JK Cement Mangrol

24th National Award for Excellence in Energy Management 2023

Presented By:-
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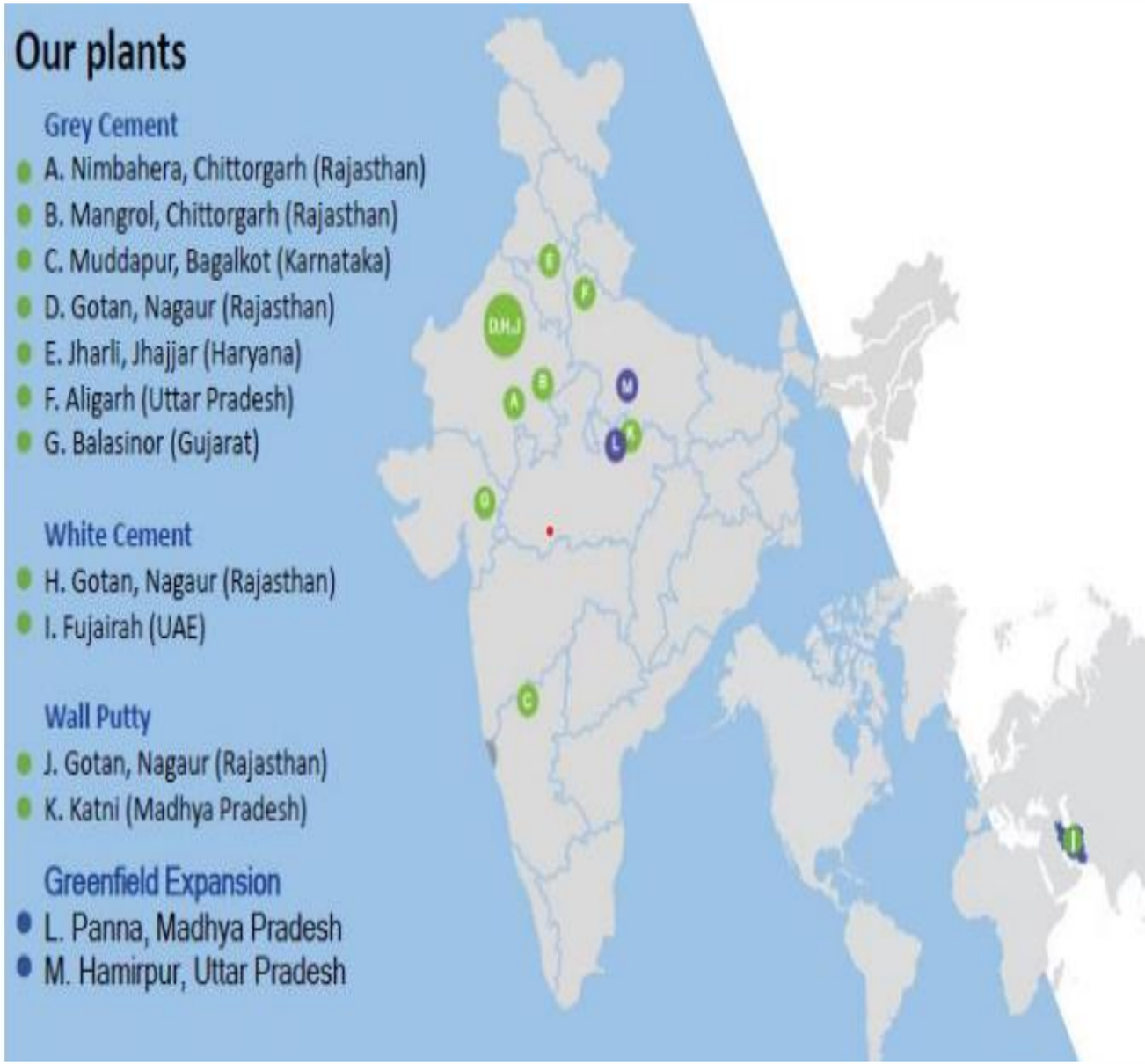
Leela Vinoth Nagendran (Production Head)
Yadvender Singh (Asst. Manager-Process)

Brief introduction on Company

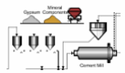
- JK Cement Ltd is an affiliate of Industrial conglomerate JK Organization, founded by Lala Kamlapat Singhania. The company is the second largest manufacturer of white cement in India (third largest in the world) & second largest producer of Wall putty in the country. First cement company to install 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 from last four years.
- GreenCo Gold rated company from CII

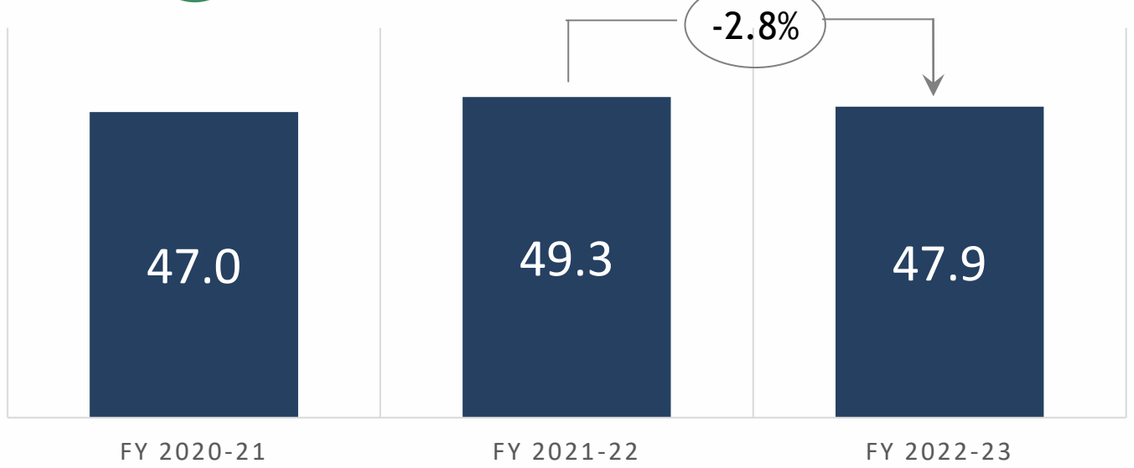


Technology/Specification of sections

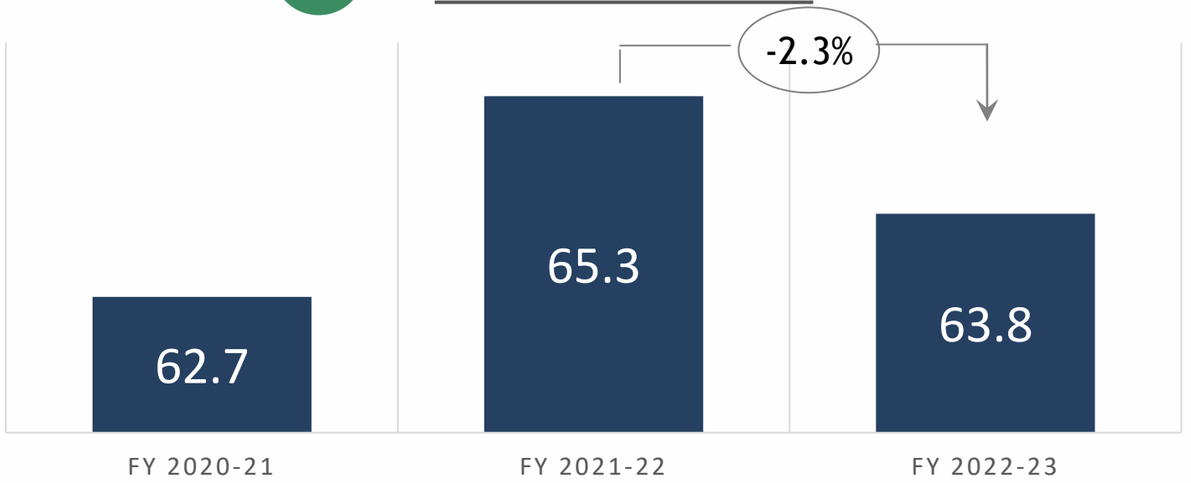
JK Cement Mangrol		Line-1	Line-2	Line-3
Stacker 	Machine type	Twin boom stacker	Luffing stacker	Luffing stacker
	Make	Promac	FLSmidth	FLS
	Capacity	350 TPH	850 t/h (wet)	1550 TPH
Reclaimer 	Machine type	Bridge type reclaimer	Bridge Reclaimer	Bridgre scraper
	Make	Promac	FLSmidth	FLS
	Capacity	200 TPH	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	Ø4.35M*67M Long, 5.0 RPM	Ø4.75M*74M Long, 5.5 RPM
	Capacity	1800 TPD (Design), 2250 (Actual)	5000 TPD (Design), 6000 TPD (Actual)	6500 TPD (Design), 8000 TPD (Actual)
	Type of cooler	Grate Cooler	Crossbar 14*49	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) (2 Nos)
	Capacity	60 TPH	120 TPH Each	150 TPH

Specific Energy Consumption Overall

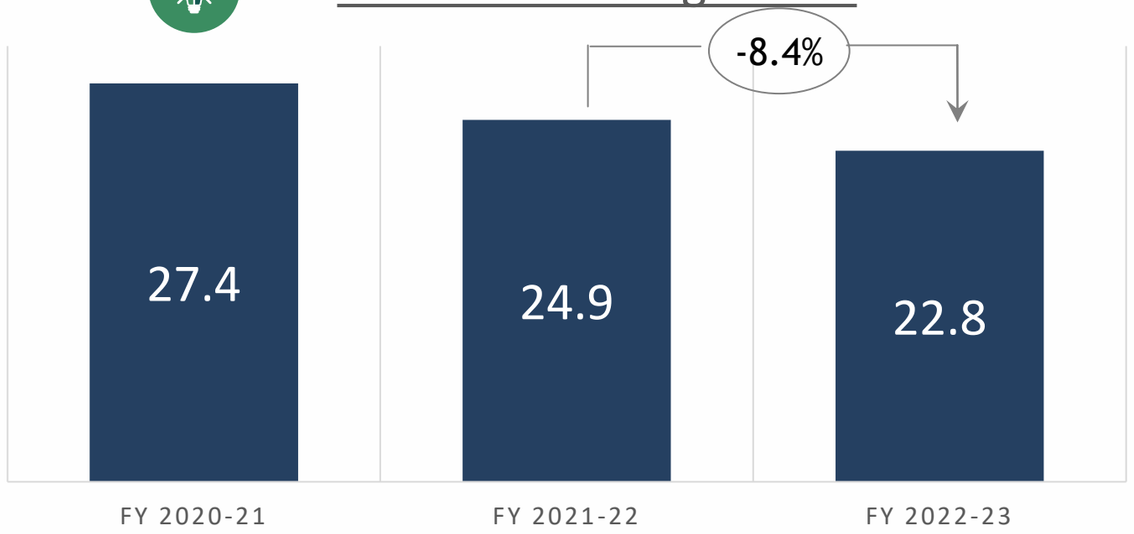
Upto Clinkerisation Power



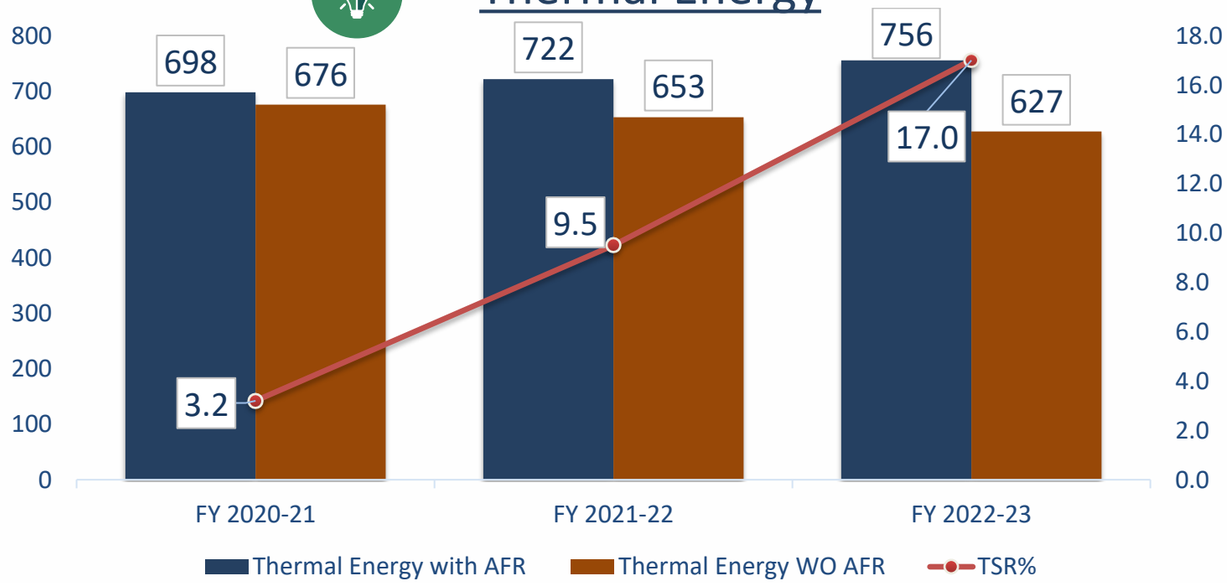
Total Plant Power



Cement Grinding Power

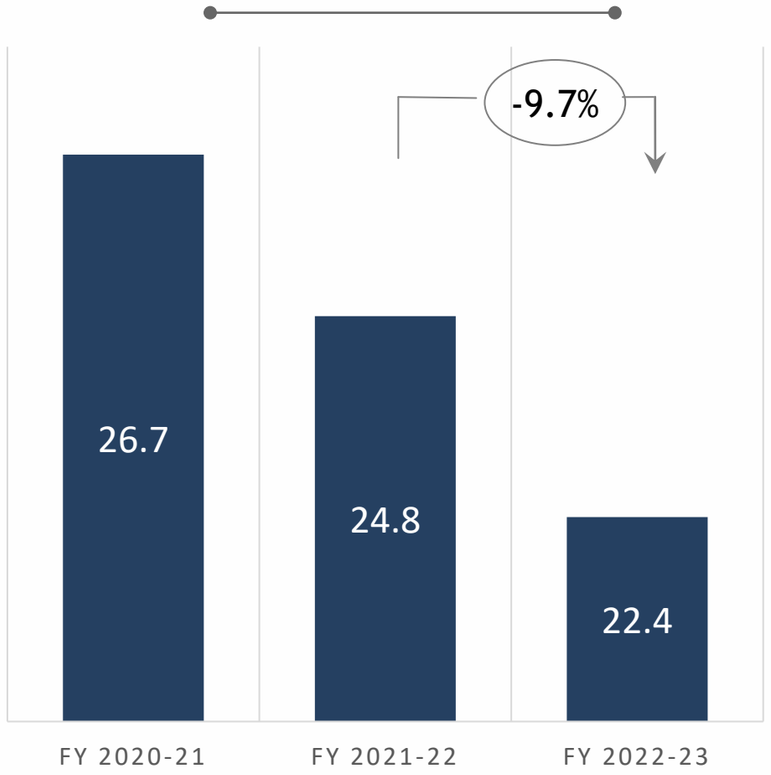


Thermal Energy



Cement Grinding Power & Composition

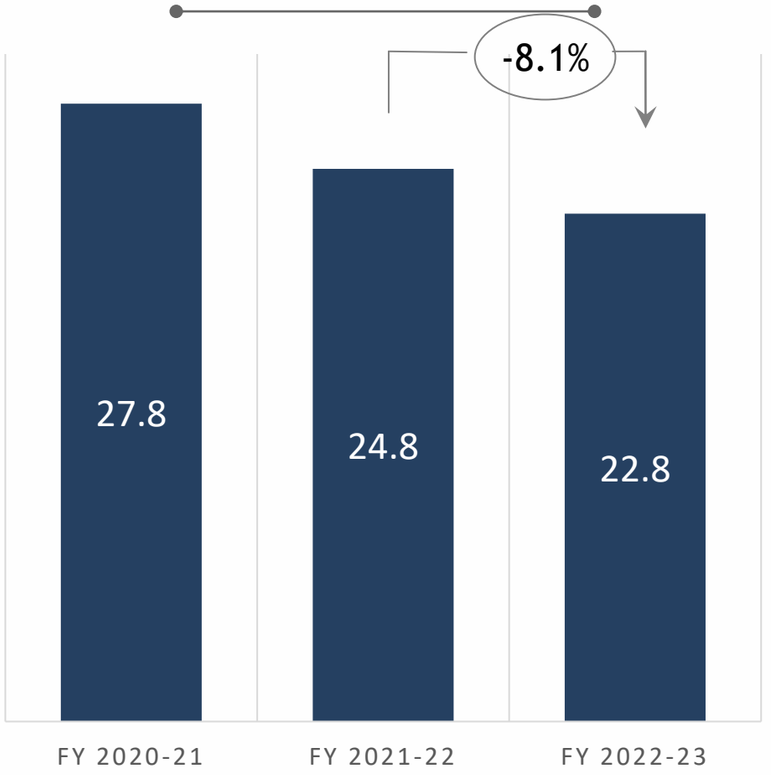
PPC



Cement Mix Ratio

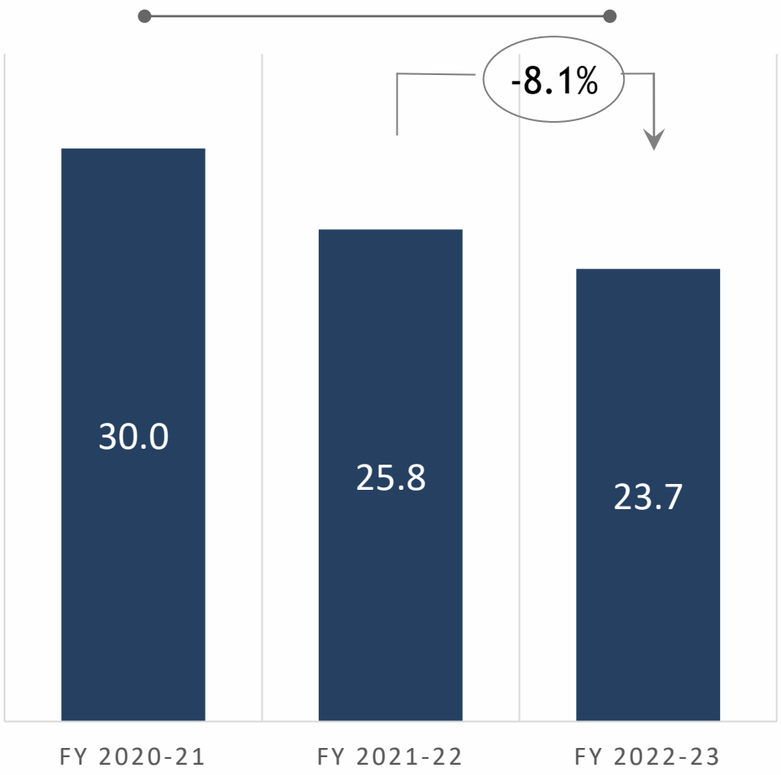
FY 2021-22	FY 2022-23
40 %	32 %

OPC-43



FY 2021-22	FY 2022-23
51 %	57 %

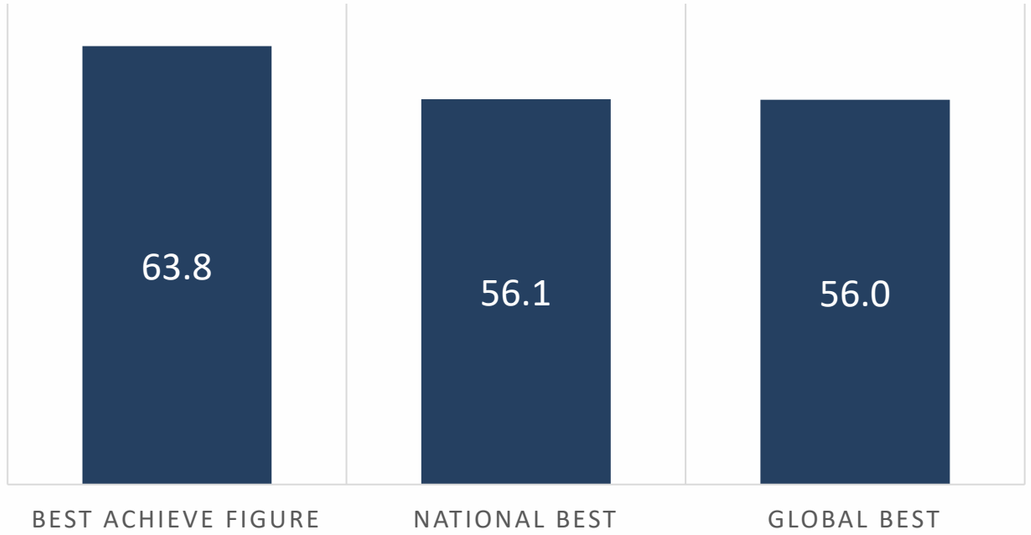
OPC-53



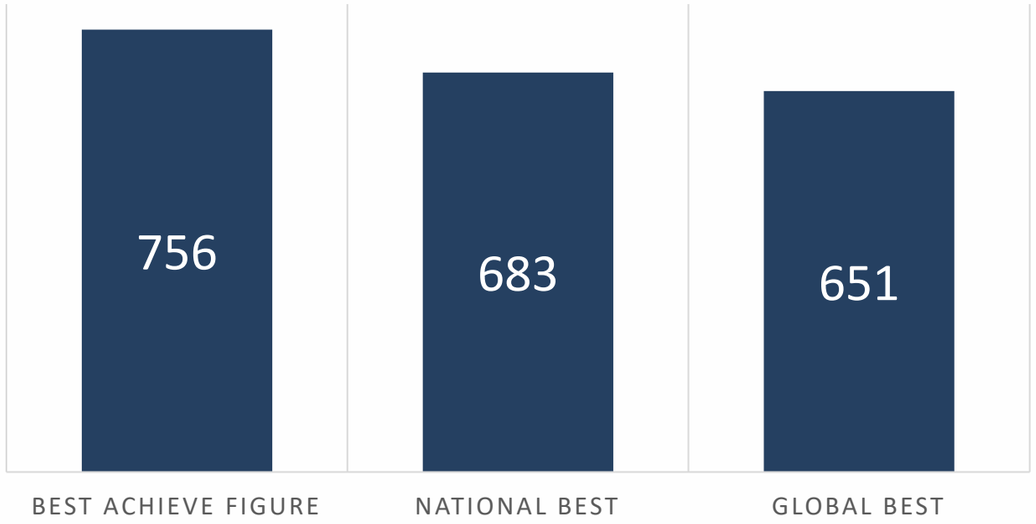
FY 2021-22	FY 2022-23
9 %	11 %

Energy Benchmarking & Action plan

TOTAL PLANT POWER



THERMAL ENERGY



Priorities for Next Year:-

- 100% Safety Compliance – Zero Harm
- 100% Implementation of SAP PM Module
- Working towards CII Green-Co rating
- Water harvesting pond of 2 Lakh KL Capacity in Mangrol Plant.
- Improvement in MTBF to reduce Clinker Cost.
- Brainstorming & implementation of more Kaizens
- Improve productivity of CM-3 & CM-4 to 300 TPH for further reduction in Sp. Power Consumption.
- Development of Alternative vendors for further reduction in STSP cost.
- Production of Synthetic Gypsum in Mangrol Plant.
- Implementation of strategic activities in Line-2 & Line-3 Pyro Section for reduction in Sp. Heat & Sp. Power Cons.

Energy Saving projects planned FY 2023-24

SN	Measures implemented/Action Implemented	Description	Investment done (in Rs)	Savings Achieved (in Rs)	Savings in Kcal/Kg Clk
1	Usage of AFR in Line-1 (29231 MT)	Usage of AFR in Line-1 by substituting primary fuel	10561645	62957175	113.9
2	Usage of AFR in Line-2 (142015 MT)	Usage of AFR in Line-2 by substituting primary fuel	51312377	408870199	167.2
3	Usage of AFR in Line-3 (178149 MT)	Usage of AFR in Line-3 by substituting primary fuel	64368192	505193258	165.8
4	Installation of new Coal firing system in Kiln-1	Installation of new Coal firing system in Kiln-1 to improve overall productivity & Quality of Clinker	50900000	14012661	5
5	Cooler modification in Kiln-1	Cooler modification of Kiln-1 to increase productivity & enhance WHR generation	291900000	50414508	25.0
6	Replacement of primary Burner in Kiln-3	Replacement of primary Burner in Kiln-3 from Jetflex to pyrojet	12500000	11105763	3
7	Aluminization paint in Kiln-2	Aluminization paint in Kiln-2 for reduction in Thermal Energy @ 4 kcal/Kg Clinker	11662000	17030000	4
8	Aluminization paint in Kiln-3	Aluminization paint in Kiln-3 for reduction in Thermal Energy @ 4 kcal/Kg Clinker	16426000	22210000	4

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 2020-21	11	10467.58*	80.69	221265	777.18	26.2** kwh/Ts Cem, 54.0** Kcal/Kg Clk
FY 2021-22	14	335.40	74.67	63788	1167.69	21.4** kwh/Ts Cem, 80.9** Kcal/Kg Clk
FY 2022-23	19	133.22	37.12	75893	899.06	11.1** kwh/Ts Cem, 128.1** Kcal/Kg Clk

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

** Remarks:- Impact is calculated as per saving achieved in Electrical & Thermal divided by Clinker & Cement Production.

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 implemented FY 2022-23

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 (26841 MT) by substituting primary fuel	Fuel Change	9698048	77156215	6693	-	9139
2	Usage of AFR in Line-2 (119765 MT) by substituting primary fuel	Fuel Change	43273254	245537265	23655	-	35762
3	Usage of AFR in Line-3 (144544 MT) by substituting primary fuel	Fuel Change	52226327	362352585	33274	-	48587
	Total		**105197629**	**685046065**	**63622**	**0**	**93488**
4	Cement Grinding Power reduction in Cement Mill-3 from 23.72 to 22.37 kwh/Ts Cem.	Illumination	-	9892462	775	2391718	
5	Upto Clinkerisation Power reduction in Line-2 from 49.46 to 47.40 kwh/Ts Clk	Illumination	-	16494852	1291	3987989	
6	Upto Clinkerisation Power reduction in Line-3 from 48.15 to 46.60 kwh/Ts Clk	Illumination	-	15991858	1252	3866379	
7	Clinker Factor reduction in Cement Mill-4 from 58.01 to 56.91% by adding treated Limestone as Activated Gypsum	Illumination	0	5727096	250		365
8	Replacement of 37 Nos. 1400w HPSV Light into 150W LED Light	Technology Absorption	163355	198413	10	30525	
9	Replacement of 71 Nos. 70W HPSV Light into 40W LED Light	Technology Absorption	96950	45689	2	7029	
10	VFD Installation for P&V Blower	Technology Absorption	0	210600	10	32400	
11	Bag filter fan VFD conversion	Technology Absorption	1680000	4816089	240	740937	

Innovative Project-1

DESCRIPTION : Ballistic separator installed to remove the foreign material in receipt RDF

Month Of Implementation- Nov 2022

- **PROBLEM STATEMENT :-**

(I) Unable to increase the RDF in co-processing due to quality issue

(II) Stone coming along with RDF waste

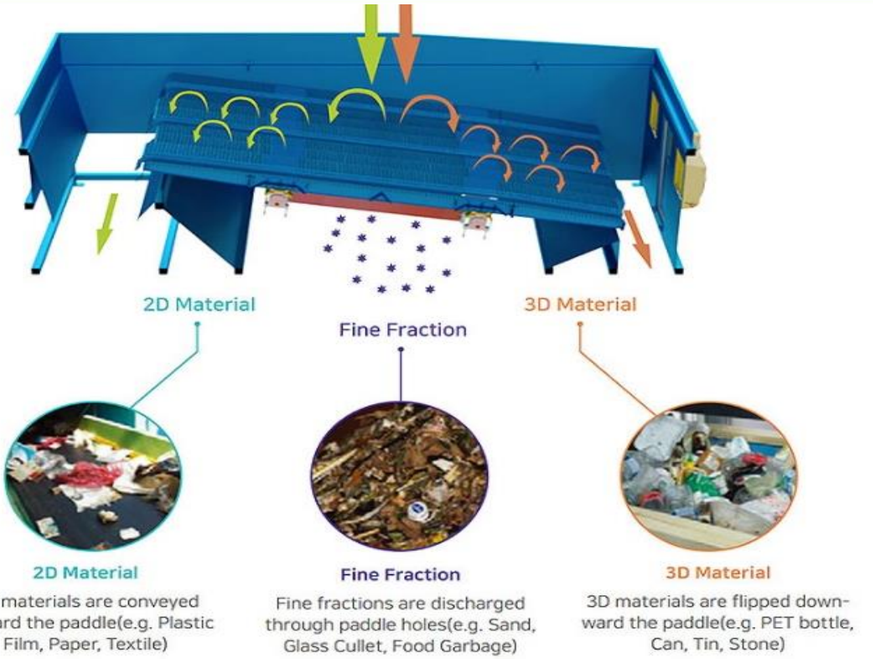
(III) Manual sorting done which is not effective

(IV) High wear & tear in shredder

- **ACTION PLAN:-**

(I) Installation of Ballistic separator to separate mixed wastes into flat materials(2D) by the gradability and rolling materials(3D) by the ballistic movement.

(II) Through various screen hole sizes, the machine sorts fine fractions efficiently as well.



BENEFITS

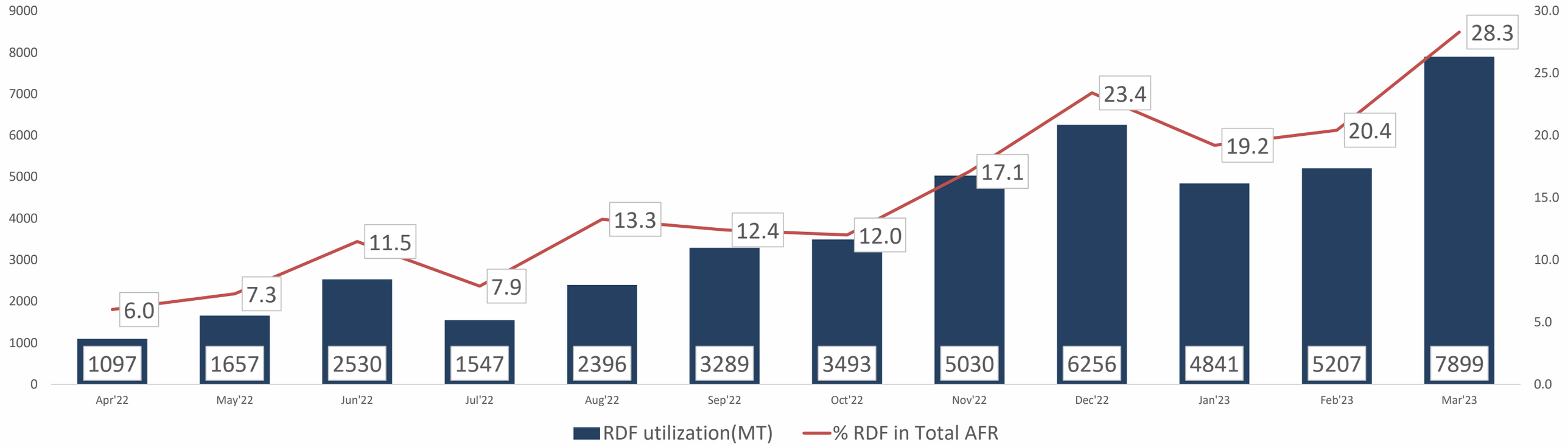
(I) Improvement in RDF Quality

(II) Increase in RDF %Usage in AFR.

(III) No manual intervention for segregation of stone

(IV) Low wear and tear in shredder.

Sample	Moisture	Ash	NCV(ARB)
	%	%	Kcal/kg
Input	22.55	41.4	2014
Middle(Reject)	24.09	56.1	1514
Output	16.48	38.8	2361

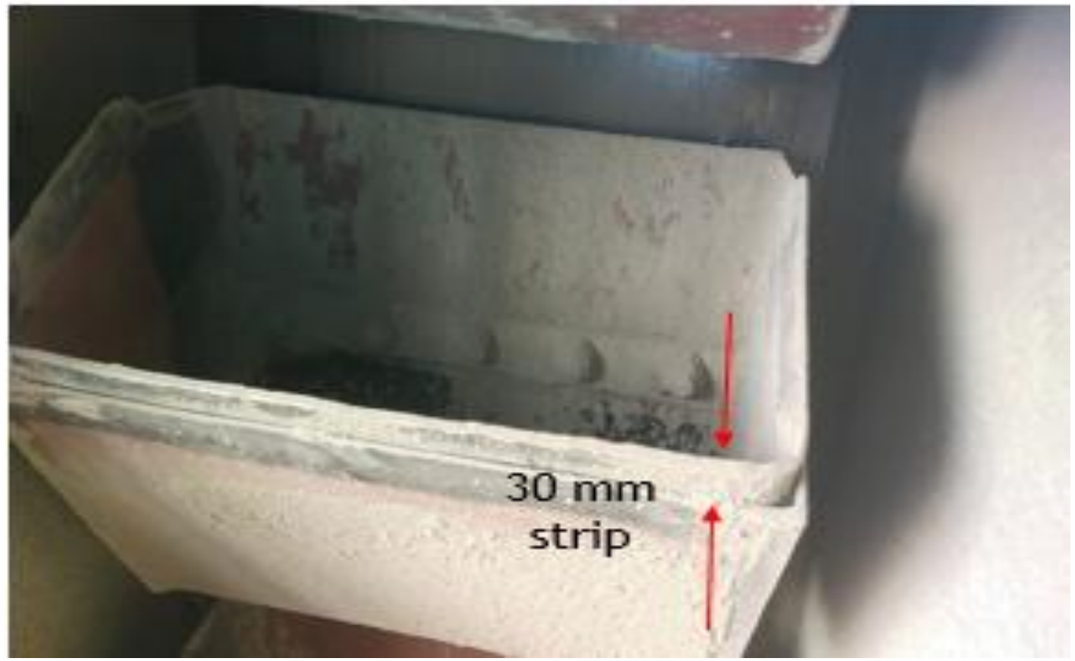


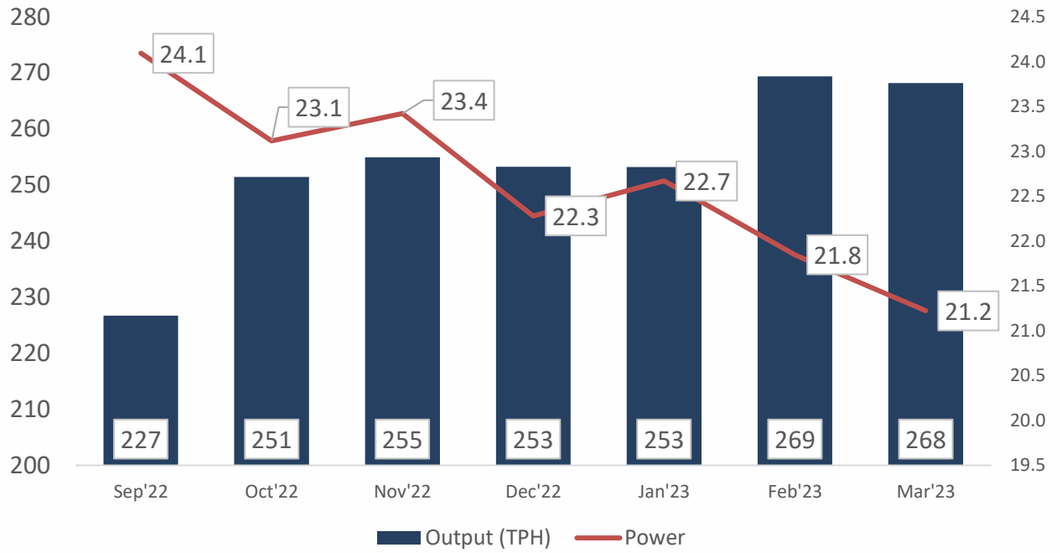
Innovative Project-2

DESCRIPTION : Increasing the height of Bucket by 30 mm strip in Cement Mill-3

Month Of Implementation- Jan 2023

- To avoid mill tripping due to boot level in silo feed elevator @ 265 TPH .
- Silo feed elevator tripped due to boot level @ 265 tph and 75 amp load , we are not able to increase mill feed due to boot level.
- Increase the height of bucket by installing 30 mm strip & hence bucket volume increased
- After this modification there is no any tripping with boot level even @ 280 tph and now we are able to increase mill feed up to 285 tph.





Innovative Project-3

DESCRIPTION : In Line-3, increase CED slope to avoid material accumulation & reduce cyclone jam frequency.

- **Month Of Implementation-** Aug 2022

BEFORE:

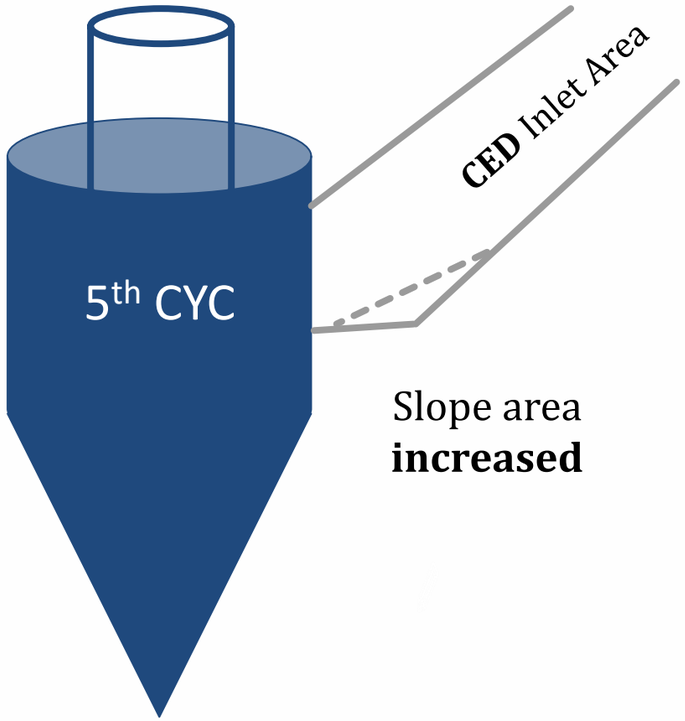
During FY 2022-23, 9 stoppages of PH cyclone feed pipe Jammed occurred before Aug'22 during the year

In Aug'22 Shutdown, PH cyclone inlet duct slope has been increased with refractory thickness to reduce material accumulation & reduce cyclone jam frequency.

AFTER : No Breakdown

➢BENEFITS / RESULTS:

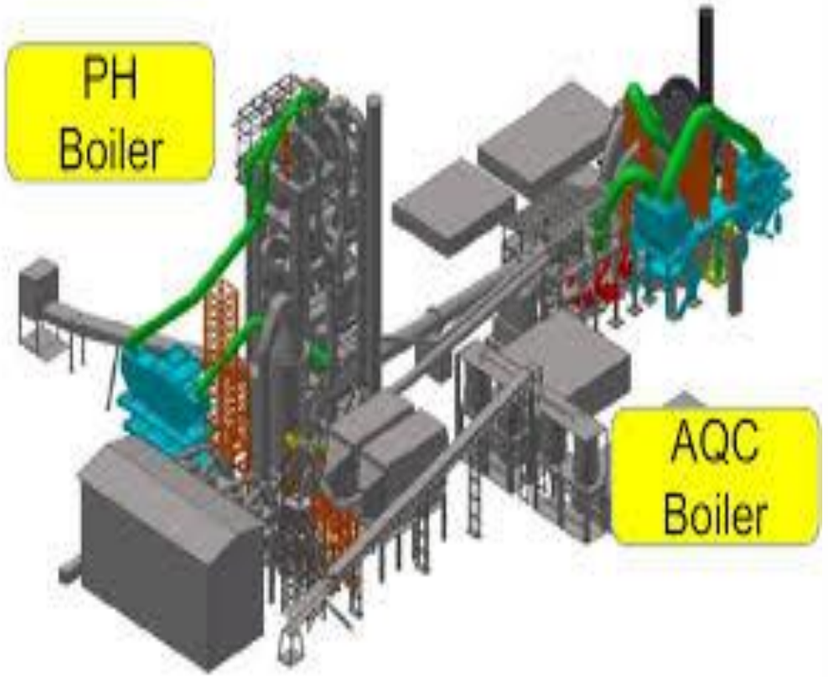
	Kaizen	Year	Frequency	Breakdown Hrs	Production loss	Loss
	UOM	FY	Nos	Hrs	MT	Lac Rs
Kiln-3	Before Kaizen	Before Aug'22	9	56.17	17581	**175.8**
	After Kaizen	From Aug'22	0	0	0	0.0



Utilization of Renewable Energy sources

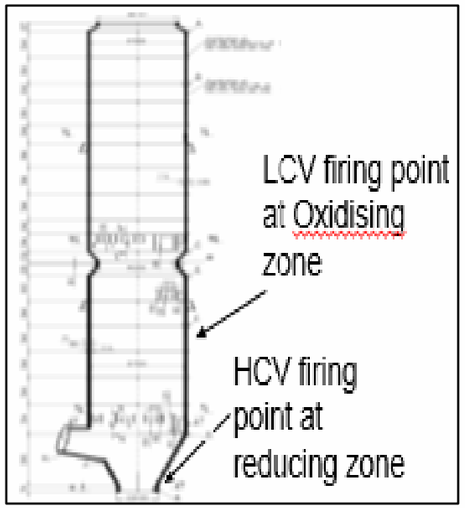
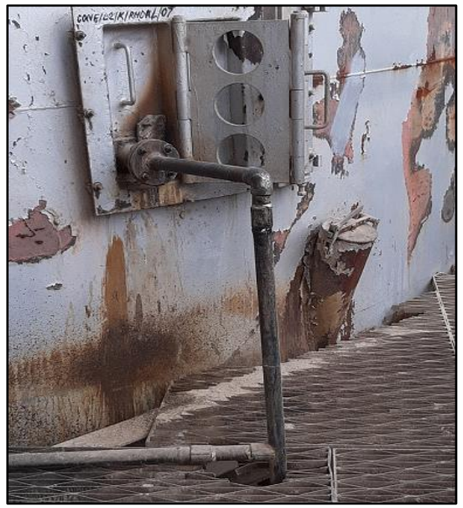
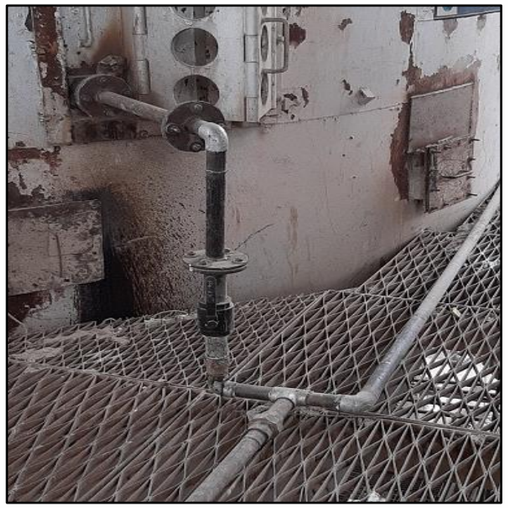
Installation of Solar plant of 7 MW	
Investment	260.12 Lacs
Saving	473.33 Lacs

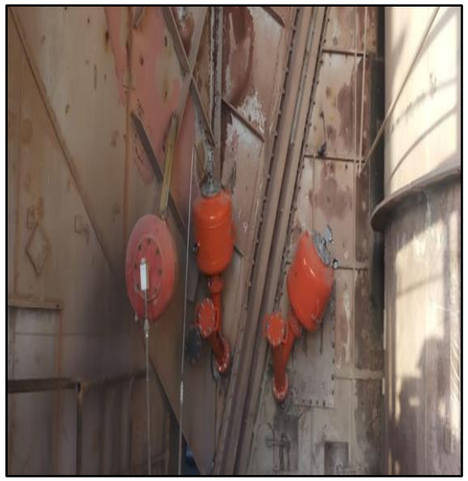
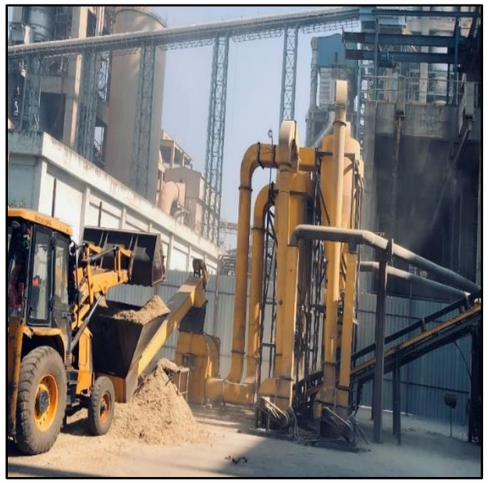
Year	Technology	Type of Energy	Onsite/ Offsite	Installed Capacity MW	Generation (million KWh)	% of overall electrical energy
FY 2020-21	Waste Heat recovery System	Electrical Energy	Onsite	29.1 MW	116.29	37%
FY 2021-22	Waste Heat recovery System	Electrical Energy	Onsite	29.1 MW	182.09	49%
FY 2022-23	Waste Heat recovery System	Electrical Energy	Onsite	29.1 MW	195.17	52%
	Solar Plant	Electrical Energy	Onsite	7 MW	7.11	2%



Waste utilization and management

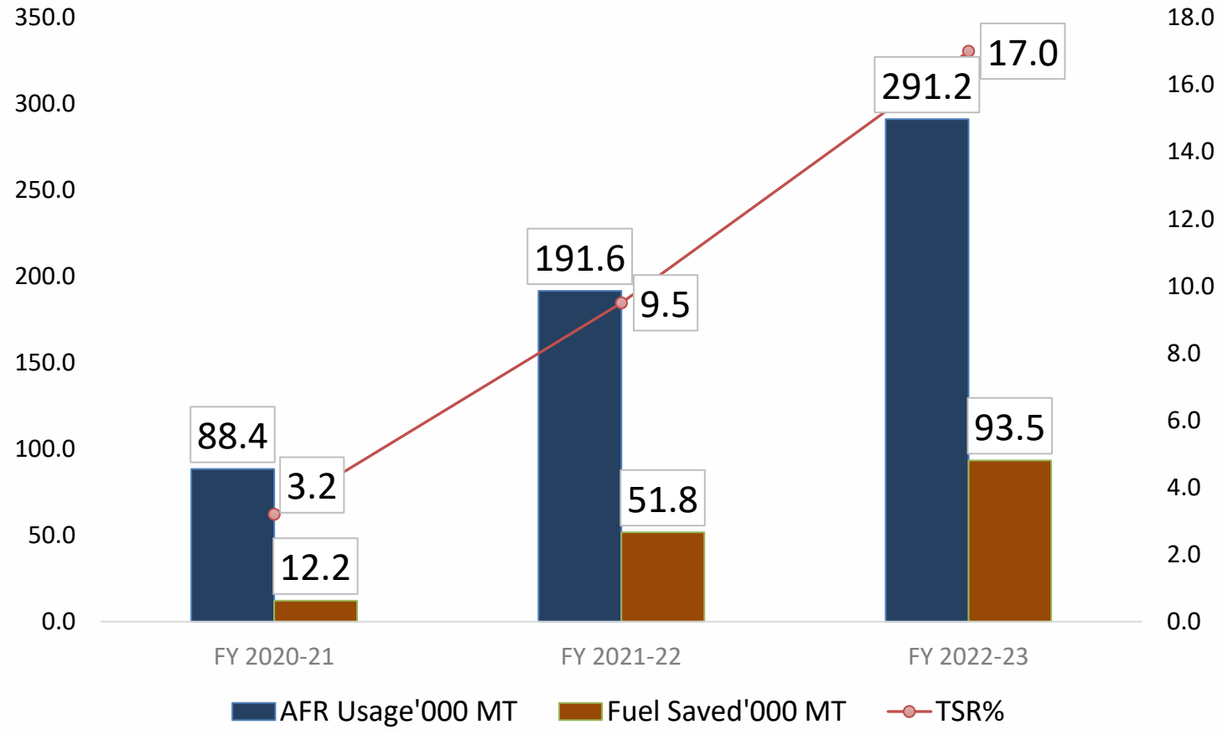
Counter measure and Implementation

Feeding Point	1st Feeding Point of LCV	2nd Feeding Point of LCV	Feeding Point of HCV	Ballistic Separator installed
				

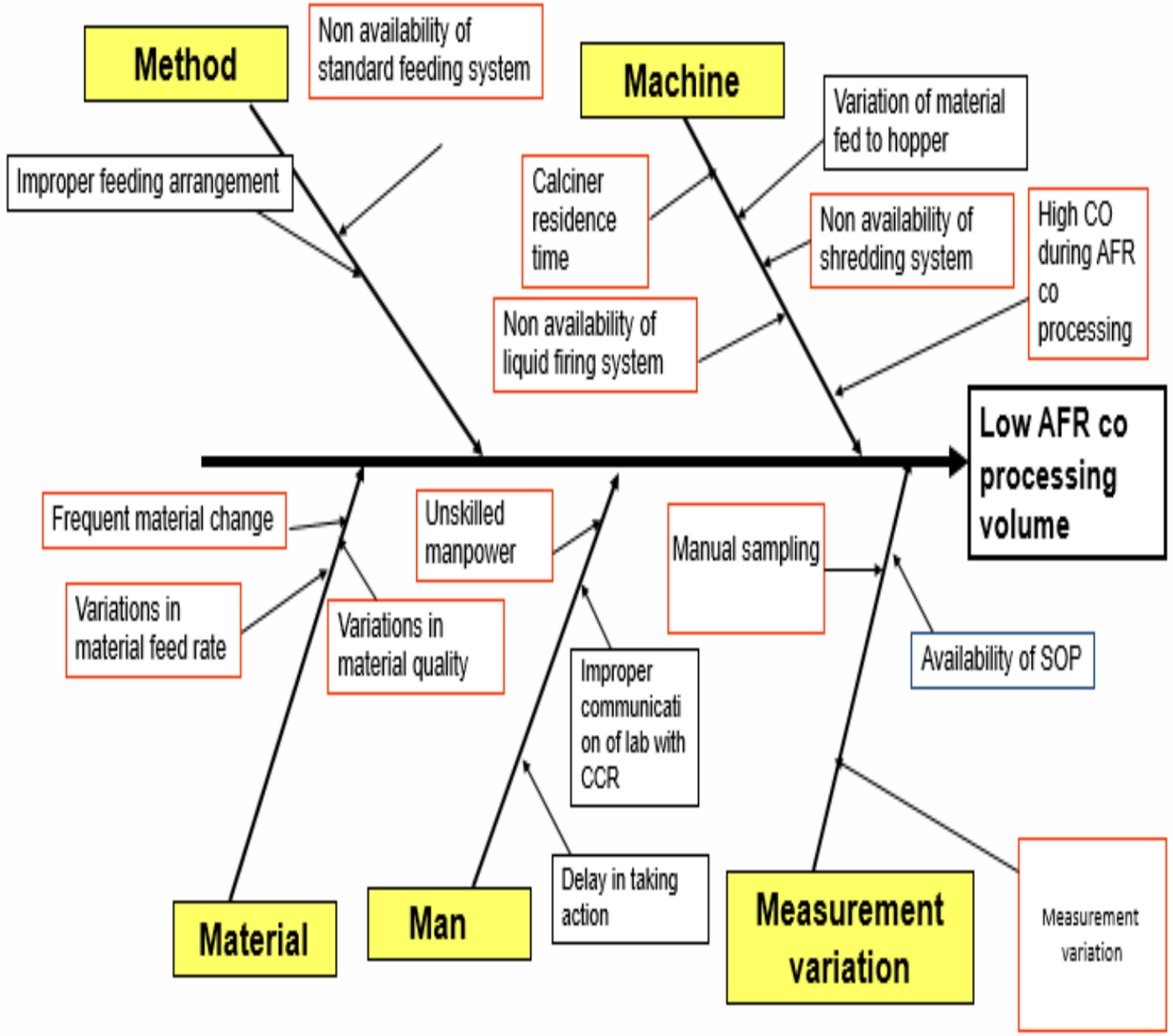
Installation of Air Blasters	2 Weima Shredder installed	Carbon Black unloading System	Agro waste Feeding System	Belt conveyor installed in Line-3
				

Waste utilization and management

Parameters	UOM	FY 2020-21	FY 2021-22	FY 2022-23
AFR Usage	MT	88424	191633	291151
Thermal Substitution rate	%	3.2	9.5	17.0
Fuel Saved	MT	12190	51755	93488



Methodology-Root cause Identification



Alternative fuel consumption with their GCV

Alternative Fuels	2020-21	GCV	Heat Value
AGROWASTE	2358.24	3520	8301.51
AMMONIUM ACETATE CAT-20.2 (HAZ LIQUID)	2059.25	50	103.68
CONTAMINATED PLASTIC WASTE	3034.00	2888	8762.52
COTTON WASTE/FIBER/CLOTH	18.00	3264	58.75
FMCG WASTE	161.96	4071	659.41
INHOUSE COLLECTION	2391.00	3456	8263.94
NON HAZARDOUS MSW(MUNICIPAL SOLID WASTE)	24.88	4201	104.51
PLASTIC & RESIN WASTE	594.00	2043	1213.43
Plastic waste (TON)	576.79	2734	1576.67
RDF	433.00	3247	1405.84
TYRE FIBRE MASS (TYRE CHIPS)	66.66	4683	312.14
WASTE MIX LIQUID	16820.79	3169	53303.60
WASTE MIX LIQUID - LCV	41896.52	234	9803.93
WASTE MIX SOLID	17911.39	2511	44974.77
WASTE/RESIDUES CAT. 23.1	77.98	4172	325.34
Total	88424.45		139170.05

Alternative Fuels	2021-22	GCV	Heat Value
AGROWASTE	27519.90	2854	78541.79
BAD GOODS	496.00	4603	2283.06
BLAST FURNACE DUST CATCHER (BFDC)	4512.00	1972	8897.66
BOILER ASH (NON-HAZARDOUS WASTE)	253.92	323	82.02
Carbon Black	10802.35	6377	68886.59
CONTAMINATED PLASTIC WASTE	1062.19	3484	3700.67
COTTON WASTE/FIBER/CLOTH	20.78	3264	67.83
DISTILLATION RESIDUE-LIQUID-20.3	70.02	3348	234.43
ETP SLUDGE	2621.86	763	2000.48
FMCG TRADE REJECTS	407.50	4538	1849.24
INHOUSE COLLECTION	2424.00	881	2135.54
MIX WASTE LIQUID-HCV	12378.78	3154	39042.67
MULTI LAYERED PLASTIC”(MLP) WASTE	86.76	3139	272.32
MUSTARD HUSK AGROWASTE	14342.38	3231	46340.23
NON HAZARDOUS MSW(MUNICIPAL SOLID WASTE)	13.74	3599	49.45
NON HAZARDOUS SOLID MIX WASTE	30.14	1467	44.22
PLASTIC & RESIN WASTE	1181.09	2577	3043.67
Plastic waste (TON)	911.37	4301	3919.78
PROCESS RESIDUE (CAT 29.1) –SOLID	148.71	3920	582.94
PROCESS RESIDUE & WASTES-SOLID-28.1	30.81	2600	80.09
PROCESS WASTES, RESIDUES AND SLUDGE-21.1	641.81	3167	2032.61
RDF	23161.00	3171	73443.53
SPENT SOLVENTS (CATEGORY: 20.2)	232.75	201	46.78
TYRE FIBRE MASS (TYRE CHIPS)	392.17	4542	1781.24
WASTE MIX LIQUID - LCV	67037.10	83	5564.08
WASTE MIX SOLID	20145.00	2671	53807.30
WASTE PLASTIC PULP MIXED	133.50	3379	451.10
WASTE/RESIDUES CAT. 23.1	415.16	5364	2226.92
WET SCRUBBER SLUDGE(RUBBER DUST)	97.76	3466	338.82
WOODEN BLOCKS	62.54	3393	212.20
Total	191633.06		401959.25

Alternative fuel consumption with their GCV

Alternative Fuels	2022-23	GCV	Heat Value
AGROWASTE- MIX TYPE	18.30	2176	39.82
AGROWASTE-JULIFLORA	12441.40	3093	38483.20
AGROWASTE-MUSTARD HUSK	83957.10	2987	250765.54
ASH FROM INCINERATOR 37.2	34.08	45	1.52
BAD GOODS	681.25	4475	3048.65
BARREL/LINNER CHEM WAST(33.1)	44.38	4938	219.17
BIOMASS BRIQUETTES	42.48	2916	123.87
BLAST FURNACE DUST CATCHER (BFDC)	14172.32	1486	21066.97
Carbon Black	33497.24	6255	209514.21
CARGO RESIDUE AND SLUDGE CAT3.1	85.66	3108	266.23
COAL DUST	90.26	1713	154.63
DISTILLATION RESIDUE SOLID(CAT-20.3)	55.56	1758	97.65
ETP SLUDGE	18524.60	714	13233.72
FILTER MEDIUM 36.2	445.92	1351	602.36
FMCG TRADE REJECTS	15.98	3596	57.47
INHOUSE COLLECTION	79.08	881	69.67
ION EXCHANGE RESIN CATEGORY-35.2	10.73	2393	25.68
LAMINATE WASTE	78.38	3451	270.49
MIX WASTE LIQUID-HCV	2149.00	3547	7623.26
OFF SPECIFICATION PRODUCTS-28.4	7.99	3239	25.88

Alternative Fuels	2022-23	GCV	Heat Value
PHOSPHATE SLUDGE 12.5	77.38	2860	221.29
PLASTIC & RESIN WASTE	1374.77	2551	3507.40
Plastic waste (TON)	83.04	4903	407.15
PROCESS RESIDUE (CAT 29.1)– LIQUID	133.26	2784	370.95
PROCESS RESIDUE & WASTES-SOLID-28.1	73.90	3985	294.46
PROCESS WASTES, RESIDUES AND SLUDGE-21.1	855.75	2142	1833.39
PU PARTS WASTE SCRAP	9.21	6296	57.98
RDF	13479.91	2780	37479.17
RDF-EPR (SHREDDED)	1325.29	2635	3492.58
RDF-EPR (UNSHREDDED)	23732.00	2715	64421.52
RDF-NON EPR (SHREDDED)	5824.67	3186	18555.57
RDF-NON EPR (UNSHREDDED)	880.00	3764	3312.34
SPENT ORGANIC SOLVENT (CATEGORY 28.6)	23.96	3775	90.45
SPENT SOLVENTS (CATEGORY: 20.2)	249.43	57	14.13
WASTE MIX LIQUID - LCV	64918.35	84	5463.24
WASTE MIX SOLID	10684.74	2587	27638.28
WASTE RESIDUES CONTAINING OIL COTTON 5.2	834.01	3841	3203.48
WASTE/RESIDUES CAT. 23.1	74.83	3598	269.21
WOODEN BLOCKS	84.64	3322	281.18
Total	291150.83		716603.75

Waste utilization and management

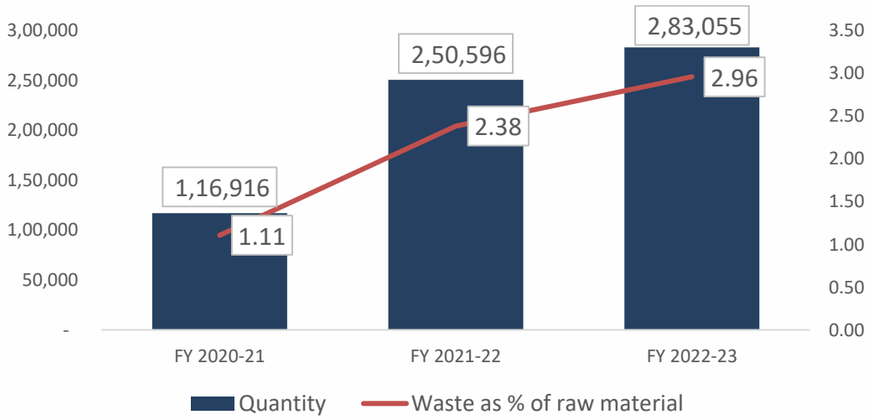
Benefits Achieved

Tangible benefits:-

- Total Saving of Rs 9309.4 Lacs from AFR usage last year.
- Total saving of 93488 MT of main fuel.

Intangible benefits:-

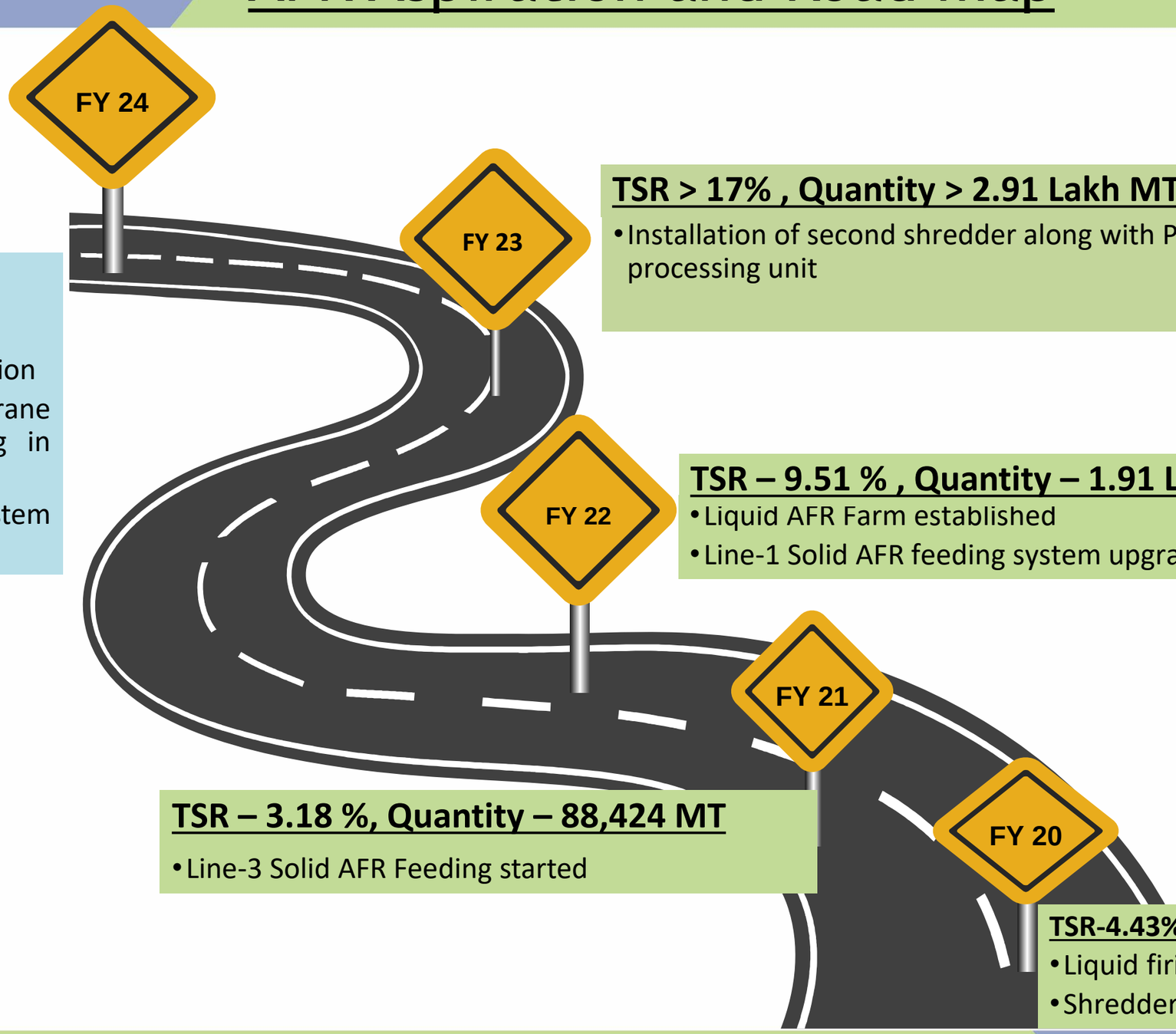
- Co-processing of AFR reduced the land filling.
- Reduction in CO2 emissions.
- To protect against global warming.



Alternative Raw Materials

S No.	Year FY	Waste as raw material	Quantity	Replaced Material	Waste as % of raw material	Saving (mio Rs)
1	FY 2020-21	Chemical Gypsum	16735	Gypsum	0.54	23.67
2		Red Mud	42972	Redochre	1.40	41.94
3		Iron Sludge	370	Laterite	0.01	0.13
4		Jarosite	16575	Gyspum	0.54	12.82
5		Lead Zn Slag	80	Laterite	0.00	0.06
6		Anhydride Gyp.	393	Gypsum	0.01	0.46
7		Activated Gypsum	39791	Gypsum	1.29	36.74
		Total	**116916**		**1.11**	**115.81**
8	FY 2021-22	Chemical Gypsum	41037	Gypsum	1.17	67.96
9		Red Mud	84836	Redochre	2.43	79.92
10		Iron Sludge	544	Laterite	0.02	0.31
11		Jarosite	15807	Gyspum	0.45	13.90
12		Activated Gypsum	108372	Gypsum	3.10	119.51
		Total	**250596**		**2.38**	**281.60**
13	FY 2022-23	Chemical Gypsum	29903	Gypsum	0.90	47.34
14		Red Mud	94183	Redochre	2.82	88.72
15		Jarosite	22361	Gyspum	0.67	19.81
16		Lead Zn Slag	736	Laterite	0.02	0.22
17		Anhydride Gyp.	2865	Gypsum	0.09	8.99
18		Activated Gypsum	133007	Gypsum	3.98	214.54
		Total	**283055**		**2.96**	**379.63**

AFR Aspiration and Road map



TSR > 30%

- Chlorine Bypass System
- Preheater fan upgradation
- Additional stationary crane for Solid AFR feeding in Line-2 & Line-3
- SAFR Feeding system upgradation

TSR > 17% , Quantity > 2.91 Lakh MT

- Installation of second shredder along with Pre processing unit

TSR – 9.51 % , Quantity – 1.91 Lakh MT

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

TSR – 3.18 %, Quantity – 88,424 MT

- Line-3 Solid AFR Feeding started

TSR-4.43% , Quantity – 65,580 MT

- Liquid firing system
- Shredder feeding started

GHG Inventorisation

Carbon Emission (Scope-1 & Scope-2):

Carbon emission	FY 2021-22	FY 2022-23	% Reduction
Scope-1 Emission (kgCO2/t Cementitious)	717	696	-2.9%
Scope-2 Emission (kgCO2/t Cementitious)	6	18	200.0%
Total Emission (Scope-1+2) (kgCO2/t Cementitious)	723	714	-1.2%

Environmental projects with carbon emission reduction in FY 2022-23:

Projects	Value
• AFR Consumption increased from 191633 to 291151 MT	By 51.9%
• Reduction of PPC Clinker factor from 0.569 to 0.565	By 0.7%
• Replacement of conventional lightening with LED lights	46426 KWH saved
• Increase in WHR Generation from 182.1 to 195.2 mio KWH	By 7.2%
• Started using Industrial Fuel Oil in replace of High speed Diesel to save natural resources.	115810 L

Environmental Projects

Installation of SNCR to reduce the Nox emissions

Installation of Liquid Firing System

Installation of Solid Feeding System

Feeding Hopper

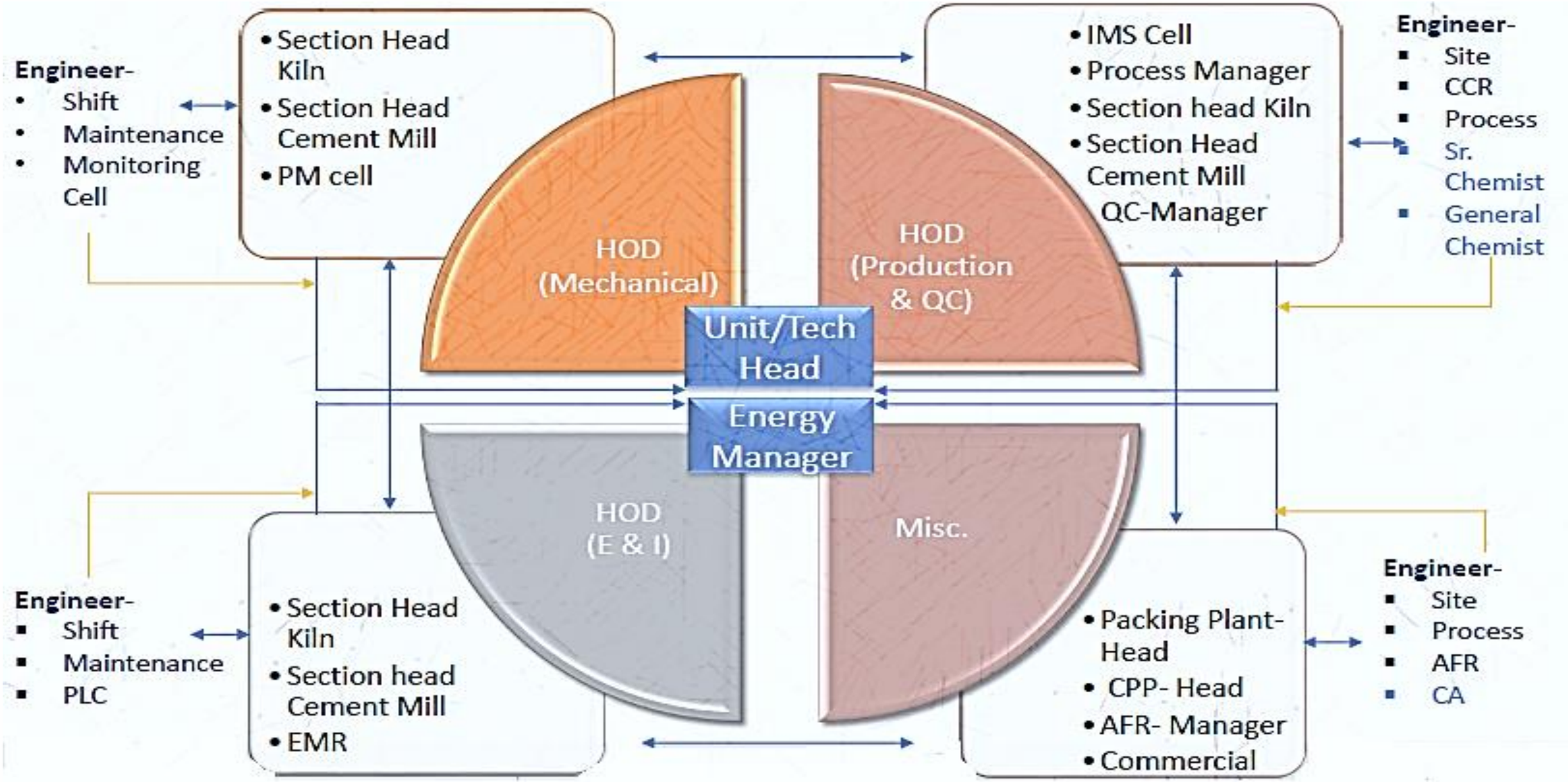
Belt Conveyor-1

Feeding System at Preheater

Belt Conveyor-2

Belt Conveyor-3

Energy Committee



Energy Monitoring System & Kaizen

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

Kaizen_FY22-23		
Sr. no	**Department**	**Total Kaizen**
1	Mechanical	38
3	Process	45
4	Electrical	77
5	Instrument	78
6	PM cell	87
7	WHR	10
8	Packing Plant	65
9	Civil	0
Total		**400**

GreenCo Certification

Confederation of Indian Industry

CII - Sohrabji Godrej Green Business Centre

hereby certifies that

JK Cement Works

Mangrol, Rajasthan

has successfully achieved the standards as required for the following level of certification under the GreenCo - Green Company Rating System which is valid for a period of 3 years

GreenCo Gold

Issue Date: 07-09-2022 Expiry Date: 06-09-2025

Jamshyd N Godrej	Pradeep Bhargava	L S Ganapati	K S Venkatagiri
Chairman	Chairman	Chairman	Executive Director
CII-Godrej GBC	GreenCo Rating System	GreenCo Assessor Panel	CII-Godrej GBC

JK Cement works, Mangrol successfully completed final assessment and Awarded with GreenCo gold.

Implementation of ISO 50001

ISO 50001	
▪ Current Issue Data	30th July 2023
▪ Expiry date	29th July 2026
▪ Certificate identity number	10538370

EnCon Project budget allocation %	
▪ Total turnover of the company/plant FY 2021-22 (Rs. Million)	81336.9
▪ Amount invested in EnCon Projects FY 2022-23 (Rs. Million)	133.22
▪ Investment %	0.16

LRQA

Current issue date: 30 July 2023
Expiry date: 29 July 2026
Certificate identity number: 10538370

Original approval(s):
ISO 45001 - 9 August 2018
ISO 9001 - 28 November 2008
ISO 14001 - 28 November 2008
ISO 50001 - 19 April 2018

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 LRQA to the following standards:

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

Approval number(s): ISO 45001 – 0052670, ISO 9001 – 00019280, ISO 14001 – 0054439, ISO 50001 – 0060520

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 - North Asia & SAMEA

Issued by: LRQA Limited

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**

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	16.5%
6.	**ESCerts**	**26457**

PAT Cycle Performance (PAT-VII)

S.No	Parameters	Base year (2018-19)	2019-20	2020-21	2021-22	2022-23	Deviation (22-23 w.r.t Base year 18-19)
1	Gate to Gate SEC (Un-normalized)	0.0854	0.0913	0.0860	0.0811	0.0738	-14.1%
2	Gate to Gate SEC (Normalized)	0.0854	0.0913	0.0858	0.0799	0.0736	-14.3%
3	Thermal SEC	702.37	707.54	698.09	721.79	755.6	7.6%
4	Electrical SEC (Up to Clinker)	49.24	49.13	48.75	51.47	50.57	2.7%
5	Electrical SEC (Cement grinding	30.96	30.53	28.76	26.45	24.68	-20.3%
6	Gross Heat Rate of CPP	3208.23	3276.22	3278	3354.28	3594.67	12.0%
7	Weighted average. heat rate	3208.21	3266.85	3245.93	3321.09	3238.39	1.0%

NET ZERO commitment

SCIENCE BASED TARGET INITIATIVE (SBTi)

Tool to commit and validate CO_2 emission target in line with keeping global temperature rise well below 2^{o}C and preferably 1.5^{o}C below pre-industrialization level.

Climate Target of JKCL

1.

Committed to SBTi targets in 2021 – Under Validation

- ✓ **Reduction of Sp. Gross CO2 emissions from 680 to 532 kg CO2/t cementitious material (~21.7% reduction) by 2030 from base year 2020 – including Power & AFR emissions.**

2.

Active member of GCCA

- ✓ **Pledged for UNFCC's 'Race to Net Zero' by 2050 under the egis of GCCA.**

3.

Submitted Energy Compact to Ministry of New & Renewable Energy approved

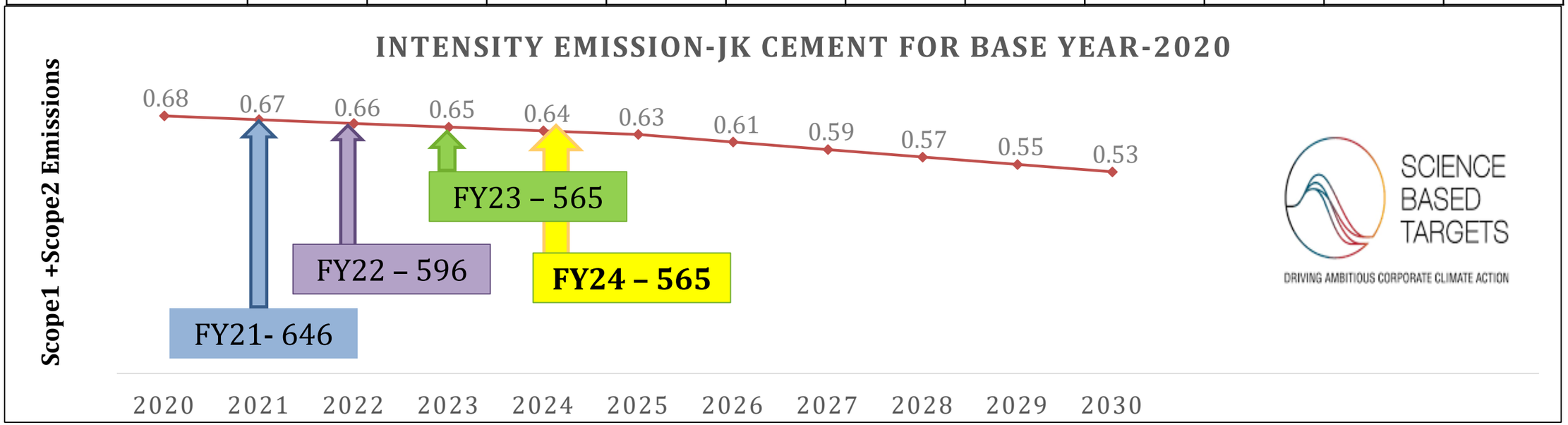
- ✓ **To increase Green Power Mix from 19% (FY2020) to 75% (FY2030).**

MODELLED SBTi TARGET vs PERFORMANCE

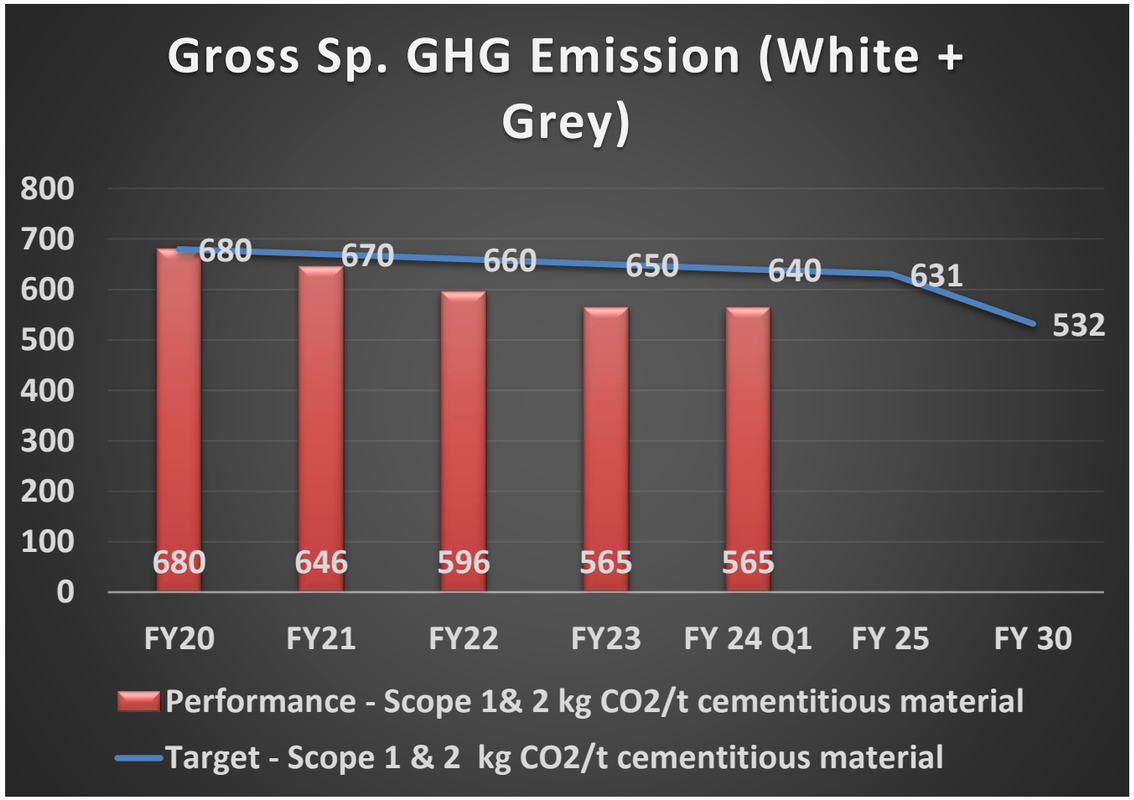
- **Required level of decarbonisation for well-below 2^{o} C scenario (WB2DS)- Fixed Market share (Sectoral Growth-5.36% over the timeframe) approach- Intensity Target – 21.7%**
- **SBTi Target Year: 2030 & Base Year: 2020**

Intensity Emission Per tone of Cementitious Material including Power and AFR

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Scope 1 Emissions	0.666	0.658	0.649	0.641	0.633	0.625	0.606	0.587	0.568	0.549	0.531
Scope 2 Emissions	0.013	0.013	0.012	0.012	0.011	0.010	0.010	0.009	0.009	0.008	0.007
S1+S2 Emissions	0.680	0.670	0.660	0.650	0.640	0.631	0.611	0.591	0.571	0.551	0.532



GROSS SP. GHG EMISSION (WITH POWER & AFR) AS PER SBTi PROTOCOL



Target- 21.7% reduction by FY2030

Surpassed FY 2025 Target

Achieved – 17% reduction by FY2024 Q1

Gross GHG Emission, $kgCO_2/t$ Cementitious mat

Scope-1 Emission ($kgCO_2/t$ Cementitious)

Year	Company	NBH	MGR	Muddapur	Gotan Grey	Gotan White	Katni	Aligarh	Jharli	Balasinor
FY 2022	577	646	717	590	911	524	0	0	1	10
FY 2023	537	581	696	542	910	465	0	0	2	9

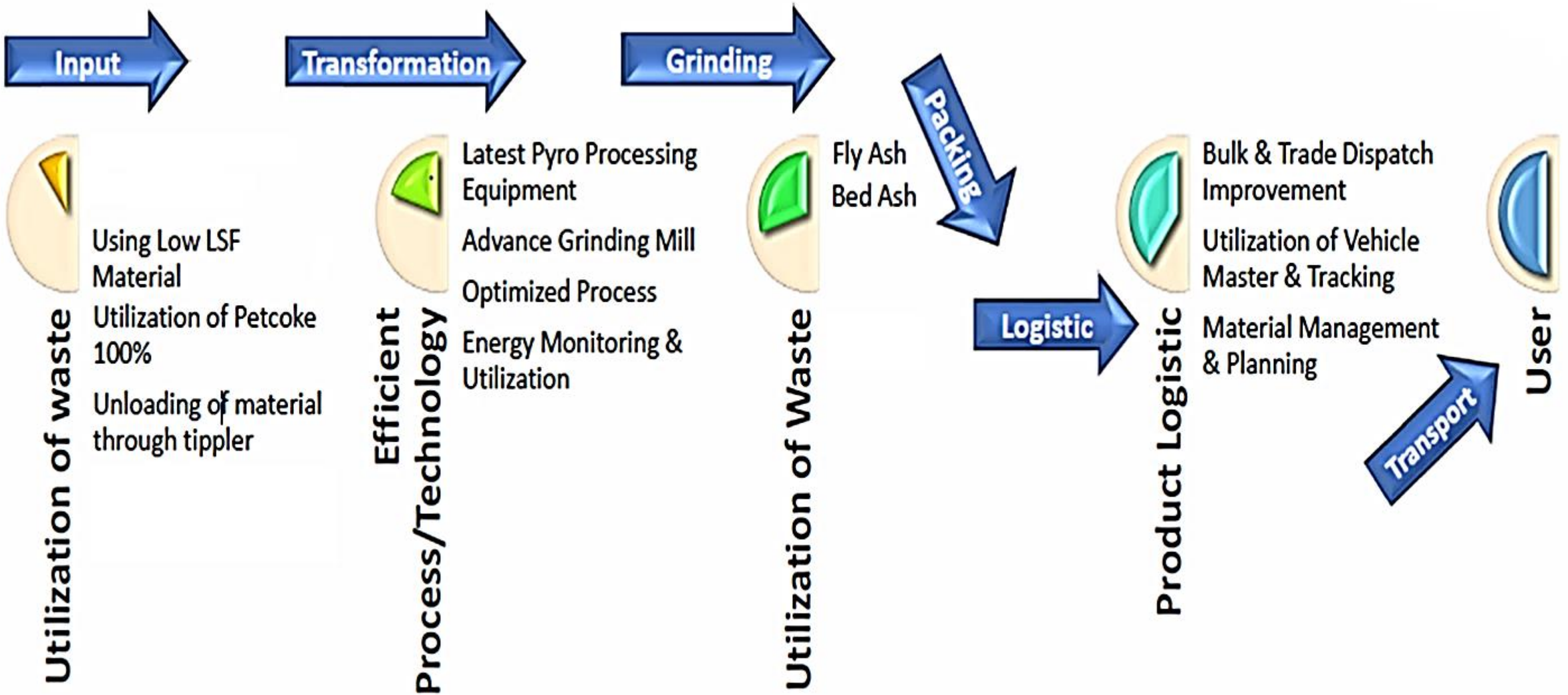
Scope-2 Emission ($kgCO_2/t$ Cementitious)

Year	Company	NBH	MGR	Muddapur	Gotan Grey	Gotan White	Katni	Aligarh	Jharli	Balasinor
FY 2022	18	24	6	8	77	51	24	48	43	49
FY 2023	28	32	18	33	69	47	19	39	35	36

Total Emission (Scope-1+2) ($kgCO_2/t$ Cementitious)

Year	Company	NBH	MGR	Muddapur	Gotan Grey	Gotan White	Katni	Aligarh	Jharli	Balasinor
FY 2022	596	670	723	598	988	574	24	48	44	59
FY 2023	565	612	714	574	979	513	19	39	37	45

Green Supply Chain Management



Green Development

Green Development

Green Development - Housekeeping


RM-4


RM-5


KILN-3


KILN-3


KILN-2

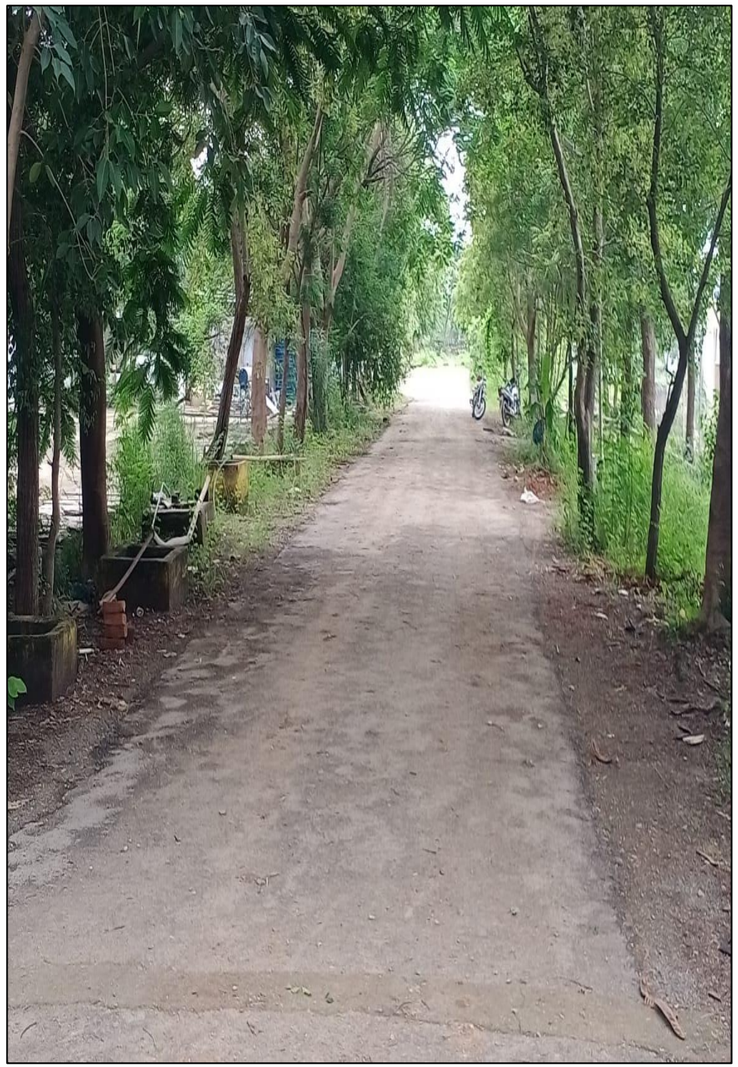
Technical Office

Green Development

Greenbelt Development at Admin Entrance, Street Ways, Ground & Gardens: -

Green Development

Greenbelt Development at Admin Entrance, Street Ways, landscape, Ground & Gardens: -



Green Development

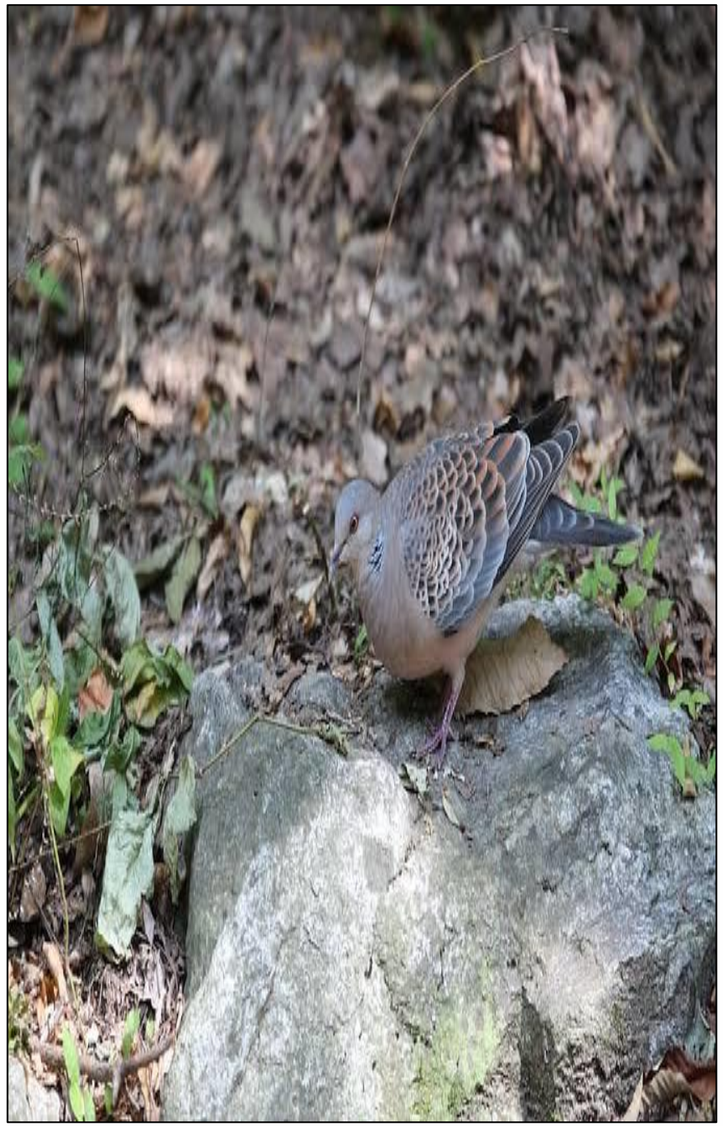
Development of In-house Nursery

Afforestation

Green Development

Plant species : Conocarpus, Plumeria, Beema Bamboo, Mango, Banana, Papaya, Kathal, Guava, Pomegranate, Lemon, Anola, Custard Apple, Ashok, Jamun etc.

Green Development



Employee involvement

Daily review meetings (PD)

Manufacturing Excellence drive

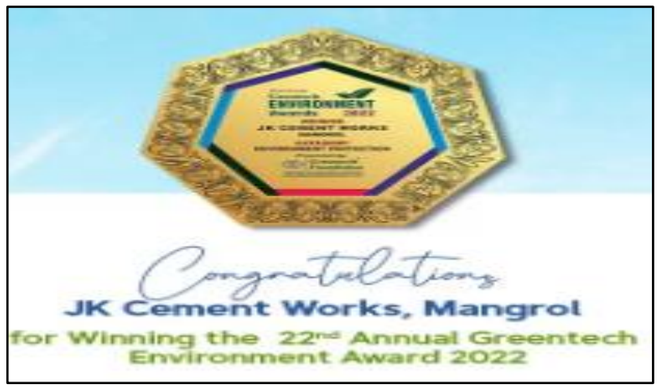
Daily site inspection

Employee Trainings

S No.	NAME OF TRAINING	No. of Persons	S No.	NAME OF TRAINING	No. of Persons
1	AC DRIVE-LV	6	30	MAINTENANCE OF ELECTRICAL EQUIPMENTS	3
2	ACCIDENT ANALYSIS & PREVENTIONS	2	31	MAINTENANCE OF PACKING PLANT AND ITS AUXILIARIES	3
3	ADVANCE EXCEL AND DATA VISUALISATION	8	32	OCCUPATIONAL HEALTH AND SAFETY	6
4	AFR CONCLAVE 2022	5	33	OPERATION & MAINTENANCE OF GEARBOXES.	5
5	BLUETREE TRAINING-CLMS	4	34	OPERATION & OPTIMISATION OF KILN & COOLER	6
6	BULK INVENTORY MANAGEMENT	6	35	OPERATION AND OPTIMISATION OF MILLS	3
7	CONFINED SPACE SAFETY	1	36	PARAMETERS OF KILN AND ITS INSPECTION	1
8	EFFECTIVE COMMUNICATION	10	37	PLC & SCADA	6
9	ELECTRICAL HAZARDS & SAFETY	4	38	PLC & SCADA DEVELOPMENT	3
10	ELECTRICAL HAZARDS AND SAFETY	4	39	POWER FACTOR MANAGEMENT AND ITS IMPORTANCE IN INDUSTRIES	1
11	ELECTRICAL PROTECTION AND RELAY MANAGEMENT	3	40	QUALITY CONTROL- CHEMICAL & PHYSICAL ANALYSIS OF RAW MATERIAL & FINISHED GOODS	6
12	ELECTRICAL PROTECTION SYSTEM AND RELAY COORDINATION-TRANSFORMERS & MOTORS	6	41	QUALITY CONTROL -CHEMICAL ANALYSIS OF CEMENT	6
13	ELECTRICAL SAFETY IN INDUSTRIES	3	42	RAW MIX DESIGN AND BURNABILITY OF CEMENT	5
14	ELELCTRICAL ENERGY CONSERVATION AND MANAGEMENT	5	43	RELIABILITY THROUGH CONDITION BASED MONITORING	2
15	FIRST AID - St. JOHN AMBULANCE PROGRAM	4	44	ROLE OF 5S IN INDUSTRIAL DEVELOPMENT	4
16	HANDLING OF HAZARDOUS WASTE & E-WASTE	2	45	ROLE OF PERMIT TO WORK IN SAFETY	1
17	HARMONICS AND ITS MITIGATING TECHNIQUES	3	46	SAARTHI TRAINING PROGRAM BATCH 2 PHASE 1	16
18	HAZARD IDENTIFICATION & RISK ASSESSMENT	1	47	SAARTHI TRAINING PROGRAM- BATCH 2 PHASE 2	17
19	HAZARDOUS & E-WASTE MANAGEMENT & ENVIRONMENT PROTECTION	1	48	SAFETY DURING HEIGHT AND CONSTRUCTION WORK	1
20	HEAT AND MASS BALANCE	2	49	SAFETY IN MATERIAL HANDLING	1
21	HYDRAULICS AND ITS APPLICATIONS	8	50	SAFETY IN ROBOTICS ENGINEERING	3
22	I & C IN AIR COOLED CONDENSERS	1	51	SAFETY IN USE OF PRESSURE VEHICLES & LIFTING TOOLS	1
23	IMPLEMENTATION OF EMERGENCY RESPONSE PLAN	1	52	SAP TRAINING (PM MODULE)	9
24	IMPORTANCE OF ERGONOMICS FOR INDUSTRIAL GROWTH	1	53	SCAFFOLDING	9
25	IMPORTANCE OF LOCK OUT - TAG OUT IN INDUSTRIES	2	54	THERMAL ENERGY CONSERVATION & MANAGEMENT	3
26	IMPORTANCE OF SAFETY MANAGEMENT AND ITS IMPACT ON PRODUCTION	4	55	USE OF FLY ASH IN CEMENT INDUSTRY - ISSUES & CHALLENGES	4
27	INDUSTRIAL SAFETY & HAZARDS MANAGEMENT	11	56	VARIABLE SPEED AC DRIVES AND MV DRIVES	5
28	ISO AUDITORS TRAINING	8	57	WORK PERMIT SYSTEM	15
29	MAINTENANCE OF BEARINGS AND RELIABILITY	3	Grand Total		264

Feathers added to Mangrol Cap in FY 2022-23

Environmental Excellence Award (North region) organized by Mission Energy Foundation for its Waste Heat Recovery system to WHR Team, Mangrol



GREEN COMPANY RATING SYSTEM
CII - SOHRABJI GODREJ GREEN BUSINESS CENTRE, INDIA
Greenco
JK Cement Works
Mangrol, Rajasthan
GOLD
2022 -2025


Thank You