Chanderia Cement Works, Chittorgarh

BIRLA CORPORATION LIMITED

Plant Details

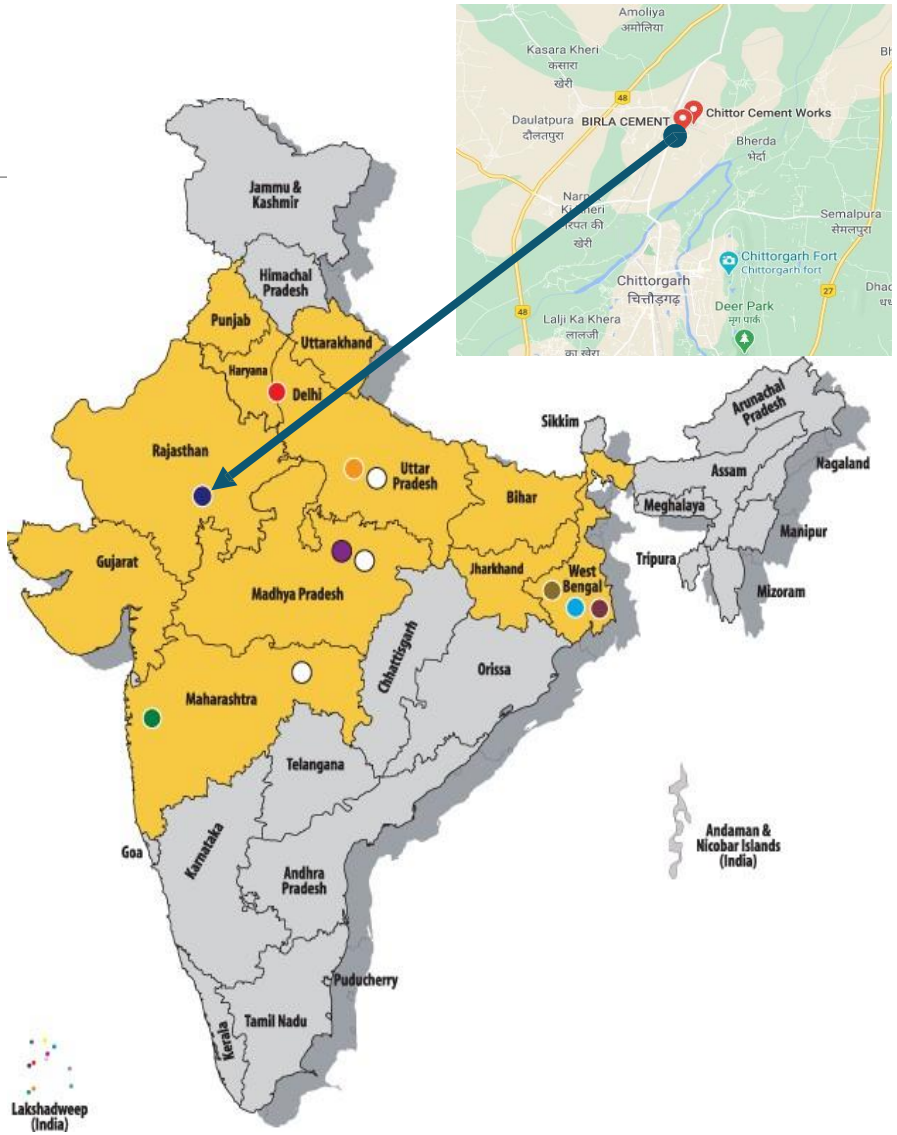
Chanderia Unit

- **Location** : 4 Km from Chittorgarh & 315 Km from Jaipur
- **Installed capacity** : 4.0 MTPA Cement

  Birla Cement Works Kiln (2 Kilns)

  Chanderia Cement Works (2 Kilns)

- **Lime Stone** : Bherda & Jai Surjana Lime stone mines
  Annual Production 4.32 MTPA



Plant Details

Chanderia Unit

Plant		Year	Make	Installed Capacity (TPD)	Present Capacity (TPD)	Remarks
Clinkerization						
BCW	Kiln-1	1967	FLS / L & T	600	1050	Last up-gradation was done in 1991-92 by L & T. BCW kiln is not in operation most of the time due to high manufacturing cost and limestone issue. It runs only on emergency requirement.
	Kiln-2	1971	FLS / L & T	600	1050	
CCW	Kiln-1	1986	FLS	2500	3700/3300	Last up-gradation was done in 2009 by M/s Atec.
	Kiln-2 (NCCW)	2012	FLS	3600	4850	Up-gradation work is in progress. **Phase-I part was completed in Jan.'20.**

Plant Details

Chanderia Unit

Plant		Type	Make	Rated Capacity-TPH	Present Capacity-TPH
Raw grinding					
BCW	RM-1	Ball Mill	FLS	68	70
	RM-2		FLS	68	70
CCW	RM-1	Ball Mill	FLS	230	180
	RM-2	VRM	NHI-China	155	190
NCCW	RP1 & RP2	2 Roller Presses in comflex mode	KHD	465	390

Plant		Type	Make	Rated Capacity-TPH	Present Capacity-TPH
Cement grinding					
BCW	CM-1	Ball Mill	FLS	45	45
	CM-2		FLS	45	45
CCW	CM-1	Ball Mill + Polycom	TKII	315	315
	CM-2		TKII	325	290

Company Profile

Birla Corporation Limited is the flagship Company of the M.P. Birla Group. Incorporated as Birla Jute Manufacturing Company Limited in 1919, it was Late Mr. Madhav Prasad Birla who gave shape to it. As Chairman of the Company, he transformed it from a manufacturer of jute goods to a leading multi-product corporation with widespread activities. Under the Chairmanship of Mrs. Priyamvada Birla, the Company crossed the Rs. 1,300 - crore turnover mark and the name was changed to Birla Corporation Limited in1998.

After the demise of Mrs. Priyamvada Birla, the Company continued to consolidate in terms of profitability, competitiveness and growth under the leadership of Mr. Rajendra S. Lodha, late Chairman of the M.P. Birla Group. Under his leadership, the Company posted its best ever results in the years ended 31.3.2006, 31.3.2007 and 31.3.2008. The Company continued to record impressive growth in 2008-09 and 2009-10.

Mr. Harsh V Lodha is now Chairman of the Company.

.

Company Profile

The Company is primarily engaged in the manufacturing of cement as its core business activity. It has significant presence in the jute goods industry aswell.

The Company has acquired 100% shares of Reliance Cement Company Private Limited (Reliance Cement), a subsidiary of Reliance Infrastructure Limited (RIL). After this acquisition, Reliance Cement has become a wholly-owned material subsidiary of Birla Corporation Limited. The entire cement business of RIL has been acquired for an Enterprise Value of Rs. 4,800 crores. This acquisition provides Birla Corporation Limited with the ownership of high-quality assets, taking its total capacity from 10 MTPA to 15.5 MTPA

PRODUCT	INSTALLED CAPACITY
Cement	15.5 Million Tons
Jute Goods	52,631 Metric Tons
Iron & Steel Casting	3,750 Metric Tons

Chanderia Cement Works

We would like to throw some light on our plant's background:-

Blasting in our plant mines was banned in 2012 by hon'ble supreme court as it was falling within 05 Kms radius of Chittorgarh fort. That was a hard time we faced suddenly and we accepted it as a challenge and decided to go for mechanical mining. We invested in breakers and splitters and slowly we reduced our dependency on outsourced LS by optimization of raw mix & fuel mix, increased usage of petcoke up to 100% other than AFR. Thus our team bounced back leaving all past setbacks. We are now able to produce 80% of our Lime stone requirement from own mines. We are now one of the best in Chittorgarh cluster in many KPIs like fly ash absorption, Cement grinding power, AFR utilization etc.

It's only plant in India having fully mechanized mines and operated without blasting.

Energy Consumption Overview

Description	UOM	Consumption During Years				
		2017-2018	2018-2019	2019-2020	2020-2021	2021-22
Total Thermal Energy Consumption	(Million Kcal)	2317073.7	2443905.1	2319816	2117260	2044502
Total Electricity consumption	Million kWh	260.836	271.967	253.954	219.35	259.65
Electricity Purchased from Grid	Lakh kWh	701.66	679.27	482.04	483.02	1121.47
Electricity Exported to Grid/Colony/Others from CPP	Lakh kWh	339.63	187.14	302.61	277.17	157.23
Total Energy Consumed (Thermal+ Electrical)	(Million Kcal)	2285139	2426955.8	2244270	2050574	2082206
Specific Energy Consumption(Without Normalization)	(TOE)	0.0763	0.0632	0.0640	0.0649	0.0610
Specific Energy Consumption (Normalized)	(TOE)	0.0698	0.0632	0.0628	0.0633	0.0613
R.P.O Obligation in Percentage	%	14.25	13.35	15	13.43	14.25

Normalized Gate to Gate Specific Energy Consumption:-**0.0613 toe/ton** of equivalent Cement

Summary (Major Achievements)

- **Electrical Energy Consumption:- Reduced 10.25 kWh/MT** Cement Power consumption in last 05 Years

- **Thermal Energy Consumption:- Reduced 22.0 kcal/kg clinker** in CCW-1 Kiln and **27.0 Kcal/kg clinker** in CCW-2 last 05 Years

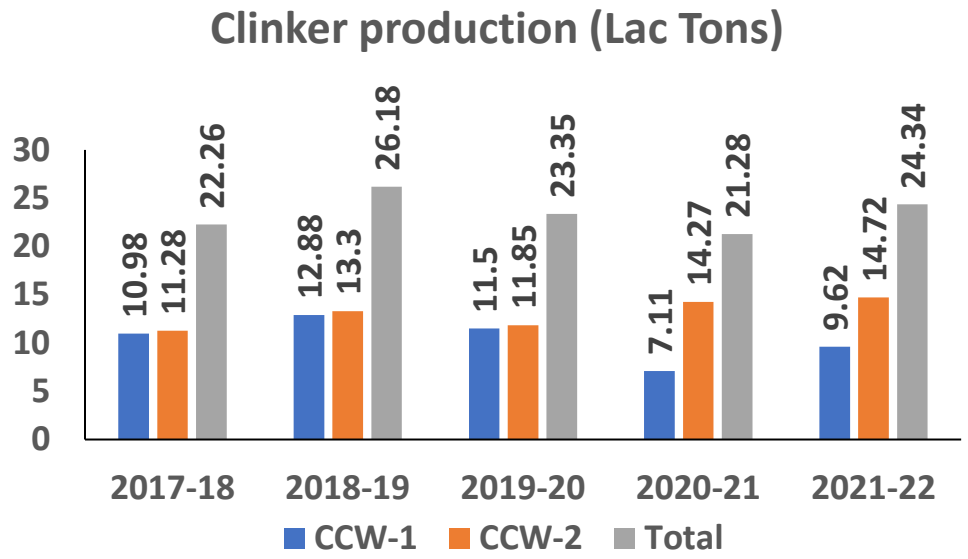
- **Fly ash Utilization:- 7.22% Increase in fly ash utilization at BCW** (from 24.86% to 32.08) and **3.0% increase in fly ash utilization at CCW** (from 30.86% to 33.86%) in last 05 Years

- **Waste Utilization:-** Used **140451 MT Solid & LIQUED** AFR during last 5 Years in CCW & NCCW.

BEE PAT Performance-CCW

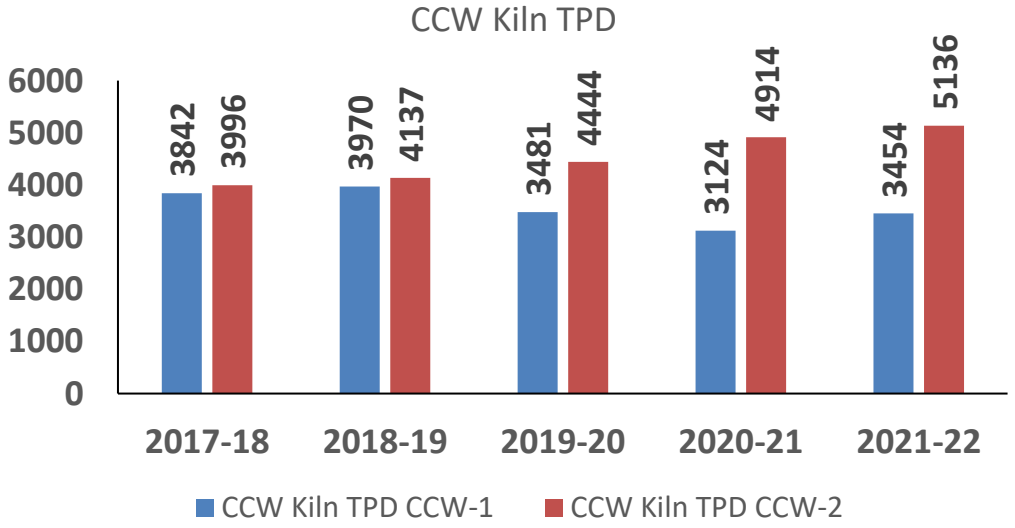
Chanderia Cement works.				
PAT Cycle No.	Energy Consumption in Kcal/Kg Major product			
	Base Line Energy Consumption	Target	Achieved	Energy Saving Certificate Acieved
PAT Cycle-1 (Assessment Year 2014-15)	887	**845**	**804**	**7098**
PAT Cycle-2 (Assessment Year 2018-19)	749	**712**	**636**	**23235**

CCW Clinker Production and Kiln TPD

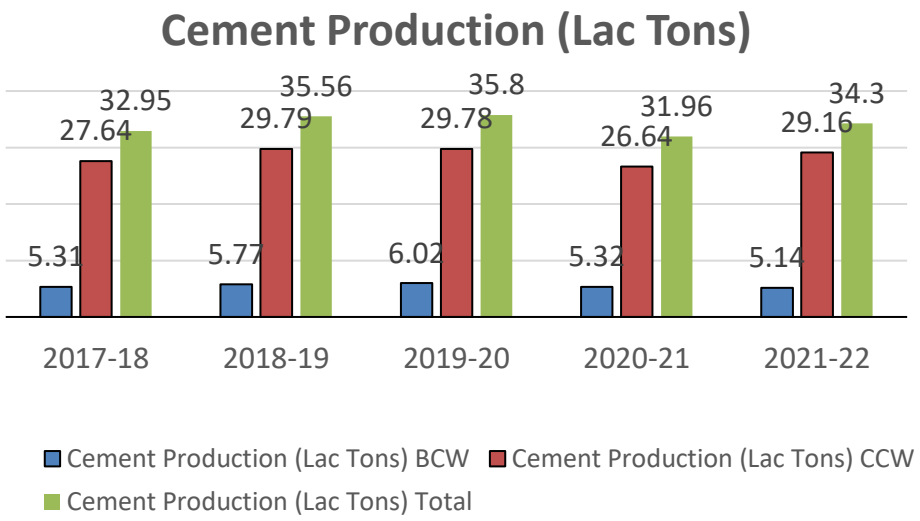


Clinker Production(Lac Tons)			
Year	CCW-1	CCW-2	Total
2017-18	10.98	11.28	22.26
2018-19	**12.88**	**13.30**	**26.18**
2019-20	11.50	11.85	23.35
2020-21	7.11	14.27	21.28
2021-22	9.62	14.72	24.34

CCW Kiln TPD		
Year	CCW-1	CCW-2
2017-18	3842	3996
2018-19	3970	4137
2019-20	3481	4444
2020-21	3124	4914
2021-22	3454	5136

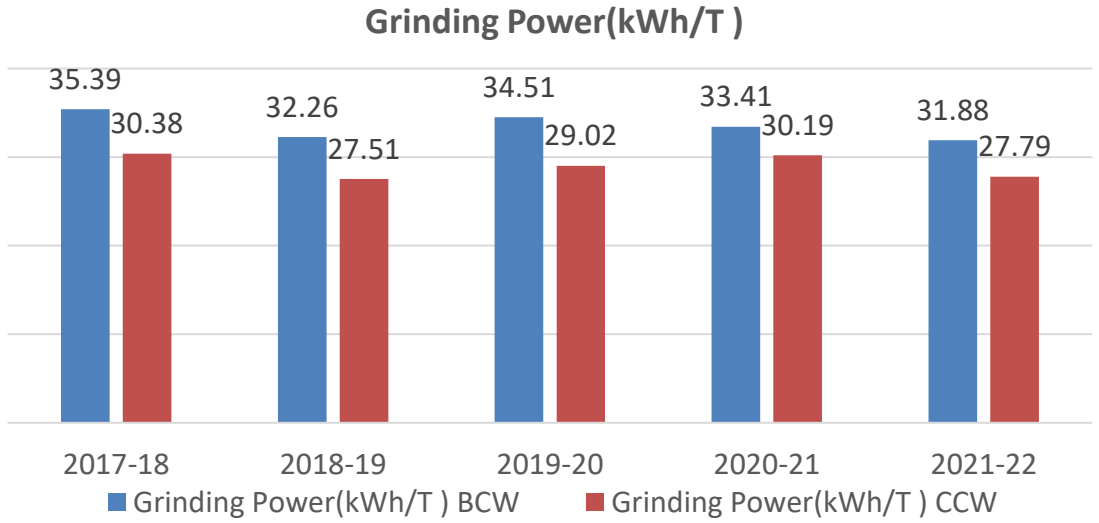


Cement Production and Specific Power

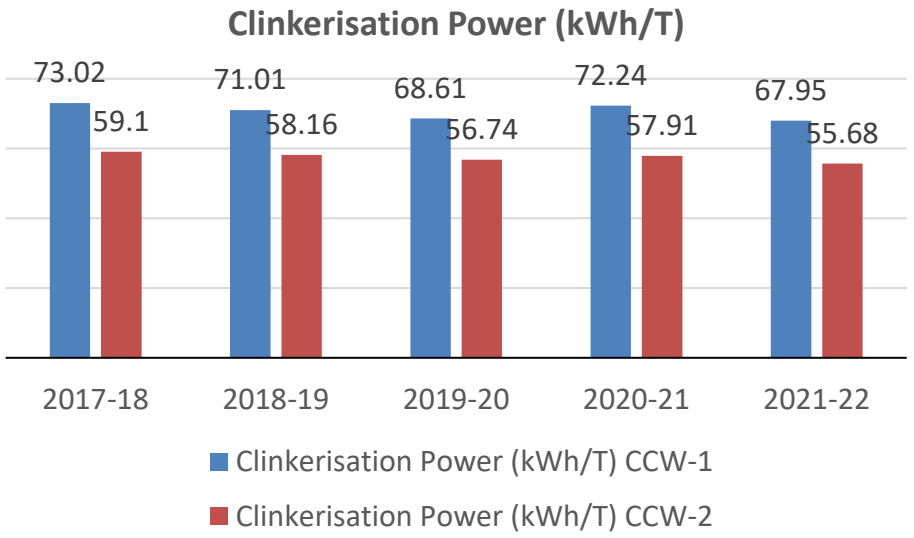


Cement Production (Lac Tons)			
Year	BCW	CCW	Total
2017-18	5.31	27.64	32.95
2018-19	5.77	29.79	35.56
2019-20	6.02	29.78	35.80
2020-21	5.32	26.64	31.96
2021-22	5.14	29.16	34.30

Grinding Power(kWh/T)		
Year	**BCW**	**CCW**
2017-18	35.39	30.38
2018-19	32.26	27.51
2019-20	34.51	29.02
2020-21	33.41	30.19
2021-22	31.88	27.79

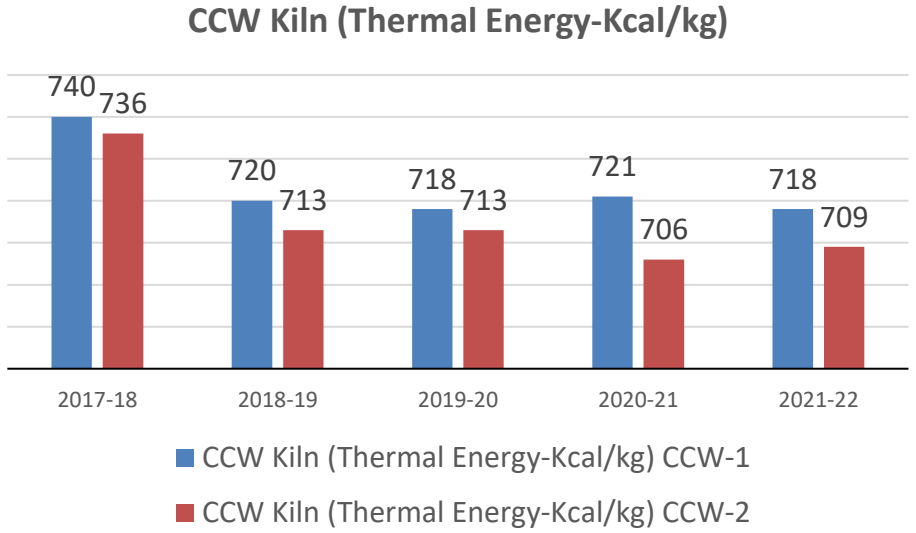


Clinker Power and Heat

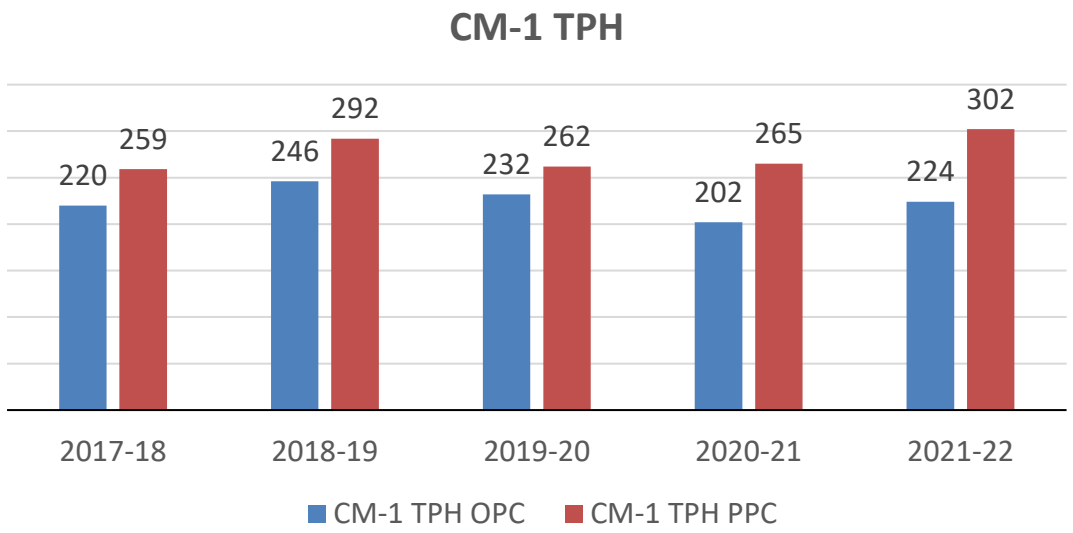


Clinkerisation Power (kWh/T)		
Year	CCW-1	CCW-2
2017-18	73.02	59.10
2018-19	71.01	58.16
2019-20	68.61	56.74
2020-21	72.24	57.91
2021-22	67.95	55.68

CCW Kiln (Thermal Energy-Kcal/kg)		
Year	CCW-1	CCW-2
2017-18	740	736
2018-19	720	713
2019-20	718	713
2020-21	721	706
2021-22	718	709

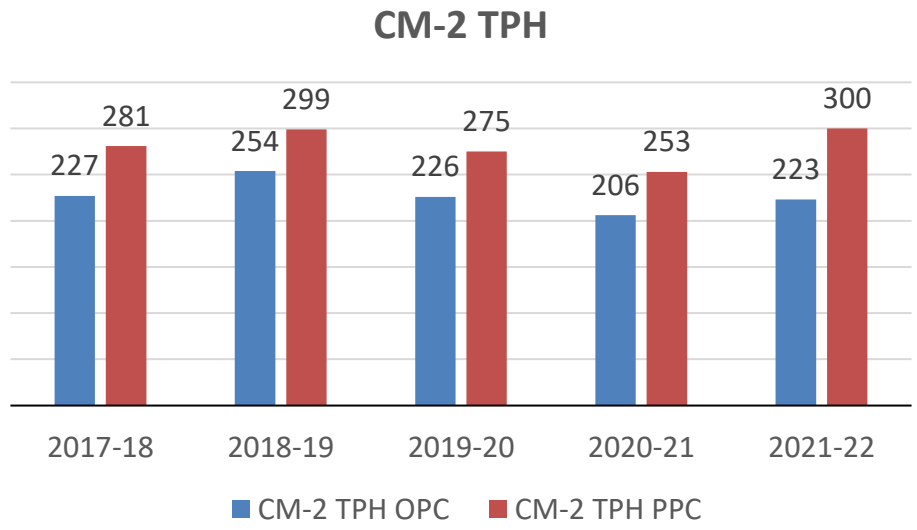


CCW Cement Mills Performance(TPH)

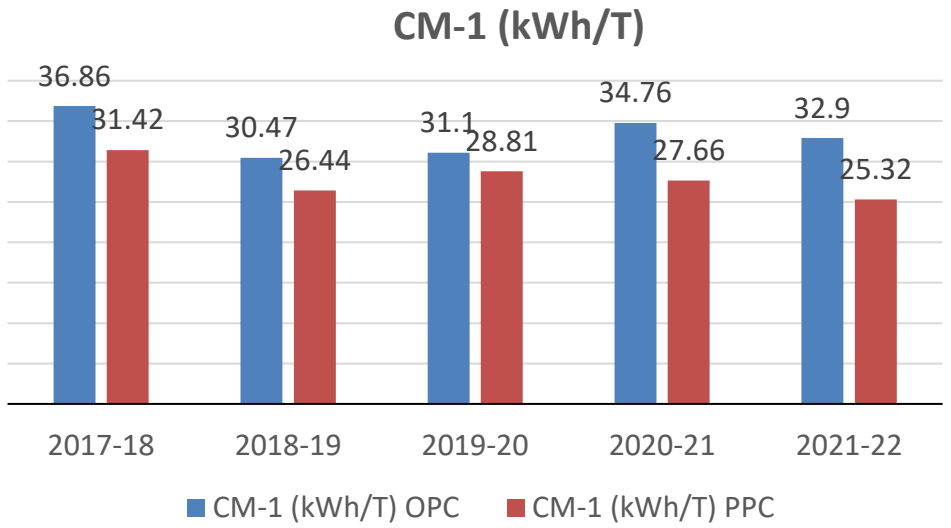


CM-1 TPH		
Year	OPC	PPC
2017-18	220	259
2018-19	246	292
2019-20	232	262
2020-21	202	265
2021-22	224	302

CM-2 TPH		
Year	OPC	PPC
2017-18	227	281
2018-19	254	299
2019-20	226	275
2020-21	206	253
2021-22	223	300

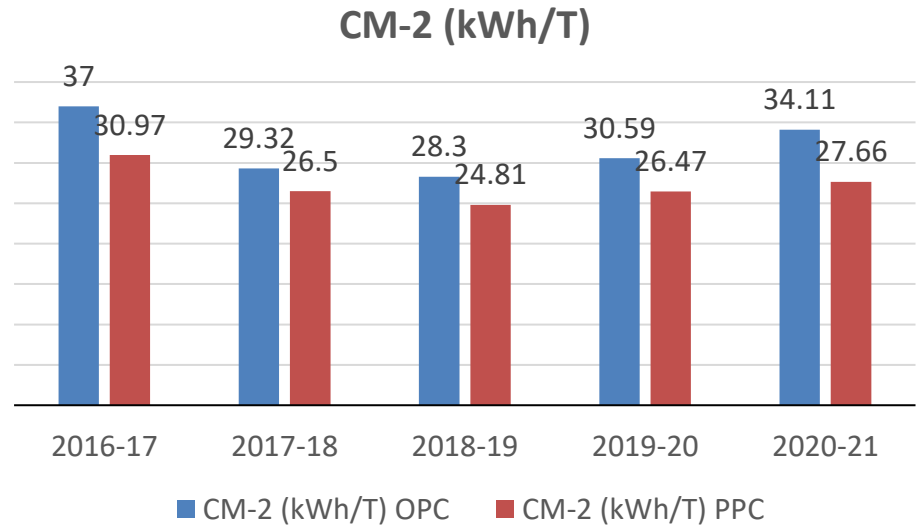


CCW Cement Mills Performance(Power Consumption)

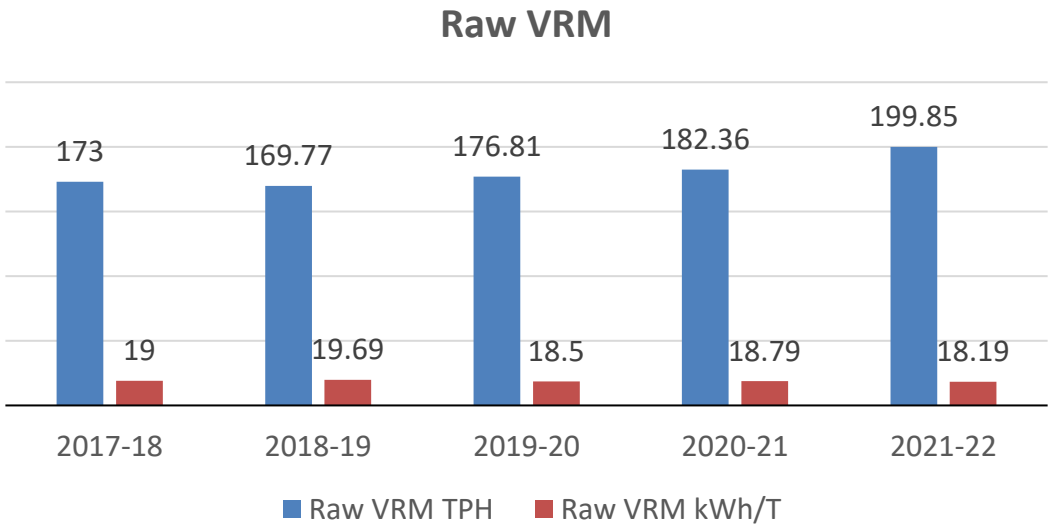


CM-1 (kWh/T)		
Year	OPC	PPC
2017-18	36.86	31.42
2018-19	30.47	26.44
2019-20	31.1	28.81
2020-21	34.76	27.66
2021-22	32.90	25.32

CM-2 (kWh/T)		
Year	OPC	PPC
2016-17	37.0	30.97
2017-18	29.32	26.5
2018-19	28.30	24.81
2019-20	30.59	26.47
2020-21	34.11	27.66

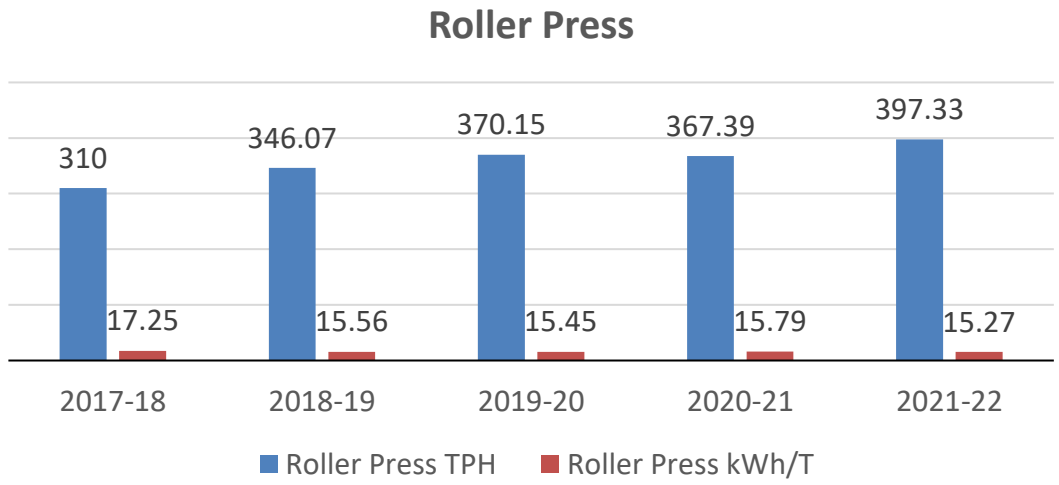


CCW Raw Mills Performance (Power Consumption)

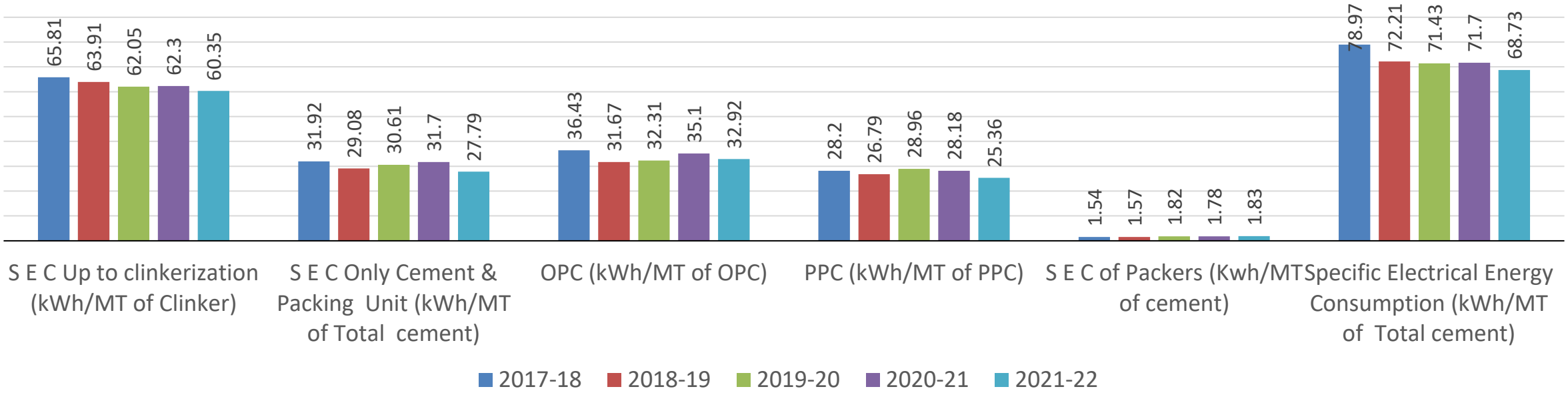


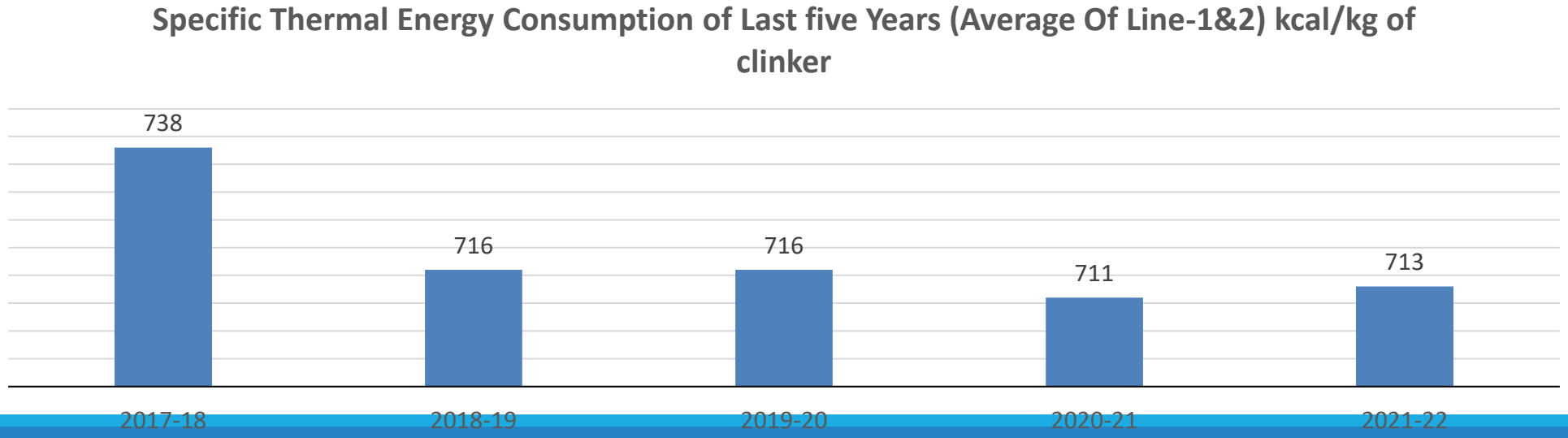
Raw VRM		
Year	**TPH**	**kWh/T**
2017-18	173.0	19.0
2018-19	169.77	19.69
2019-20	176.81	18.5
2020-21	182.36	18.79
2021-22	199.85	18.19

Roller Press		
Year	**TPH**	**kWh/T**
2017-18	310.0	17.25
2018-19	346.07	15.56
2019-20	370.15	15.45
2020-21	367.39	15.79
2021-22	397.33	15.27



Sp. Electrical Energy Consumption in last 5 years (Section wise Bifurcation)





Information on Competitors, National & Global benchmark

MP BIRLA GROUP

		Cluster Benchmarking	National Benchmarking	NCCW	Remarks
Impact crusher Power Breakup (KWH/T Mtl)					
a	Crusher Drive		0.2		
b	Other Auxilaries		0.38		
c	Jai Crusher			**1.52**	
d	CCW Crusher			**3.52**	
e	Total		**0.58**		
Roller Press Power Break-up For Raw Grinding (KWH / T mtl)					
1	Make	**Polysius Roller Press**	FLS HRP	KHD	
2	Raw Mill Aux	0.59	3.23	2.85	
3	Raw Mill Fan	2.68	2.20	4.86	
4	Seperator vent Fan		1.11		
5	Raw Mill Roller Press Motor	7.17	6.40	7.02	
6	Raw Mill Dynamic Separator	0.16			
7	Raw Mill Transport	0.71			
8	Mill feeding belt	0.14			
9	Roller Press B/E	0.73			
10	Silo feeding B/E	0.25		0.98	
11	Compressors	0.20		0.78	
12	Total	**12.63**	**12.94**	**16.48**	
Coal Mill Power Break-up (KHW/T Mtl)					
13	Make	**Pfifer (Pet coke Grinding)**	**Polysius (Petcoke Grinding)**	**Pfifer (Petcoke Grinding)**	
14	Coal Mill Aux	3.17	4.98	12.8	Coal Mill is design for 60 HGI but we are operating at 40 HGI of Coal
15	Coal Mill Fan	15.19	12.30	14.5	
16	Coal Mill Main Drive	12.23	18.90	14.8	
17	Coal / Gypsum Storage	4.21			
18	Compressors	1.43			
19	TOTAL	**36.2**	**36.2**	**42.1**	

Information on Competitors, National & Global benchmark

Pyro-Power Break-Up (KWH/T Clk)					
20	Make	**Thyseen Krup**		**FLS**	
21	Baghouse Fan	1.1		3.09	
22	Bag House Transport	0.2			
23	Cooler Fans, PA Fan &	4.9	3.4	6.07	Selection of cooler is different
24	Kiln Main Drive	2.0	1.5	1.3	
25	Kiln Auxiliary	0.5	4.2	3.8	
26	Kiln Feed	0.9	1.0		
27	Preheater Fan	4.9	8.7	7.1	Pre-Heater fan is operating on LRS
28	RootBlowers,Coal firing	0.6			
29	Clinker silo transport gro	0.5			
30	Dialution airfan	0.0			
31	ESP transformers	0.0		0.21	
32	Cooler hydraulicpumps	0.2		0.54	
33	Kiln feed B/E	0.8		0.36	
34	ESP Fan	0.7	1.2	0.65	
35	Compressors	0.8		1.19	
36	TOTAL	**18.1**	**19.98**	**24.4**	
Cement Mill OPC-43 (KWh/T		**Polysius-RP for cement grinding**		**Polysius-RP for cement grinding**	
37	Mill Main Drive	12.06		10.04	
38	Seperator			1.35	
39	Mill Seperator Fan				
40	Sepol Fan	1.88		3.59	
41	Seperator BallMill				
42	Booster Fan				
43	Roller Press drive	4.35		7.2	
44	Fly-Ash unloading				
45	Compressors			0.94	
46	Re-circualtion Elevator			0.66	
47	Auxilary	4.6		5.94	
48	**TOTAL**	**22.89**	**0**	**29.72**	
Cement Mill PPC (KWh/T Ce		**Polysius-RP for cement grinding**		**Polysius-RP for cement grinding**	
49	Mill Main Drive	13.9		7.6	
50	Seperator			0.98	
51	Mill Seperator Fan	2.4			
52	Sepol Fan			2.72	
53	Seperator BallMill				
54	Re-circualtion Elevator			0.5	
55	Roller Press drive	4.62		6.04	
56	Fly-Ash unloading			1.16	
57	Cpmpressor			0.95	
58	Auxilary	4.6		4.9	
59	TOTAL	**25.52**	**0**	**24.85**	

Energy Saving projects implemented in for last five years

Year	No. of Proposals	Investments	Savings	Payback months
2017-18	13	1991.34	1828.29	11
2018-19	14	1312.15	3618.68	3
2019-20	08	2800	987.77	3.0
2020-21	4	Nil	854.248	0
2021-22	2	15,000	1030.79	0

Project Details	Investments (Rs. million)	Savings (Rs. million)	Payback months
Optimization of NCCW Kiln-2 (Thermal)	13	15.01	0
Optimization of CCW CM-1 Grinding	0	32.61	0
Optimization of CCW CM-2 Grinding	0	33.40	0
Optimization of CCW Kiln (Electrical)	0	7.59	0
Optimization of Roller press for raw meal Grinding	2	9.32	0
Total Saving		**103.079**	

Major Energy Saving projects implemented

Phase-I part of NCCW Expansion Project up to 6000 TPD (Design - 5500 TPD) consisting of the following has been completed:

- Installation of ABC inlet instead of CIS at clinker cooler
- Extension of clinker cooler by addition of 02 nos. cooler modules
- Up gradation of Cooler ESP by addition of 4th field of ESP
- After completion of the above, the Specific Heat Consumption of NCCW has reduced up to 705 Kcal/kg clinker and Kiln TPD increased up to 5000 TPD.

Energy Saving projects implemented in for last three years

Top view of extended part of Clinker Cooler

Side view of extended part of Clinker Cooler HRB

Clinker Cooler ESP Vent Fan

Clinker Cooler Fan no. 8

Innovative Projects implemented

1. Raw grinding roller press Optimization

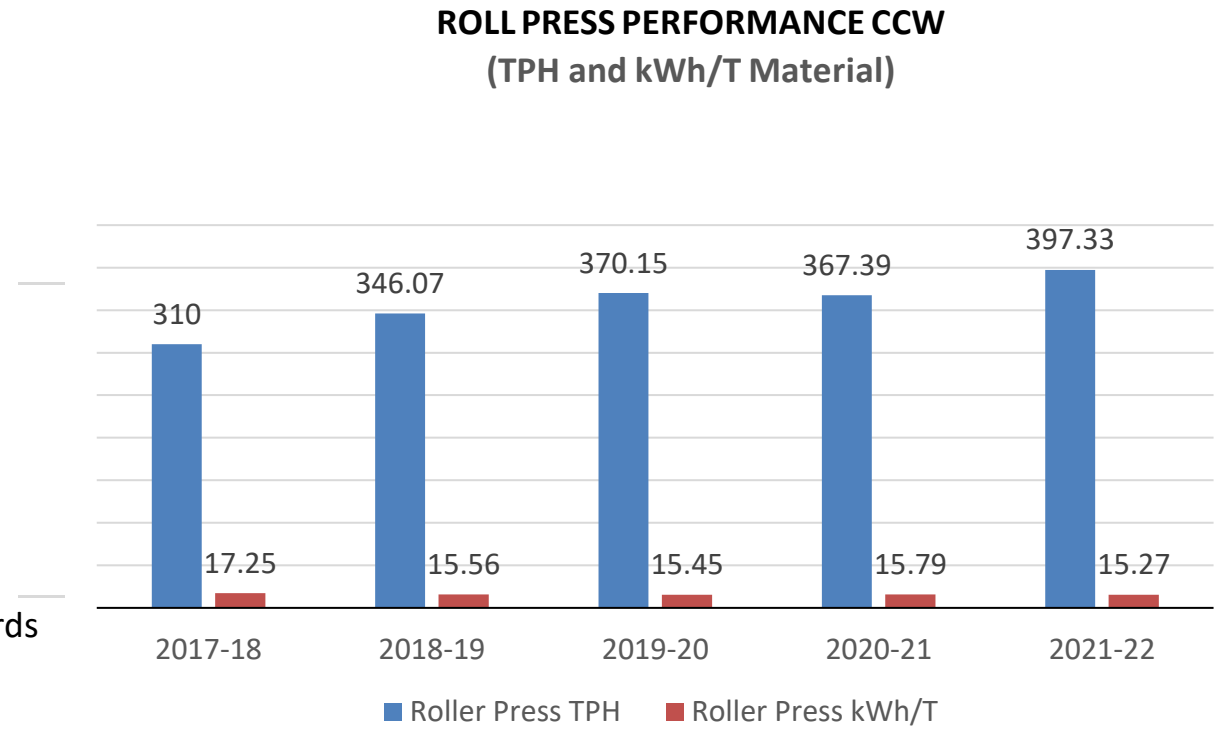
Action Taken:-

- During maintenance both feed gate checked and gap was uneven for both RPs which was varying from 120 to 180 gap. We have reduced it up to 120 mm by adjusting the plate , choke feeding started due to this.

- Level sensor in overflow bin below SKS separator is always showing 1.98 MT(Full) due to this there is always having some risk of filling material in separator and fines eject from separator overflow bin air slide to both elevators, Level sensor checked by instrument and now it is working perfectly

- Blaster installed at SKS outlet duct to avoid dust accumulation.

- It was observed many times that When both RPs running in auto condition and RP-1 tripped due to any fault whole fines from SKS rushed towards RP-2 and bucket elevator tripped many times ,
  Logic changed and now fines controlling is better.
- Motorized actuator required for SKS reject air distribution gate for RP-1 for better fines control, Correct size Actuator installed to control reject material.

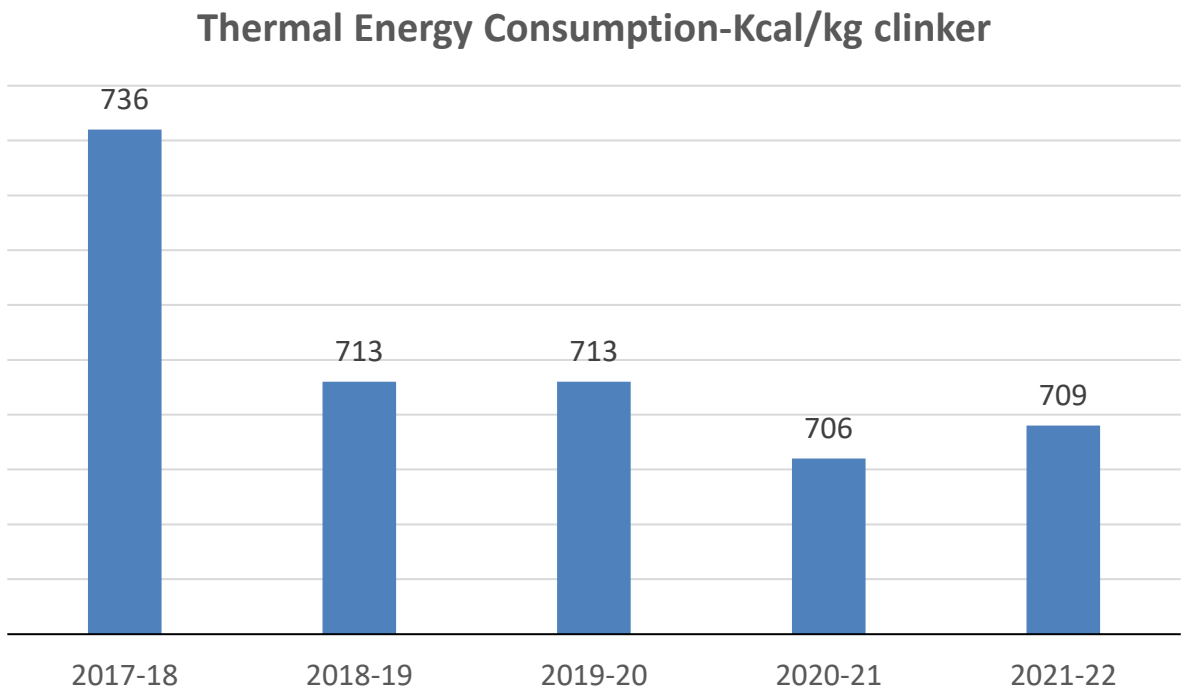


Innovative Projects implemented

2. Reduction in thermal Energy consumption

Action Taken:-

- Formation of lime stone piles instead of point stacking (Quality variatio reduced)
- Same fuel mix started for both the kilns(100% Pet coke).
- Dedicated SGA teams formed for regular arresting of false air.
- Change both inlet and outlet seal for CCW-1.
- Reduce kiln feed residue from 18-19% to 16-17% @+90
- Reduced Kiln feed residue from 4.67% to 2.5% @+212
- Change kiln burner for CCW-1
- False air arrested and major leakages arrested during kilns shutdown.

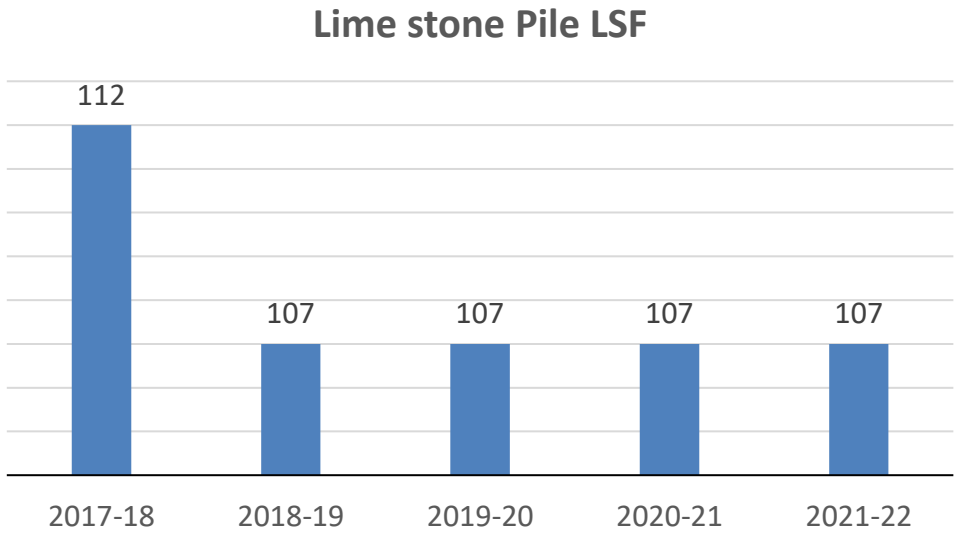


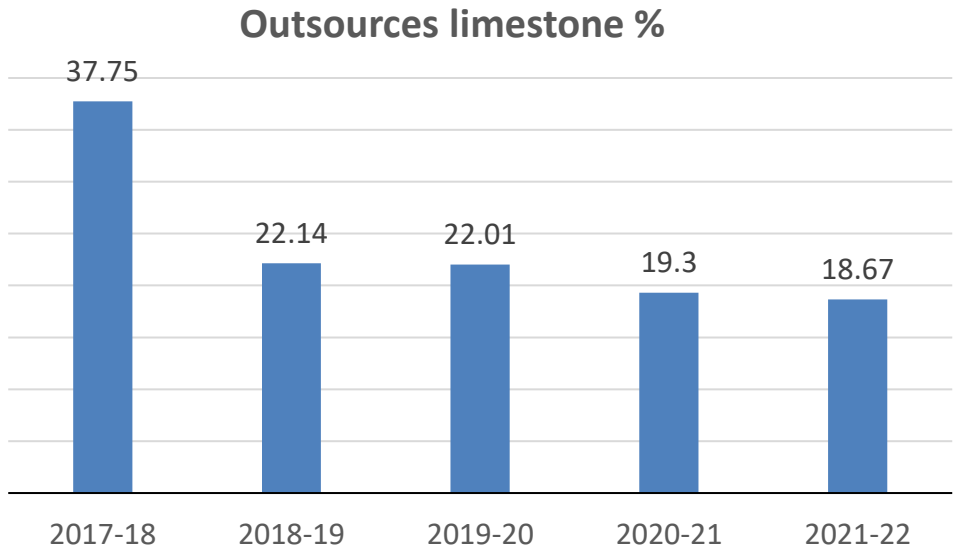
Innovative Projects implemented

3. Reduction in Lime stone Pile LSF and reduce outsourced lime stone

Action Taken:-

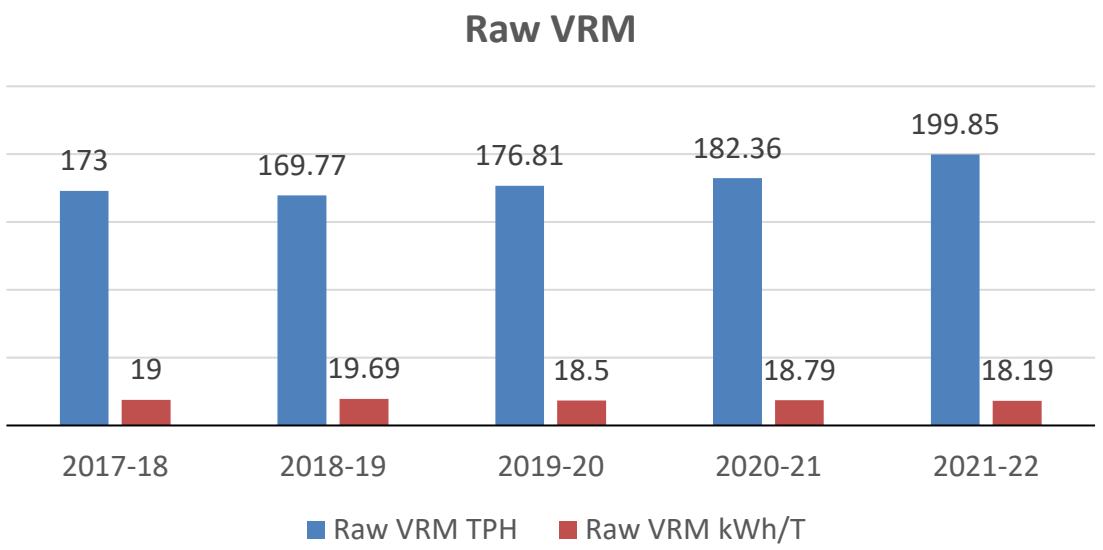
- Usage of bauxite having silica up to 7-8%
- Formation of larger size lime stone piles instead of point stacking
- Increase pet coke consumption in CCW up to 100%
- Raw mix optimization according to available fuel mix
- Reduce kiln feed residue from 18-19% to 16-17% @+90
- Reduced Kiln feed residue from 4.67% to 2.50% @+212 R
- Increase smoke chamber and riser duct cleaning frequency
- Installation of extra air cannon as per the requirements





4. Optimization of Vertical Roller Mill and reduce breakdowns

Description & Action Taken:-	status
Dam ring provided for mill table	Done (30mm dam ring)
Interlocking to be changed for metal detector from 3 times to 02 times in the circuit and to be rev ised in future if required	Done
Reset LBP (at RM-1) shifted near metal detector	Done
Damaged nozzle plates repaired and planned to replace complete set during next opportunity	Done
Replacement of table/roller liner	Done
Repair and Optimization feed entry triple gate and reject chute	Done
Reduction in False air entry(Up to 13%) and dedicated team formation to monitor in regularly	Done
Formation of Lime stone Piles instead of point stacking	Done



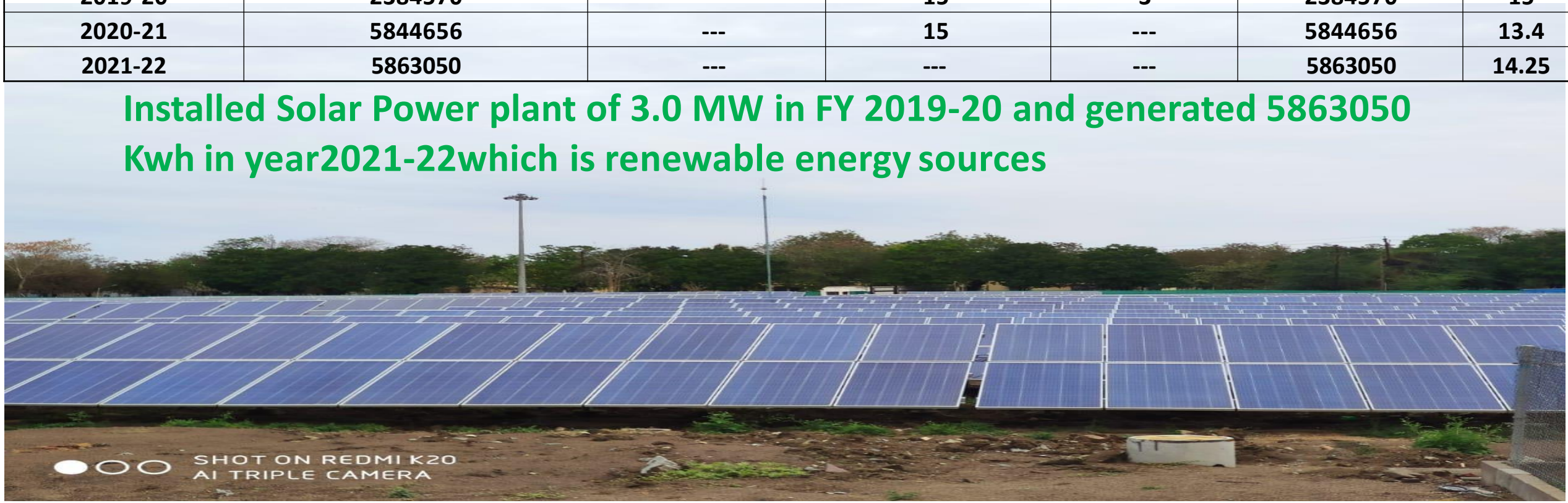
Innovative Projects implemented

5. Solar Plant (3 MW) Installed in Year 2019-2020

Utilization of Renewable Energy Sources

Years	Onsite generation (MW)	Off-site generation (MW)	Investment made (INR Crores)	Capacity addition (MW)	Power generation (Kwh)	RPO obligation
2017-18	---	---	---	---	---	14.3
2018-19	---	---	---	---	---	13.4
2019-20	2384570	---	15	3	2384570	15
2020-21	5844656	---	15	---	5844656	13.4
2021-22	5863050	---	---	---	5863050	14.25

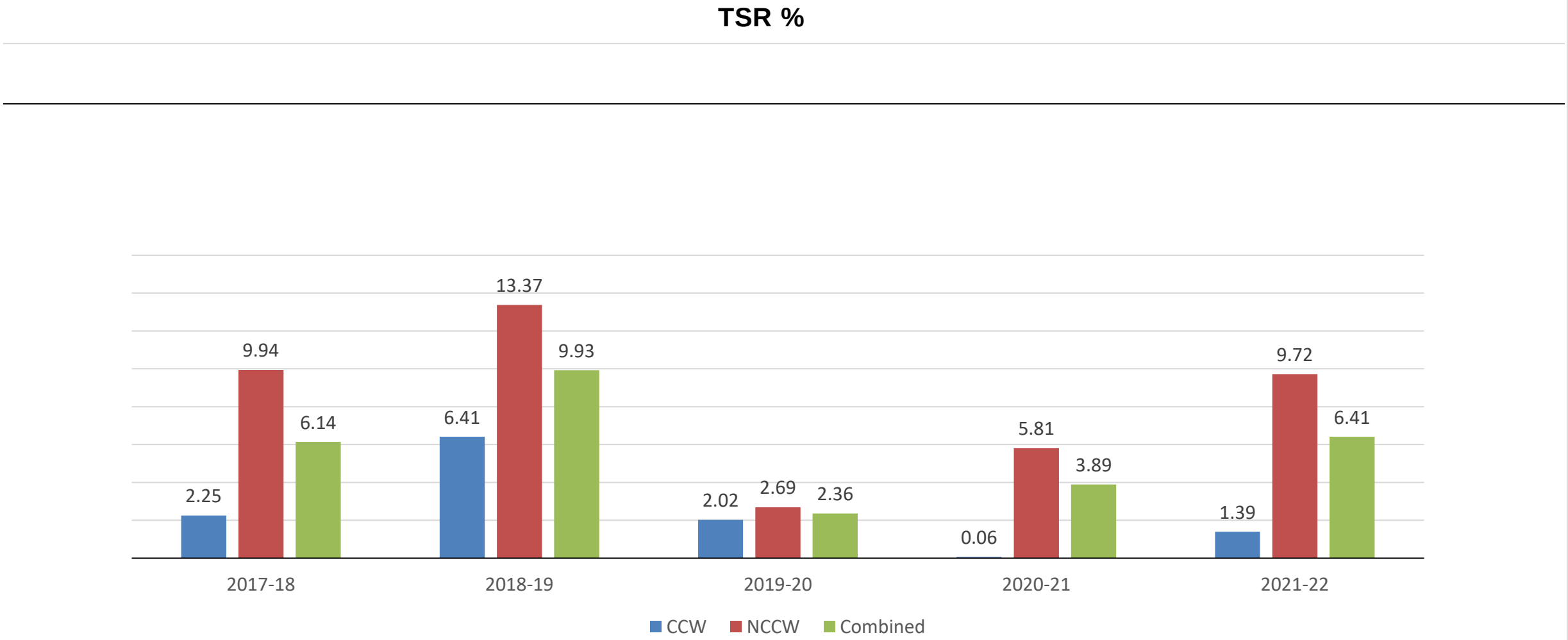
Installed Solar Power plant of 3.0 MW in FY 2019-20 and generated 5863050 Kwh in year2021-22which is renewable energy sources



Waste utilization and management

Waste utilization and management (Usage of AFR)					
Type of materials (MT)	2017-18	2018-19	2019-20	2020-21	2021-22
Carbon Black	3037	7468	2508	--	4670
Power Plant Ash	3114	0.92	--	--	-
Waste Mix Solids	9511	10383	6130	4924.39	7320
ETP Sludge	1203.04	--	--	--	137
Mustard Husk, Ground nut Husk	3621	6137.8	701	15	2977
TDI Tar	517.23	860.44	229	3.8	-
Industrial Waste	16.1	30.7	183	6	-
Waste Mix Solids Non Haz.	327	8.5	42	0.7	15
Saw Dust	--	673.58	64	77.8	445
Liquid Waste	292.86	3912	2398.5	133	4047
Plastic waste (Hazardous+Non hazardous)	45	4565.69	1778	9247.74	12629
COAL ASH	4169	14407.93	1909	--	-
Liquid (LCV)	--	13.5	--	--	6
Wooden Chips	145	139	66	130.43	38
N Hz paper waste	--	4.25	--	--	-
Refused Derrived Fuel	--	--	60	18.3	-
FUEL PTRL,PTCK (PTRLM CK),TPP	6488	180.41	--	--	-
Crushed F.M.C.G	--	--	354	121.99	211
TOTAL	32486.22	48785.72	12005.5	14679.15	32495

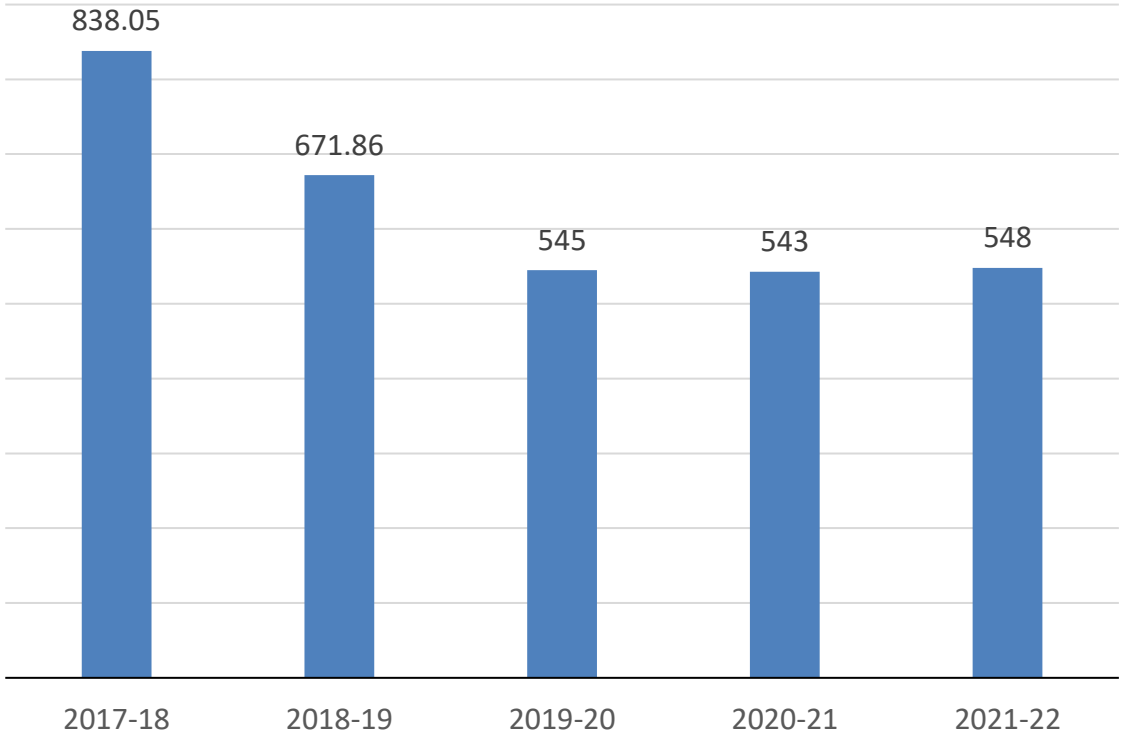
Waste utilization andmanagement



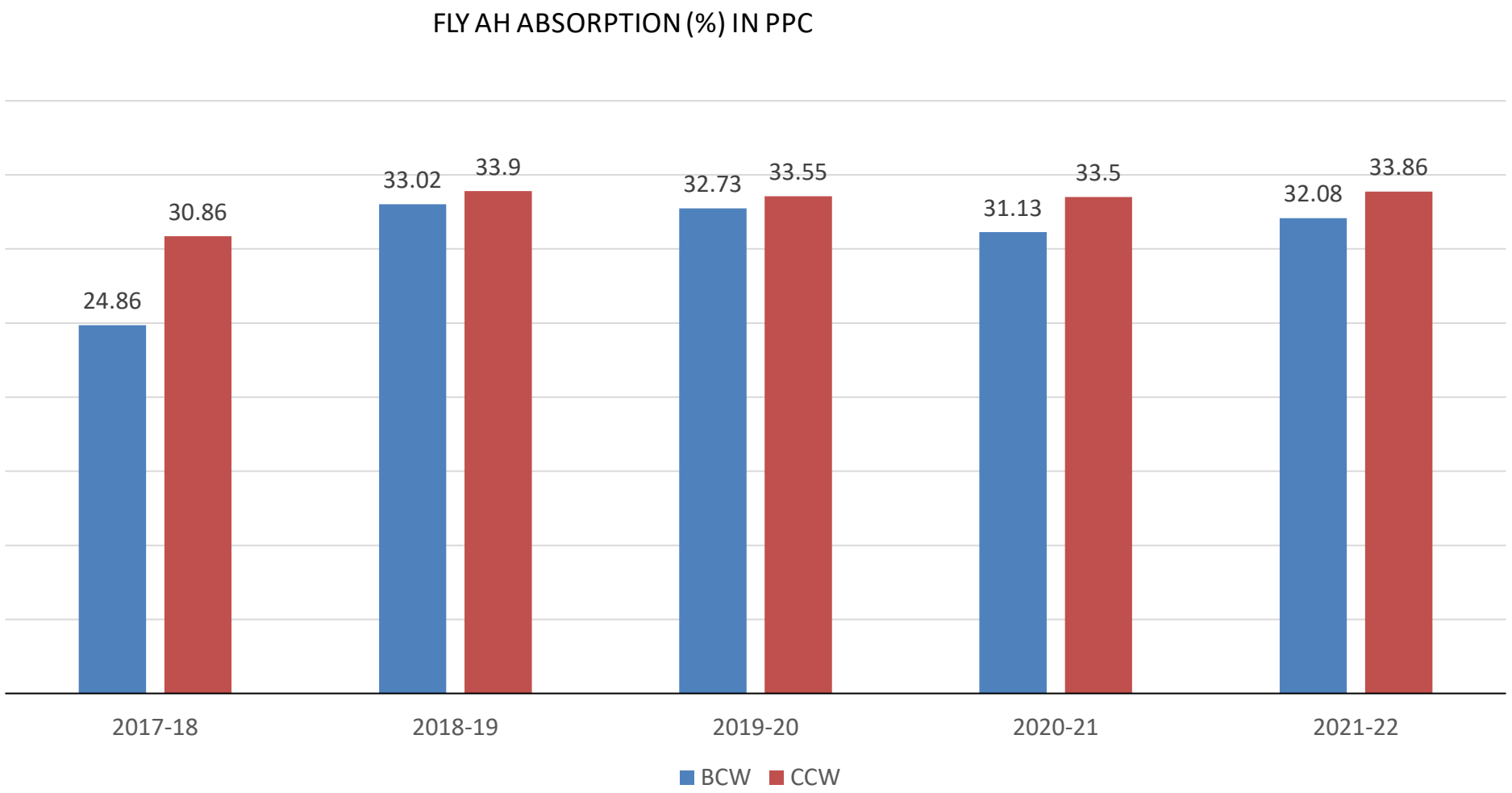
GHG Inventorisation

Green Plantation – Birla Premises

Reduction in Emission ($kgCO_2$/ Ton of Final Product)



Green Supply Chain Management



Way forward

- Reduction in Thermal Energy/Electrical Energy of CCW Kiln-1 after TAD modification
- Reduction in Thermal Energy/Electrical Energy of CCW Kiln-2 after Expansion Phase-2
- Exploring possibilities to optimize fuel mix
- Increase usage of AFR

Summary (Major Achievements)

- **Electrical Energy Consumption:- Reduced 10.25 kWh/MT** Cement Power consumption in last 05 Years

- **Thermal Energy Consumption:- Reduced 22.0 kcal/kg clinker** in CCW-1 Kiln and **27.0 Kcal/k clinker in CCW-2** in last 05 Years

- **Fly ash Utilization:- 7.22% Increase in fly ash utilization at BCW** (from 24.86% to 32.08) and **3.0% increase in fly ash utilization at CCW** (from 30.86% to 33.86%) in last 05 Years

- **Waste Utilization:-** Used **140451 MT Solid & LIQUED** AFR during last 5 Years in CCW & NCCW

Team work, Employee Involvement & Monitoring

- Daily Energy review meeting chaired by **Unit Head (Review sheet attached below)**
- Separate **Budget taken every year** for energy saving projects
- *Energy efficiency/awareness training program conducted* ***in house and external through RTC, CII etc.***
- Energy savings through Small group activities (**Total 42 Nos. of SGA groups-List Attached)**
- **Monthly Meeting review meeting held(Chaired by Unit Head) for each SGA** groups consisting down to level employees and workmen f various improvement initiative in the plant and award also given to performer team
- **One cross functional team (CFT) also formed** which review energy performance on **weekly basis** and send MOM to top management with a PPT for all the KPIs **(PPT Attached Below)**

SGA Monitoring and Encouragement

Energy Training

Inhouse Training

Twentythree Training Programs Conducted

50 Nos. of Participants Covered

SGA Champions

Involvement of Employee/workmen for 5S, Energy etc. and review

5S
A Workplace Management System

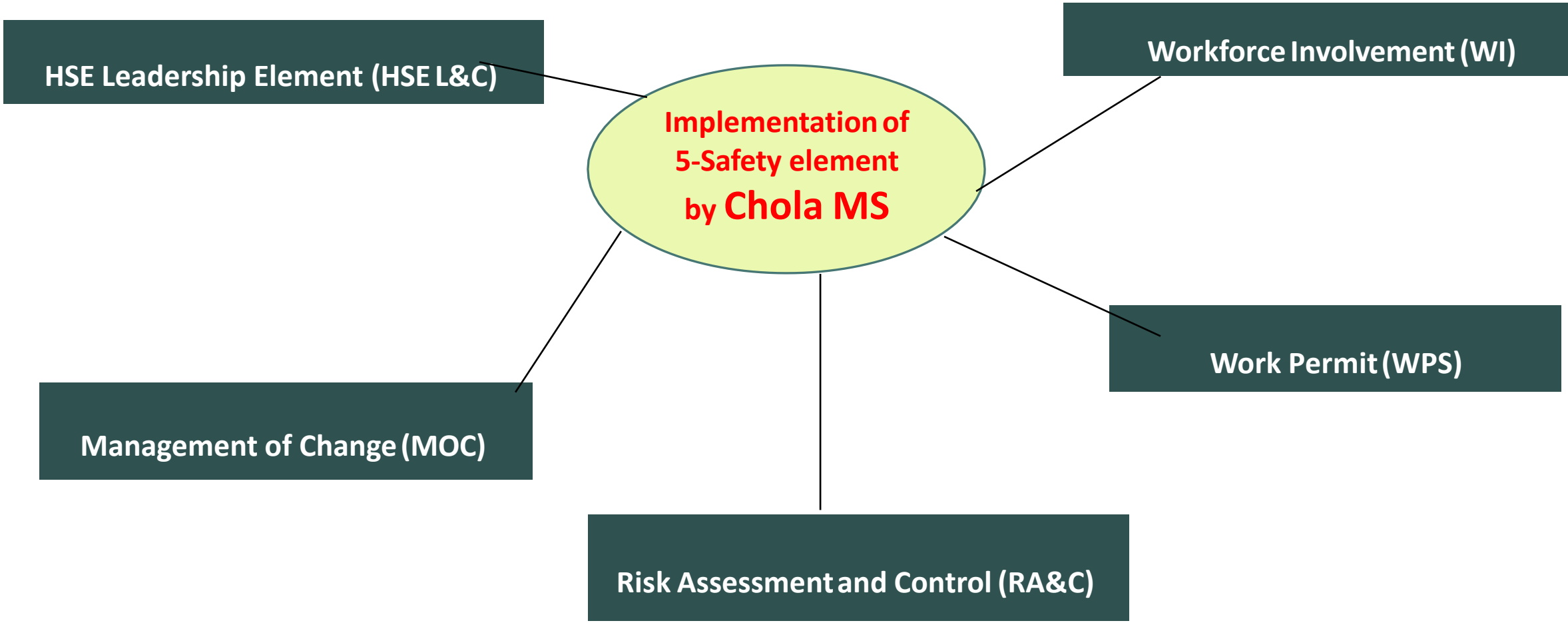
Energy Visit

5S Visit

Review Meeting with Zone Members

Plant Visitfor Reviewing Energy Findings/5S

Involvement of Employee/workmen for 5S, Energy etc. and review –



Involvement of Employee/workmen for 5S, Energy etc. and review –

Implementation of 5-Safety element by Chola MS

Safety Vision, Mission and Core Values

Safety Vision

To become the most admired and respected organization by ensuring safety and occupational health in a sustainable manner.

Safety Mission

To achieve the safety vision of being the best-in-class, MP Birla Group shall:

- Establish and implement safety and occupational health standards, governance mechanism and related infrastructure as required.
- Development of competencies through training and skills upgradation, leveraging digital technologies for all stakeholders.
- Engage all stakeholders, including contractors, on safety on a continuous basis and in an effective manner.
- Hold employees accountable for safety of all their actions and ensure operational discipline.

Safety Core Values

- **Safety First:** Will passionately demonstrate commitment towards safety.
- **Focussed Competency:** Develop safety competency systematically to positively influence risk perception and learn from mistakes.
- **Accountability:** Responsibility for all actions and deliver on commitments towards becoming the best-in-class in safety.
- **Empower People**: Employees including contractors are empowered to intervene in any unsafe situation.

Details of Energy Awards

AWARD DETAILS	AWARD BY
Rajasthan Energy Conservation Award – 2019 Under cement category for excellent efforts in energy conservation	By Government Energy Department, Jaipur In December, 2019
Excellence in Energy Management – 2019 (Excellent Energy Efficient Unit Award)	By CII, Hyderabad In November, 2019
National Energy Management Award – 2019 For excellence in energy conservation	By SEEM, 2019
Best Improvement in Electrical Energy Performance 18-19	By NCCBM International In November, 2019
fly ash utilization, 1st Award, during "fly ash utilization conference 2019"	By Mission Energy Foundation in February, 2019
08 set of papers presented at NCCBM International seminar In November, 2019, regarding saving of energy / Plant initiatives.	Presented at NCCBM International seminar Dec, 2019
Excellence in Energy Management – 2020 (Energy Efficient Unit Award)	By CII, Hyderabad In Sep, 2020
Silver Award & SEEM National Energy Management Award – 2019 Indian Energy Enclave – 2019 for excellent efforts in energy conservation	By IICC, New Delhi In October, 2019
For fly ash utilization, 2nd Award, during "fly ash utilization conference 2020"	By Mission Energy Foundation in February, 2020
Gold Award & SEEM National Energy Management Award – 2020 Indian Energy Enclave – 2020 for excellent efforts in energy conservation	SEEM Delhi
For fly ash utilization, 2nd Award, during "fly ash utilization conference 2020"	By Mission Energy Foundation in February, 2020

Presented 08.0 Nos. of Technical Papers during NCCBM International seminar in Dec-2019.

Details of Energy Awards

Award from Govt. of Rajasthan (1st Prize)

Best EE reduction Award by NCCBM

Excellent energy efficient award by CII

Certificate of CII

Fly ash utilization Award, Feb-2020

Award at India Energy Conclave-2019

MP BIRLA GROUP

Thanks