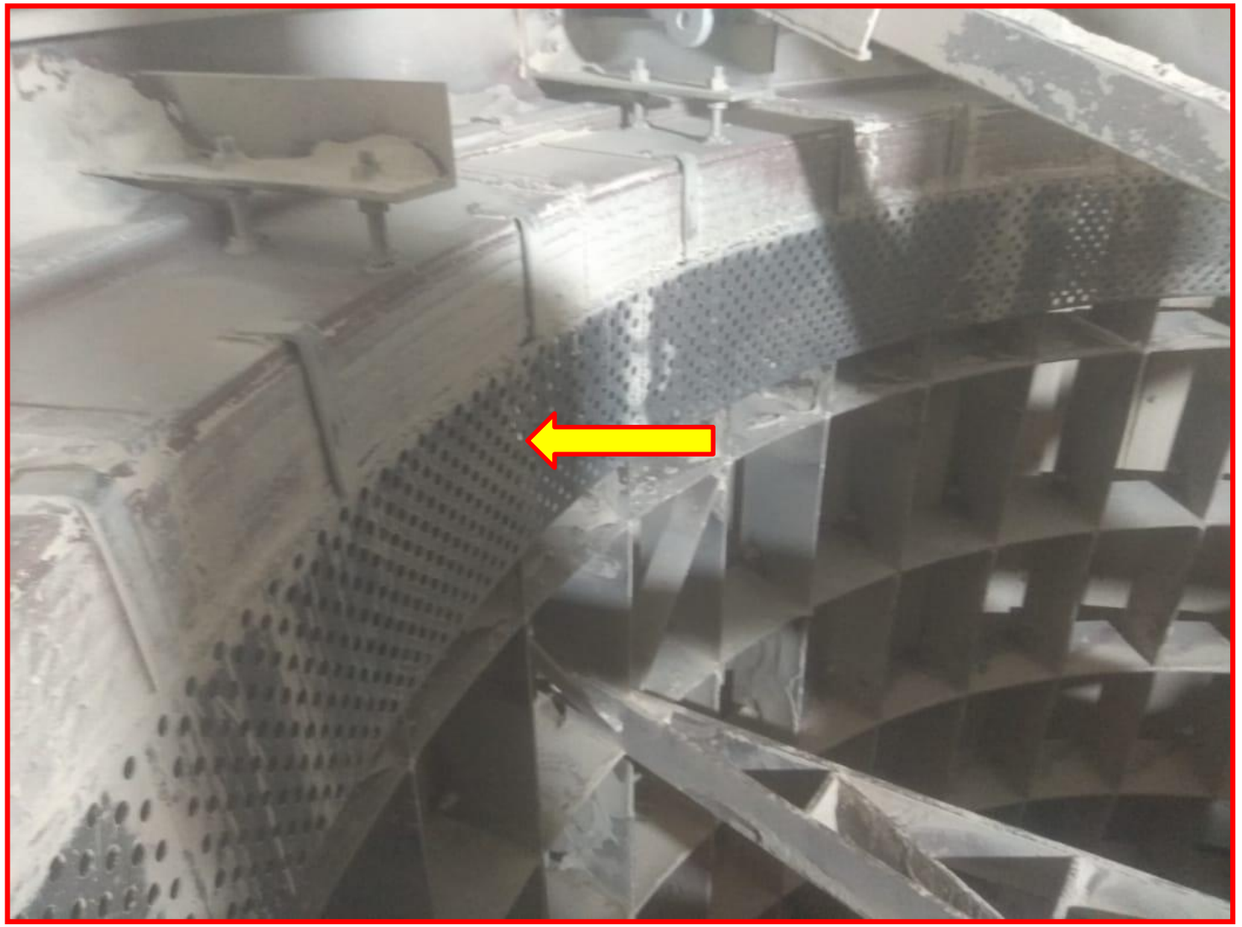




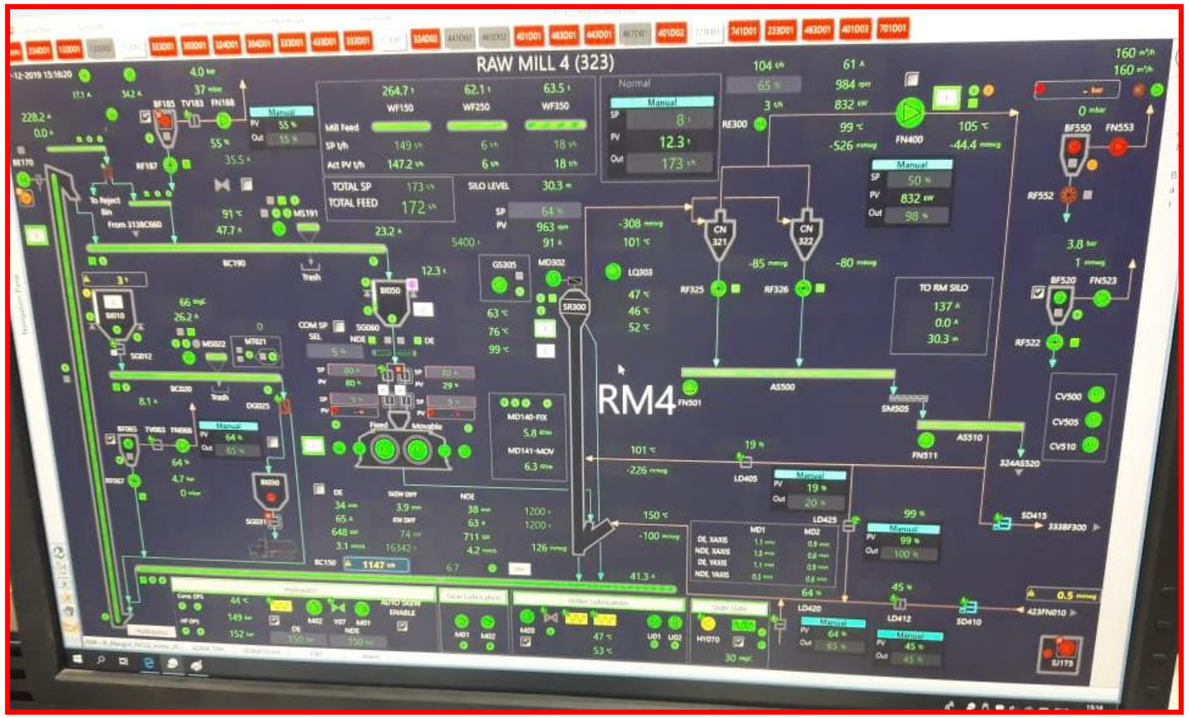
Innovative Projects

Improvement of dynamic separator efficiency

- Issue: To maintain the desired residue at final output
- Solution/Action taken: Dynamic separator rotor block by 16%
- Benefit: Separator RPM reduced, Material residue improved

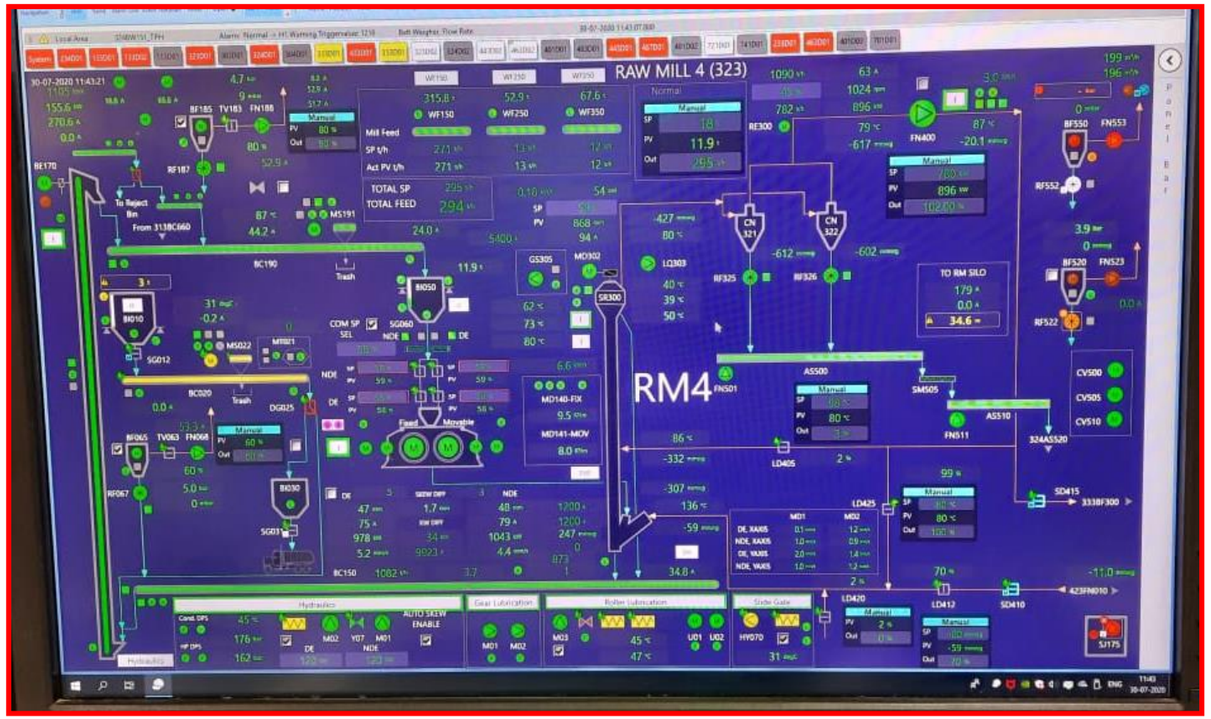


Results after modification



Data before modification-

- Feed- 173 TPH
- Material recirculation- 1147 TPH
- Separator fan RPM- 984
- Separator KW- 832 KW



Data after modification-

- Feed- 295-300 TPH
- Material recirculation- 1082 TPH
- Separator fan RPM- 1024
- Separator KW- 896 KW

Production increased approx. 175%

Utilization of Renewable Energy sources

Year	Technology	Type of Energy	Onsite/Offsite	Installed Capacity MW	Generation (million KWh)	% of overall electrical energy
FY 2018-19	Waste Hear recovery System	Electrical Energy	Onsite	10 MW	66.22	22%
FY 2019-20	Waste Hear recovery System	Electrical Energy	Onsite	10 MW	63.49	24%
FY 2020-21	Waste Hear recovery System	Electrical Energy	Onsite	29.1 MW	116.29	37%

Utilization of Renewable Energy sources

Installation of 13 MW Solar Power plant (Planned)

Equipment	Average load (MW)
Line 1 (Excluding Pyro Section)	9.9
Line 2	21.4
Line 3	17.1
Maliakhera Crusher	1.7
Total	**50.1**

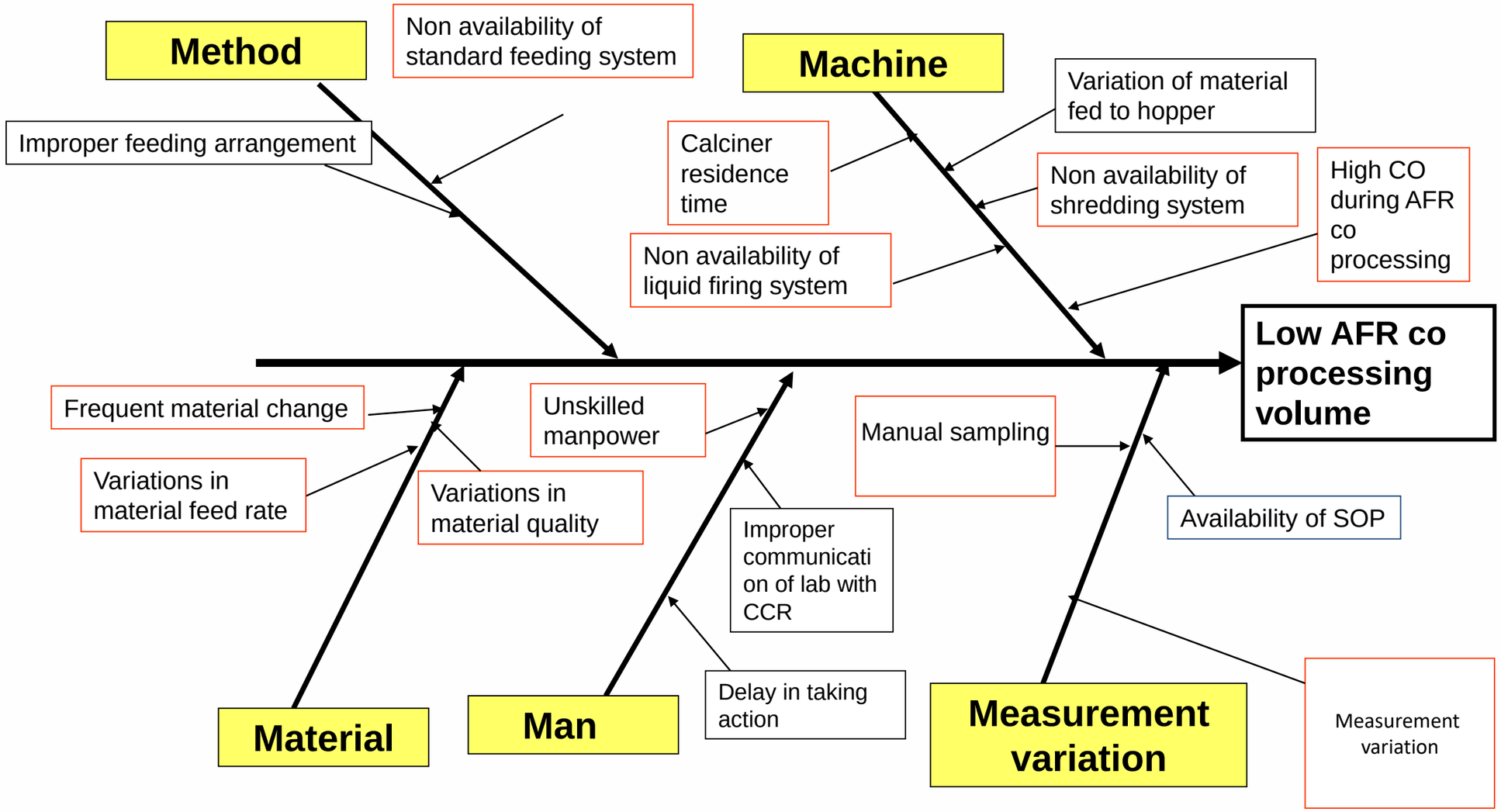
Source (MW)	Max. Load	Sent-out
CPP	25	22
WHRS	29.2	22
Grid sanctioned load	31.5	31.5
Total	**85.7**	**75.5**

In-house source (MW)	44
Power Deficit (MW)	6.1
Running CPP at low PLF (MW)	3.0
Peak AC capacity required	9.07
DC to AC loading factor	1.4
Average PLF (%)	17%
Total Solar Capacity (MW)- DC plant capacity	13
Savings (INR / Year)	6,06,15,173
Savings (MT Cement)	17
Investment (INR)	4,19,03,400
Payback (Years)	**0.69**

Cost of electricity @ MGRL 6.25, Solar @ 3.5

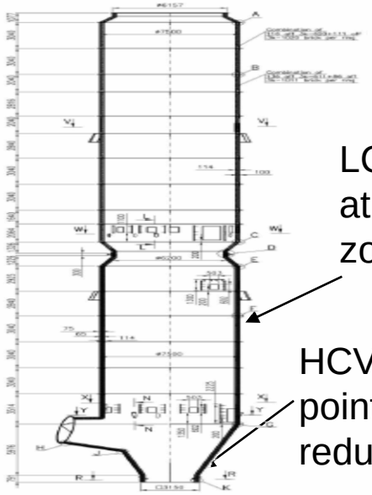
D/E ratio - 70:30, & 26% equity in group captive considered

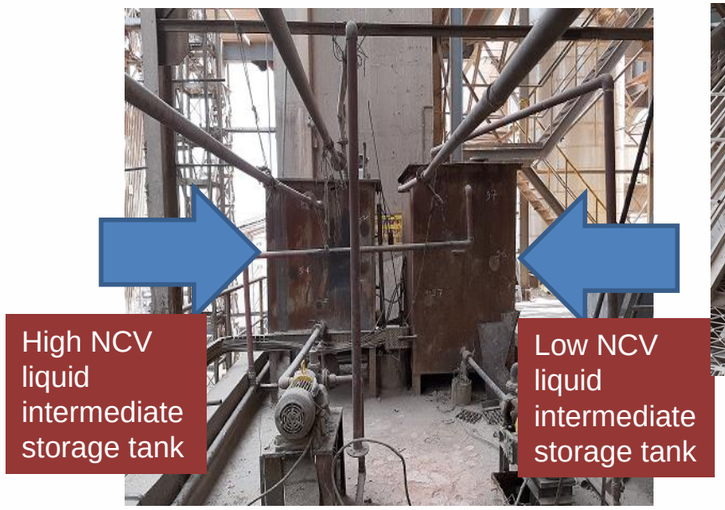
Methodology-Root cause Identification



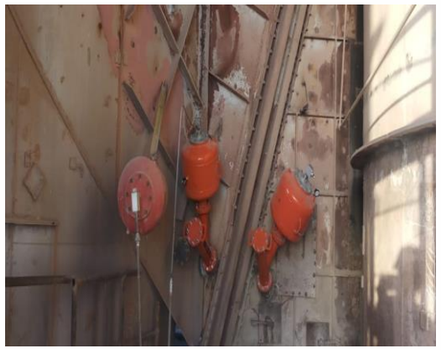
Counter measure and Implementation

- Equipment Installation





3rd feeding point of low NCV feeding point at ILC TAD duct outlet duct connecting to ILC



Installation of additional Martin Blasters at coating prone zone

Weima Shredder installed

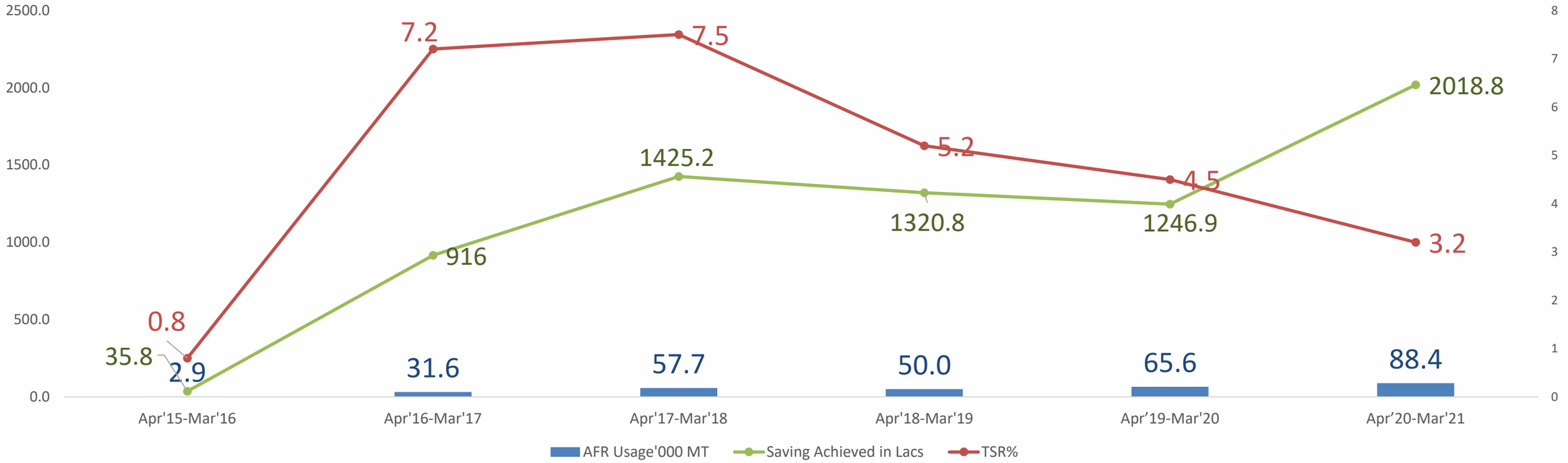
High NCV feeding point at reducing zone of calciner

Ist feeding point of low NCV feeding point at oxidising zone

2nd feeding point of low NCV feeding point at oxidising zone

Data comparison Before & After

Parameters	UOM	Apr'15-Mar'16	Apr'16-Mar'17	Apr'17-Mar'18	Apr'18-Mar'19	Apr'19-Mar'20	Apr'20-Mar'21
AFR Usage	MT	2933	31565	57744	50015	65580	88424
Thermal Substitution	%	0.8	7.2	7.5	5.2	4.5	3.2
Saving Achieved	Lacs	35.8	916.0	1425.2	1320.8	1246.9	2018.8



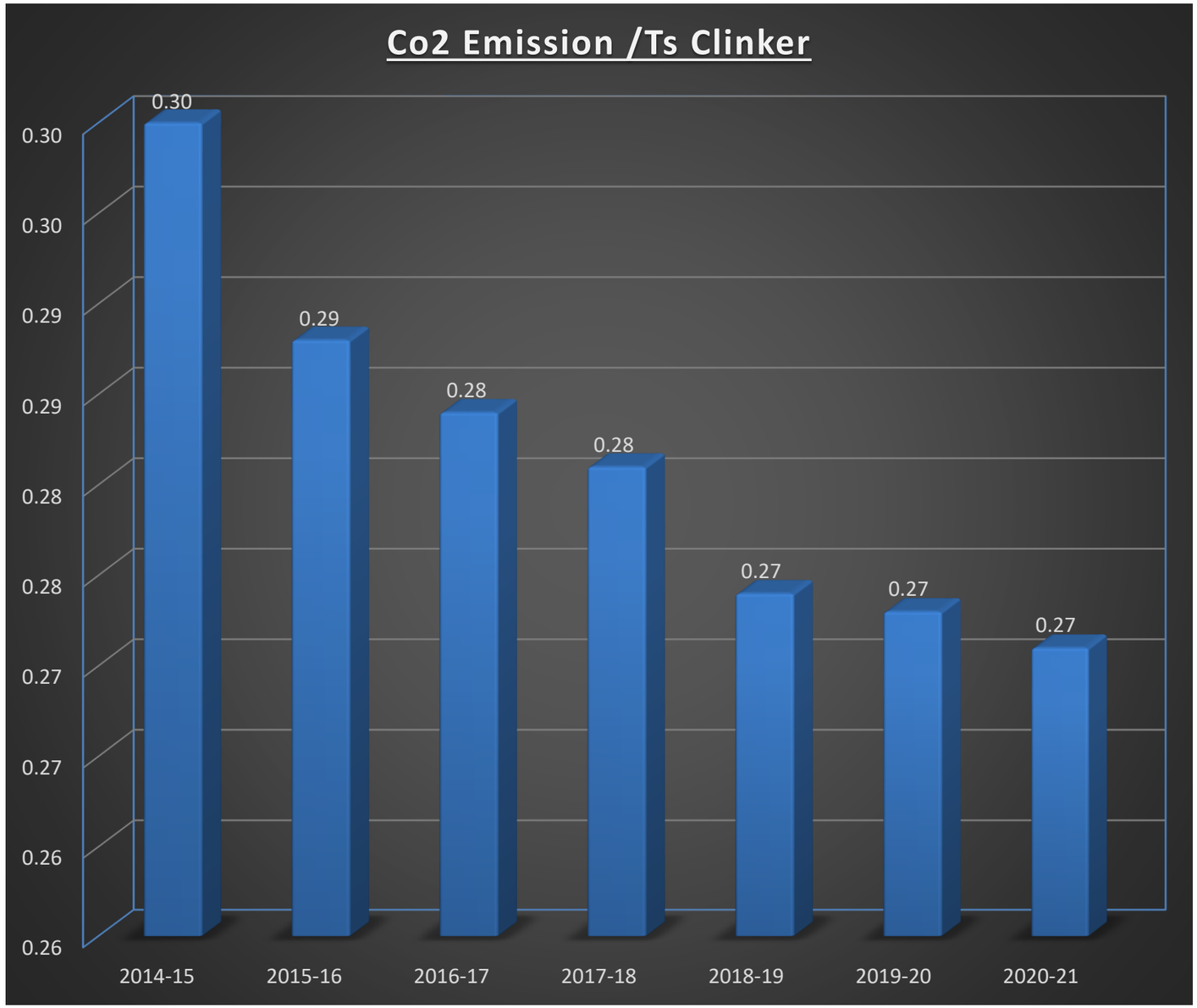
Benefits Achieved

Tangible benefits:-

- Total Saving of Rs 2118.8 Lacs from AFR usage last year.
- Total saving of 12190 MT of main fuel (Pet coke).

Intangible benefits:-

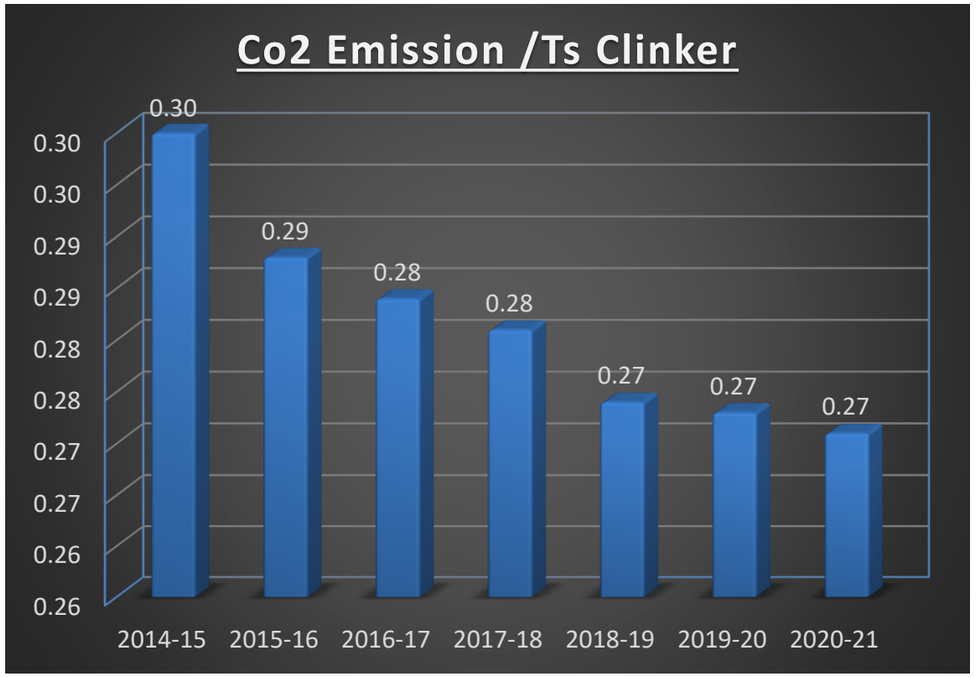
- Co-processing of AFR reduced the land filling.
- Reduction in CO2 emissions.
- To protect against global warming.



GHG Inventorisation

Cement Plant

Parameter	Line-1			Line-2			Line-3	
	YEAR FY			YEAR FY			YEAR FY	
	2018-19	2019-20	2020-21	2018-19	2019-20	2020-21	2019-20	2020-21
Co2Emission /Ts Clinker (Fuel)	0.31	0.28	0.27	0.28	0.27	0.27	0.28	0.26



Power Plant

Parameter	YEAR FY		
	2018-19	2019-20	2020-21
Co2Emission /MW	1.23	1.17	1.17

GHG Inventorisation

Environmental projects with carbon emission reduction in FY 2020-21:

Projects	
• AFR Consumption increased from 65580 to 88424 MT	By 34.8%
• Reduction of OPC Clinker factor from 0.896 to 0.876	By 2.2%
• Reduction of PPC Clinker factor from 0.658 to 0.624	By 5.2%
• Replacement of conventional lightening with LED lights	125400 KWH saved
• Reduction of CO2 from 612 to 611 kg/MT of cem	By 0.2%
• Reduction of total plant power from 70.65 to 62.74 Kwh/Mt	By 11.2%
• Reduction of Thermal Energy from 711 to 698 kcal/Kg Clk.	By 1.8%

Environmental Projects

Installation of SNCR to reduce the Nox emissions

Installation of Liquid Firing System

Installation of Solid Feeding System

Feeding Hopper

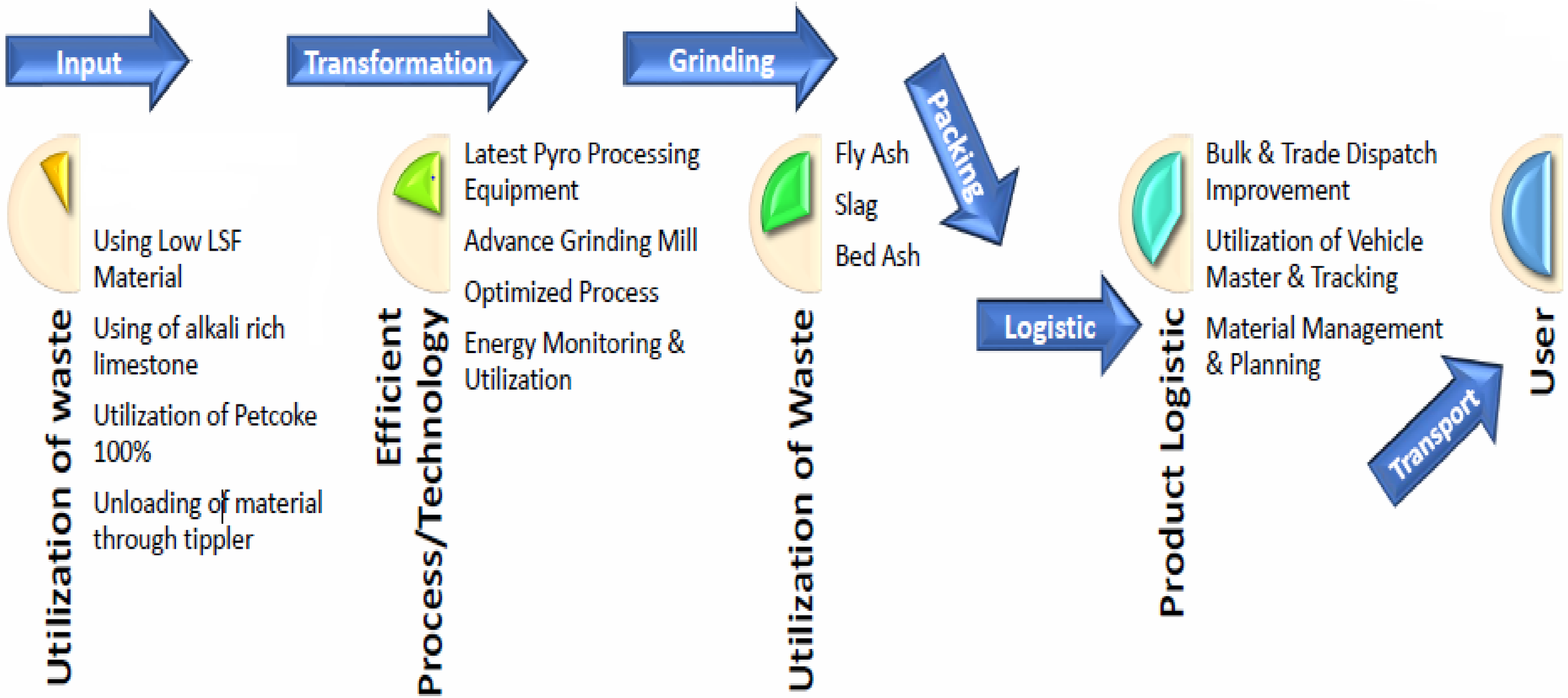
Belt Conveyor-1

Feeding System at Preheater

Belt Conveyor-2

Belt Conveyor-3

Green Supply Chain Management



Green Development

Green Development - Housekeeping


RM-4


RM-5

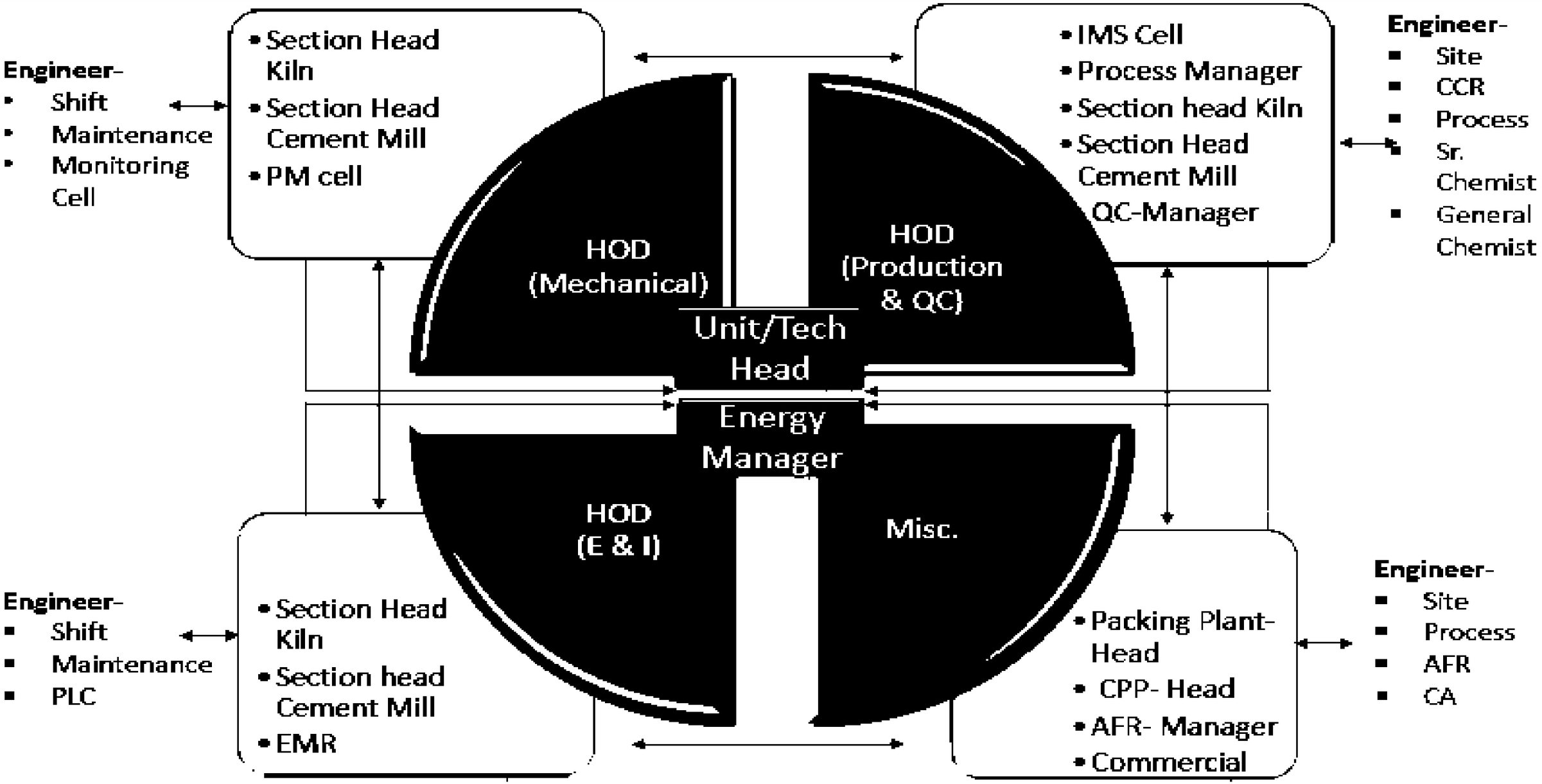

KILN-3


KILN-3


KILN-2

Technical Office

Energy Committee



Energy Monitoring System & Keizen

Reports/Presentation	Frequency
▪ Frequency of review of energy consumption	Daily
▪ Energy Management cell meeting	15 Days
▪ Frequency of review of energy conservation Project	Monthly
▪ Energy management Review meeting	Monthly

Keizen report

Safety Keizens

Daily Drive wise Power monitoring

Drive Wise Power back up									
Machine	DESCRIPTION	Ever Best	Month	Output (TPH/TPD)	MTBF (Hrs.)	29	30	31	up to date
Crusher 1	HT Drive	0.74	July'16	352	NA	0.93	0.91	0.93	0.82
	LT Aux.	0.29				0.36	0.38	0.38	0.37
	Crusher 1 Maintenance	0.10				0.00	0.00	0.00	0.02
	Total	**1.03**				**1.28**	**1.28**	**1.31**	**1.19**
Crusher 2	L/S Crusher M.D. (H.T.)	0.42	Mar'19	621	NA	0.52	0.55	0.49	0.46
	L/S and Additive Crusher PMCC 1 (L.T.)	0.51				0.55	0.59	0.55	0.54
	Crusher 2 Maintenance	0.04				0.00	0.00	0.00	0.05
	Total	**0.93**				**1.07**	**1.14**	**1.05**	**1.01**
Raw Mill 1	HT Drive	7.98	Apr'16	76	127	8.41	8.57	8.47	8.13
	RM-1 Fan	6.69				7.60	7.63	7.11	7.07
	RM-1 MCC	0.73				0.67	0.72	0.68	0.63
	Common MCC	1.23				1.18	1.29	1.19	1.22
	Raw Mill 1 Maintenance	0.00				0.00	0.00	0.00	0.04
	Total	**16.62**				**17.87**	**18.21**	**17.45**	**17.05**
Raw Mill 2	HT Drive	8.24	Apr'16	75	34	8.39	8.35	8.59	8.12
	RM-2 Fan	6.25				6.64	6.74	6.57	6.42
	RM-2 MCC	0.63				0.63	0.66	0.62	0.59
	Common MCC	1.26				1.26	1.27	1.21	1.22
	Raw Mill 2 Maintenance	0.00				0.00	0.00	0.00	0.04
	Total	**16.37**				**16.92**	**17.02**	**16.99**	**16.35**
Raw Mill 3	Roller Press M.D. 1 1700 KW (H.T.)	2.95	May'19	430	319	3.36	3.26	3.36	3.39
	Roller Press M.D. 2 1700 KW (H.T.)	3.65				3.56	3.61	3.62	3.64
	Raw Mill Separator Fan 1450 KW (H.T.)	1.90				2.10	2.10	2.09	2.17
	Raw mill PMCC 3 (L.T.)	1.75				1.77	1.80	1.87	1.89
	L/S and Additive Transport PMCC 2 (L.T.)	0.54				0.64	0.66	0.59	0.61
	Utility	0.34				0.28	0.29	0.28	0.29
	Raw Mill 3 Maintenance	0.00				0.00	0.51	0.50	0.03
	Total	**11.14**				**11.70**	**11.73**	**11.81**	**11.99**
Raw Mill 4	RP Drive1 Power (HT)	3.35	Sep'20	298	34	3.91	3.95	3.84	3.78
	RP Drive 2 Power (HT)	3.19				3.52	3.56	3.54	3.38
	RM Sep Fan (HT)	3.39				3.79	3.73	3.49	3.70
	RM Sep. Drive (LT From PCC2)	0.03				0.04	0.04	0.04	0.04
	RM MCC-4 (LT)	0.73				0.84	0.86	0.83	0.80
	323BE170 Bucket Elevator (Calculated)	0.54				0.59	0.59	0.58	0.57
	343BE010 Bucket Elevator (Calculated)	0.24				0.14	0.15	0.16	0.16
	Common MCC(LS REC,MCC-3)	0.49				0.44	0.43	0.45	0.40
	Utility(15%)	0.26				0.32	0.30	0.30	0.32
	RM-4 Maintenance	0.11				0.00	0.00	0.00	0.02
	Total	**12.21**				**13.60**	**13.62**	**13.24**	**13.15**
Raw Mill 5	RP Drive1 Power (HT)	3.37	Nov'20	300	41	4.07	4.22	4.06	4.09
	RP Drive2 Power (HT)	3.13				4.12	4.25	4.09	4.18
	RM Sep Fan (HT)	3.91				3.94	3.79	3.72	3.86
	RM Sep. Drive (LT From PCC2)	0.03				0.04	0.03	0.03	0.03
	RM MCC-5 (LT)	0.84				0.85	0.78	0.76	0.82
	324BE170 Bucket Elevator (Calculated)	0.55				0.58	0.56	0.55	0.56
	343BE010 Bucket Elevator (Calculated)	0.18				0.16	0.14	0.13	0.16
	Common MCC(LS REC,MCC-3)	0.36				0.50	0.42	0.42	0.42
	Utility(15%)	0.34				0.37	0.28	0.26	0.33
	RM-5 Maintenance	0.07				0.00	0.00	0.00	0.02
	Total	**12.70**				**14.62**	**14.48**	**14.02**	**14.45**

Drive Wise Power back up									
Machine	DESCRIPTION	Ever Best	Month	Output (TPH/TPD)	MTBF (Hrs.)	29	30	31	up to date
KILN 1	Kiln Main motor	1.46	Apr'16	2340	646	1.35	1.39	1.34	1.34
	CF silo MCC	1.63				1.57	1.57	1.53	1.52
	ESP & DT MCC	2.77				3.00	2.93	3.00	2.73
	Folax Cooler MCC	3.51				3.61	3.61	3.60	3.65
	Smoke Gas Fan	7.98				8.24	8.26	8.43	8.18
	Bag House Fan	2.65				2.61	2.66	2.75	2.67
	Coal Firing MCC	1.71				1.72	1.72	1.76	1.69
	Agrowaste MCC	0.08				0.05	0.06	0.06	0.10
	Kiln 1 Maintenance	0.50				0.00	0.00	0.00	0.00
	Total	**21.78**				**22.15**	**22.20**	**22.47**	**21.88**
COAL MILL 1	Coal Mill MCC	11.75	Apr'16	10	NA	14.83	15.37	15.27	14.81
	Coal Mill HT Drive	12.59				15.99	16.75	16.78	14.90
	Coal Mill Maintenance	0.81				0.00	0.00	0.00	0.00
	Total	**24.34**				**30.82**	**32.13**	**32.05**	**29.71**
KILN 2	Kiln M.D. 760 KW (H.T.)	1.70	Dec'16	5663	306	1.97	1.98	1.93	1.98
	Pre Heater Fan 1900 KW (H.T.)	7.81				7.86	7.91	7.87	7.85
	Bag House Fan 1600 KW (H.T.)	1.48				1.31	1.39	1.45	1.35
	Kiln and Pyro PMCC 4 (L.T.)	2.12				2.26	2.22	2.22	2.17
	Coller and Clinker Transport PMCC 5 (L.T.)	2.05				2.23	2.27	2.29	2.30
	Coller Fans PMCC 6 &7 (L.T.)	5.10				7.94	7.82	7.82	8.25
	Utility	1.19				1.02	1.02	1.03	1.03
	Kiln 2 Maintenance	0.03				0.00	0.00	0.00	0.00
	TOTAL	**21.45**				**24.59**	**24.61**	**24.60**	**24.93**
COAL MILL 2	Coal mill M.D. (H.T.)	13.87	Dec'16	27	NA	15.09	14.77	15.53	13.58
	Coal Mill Fan (H.T.)	14.78				14.68	14.46	15.40	13.60
	Coal Mill PMCC 8 (L.T.)	6.13				9.14	14.35	14.76	12.99
	Coal Handling PMCC 9 (L.T.)	2.80				4.61	4.69	4.81	4.14
	Coal Mill Maintenance	0.00				0.00	0.00	0.00	0.00
	Total	**37.58**				**43.52**	**48.27**	**50.50**	**44.31**
Kiln-3	Kiln Main Drive (HT)	1.60	Sep'20	7748	64	1.88	1.94	1.89	1.86
	Pre-heater Fan-1 (HT)	2.42				2.66	2.68	2.62	2.66
	Pre-heater Fan-2 (HT)	2.37				2.72	2.74	2.65	2.67
	BagHouse Fan (HT)	2.37				1.36	1.35	1.28	1.42
	Cooler Fan (HT)	6.05				6.05	5.98	5.94	6.15
	Cooler Vent Fan (HT)	0.91				1.54	1.56	1.55	1.52
	Kiln Emergency (MCC-07A)	0.80				1.08	1.04	1.19	1.00
	Kiln Feed & Pre Heater (MCC-07)	0.49				0.63	0.61	0.61	0.62
	Cooler & Coal Firing (MCC-08)	1.02				1.10	1.07	1.05	1.09
	Cooler ESP (443EP500)	0.35				0.26	0.26	0.26	0.28
	VFD For Blower (467BL310- From PCC3)	0.00				0.31	0.30	0.29	0.30
	VFD For Blower (467BL360- From PCC3)	0.22				0.00	0.00	0.00	0.00
	VFD For Blower (467BL410- From PCC3)	0.19				0.24	0.24	0.23	0.23
	353BE225 M1 Elevator (Calculated)	0.41				0.41	0.40	0.40	0.41
	353BE225 M2 Elevator (Calculated)	0.37				0.41	0.41	0.40	0.40
	RM Bag House to Blend Silo (MCC-6)	0.29				0.62	0.59	0.61	0.62
	Utility(70%)	0.93				1.10	1.06	1.06	1.16
	Kiln3 Maintenance	0.72				0.00	0.00	0.00	0.14
	Total	**20.78**				**22.37**	**22.22**	**22.01**	**22.40**
Coal Mill-3	Coal Mill Drive Power (HT)	14.68	Sep'20	41	NA	17.07	16.77	20.21	15.44
	Coal Mill Fan Drive (HT)	12.18				16.43	16.62	20.39	14.78
	Coal Mill Sep. Drive (LT From PCC3)	1.93				1.84	1.83	2.21	1.69
	Coal Transp. & Grinding (MCC-10)	2.98				5.29	4.49	5.10	4.98
	Coal Mill3 Maintenance	0.14				0.00	0.00	0.00	0.24
	Total	**31.77**				**40.63**	**39.70**	**47.91**	**36.89**

Drive Wise Power back up									
Machine	DESCRIPTION	Ever Best	Month	Output (TPH/TPD)	MTBF (Hrs.)	29	30	31	up to date
Cement Mill 1	HT Drive	0.00	NA	NA	NA	0.00	0.00	0.00	0.00
	LT MCC	0.00				0.00	0.00	0.00	0.00
	Cement Mill 1 Maintenance	0.00				0.00	0.00	0.00	0.00
	Total	**0.00**				**0.00**	**0.00**	**0.00**	**0.00**
Cement Mill 3	Roller Press M.D. 1 1700 KW (H.T.)	4.16	Apr' 21	262	103	3.86	4.54	4.24	4.40
	Roller Press M.D. 2 1700 KW (H.T.)	3.88				3.56	4.28	4.00	4.11
	Ball Mill M.D. 2600 KW (H.T.)	7.18				6.53	6.96	6.88	6.89
	Bag House Fan 280 KW (L.T.)	0.56				0.53	0.61	0.61	0.57
	C.M. Separator Fan 1200 KW (H.T.)	3.82				4.00	3.89	3.87	3.81
	Separator Drive 475 KW (L.T.)	0.77				0.87	0.78	0.70	0.75
	Cement Mill PMCC 10 (L.T.)	2.27				2.37	2.30	2.37	2.34
	Clinker and Fly Ash Handling PMCC 10 A (L.T.)	0.68				0.55	0.73	0.91	0.76
	Utility	0.75				0.96	0.98	1.16	0.85
	Cement Mill 3 Maintenance	0.17				0.00	0.00	0.00	0.00
	Total	**24.08**				**23.23**	**25.07**	**24.72**	**24.49**
Cement Mill 4	RP Main Drive -1 522MD140M1 (L02)	2.43	Feb' 21	275	91	2.37	2.32	2.25	2.30
	RP Main Drive-2 522MD140M2 (L03)	3.06				3.23	3.19	3.09	2.95
	Z2M03M1 BALL MILL DRIVE -1	5.91				6.36	6.46	7.14	6.39
	Z2M03M2 BALL MAIN DRIVE -2	5.91				6.41	6.53	6.97	6.41
	Separator Fan 522FN550 (L05)	4.14				4.75	4.85	4.65	4.80
	Separator drive 522MD302	0.27				0.26	0.27	0.28	0.26
	Elevator 522BE170M1	0.28				0.31	0.30	0.31	0.30
	Elevator 532BE220M1	0.28				0.26	0.25	0.27	0.27
	CM-4 MCC	1.32				1.45	1.34	1.45	1.46
	CM-2 MCC	1.01				1.53	1.27	1.23	1.30
	FLY ASH MCC	0.40				0.41	0.36	0.42	0.29
	Utility	0.91				0.72	0.65	0.87	0.67
	Cement Mill 4 Maintenance	0.00				0.00	0.00	1.04	0.40
	Total	**25.91**				**28.05**	**27.78**	**28.92**	**27.39**

Implementation of ISO 50001

ISO 50001	
▪ Current Issue Data	28th Aug 2020
▪ Expiry date	29th July 2023
▪ Certificate identity number	10288749

EnCon Project budget allocation %	
▪ Total turnover of the company/plant FY 2020-21 (Rs. Million)	14800
▪ Amount invested in EnCon Projects FY 2020-21 (Rs. Million)	10467.58
▪ Investment %	70.73

Lloyd's Register

Current issue date: 28 August 2020
Expiry date: 29 July 2023
Certificate identity number: 10288749

Original approval(s):
ISO 14001 - 28 November 2006
ISO 45001 - 9 August 2018
ISO 50001 - 19 April 2016
ISO 9001 - 28 November 2006

Certificate of Approval

This is to certify that the Management System of:

J K Cement Works

(Unit of J.K Cement Ltd.), Mangrol, Distt : Chittorgarh, Rajasthan, 312620, 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 – 0054439, ISO 45001 – 0052670, ISO 50001 – 0060520, ISO 9001 – 00019280

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:

The manufacture of ordinary Portland cements, blended cements and mining activities at Tilakhera and Mangrol.

Luis Cunha

Area Operations Manager - SAMEA

Issued by: Lloyd's Register Quality Assurance Limited

UKAS MANAGEMENT SYSTEMS 001

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Issued by: Lloyd's Register Quality Assurance Limited, 63-64, Kalpataru Square, 6th floor, Kondivita Lane, Off Andheri-Kurla Road, Andheri (E), Mumbai, 400059, India for and on behalf of: Lloyd's Register Quality Assurance Limited, 1 Trinity Park, Bickenhill Lane, Birmingham B37 7ES, United Kingdom

Employee involvement

Daily review meetings (PD)

Manufacturing Excellence drive

Daily site inspection

Employee Trainings

S No.	NAME OF TRAINING	No. of Persons	S No.	NAME OF TRAINING	No. of Persons
1	ADVERSE IMPACT OF GAS FLOW IMBALANCE	6	20	LATEST LOW NOX PYRO PROCESSING SYSTEMS	8
2	AN ORIENTATION TO CEMENT MANUFACTURING PROCESS	7	21	LOW CARBON CEMENT - OPTION & CHALLENGES	2
3	CHEMICAL ANALYSIS OF HYDRAULICS CEMENT-1	3	22	LOW CARBON CEMENT-OPTION & CHALLENGES	2
4	CHEMICAL ANALYSIS OF HYDRAULICS CEMENTS-1	3	23	MAINTENANCE OF BEARINGS & RELIABILITY	6
5	DESIGNING ENERGY EFFICIENT COMPRESSED AIR DISTRIBUTION SYSTEM	3	24	MAXIMIZATION OF ALTERNATE FUELS AND RAW MATERIALS UTILIZATION IN CEMENT INDUSTRY	2
6	ELECTRIC CIRCUIT BREAKER	2	25	OPERATION & MAINTENANCE OF GEARBOX	6
7	ENHANCING PROFESSIONAL EFFECTIVENESS OF EMPLOYEES	2	26	OPERATION & MAINTENANCE OF HT MOTORS	3
8	ESSENTIALS OF SUSTAINABLE ZERO LIQUID DISCHARGE (ZLD) SYSTEMS	1	27	PFISTER ROTOR WEIGH FEEDERS FAR	14
9	FATALITY PREVENTION ELEMENTS - FPEs (PROACTIVE & REACTIVE APPROACH TO SAFETY)	16	28	PRODUCT CERTIFICATION PROCEDURE FOR BIS	1
10	FIRE WARDEN/ ERT TRAINING	24	29	RAW MIX DESIGN AND ITS MODULI VALUE	1
11	FIRST AID- ST. JOHN AMBULANCE & FIRE FIGHTING	18	30	REDUCTION OF AT & C LOSSES IN ELECTRICAL TRANSMISSION AND DISTRIBUTION SYSTEM	1
12	FIRST AID TRAINING	24	31	REDUCTION OF AT & C LOSSES IN ELECTRICAL TRANSMISSION AND DISTRIBUTION SYSTEMS	1
13	GREENCO SUMMIT 2020 (VIRTUAL CONFERENCE & EXPO)	1	32	REFRESHER RAINING ON FIRST AID	2
14	IMPACT OF RAW MIX DESIGN AND BURNABILTY ON CEMENT QUALITY	11	33	SAFE WORKING IN CORONA (COVID-19) RISK PERIOD	15
15	INCIDENT REPORTING, INVESTIGATION AND CAPA	11	34	SELECTION, USE, MAINTENANCE, REJECTION AND CARE OF PPEs	15
16	INCREASING EFFICIENCY IN INDIA'S PACKING AND DISPATCH OPERATIONS	8	35	SUSTAINABLE SOLUTION FOR JUDICIOUS USE OF FLY ASH FROM DESULFURIZATION PROCESS AND POND ASH	4
17	KILN REPAIR AND MAINTENANCE	10	36	TRAINING ON FIRST AID	6
18	LARGE SIZE VERTICAL ROLLER MILLS	20	37	TRAINING PROGRAM ON FIRST AID -SNAKE BITE	7
19	LATEST GENERATION CROSSBAR COOLER	7	Grand Total		273

Key Achievement FY 2020-21

Achievements		Previous Best	FY 20-21	UOM
▪ Clinker Production	Highest	28.62	40.98	Lac MT
▪ Cement Production	Highest	24.55	30.80	Lac MT
▪ Cement Despatch	Highest	24.48	30.81	Lac MT
▪ Clinker Factor:-				
○ OPC-43 Line-2	Lowest	89.35	87.27	%
○ OPC-53 Line-2	Lowest	91.89	90.76	%
○ PPC Line-2	Lowest	63.68	62.66	%
○ OPC-43 Line-3	Lowest	90.55	87.23	%
○ PPC Line-3	Lowest	65.62	62.22	%
▪ Thermal Energy Kiln-3	Lowest	757	694	kcal/Kg Clk.
▪ Upto Clinkerisation power Line-3	Lowest	56.12	46.50	kwh/Ts. Clk.
▪ Upto Cement Grinding Power Line-3	Lowest	30.21	27.71	kwh/Ts. Cem.
▪ Upto Cement Grinding Power Line-2	Lowest	27.52	27.22	kwh/Ts. Cem.
▪ AFR consumption	Highest	65,580	88,424	MT
▪ AFR saving	Highest	12.01	20.19	Cr
▪ Clinker average TPD Kiln-3	Highest	4886	7351	TPD

Awards Achieved in FY 2020-21

THANKS

STAY SAFE