JK Cement Mangrol

23rd National Award for Excellence in Energy Management 2022

Presented By:-
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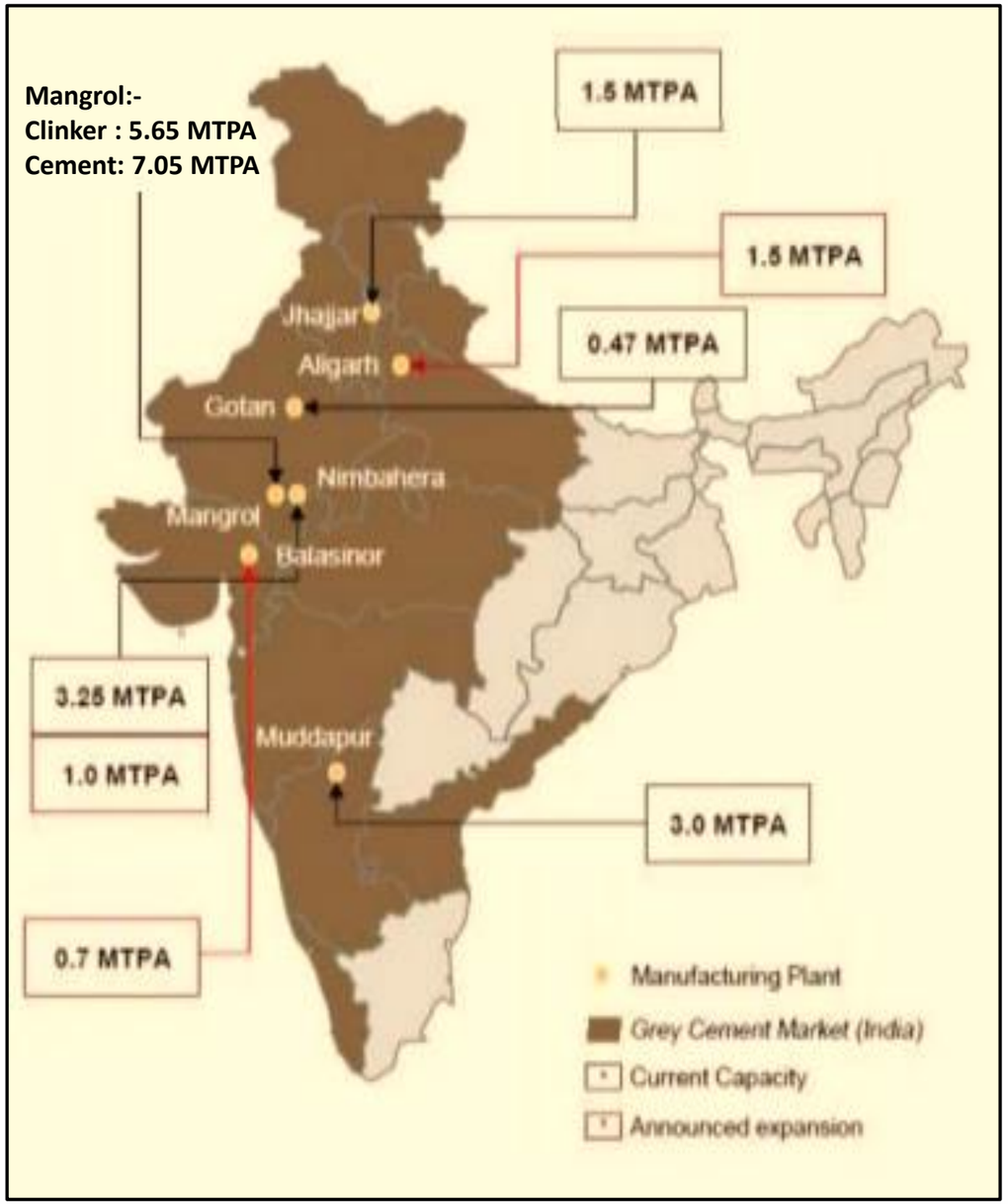
Brief introduction on Company

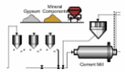
- JK Cement Ltd is an affiliate of Industrial conglomerate JK Organization, founded by Lala Kamlapat Singhania. The company is the second largest manufacturer of white cement in India (third largest in the world) & second largest producer of Wall putty in the country. First cement company to install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

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

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

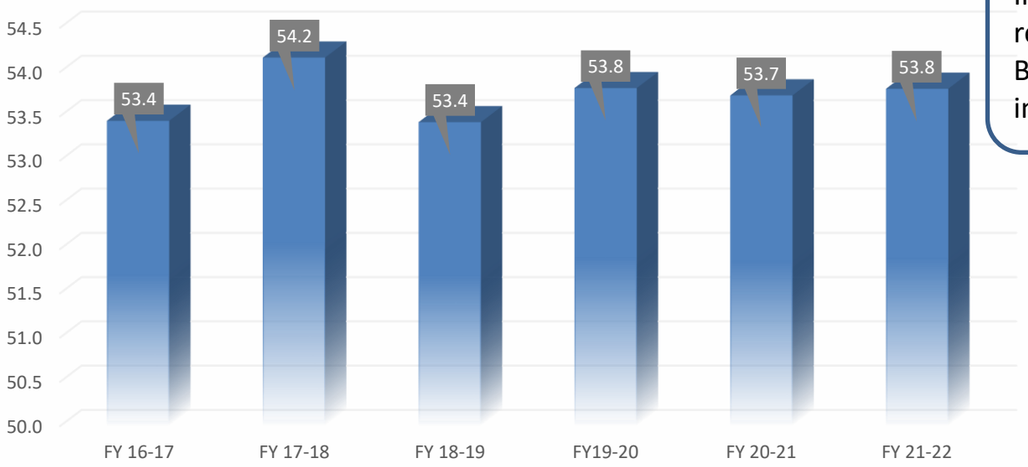


Technology/Specification of sections

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

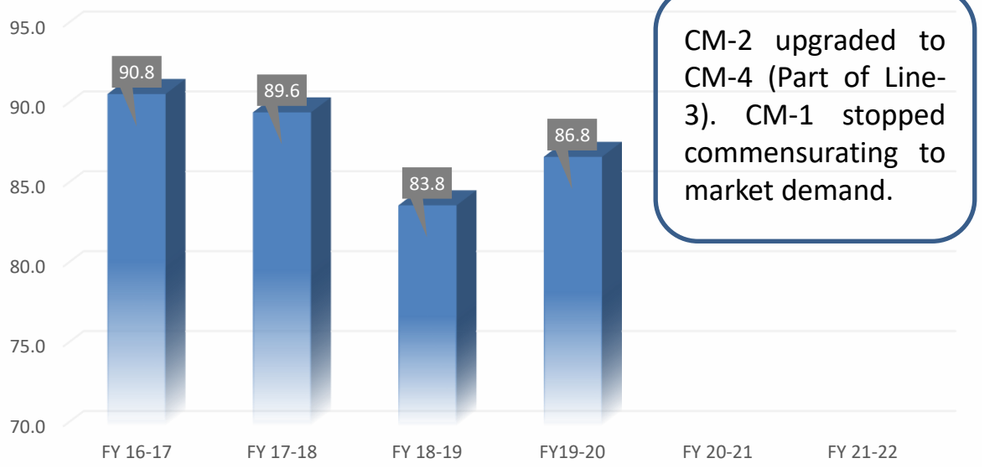
Specific Energy Consumption Line-1

UPTO CLINKERISATION



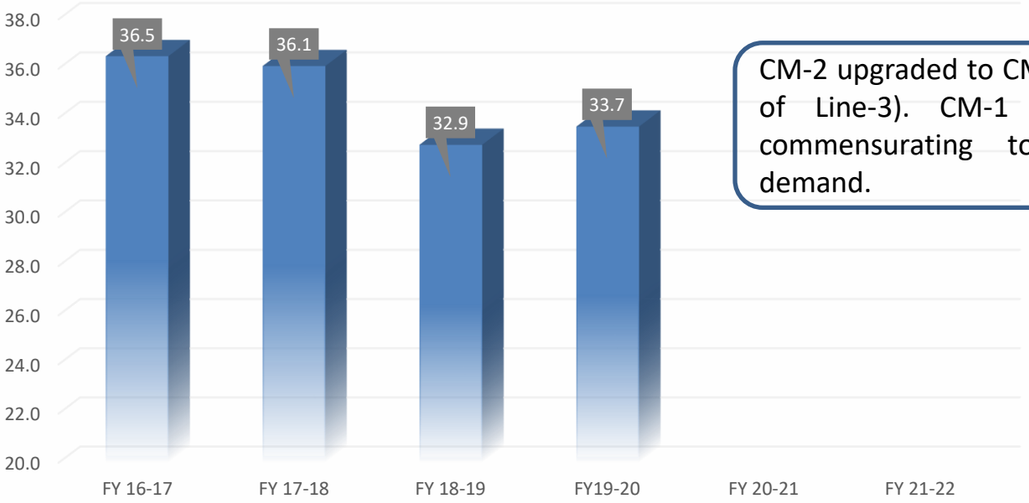
Increase in AFR consumption resulted in increase in PH & Baghouse fan power as TSR% increased from 3.2% to 6.7%

TOTAL PLANT POWER



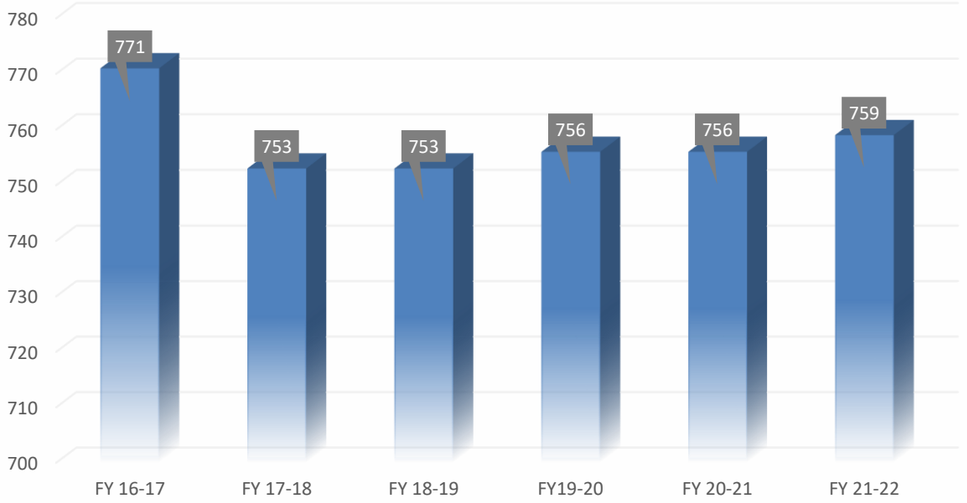
CM-2 upgraded to CM-4 (Part of Line-3). CM-1 stopped commensurating to market demand.

CEMENT GRINDING



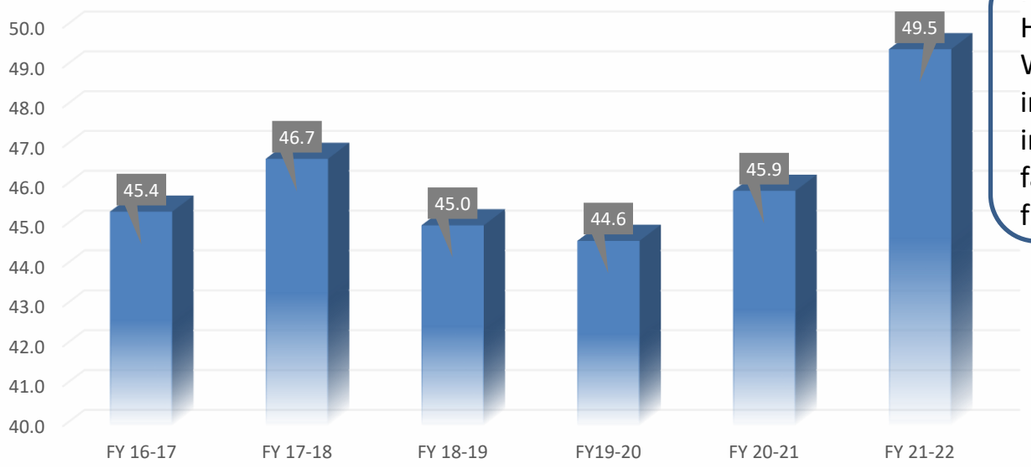
CM-2 upgraded to CM-4 (Part of Line-3). CM-1 stopped commensurating to market demand.

THERMAL ENERGY



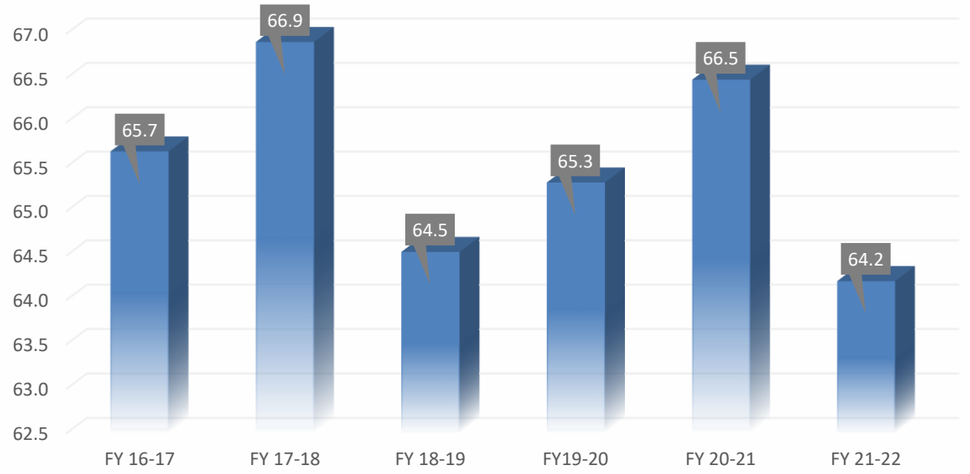
Specific Energy Consumption Line-2

UPTO CLINKERISATION

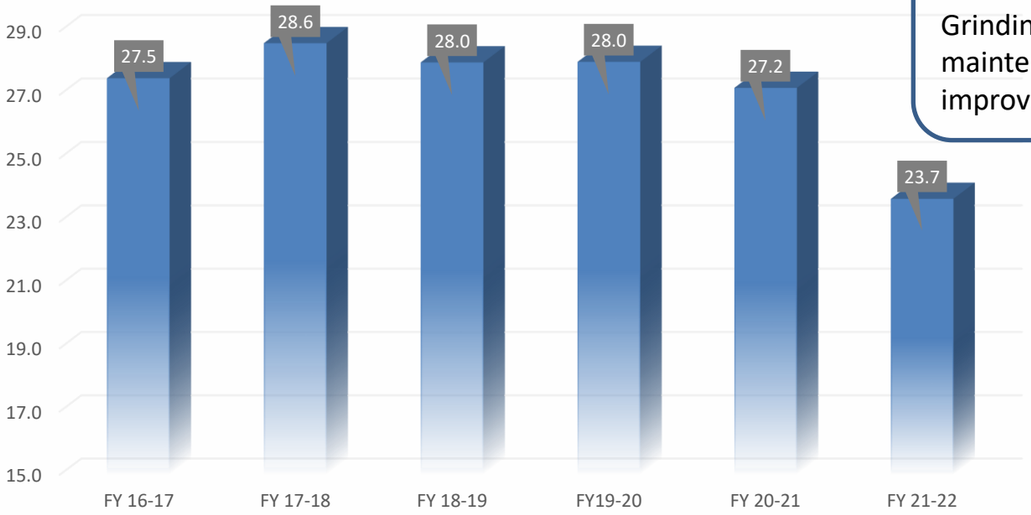


Kiln power increased due to HAR fan installed to increase WHR generation & Increase in AFR consumption resulted in increase in PH & Baghouse fan power as TSR% increased from 5.9% to 10.7%

TOTAL PLANT POWER



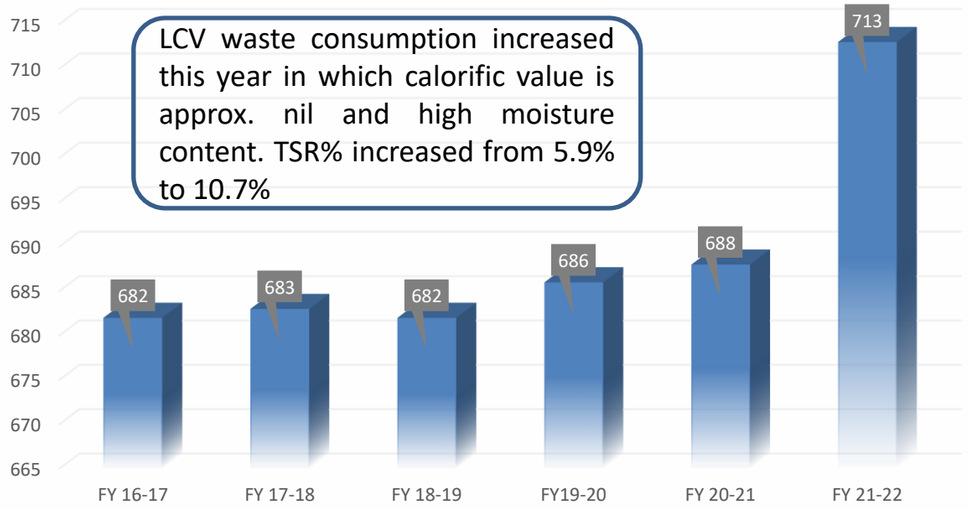
CEMENT GRINDING



Cement grinding Power decreased by 14.7% by continuous monitoring, Grinding media optimization, proper maintenance of HRP & Clinker quality improvement.

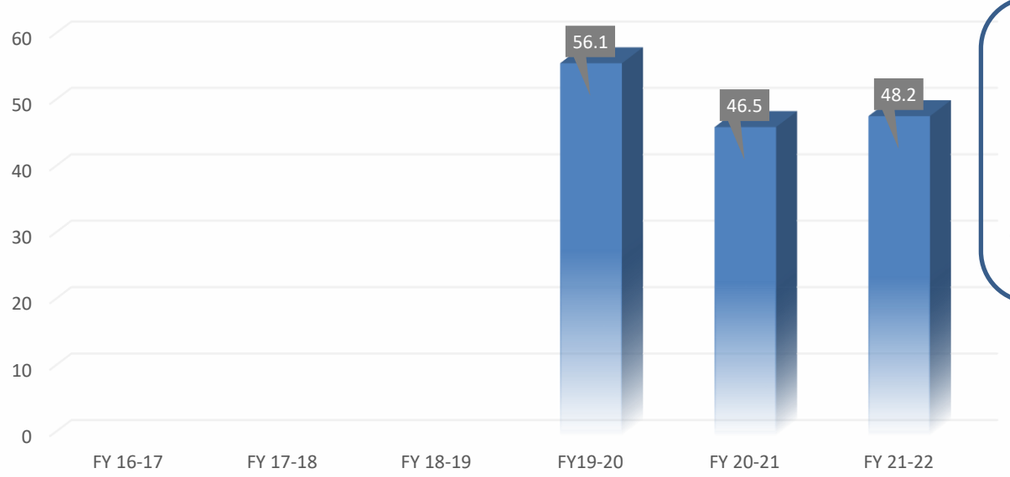
THERMAL ENERGY

LCV waste consumption increased this year in which calorific value is approx. nil and high moisture content. TSR% increased from 5.9% to 10.7%



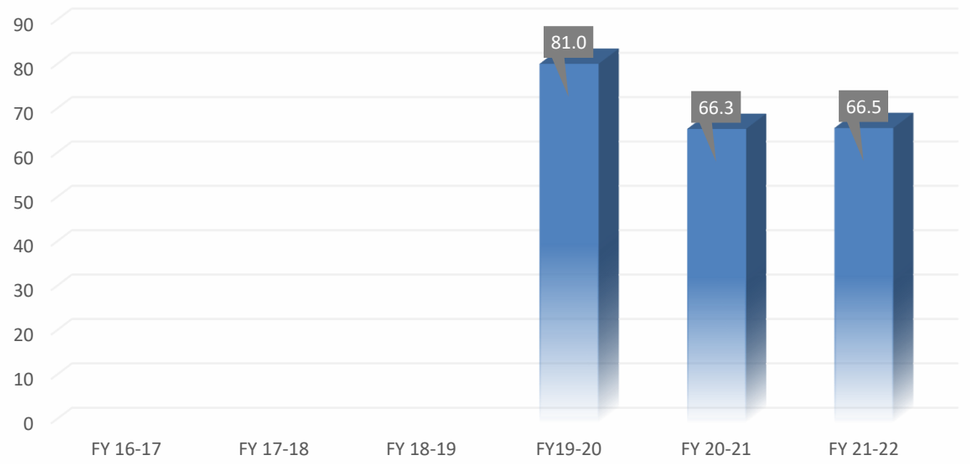
Specific Energy Consumption Line-3

UPTO CLINKERISATION

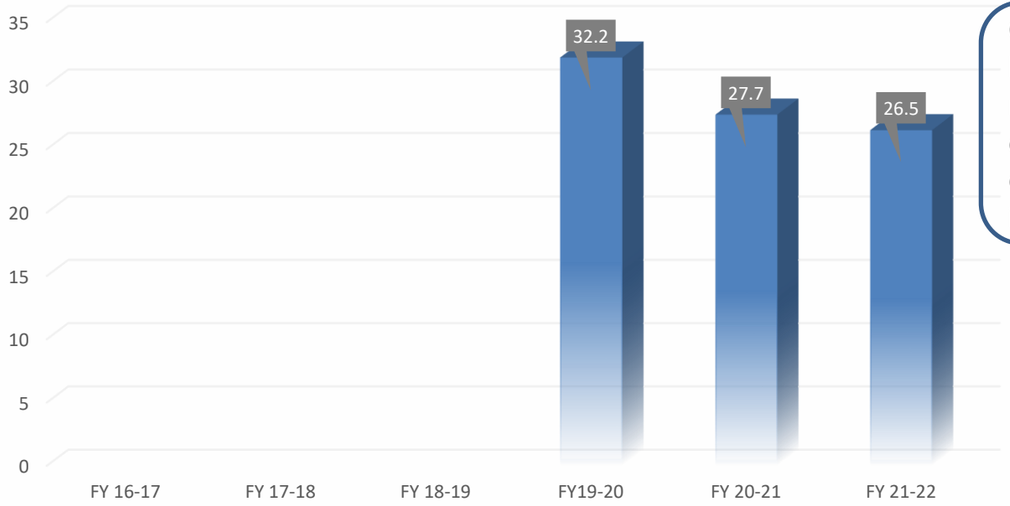


Kiln power increased due to HAR fan installed to increase WHR generation & Increase in AFR consumption resulted in increase in PH & Baghouse fan power as TSR% increased from 0.9% to 9.3%

TOTAL PLANT POWER



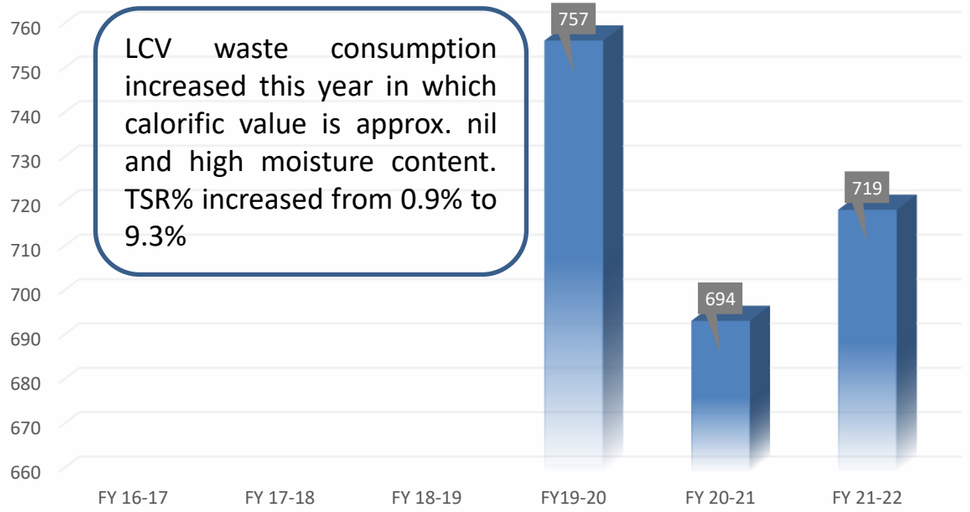
CEMENT GRINDING



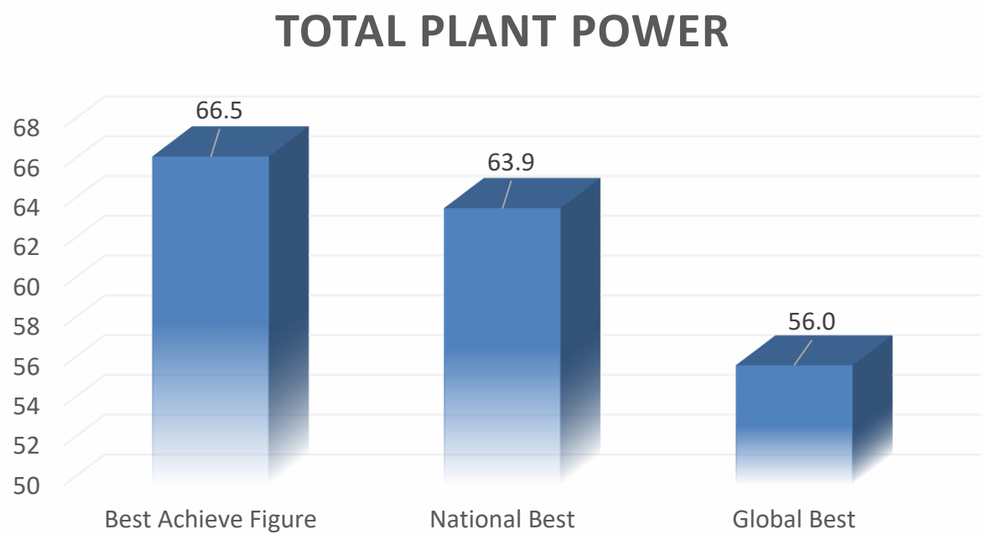
Cement grinding Power decreased by 4.3% by continuous monitoring, Grinding media optimization, proper maintenance of HRP & Clinker quality improvement.

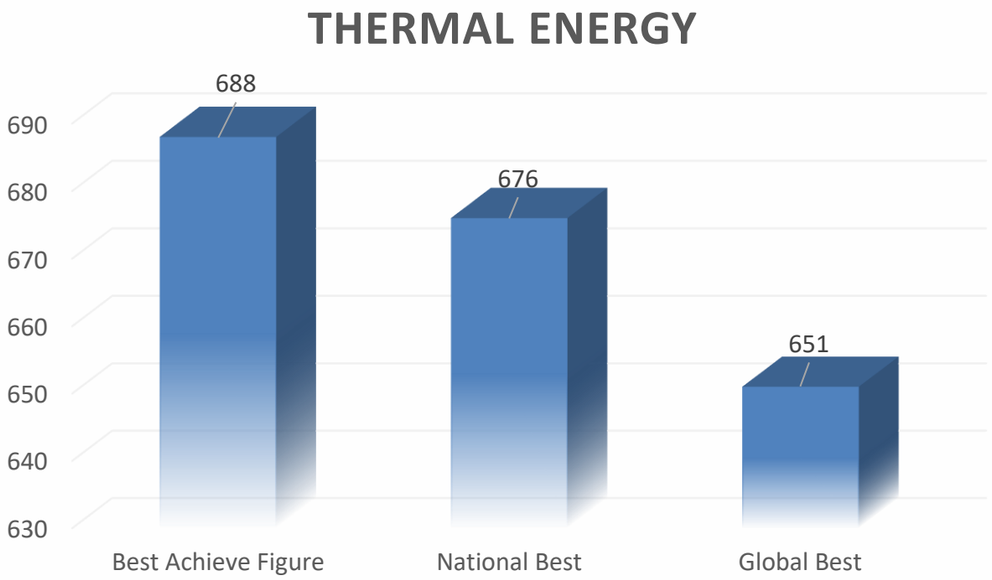
THERMAL ENERGY

LCV waste consumption increased this year in which calorific value is approx. nil and high moisture content. TSR% increased from 0.9% to 9.3%



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 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 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
FY 2021-22	14	335.40	74.67	63787.71	1167.69	21.4 kwh/Ts Cem, 80.9 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 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**

Energy Saving projects implemented FY 2021-22

SNo.	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 (11758 MT) by substituting primary fuel	Fuel Change	38627300	51531453	3080	-	4836
2	Usage of AFR in Line-2 (84691 MT) by substituting primary fuel	Fuel Change	104837543	228250409	13643	-	21420
3	Usage of AFR in Line-3 (95184 MT) by substituting primary fuel	Fuel Change	167867795	271721256	16241	-	25499
	Total		**311332639**	**551503118**	**32964**	**0**	**51755**
4	Cement Grinding Power reduction in Cement Mill-3 from 27.22 to 23.72 kwh/Ts Cem.	Illumination	-	22281476	2305	6939249	
5	Clinker Factor reduction in Cement Mill-3 from 77.79 to 74.35% by adding treated Limestone as Activated Gypsum	Illumination	19122647	120916386	4929		7739
6	Clinker Factor reduction in Cement Mill-4 from 74.62 to 73.62% by adding treated Limestone as Activated Gypsum	Illumination	4246188	26849511	1095		1718
7	Replacement of 150 Nos. 150Watt HPSV Well Glass light by 40 Watt LED Well Glass	Illumination	204825	363726	18	54450	
8	Replacement of 250 Nos.70Watt HPSV Well Glass light by 40 Watt LED Well Glass	Technology Absorption	341375	165330	8	24750	
9	Replacement of 92 nos of 2x36 watt conventional light by 2X18 watt LED light	Technology Absorption	148626	59735	3	8942	
10	Cement Grinding Power reduction in Cement Mill-4 from 27.71 to 26.49 kwh/Ts Cem. (After Ball mill circuit modified to Combi Circuit in FY 2019-20)	Technology Absorption	-	5928132	613	1846232	
11	WHR Generation increased by 65798839 KWH (Generation in year 2020-21 was 116286171 kwh and in year 2021-22 is 182085010 kwh), plant commissioning completed in month Oct-2020.	Technology Absorption	-	439619926	21852	65798839	
	Total		**335396300**	**1167687339**	**63788**	**74672463**	**61213**

Energy Saving projects

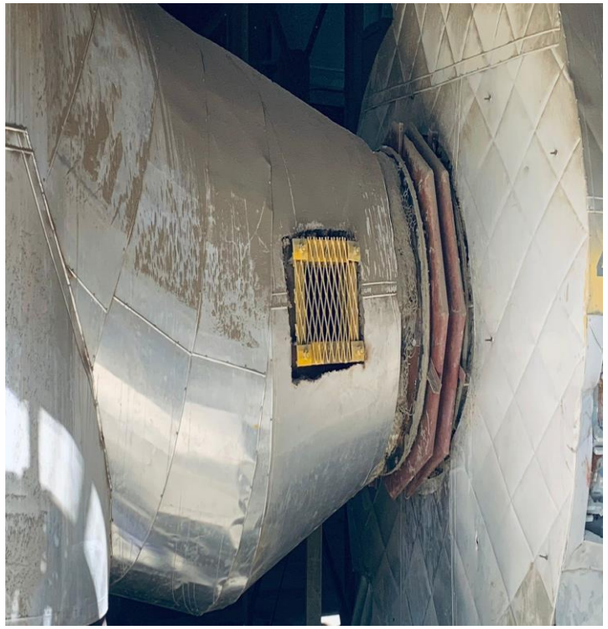
1. WHRS Enhancement through, in house modification & optimization- Kiln 2&3

- **To optimize heat recuperation and WHRS generation by modifying HAR circuit.**

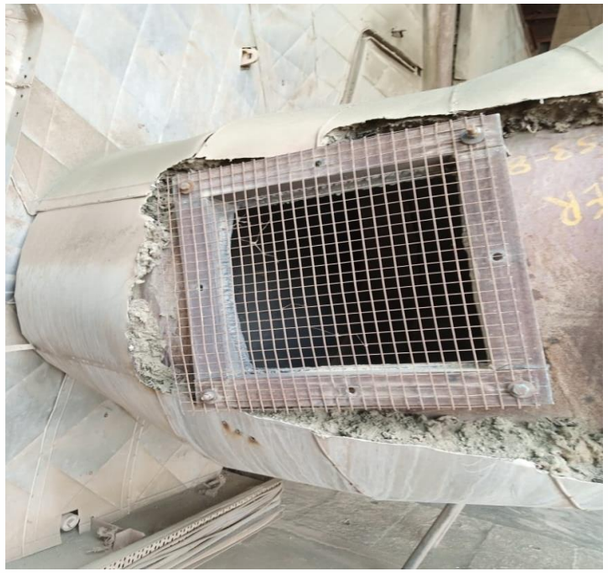
- Prior to modification, some operational points were observed that few Cooler fans were running on low load as well as stack damper was **partially opened (40-45%)** resulting into **-80 to -90 mmwg draft** in HAR Duct. A higher negative draft depicts that there is scarcity of air for cooling of clinker and to further to AQC boiler. A significant parameter for which is AQC inlet temperature 370 ˚C to 420 ˚C.

Modification done

Kiln-2



Kiln-3

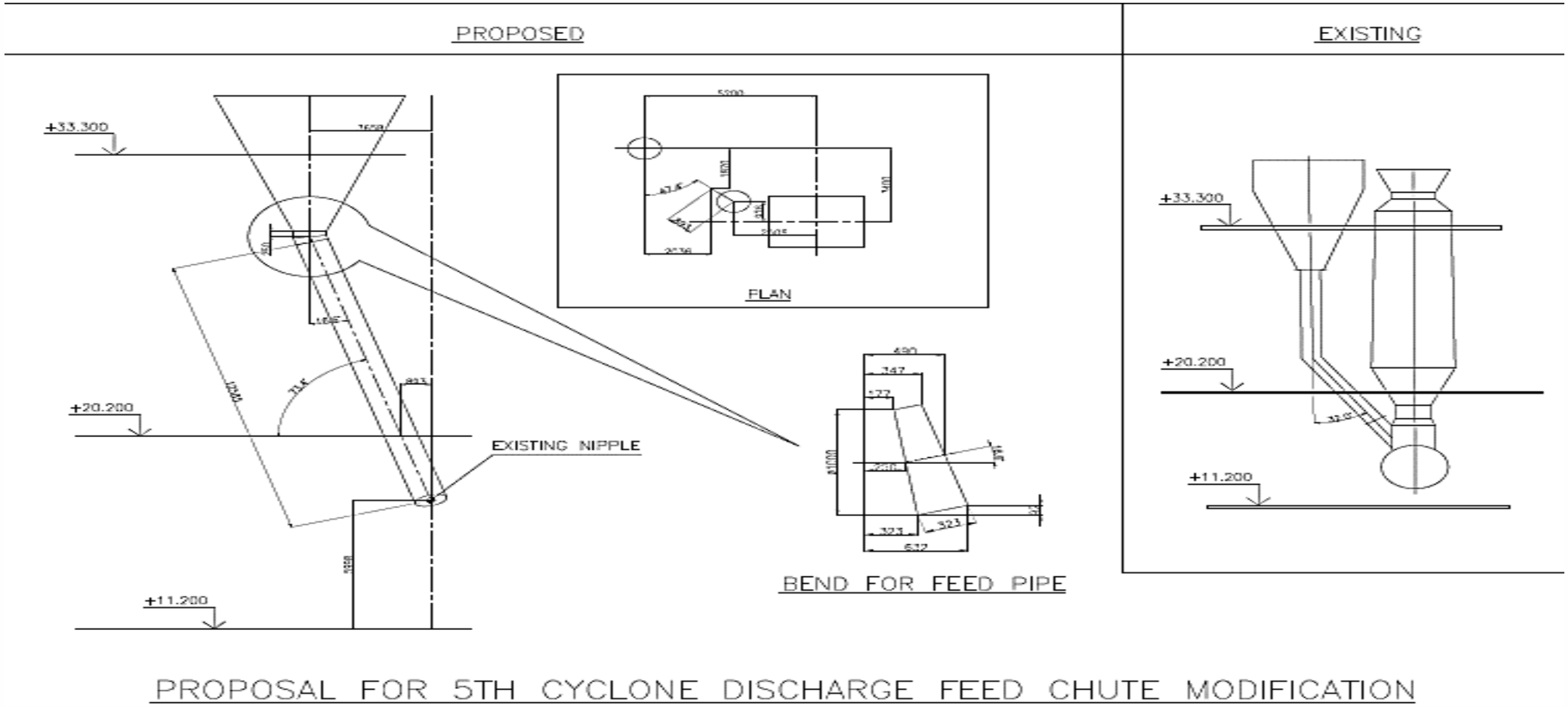


- After modification, a very large decrease in static pressure is observed in HAR duct **(from -90 to +1˜-1 mmwg)** along with increased flow rate at AQC inlet. Albeit, apart from flow AQC inlet temperature have also increased **(from 420 ˚C to 480 ˚C).**
- Through this we achieved constantly higher WHRS inlet temp. with some gain in clinker temperature drop also.
- The same modifications was done in few cooler fans of Kiln-3 also and resulting into the consistent AQC inlet temperature of about 470-500 Deg C and also increased air flow to AQC boiler.

Energy Saving projects

2. Case study Reduction in Cyclone jamming stoppages in Kiln-1:

- In Unit-I, we modified Cyclone-V feed pipe orientation as per material flow to avoid cyclone jam.



PROPOSAL FOR 5TH CYCLONE DISCHARGE FEED CHUTE MODIFICATION

Energy Saving projects

3. VFD installation in bag filter fans in U-II & U-III

- Currently, in RM-III section in mill feeding belt we have two bag filter fan FN-152 & FN-107 which are running continuously with full speed on damper control mode.

- Their damper position is about 50-60% controlled by CCR.

- Another two bag filter fans running for DBC and in clinker tank top area with manual damper i.e. FN-622 & FN-462.

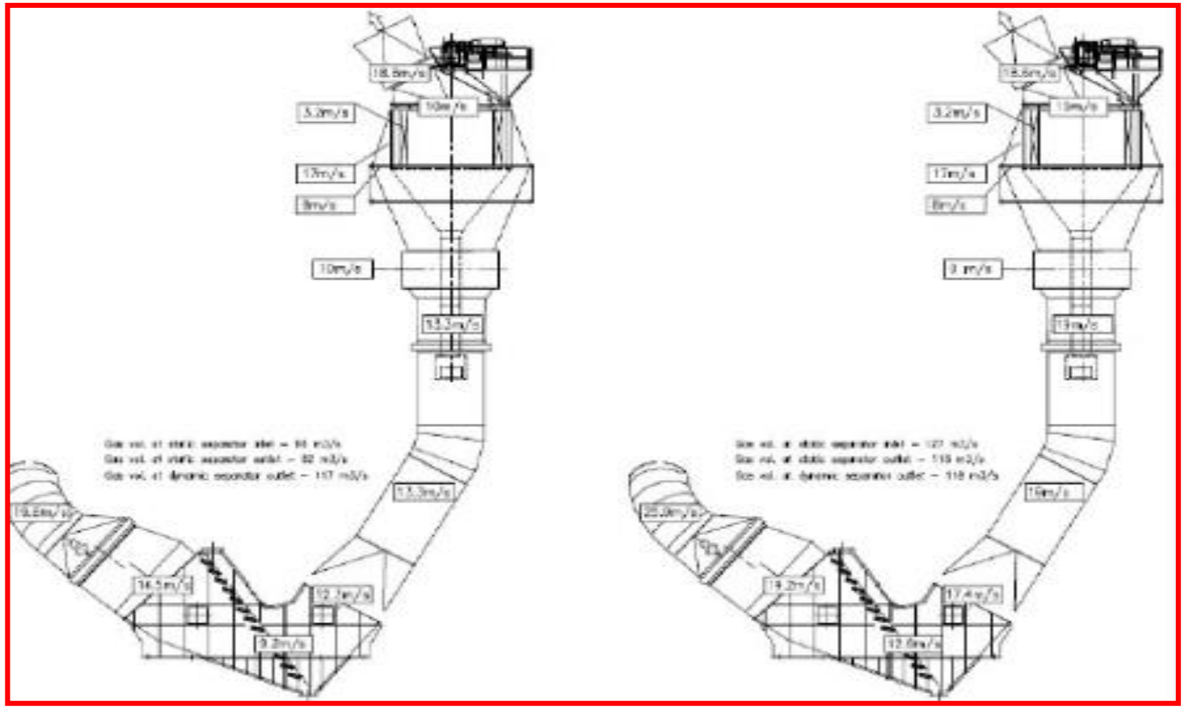
- In RM-IV & RM-V section in mill feeding belt we have two bag filter fan FN-613, FN-618, which are running continuously with full speed on damper control mode.

Unit-II		
Saving in Power	24	kwh
Cost per unit (Nov'21)	3.79	INR/kwh
Running duration per day	22	hours
Days running in an year	330	days
Total Saving	660370	INR/year
Total Investment	560000	INR
ROI	0.85	year
ROI	10	Months

Unit-III		
Saving in Power	35	kwh
Cost per unit (Nov'21)	3.79	INR/kwh
Running duration per day	22	hours
Days running in an year	330	days
Total Saving	963039	INR/year
Total Investment	1100000	INR
ROI	1.14	year
ROI	14	Months

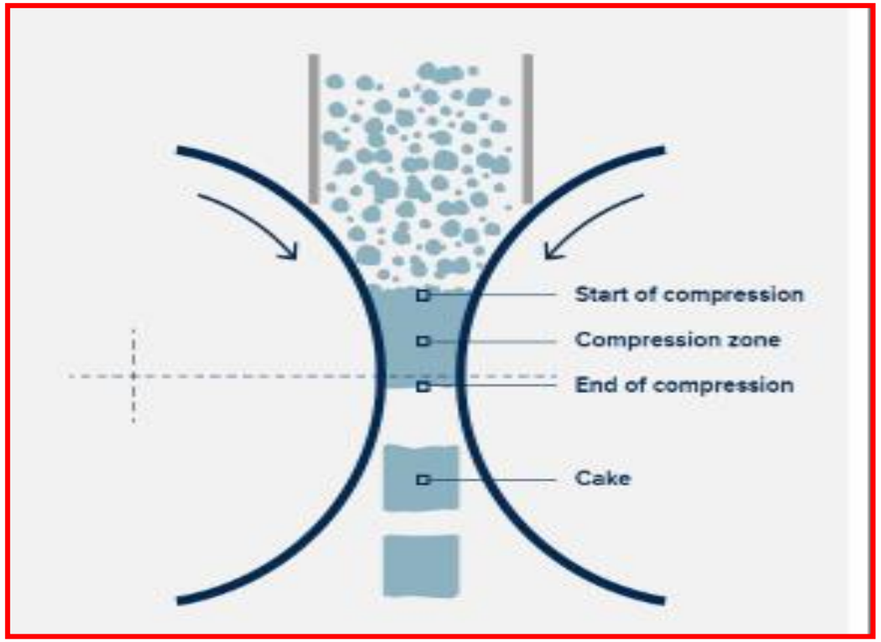
Energy Saving projects

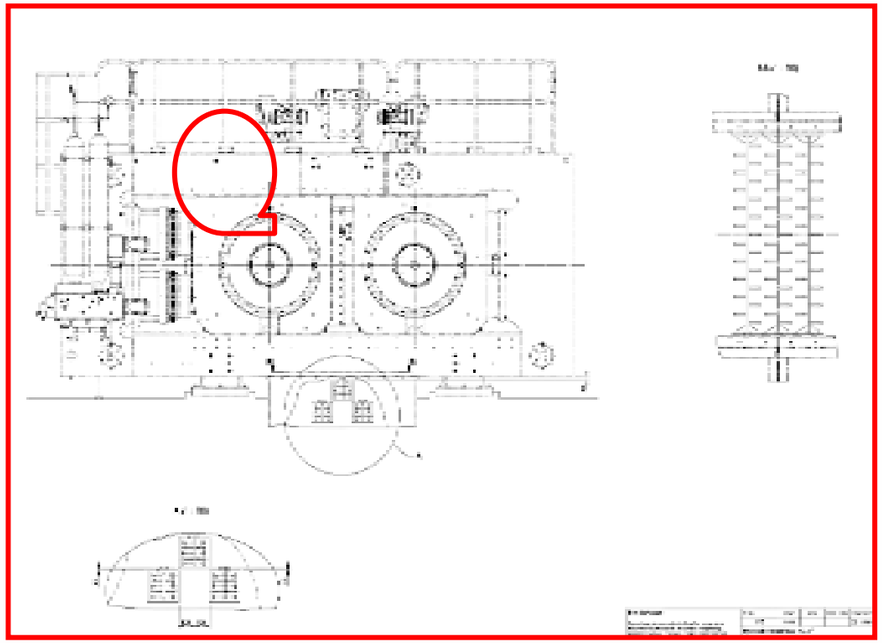
- Issue: High recirculation of material in static separator, it results lower rate of fresh feed in Cement mill-4
- Solution/Action taken:
  - Installation of Movable guide vanes (5 + 2 nos.)at gas inlet side - CRPG-S
  - Adjustable guide vanes (5 no's) - CRPG-S in the outlet side
- Benefits: Fine material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



Energy Saving projects

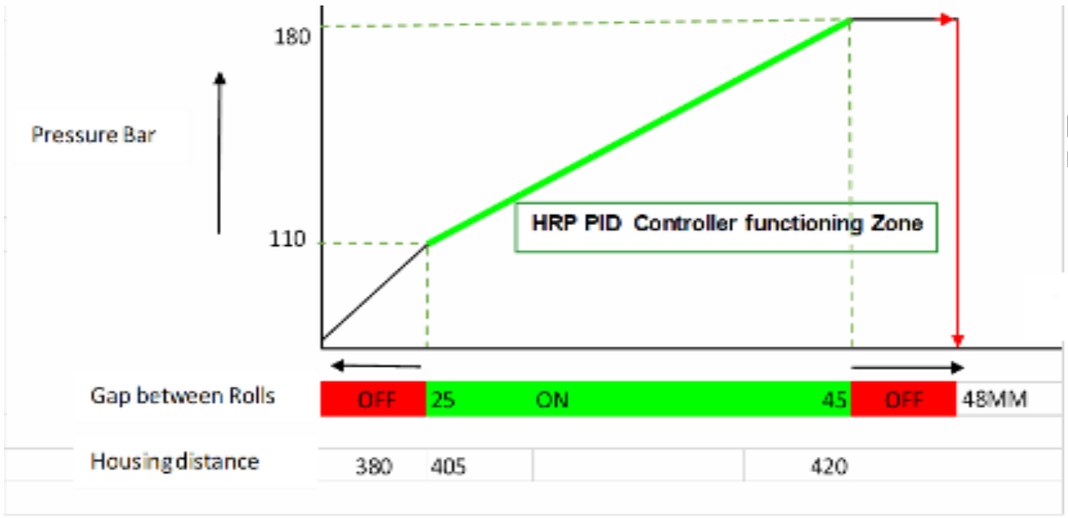
- Issue: Cake formation of HRP discharge material fed to static separator. High recirculation of material in Cement Mill-4
- Action Taken: Installation of cake breaker at roller press discharge chute
- Benefit: Homogeneous material feeding to static separator discharge belt



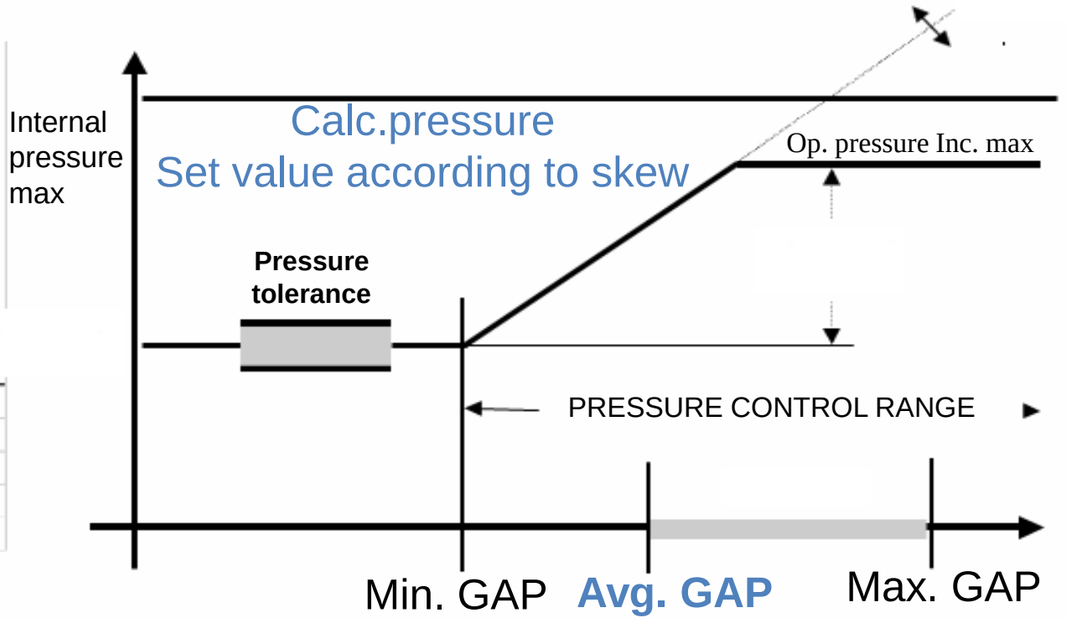


Energy Saving projects

Operation of Cement Mill-4 in Auto loop

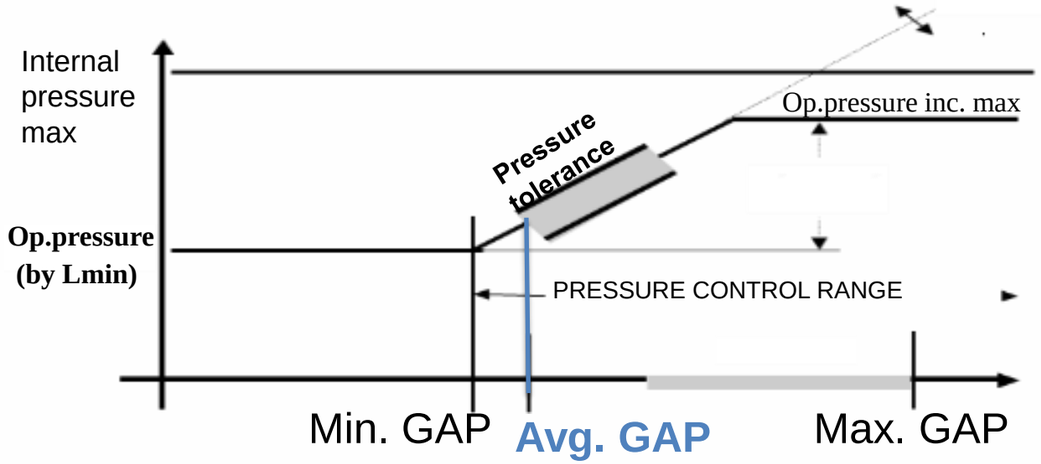


Normal functioning of logic



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



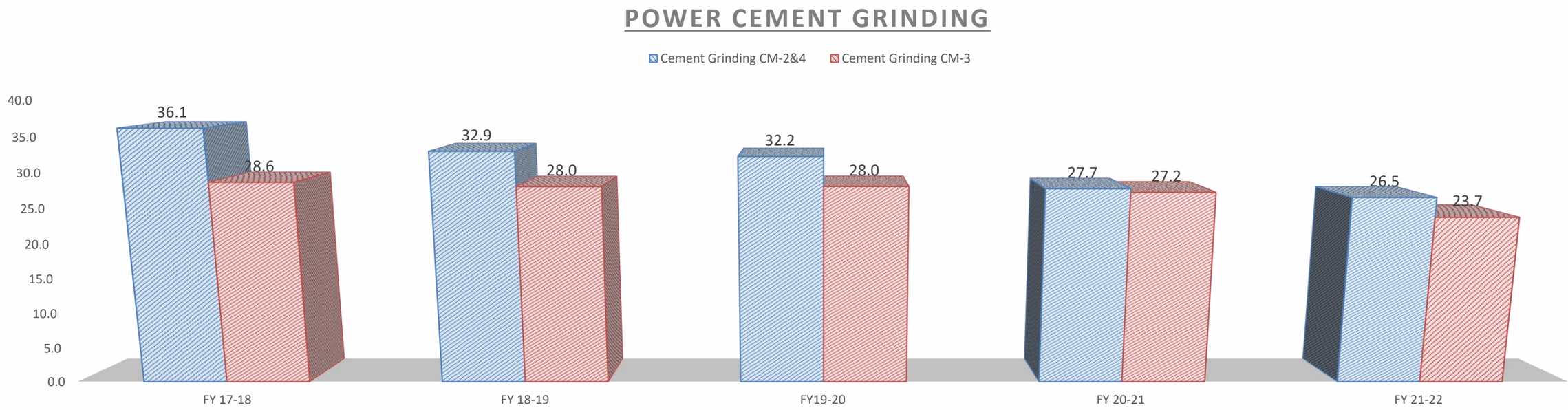
Data comparison of Cement Mill-3&4 Before & After

Major Modification

- Interlocks to reduce power consumption(Ball mill start time)
- Silo feeding elevator main drive changed which help in increasing feed.
- False air arrest done which helps in grinding power reduction
- Cement Mill-3 Ball mill fan & Separator fan Inlet damper removed to reduce pressure drop for enhancing power saving.

Minor Modification in Circuit

- Change in Sample location
- Change in BC110 venting location
- Mill discharge flap



CM-3 Bottlenecks & Action Plan (300 TPH)

S. No.	Bottleneck	Problem Description	Action Plan
1	Silo feed elevator	• Silo feed elevator is designed for 300 TPH at 1 T/m3 bulk density and max load is 95A. The tripping is given at 85 A. Whenever silo feed bucket elevator reaches 80 A, control room operator reduces the feed rate to avoid mill stoppage	• Immediate Action: Tripping limit increased to 90 A. Long term Action: Elevator upgradation
2	Material surging	• Whenever CM3 is running in OPC 43 or 53 grade, material surging observed from product cyclone	• Immediate Action: Detailed process measurement will be taken to identify the cause for surging problem
3	Gypsum hopper frequent jamming	• Frequent gypsum hopper jamming observed and it reduces the mill output	• New chute with Teflon plate along with air blasters will be fixed in coming shutdown
4	Additive feeding	• Additive reclaimer capacity is not enough to feed all the materials (Pond ash, PI and Gypsum)	• Additive reclaimer speed will be increased with the help of Mech. & Inst. team

CM-4 Bottlenecks & Action Plan (300 TPH)

S. No.	Bottleneck	Problem Description	Action Plan
1	Clinker hopper capacity	• Clinker hopper capacity is 235 MT and same feeding belt for PI and clinker. If we increase the feed, we couldn't able to make up the clinker hopper and whenever clinker reaches lower level, surges happened.	• Use RABH dust as PI in CM4 through FK pump system and avoid PI feeding as well as hopper. So clinker feeding rate can be improved and PI hopper can be used as clinker hopper. (Detailed proposal will be submitted after evaluating site feasibility) • New steel hopper and feeding system for PI and use the existing PI hopper for clinker.
2	Less utilization of CSP	• CM 1 extraction belt is not in use and 40% CSP clinker couldn't able to extract during running	• CM1 extraction belt (U1L16) will be connected with CM4 (U1L18) extraction belt by extending tail drum to increase the clinker feeding rate and also we can utilize full CSP capacity
3	RP recirculation elevator tripping limit	• Additive reclaimer capacity is not enough to feed all the materials (Pond ash, PI and Gypsum)	• Additive reclaimer speed will be increased with the help of Mech. & Inst. team
4	RP prebin flushing	• Whenever RP slide gate opening increased in roller press, sudden material surge happens and RP tripped in vibration	• Fresh feed and recirculation material segregation observed in pre-bin feed belt. Will be rectified in coming shutdown
5	Gypsum hopper frequent jamming	• Frequent gypsum hopper jamming observed and it reduces the mill output	• New chute with Teflon plate along with air blasters will be fixed in coming shutdown
6	Diaphragm jamming	• More nibs observed in diaphragm slots in short duration which chokes the ball mill frequently	• Nibs trap chute cleaning will be done in mill running condition itself if the nibs trap feed pipe connected with ball mill recirculation elevator. This work will be carried out in coming shutdown
7	Baghouse rotary airlock over load	• Frequent mill stoppages are due to bag house cage fallen in rotary air lock and getting over load. The above problem is persisting because of design issue in baghouse	• Require long stoppage (around 10 - 15 days) to do the necessary modifications as per OEM recommendation. All the orders already processed. Awaiting for mill stoppage.

Operation of OLBC belt from Maliakhera mines

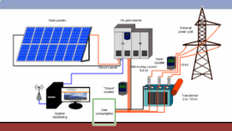
- In rough terrain, the transport of goods – for example by truck – involves significant effort and costs. When you use a Over land belt conveyor, you not only save much time and energy but reduce your costs for earthwork and transfer stations – while benefiting from low personnel expenses. At the same time you contribute to environmental protection thanks to reduced CO2 emissions, as well as lower noise emissions compared with truck and rail transport.
- Quick amortization of the systems due to high savings potential, as well as low maintenance costs are further winning arguments. The smart feed control provides optimized usage of drives and belts when facing varying height profiles. Sophisticated drive technology and low-wear and low-maintenance components of high quality reduce system charge and increase service life.
- Operation of OLBC belt from Maliakhera mines to plant by which it will save diesel cost by vehicle installed in Dec'21 and operation in Jan'22. Saving calculation done for only three months.

Project Cost (INR Lakhs)	Intangible Benefits	Tangible Benefits	Savings (INR)	Payback (Years)
630.11	Reduction in CO2 emissions. To protect against global warming.	2.2 Lakh Liter Diesel Saved	**203.31**	**0.77**

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 Heat recovery System	Electrical Energy	Onsite	10 MW	66.22	22%
FY 2019-20	Waste Heat recovery System	Electrical Energy	Onsite	10 MW	63.49	24%
FY 2020-21	Waste Heat recovery System	Electrical Energy	Onsite	29.1 MW	116.29	37%
FY 2021-22	Waste Heat recovery System	Electrical Energy	Onsite	29.1 MW	182.09	49%

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**

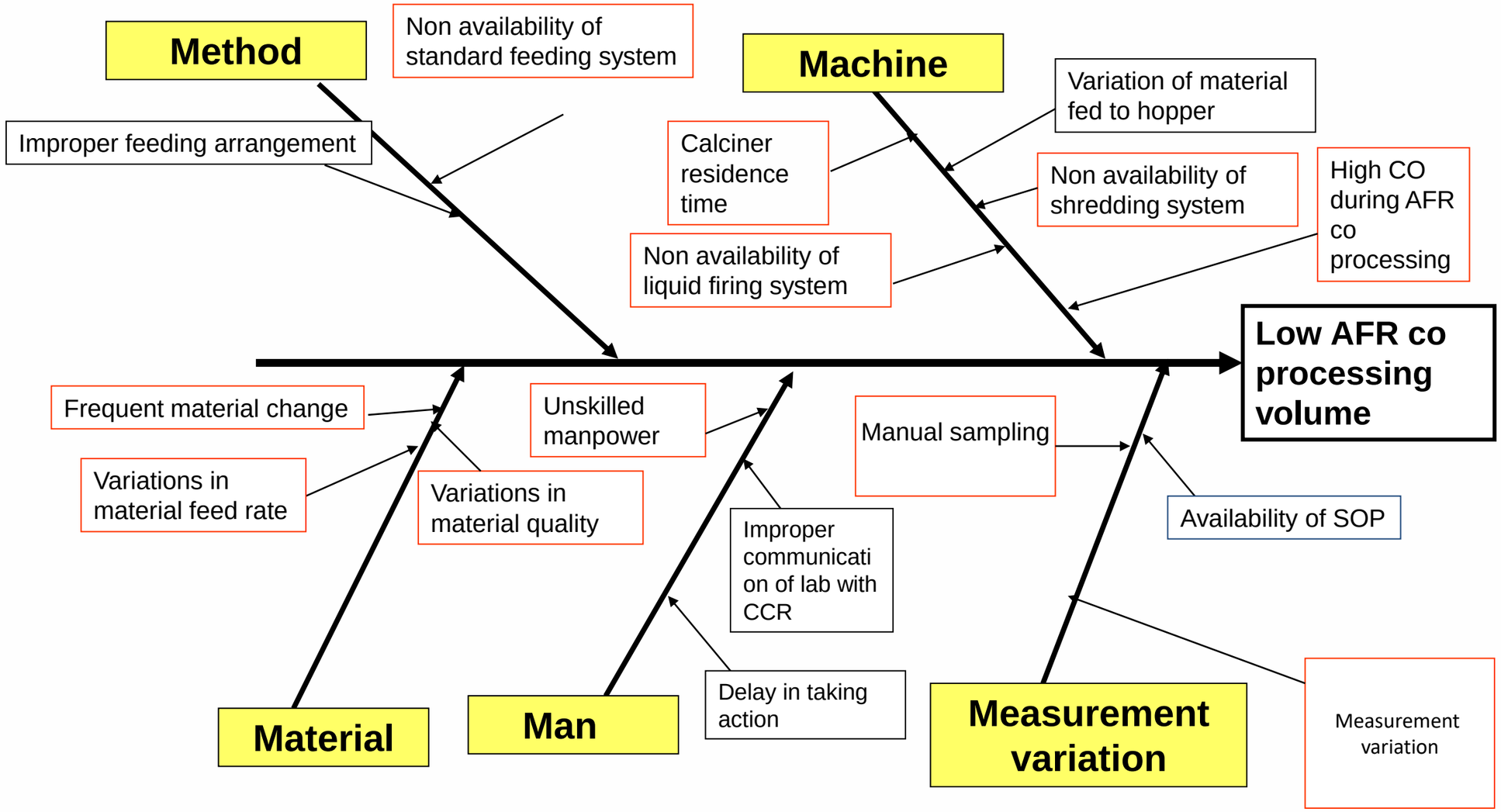
Source (MW)	Max. Load	Sent-out
CPP	25	22
WHRS	29.2	22
Grid sanctioned load	31.5	31.5
Total	**85.7**	**75.5**

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

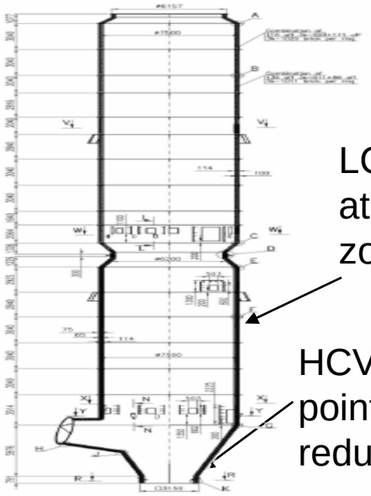
D/E ratio - 70:30, & 26% equity in group captive considered

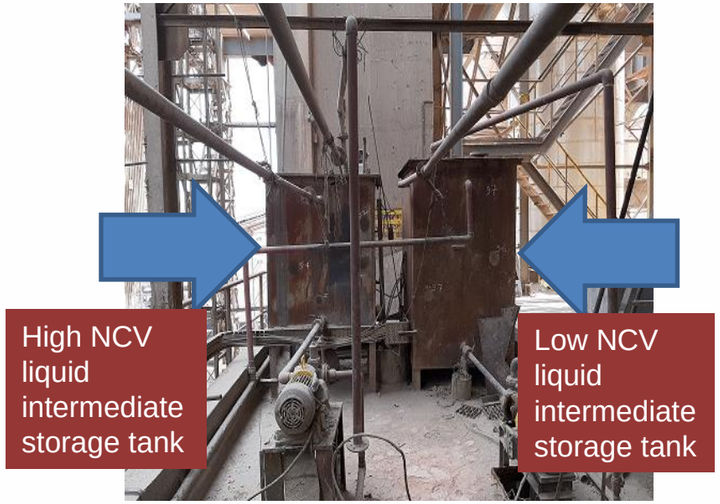
Methodology-Root cause Identification



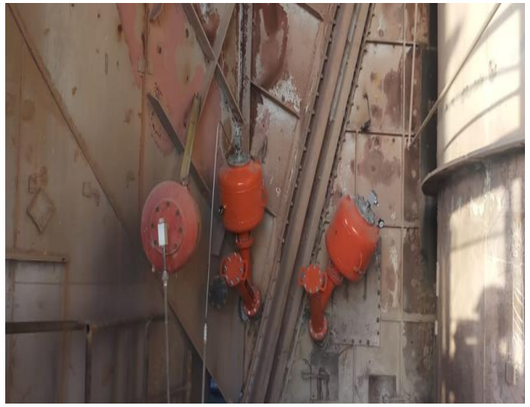
Counter measure and Implementation

- 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

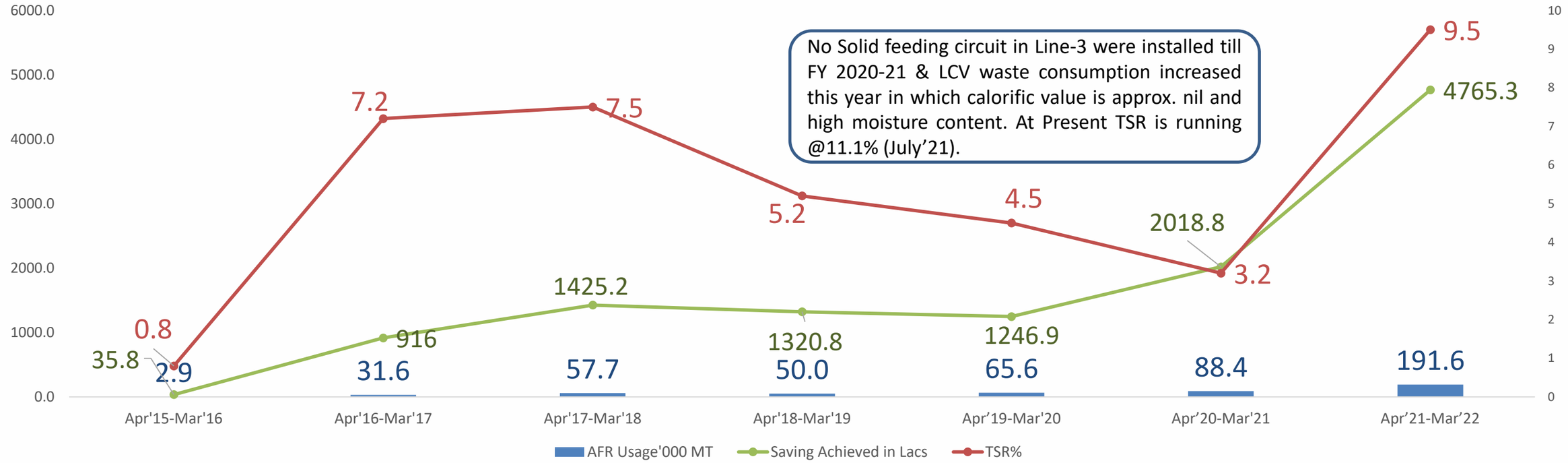
High NCV feeding point at reducing zone of calciner

1st 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	Apr'21-Mar'22
AFR Usage	MT	2933	31565	57744	50015	65580	88424	191633
Thermal Substitution	%	0.8	7.2	7.5	5.2	4.5	3.2	9.5
Saving Achieved	Lacs	35.8	916.0	1425.2	1320.8	1246.9	2018.8	4765.3



Benefits Achieved

Tangible benefits:-

- Total Saving of Rs 4765.3 Lacs from AFR usage last year.
- Total saving of 51755 MT of main fuel (Pet coke).

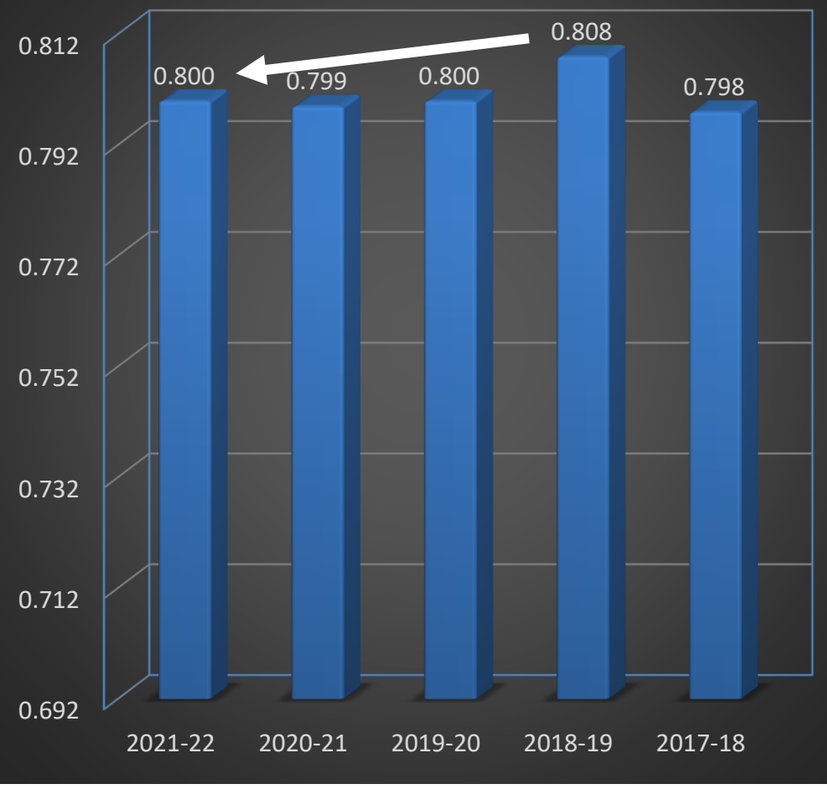
Intangible benefits:-

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

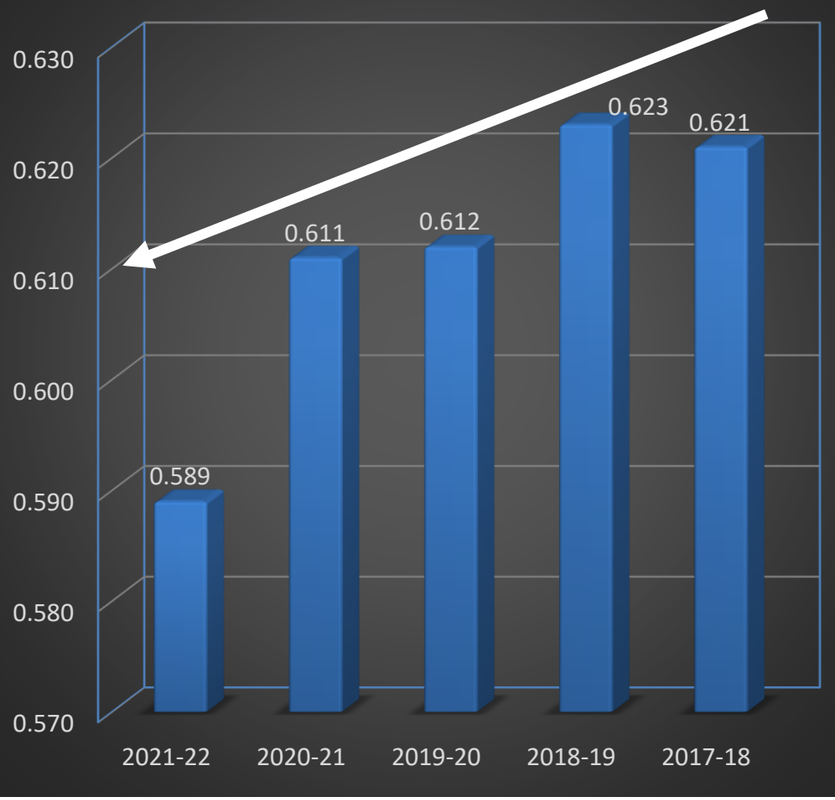
Fly Ash Utilization							
	2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**
%	29.2	30.7	30.9	28.4	27.1	29.8	31.8
Quantity	261269	333667	340945	362206	372162	407721	387961

GHG Inventorisation

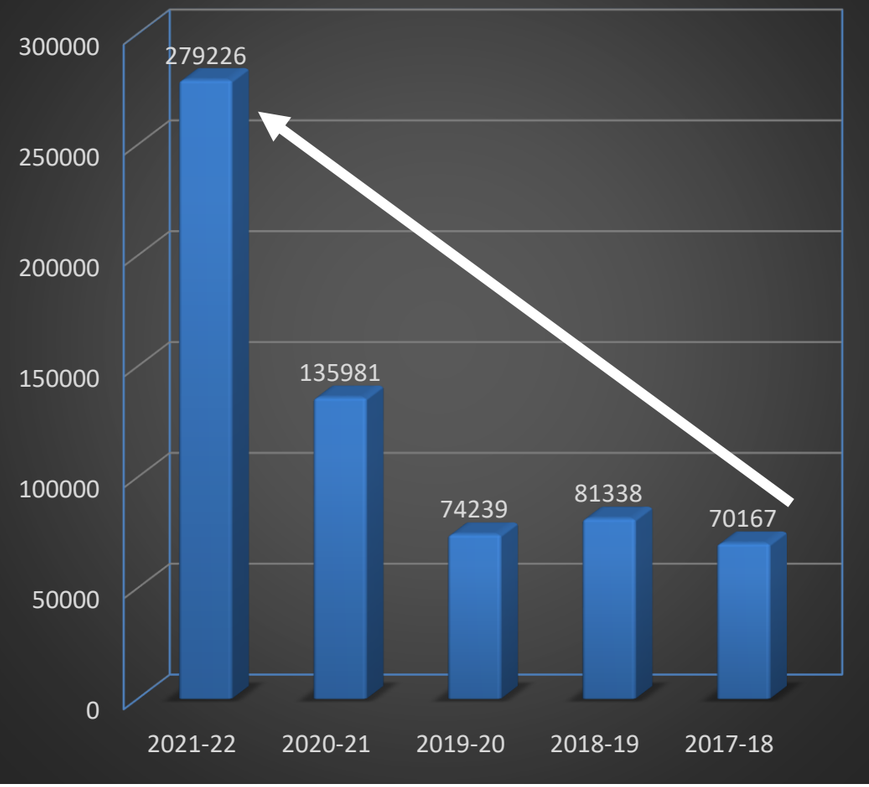
Co2 Emission /Ts Clinker



Co2 Emission /Ts Cement

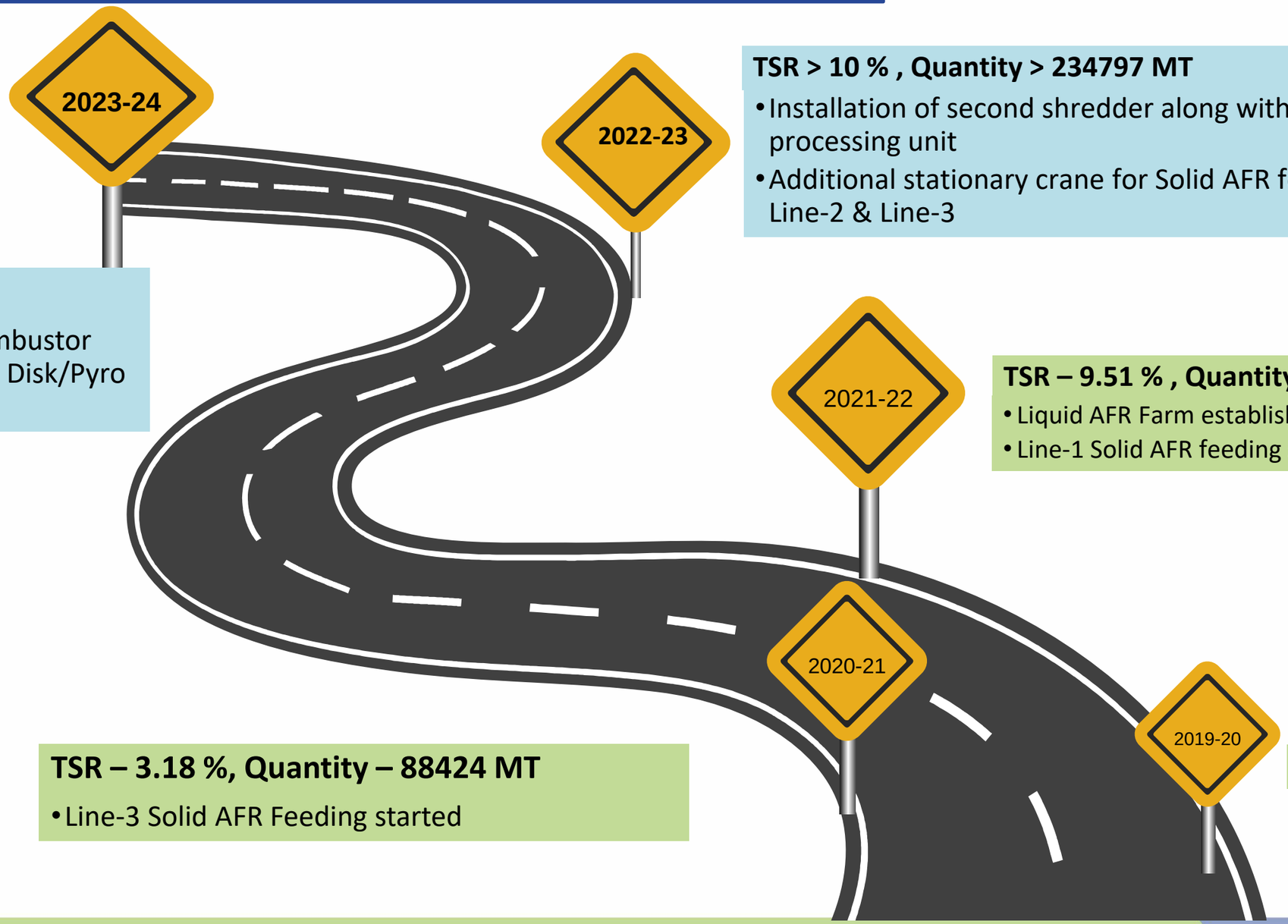


Carbon red. in terms of WHR gen



Co2 Emission /Ts	2021-22	2020-21	2019-20	2018-19	2017-18
Emission Per Ts Clinker	0.800	0.799	0.800	0.808	0.798
Emission Per Ts Cement	0.589	0.611	0.612	0.623	0.621
Carbon reduction in terms of WHR gen.	279226	135981	74239	81338	70167

AFR Aspiration & Roadmap



TSR > 18%

External combustor System (Hot Disk/Pyro rotor)

TSR > 10 % , Quantity > 234797 MT

- Installation of second shredder along with Pre processing unit
- Additional stationary crane for Solid AFR feeding in Line-2 & Line-3

TSR – 9.51 % , Quantity – 191633 MT

- Liquid AFR Farm established
- Line-1 Solid AFR feeding system upgraded

TSR – 3.18 %, Quantity – 88424 MT

- Line-3 Solid AFR Feeding started

TSR-4.43% , Quantity – 65580 MT

- Liquid firing system
- Shredder feeding started

GHG Inventorisation

Environmental projects with carbon emission reduction in FY 2021-22:

Projects	
• AFR Consumption increased from 88424 to 191633 MT	By 116.7%
• Reduction of OPC Clinker factor from 0.876 to 0.868	By 0.9%
• Reduction of PPC Clinker factor from 0.624 to 0.569	By 8.8%
• Replacement of conventional lightening with LED lights	88142 KWH saved
• Reduction of CO2 from 611 to 589 kg/MT of cem	By 3.6%
• Increase in WHR Generation from 116.3 to 182.1 mio KWH	By 56.6%
• Started using Industrial Fuel Oil (96,460 L) in replace of High speed Diesel to save natural resouces.	96460 L

Environmental Projects

Installation of SNCR to reduce the Nox emissions

Installation of Liquid Firing System

Installation of Solid Feeding System

Feeding Hopper

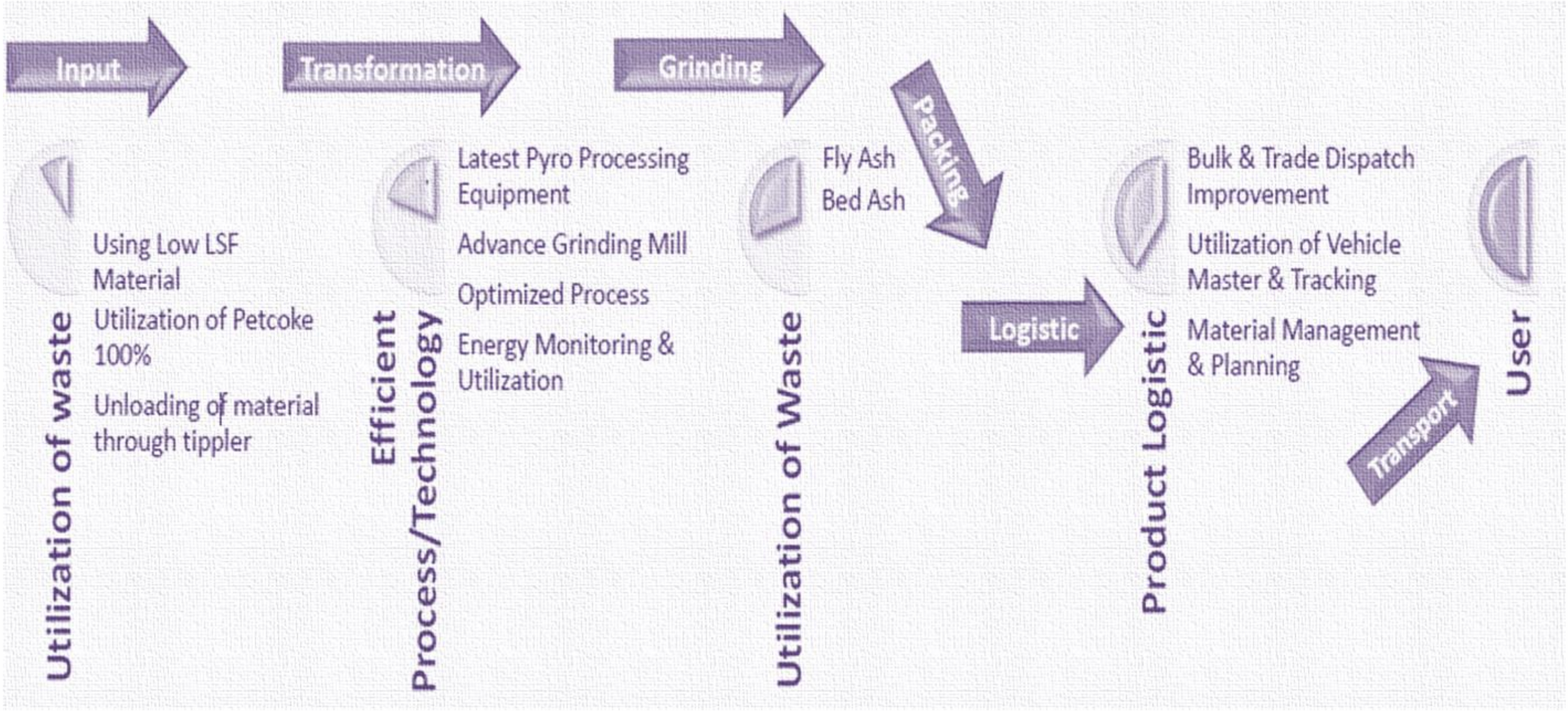
Belt Conveyor-1

Feeding System at Preheater

Belt Conveyor-2

Belt Conveyor-3

Green Supply Chain Management



Green Development

Green Development

Green Development - Housekeeping


RM-4


RM-5

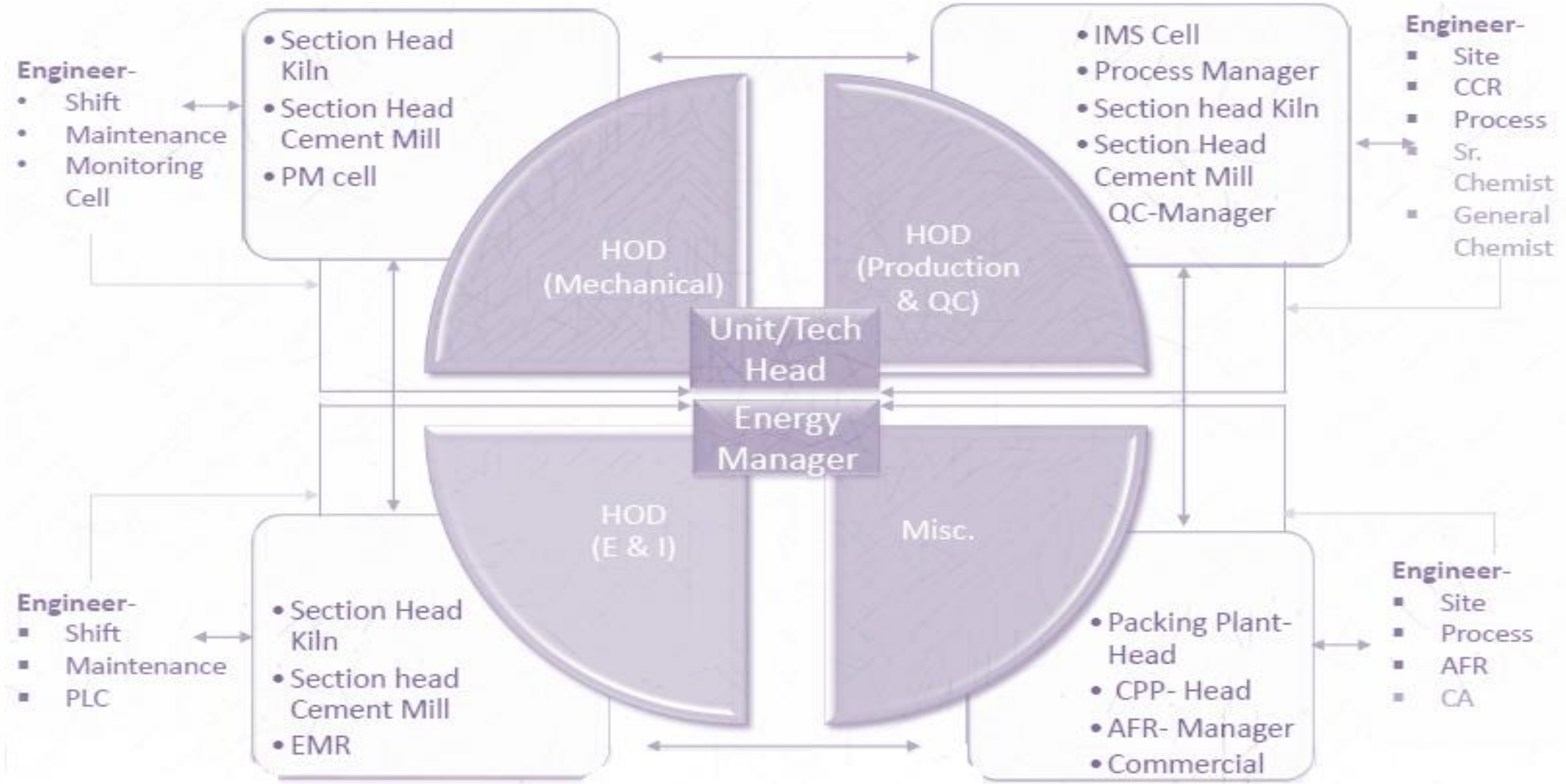

KILN-3


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

Mangrol Keizen

Last PAT Cycle Performance (PAT-II)

S. No.	Parameters	Values
1.	Achieved (2018-19) SEC Toe/t	0.0656
2.	Baseline (2014-15) SEC Toe/t	0.0833
3.	Target Toe	0.0786
4.	Baseline Production Tonnes	2035131
5	Target Reduction in gate to gate SEC	5.52%
6.	**ESCerts**	**26457**

PAT Cycle Performance (PAT-VII)

S.No	Parameters	Base year (2018-19)	2019-20	2020-21	2021-22	Percentage Decrease 21-22 w.r.t Base year 18-19)
1	Gate to Gate SEC (Un-normalized)	0.0854	0.0913	0.0860	0.0811	5%
2	Gate to Gate SEC (Normalized)	0.0854	0.0913	0.0858	0.0796	7%
3	Thermal SEC	702.37	707.54	698.09	721.79	-3%
4	Electrical SEC (Up to Clinker)	49.24	49.13	48.75	51.47	-5%
5	Electrical SEC (Cement grinding	30.96	30.53	28.76	26.45	15%
6	Gross Heat Rate of CPP	3208.23	3276.22	3278	3354.28	-5%
7	Weighted average. heat rate	3208.21	3266.85	3245.93	3321.09	-4%

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 2021-22 (Rs. Million)	64416
▪ Amount invested in EnCon Projects FY 2021-22 (Rs. Million)	335.4
▪ Investment %	0.52%

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 Achievements in Plant Performance KPI

Ever Best achievements in a Year	UOM	FY'22	Previous Best	
Clinker Production	Lac MT	**48.17**	40.98	Month best – **4.53 Lac MT**
Cement Production	Lac MT	**34.96**	30.80	Month best – **3.45 lac MT**
Cement dispatch	Lac MT	**35.10**	30.81	Month best – **3.54 lac MT**
WHR Generation Capability	Lac KWH	**1820.85**	1162.86	Month best – **175.22 Lac KWH**
WHR Generation Capability	Kwh/Ts Clk	**37.80**	28.38	
AFR consumption	Lac MT	**1.92**	0.88	Month best – **0.25 Lac MT**
AFR TSR	%	**9.51**	3.18	Month best – **14.98 %**
AFR Savings	Cr.	**49.97**	20.19	Month best – **6.93 Cr**
Overall clinker factor	%	**74.04**	76.43	Month best – **72.89 %**
Fly Ash Consumption	%.	**31.83**	30.94	Month best – **32.53 %**
Grinding Power CM-3	Kwh/Ts Cem	**23.72**	27.22	Month best – **21.74 kwh/Ts Cem**
Grinding Power CM-4	Kwh/Ts Cem	**26.49**	27.71	Month best – **24.09 kwh/Ts Cem**

Key Achievements

- Cost Saving in STSP by sourcing from Alternate vendors in FY21-22 (Saving of INR 2.54 Cr)
- Successfully establishment of Liquid AFR Farm in Mangrol Plant leading to consistency of Liquid AFR Feeding.
- Commissioning of OLBC for feeding of Limestone in Line-3, a move towards Carbon emission reduction & saving in Limestone cost (Feb'22 saving of INR 85.45/MT clk. Achieved as compare to Dec'21)
- Successfully commissioning of Oxygen Generation Plant which will help in reduction of dependency on vendors.
- Successful commissioning of New packer and truck loaders. It helps in increasing utilization of CM-4 and additional 1500 MT dispatch.
- Implemented more than 982 Kaizen.
- SAP implementation journey from <10% implementation to >85% Implementation in Mangrol Plant.

Feathers added to Mangrol Cap in FY'22

Centre of Excellence for Competitiveness for SMEs

Certificate of Award

This is to certify that
JK Cement Works, Mangrol
has been awarded as the 2nd Runner Up (Large Sector)
under Best Energy Efficient Organisation
Category in the 6th Edition of
CII National Energy Efficiency Circle Competition
held on 14-16 July 2022.

Confederation of Indian Industry

6th Edition of CII National Energy Efficiency Circle Competition

Mr Shreekant Somany, Chairman, CII – Centre of Excellence for Competitiveness for SMEs
Dr Sudhir Kapoor, Chief Jury, CII National Energy Efficiency Circle Competition
Mr Pikender Pal Singh, Executive Director, Confederation of Indian Industry

Date: 16-07-2022
Certificate No. EC22/A05

Centre of Excellence for Competitiveness for SMEs

Certificate of Award

This is to certify that
JK Cement Works, Mangrol
has been awarded as the 2nd Runner Up
under Best Case Study on Low Carbon and Carbon Neutral initiative Category in the
6th Edition of CII National Energy Efficiency Circle Competition held on 14-16 July 2022.

Confederation of Indian Industry

6th Edition of CII National Energy Efficiency Circle Competition

Mr Shreekant Somany, Chairman, CII – Centre of Excellence for Competitiveness for SMEs
Dr Sudhir Kapoor, Chief Jury, CII National Energy Efficiency Circle Competition
Mr Pikender Pal Singh, Executive Director, Confederation of Indian Industry

Date: 16-07-2022
Certificate No. EC22/A014

Centre of Excellence for Competitiveness for SMEs

Certificate of Award

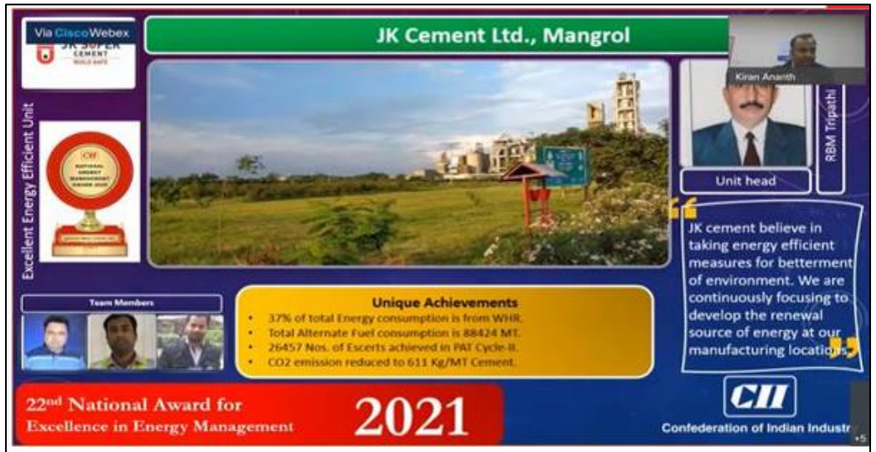
This is to certify that
JK Cement Works, Mangrol
has been awarded as the 2nd Runner Up (Large Sector)
under Best Energy Efficient Designated Consumer (Under BEE PAT Scheme) Category in the
6th Edition of CII National Energy Efficiency Circle Competition held on 14-16 July 2022.

Confederation of Indian Industry

6th Edition of CII National Energy Efficiency Circle Competition

Mr Shreekant Somany, Chairman, CII – Centre of Excellence for Competitiveness for SMEs
Dr Sudhir Kapoor, Chief Jury, CII National Energy Efficiency Circle Competition
Mr Pikender Pal Singh, Executive Director, Confederation of Indian Industry

Date: 16-07-2022
Certificate No. EC22/A017



- *"JK Cement Mangrol" Won Excellent Energy Efficient Unit in Cement Sector at CII National Energy Award for Excellence in Energy Management held on 24 - 27 August 2021 as Online Event.*

JKCement

CONGRATULATIONS

JKCement Works, Mangrol for winning Gold Award under the Apex India Occupational Health & Safety Award 2021 in Cement Sector.

JKCement

CONGRATULATIONS

JKCement Works Mangrol for winning **2nd prize** at the **Rajasthan Energy Conservation Award (RECA-2021)** for the efforts in **Energy conservation** under the **Cement industry category.**

Mr. Sachin Gupta- Head E&I, Energy auditor of JK White Cement Works, Gotan for being awarded the **Rajasthan Energy Conservation Award 2021** for efforts in **Energy Conservation** under the **Energy Auditor Individual Category.**

THANKS

STAY SAFE