Chettinad Cement Corp. Pvt, Ltd
Kallur Works

Mentor : Shri. K Saikumar
(Unit Head)

Team Members:
Mr. K Hari Babu (Sr. Mgr, Operation)
Mr. G Selvaraju (GM, Electrical)
Mr. K Gopi Krishna (Manager, Inst/ EM)

CII National Award for Excellence in Energy Management 2022: 23- 25 August 2022

Company Profile & Products

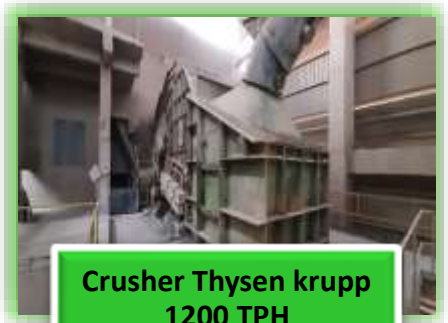
Group Installed Capacity (Clinker)	14.0 mMTPA
Plant Installed Capacity (Clinker)	2.0 mMTPA
Installed Capacity (Cement)	2.5 mMTPA
Captive Power Plant	30MW
WHR Power Plant	7.3 MW
Solar Power Plant	3.0 MW
Product Range	OPC, PPC & Max Crete

Solar Power Plant -3 MW

WHRPP -7.3 MW

Captive Power Plant -30 MW

Technology/specifications of major sections



Crusher Thysen krupp 1200 TPH

Stacker/Reclaimer Takraf. LS pile Cap 23000 MT x 2

Raw Mill 1&2 (RP) FLS -2* 240 TPH

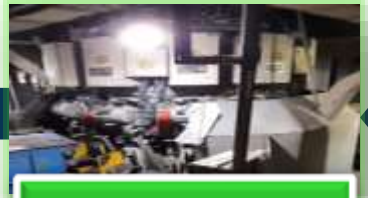
Coal Mill VRM Attox30 - 75 TPH

Design: 6000 TPD; Operating 8000 TPD; 5 Stage ,2 String ILC

Kiln 4.75 mØ x 74m L

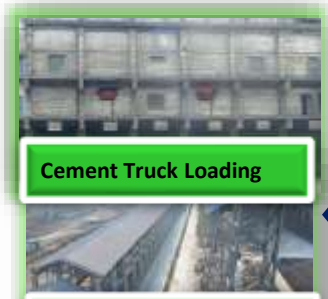
Cooler SF 4x6 F

RP with Ball Mill, FLS 270 TPH



Packing Plant Conweigh 3No x 180 TPH,

Fls : 1No x 120 TPH



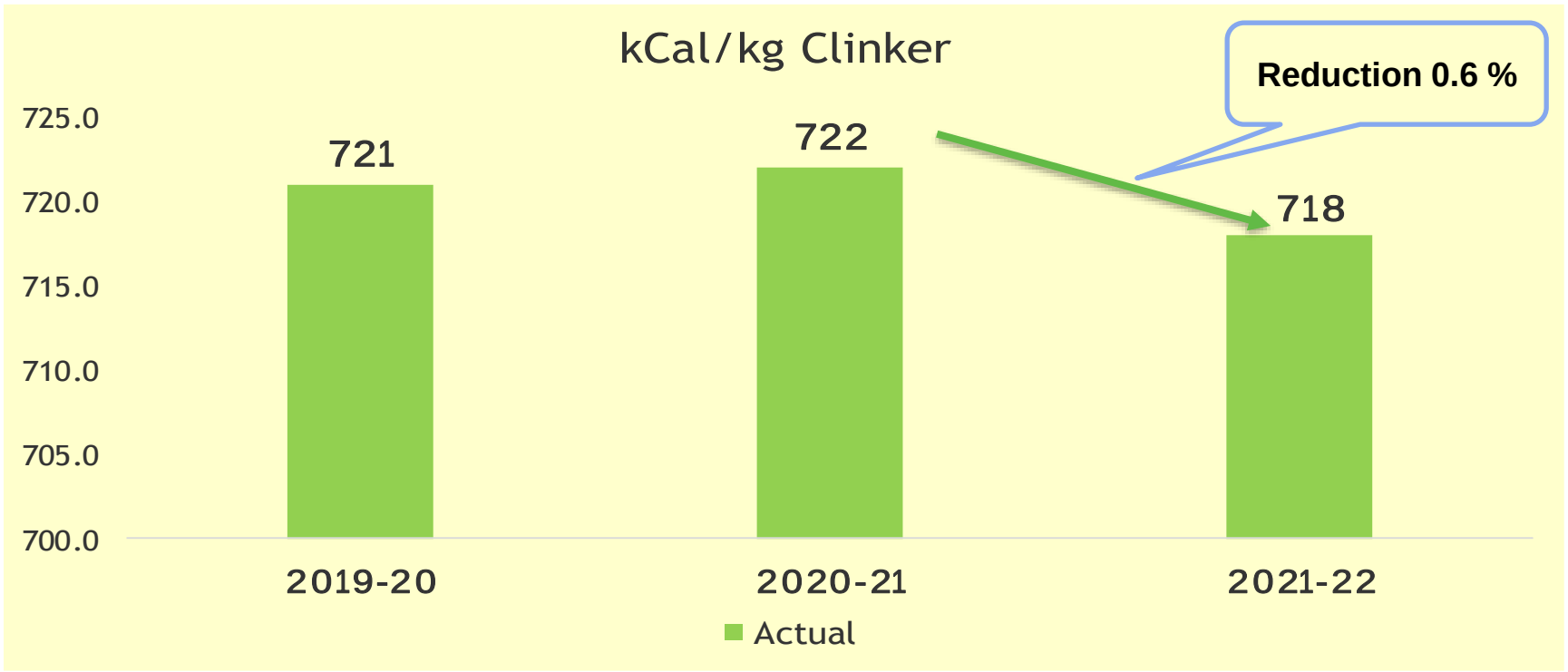
Cement Truck Loading

Cement Wagon Loading

Clinker Wagon Loading

Coal /GYP Wagon Tippler

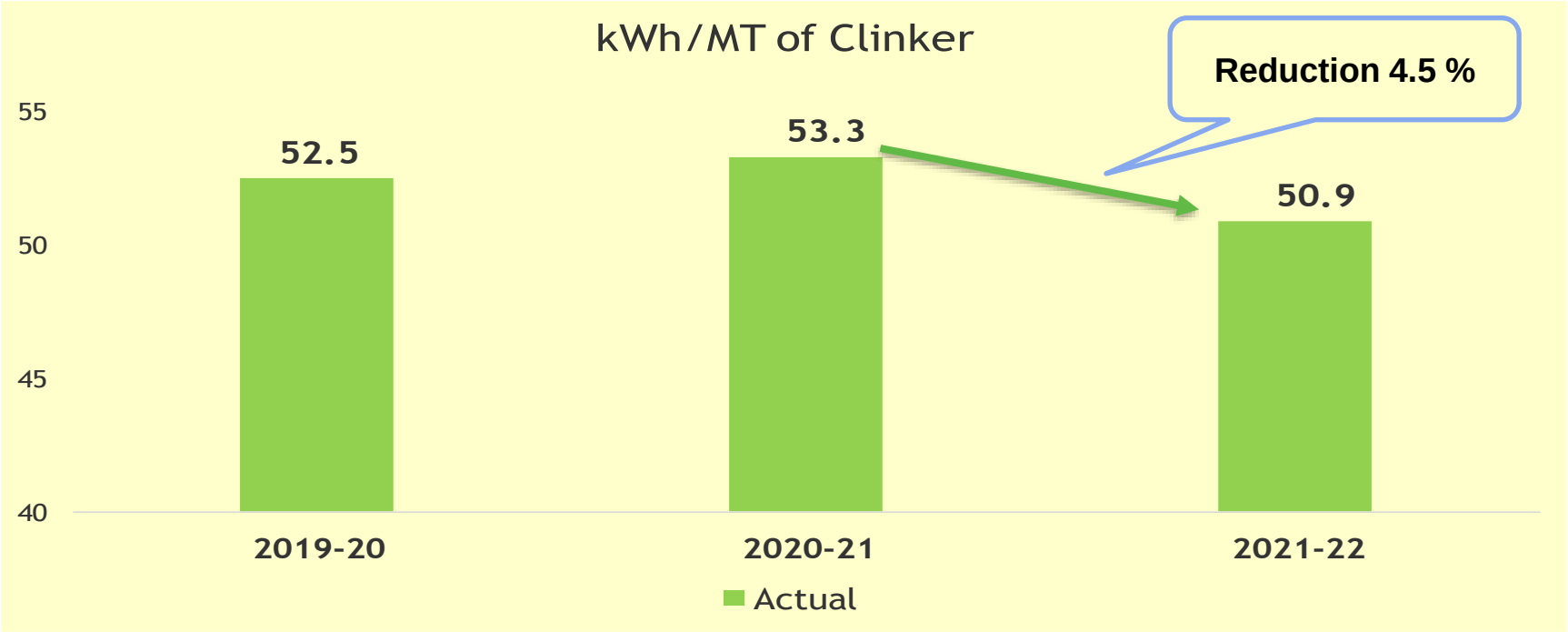
Thermal SEC (kCal/ kg clinker)



Achieved reduction in thermal energy consumption by:

- ✓ Consistency operation of kiln
- ✓ Reduction in kiln No. of START/STOP.
- ✓ Reduction in heat losses by process optimization

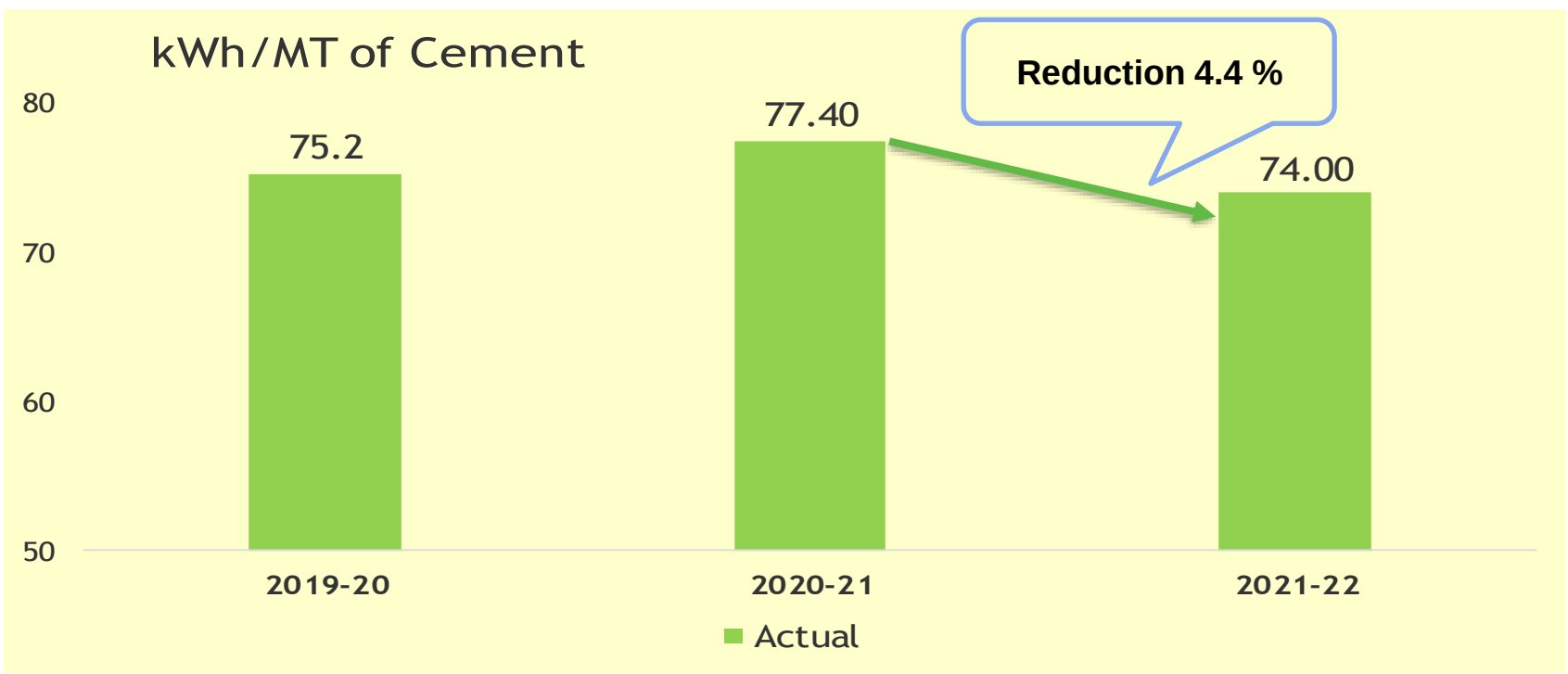
Up to clinkerization (kWh / MT clinker)



Achieved reduction in Specific energy consumption by:

- ✓ Consistency operation of kiln
- ✓ Process optimization by reducing PH fan speed considering O2 at kiln inlet
- ✓ Raw material grinding power optimization
- ✓ Improvement in kiln No. of START/STOP.
- ✓ Kaizens implemented

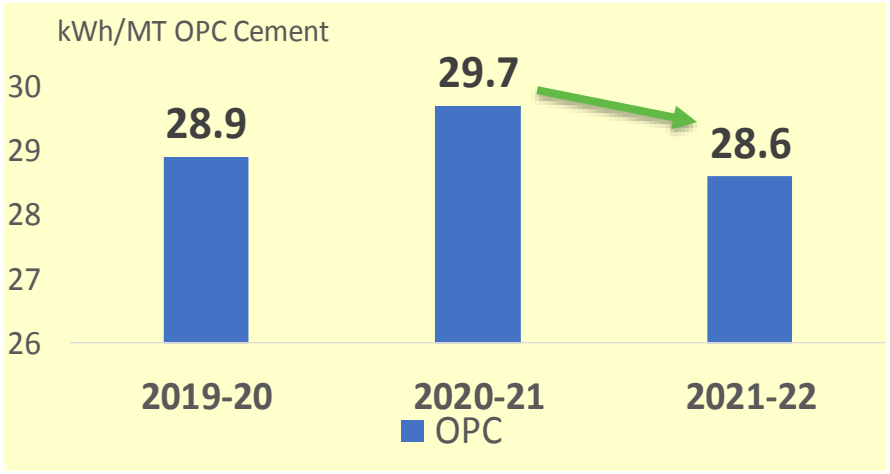
Overall cement (kW / MT Cement)

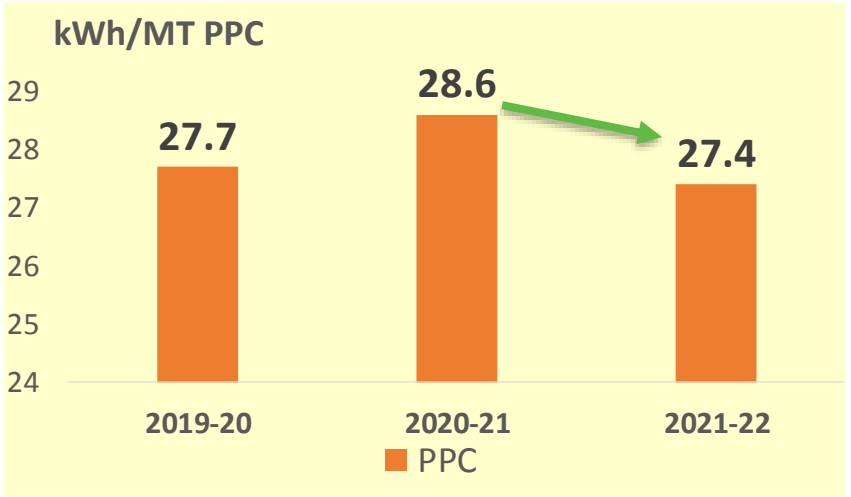


Achieved reduction in overall specific energy consumption by:

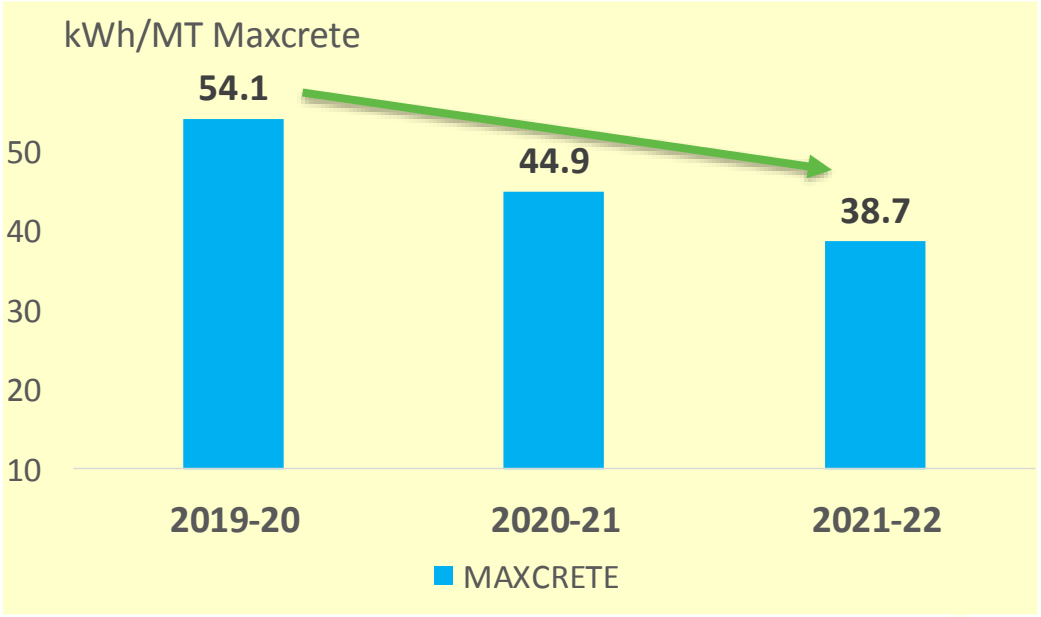
- ✓ Reduction in up to clinkerization power
- ✓ Cement grinding power optimization
- ✓ Kaizens implemented

Cement grinding –Variety wise, OPC, PPC, and Maxcrete (kWh / MT cement)

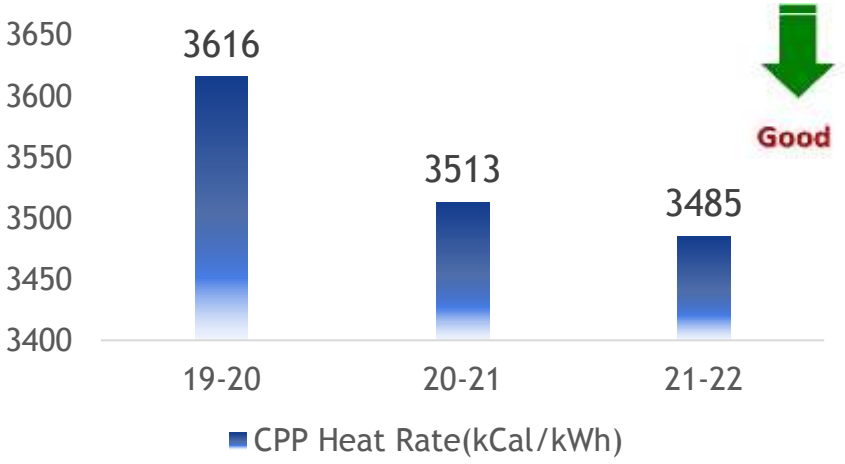


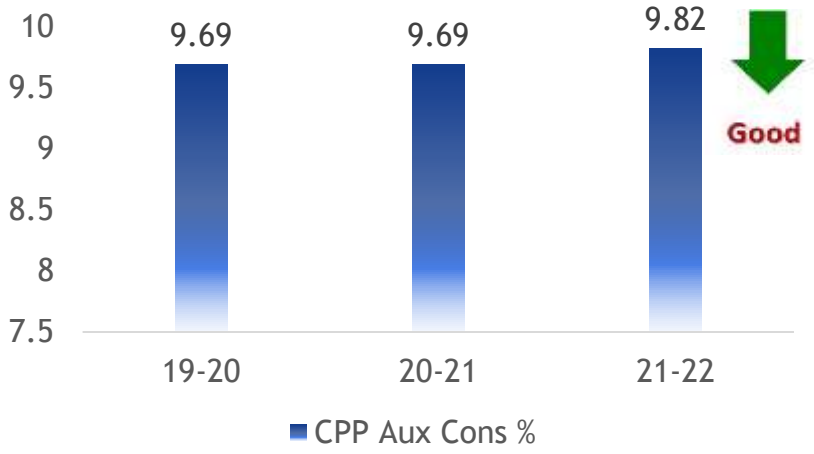


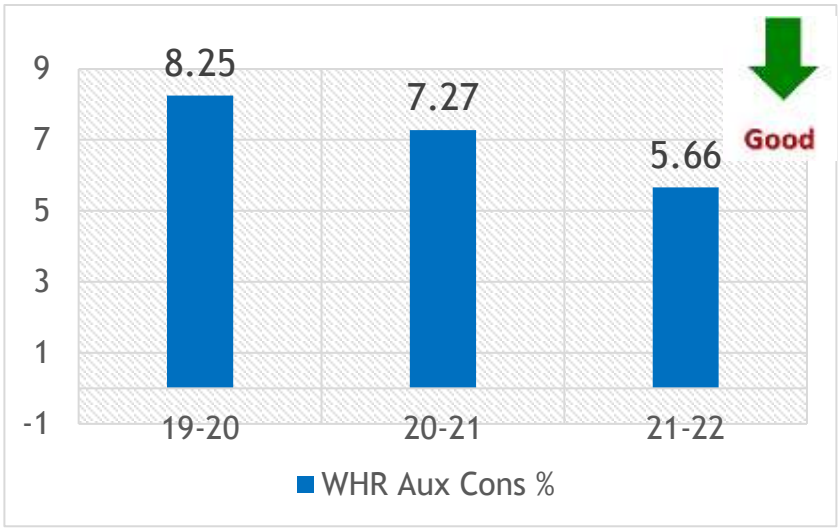
Good

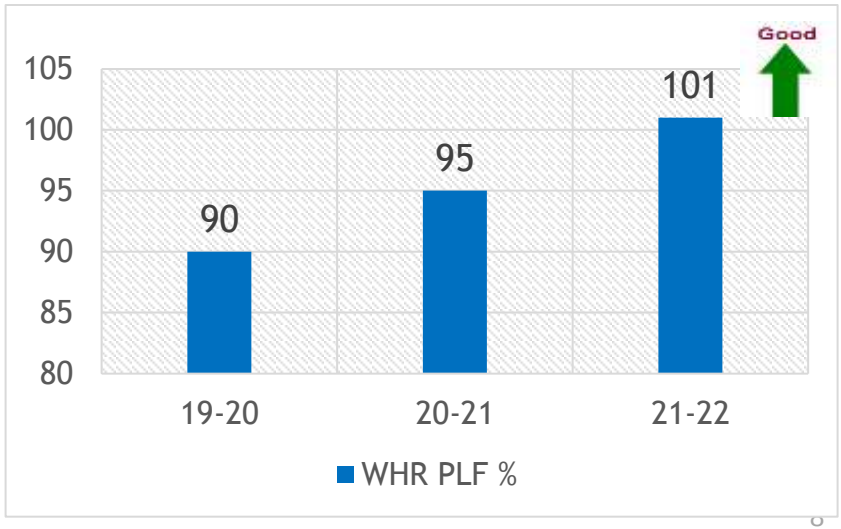


CPP & WHR ENERGY PERFORMANCE









Comparison on Competitors, National & Global benchmark

Bench marking	Plant	Electrical (kWh/ Ton of Cement)	Thermal (kCal / kg of clinker)
Achieved	Chettinad – Kallur	74.0	718
Internal benchmarking	Puliyur works	65.6	Kallur Works
External benchmarking	Orient Cement	61.5	685
	Vicat Sagar	76.8	730
	The India cement Ltd	88.6	810
	*National level	56.14 (Plant#1)	676 (Plant#1)

* Source of Information : CII Energy Bench marking data May'2021

Encon Projects Planned FY2022-24

Sl.No.	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)
1	Replace re winded motors with Energy efficient Motors	0.01	-	0.23
2	Replace existing AHU motors with direct driven BLDC AHU	0.06	-	0.86
3	Install AC energy savers for Split ACs	0.08	-	0.96
4	Replace conventional ceiling fans with BLDC fans	0.01	-	0.11
5	Replace existing Light fixture with LED	0.29	-	3.96
6	Interlock operation of compressor in LS crusher area with operation of the Limestone Crusher operations	0.004	-	0.01
7	Reduce the generation pressure for the identified compressors	0.41	-	0.10
8	Avoid usage of compressed air for cleaning applications by using Transvector Nozzle or LP blowers	0.01	-	0.05
9	Install auto drain valves for the receiver at the wagon unloading section	0.003	-	0.02

Encon Projects Planned FY2022-24

Sl.No.	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)
10	Replace Timer-based purging with DP-based purging for Auxiliary Bag Filters in the plant	0.03		0.15
11	Avoid the unloading of the identified compressors by installing VFD	0.18	40.6	2.15
12	Replace existing BFP with Energy Efficient BFP for the present operating conditions	1.23	778.6	7.50
13	Improve the insulation of identified areas of the boiler		1299	0.02
14	Replace existing CEP Pump with Energy Efficient Pump in WHR	0.13	5195	1.20
15	Optimize coal conveying phase density in kiln coal conveying pipeline by reduce pipeline size		5715.	1.50
16	Reduce radiation heat loss by applying insulation paint on outside surface of kiln surface	0.57	10910.	2.50
17	Improve preheater top stage cyclone efficiency by conducting CFD study and modifying the cyclone internals as per CFD suggestions	0.73	40.6	3.00

Encon Projects Planned FY2022-24

Sl.No.	Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)
18	Improve cooler recuperation efficiency by modification and installation of high efficiency inlet grate systems	3.90	778.6	10.00
19	Reduce head loss across damper in identified auxiliary bag filters by opening damper 100% and controlling fan capacity by other energy efficient methods in identified bag filter fans	0.36		2.60
20	Reduce bag filter pressure drop by optimizing purging and replacing old bags in identified dedusting bag filters	0.15		1.00
21	Reduce radiation heat loss across preheater cyclones by applying insulation paint on the outside surface of preheater cyclones		7790	3.00
22	Arrest false air across coal mill circuit and reduce mill fan power consumption	0.44		0.00
23	Reduce pressure drop across cement mill main bag house by optimizing purging cycle and replacing old bags	0.09		0.50
	Total	**8.67**	**31728**	**41.42**

Energy Saving projects implemented in last three years

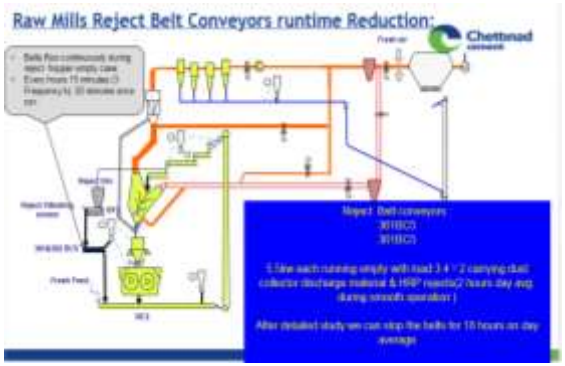
Year	No of Energy saving projects	Investment (INR Million)	Electrical savings (Million kWh)	Thermal savings (Million kCal)	Savings (INR Million)	Impact on SEC (Electrical kWh /MT cement, thermal)
2019-20	26	2.55	1.81	-	10.05	0.95
2020-21	18	0.77	11.95	-	58.08	1.61
2021-22	45	7.62	8.82	7365	48.59	3.4

Energy Saving projects implemented 2021-22

INSTALLATION OF LOW PRESSURE COMPRESSOR FOR FA UNLODING

VFD INTALLED FOR 5nOS BAG FILTER FANS AT CM & PP

Universal Controller Kit for Package AC units at various location in plant area



361BC5 & 362BC5 belt idle running avoided by PLC interlock in both raw mills

Avoided running of belt conveyor 362BC4 by providing direct chute modification at separator discharge

Water spray system provided for both raw mills.

Energy Saving projects implemented 2021-22

Replacement FRP Blades in ACC Fans- CPP (5062 kW/day saving, Invest 16.5 L)

Replacement FRP Blades in ACC Fans- WHRP (1745 kW/day saving, Invest 12 L)

VFD INTALLED FOR CEP PUMP AT WHRPP

VFD INTALLED FOR RO WATER PUMP AT WTP

Roof GI sheets replaced with transparent GI sheets at main store

CPP CT tower fans running with fixed RPM and provision made in DCS manual changing of RPM w,rto discharge temp of Aux. cooling water line.

Innovative Projects Implemented

Innovative project # 1:
Upgrade of Cooler MFRs Pattern in Fourth chamber

Contribution and efforts:

- To reduce the clinker temperature (Heat losses reduction) from 190’c to 180’c
- Reduced Cooler water spray frequency & quantity (6 m3/hr to 4 m3/hr)
- Smooth operation
- Contributed for WHR AQC generation.

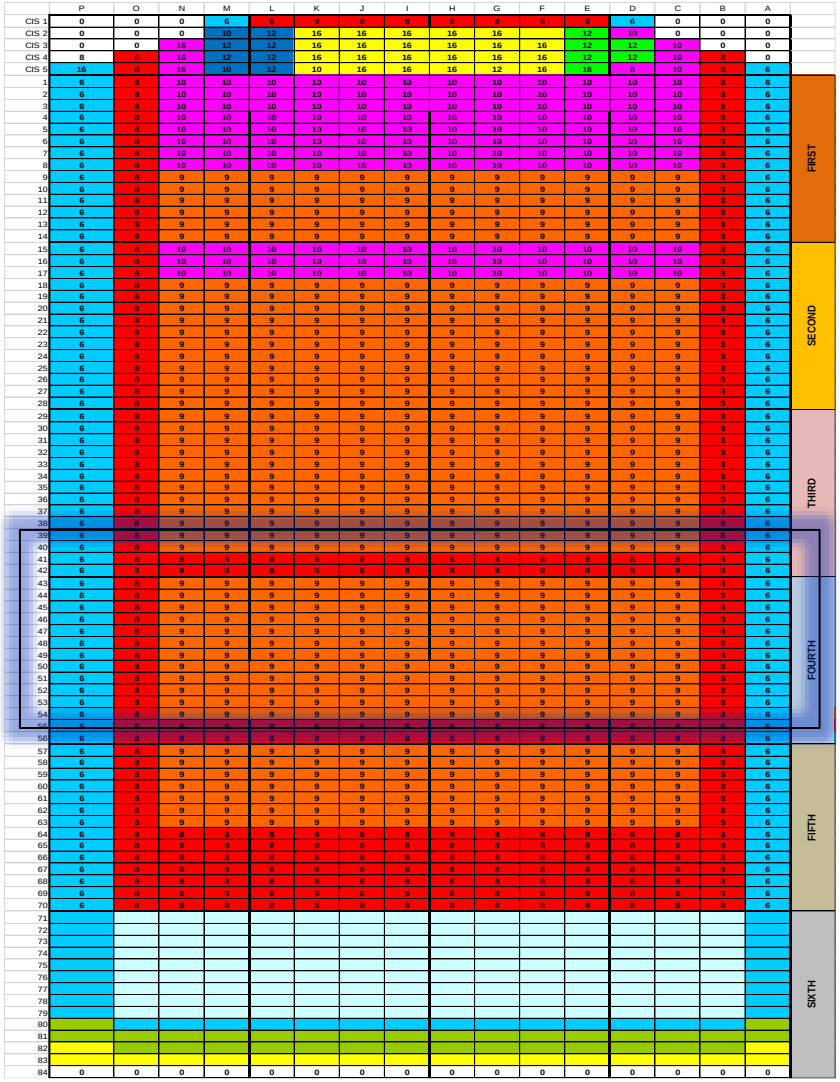
Project details and replication potential:

- Upgrade size of MFR in fourth chamber, MFR Size : **90,80,60** Changed to **100,90,60** MFR Size.
- Reduction in pressure drop from 820mmwc to 780mmwc.
- Improvement in Air mass flow rate from 1690 kg/min. to 1850 kg/min.

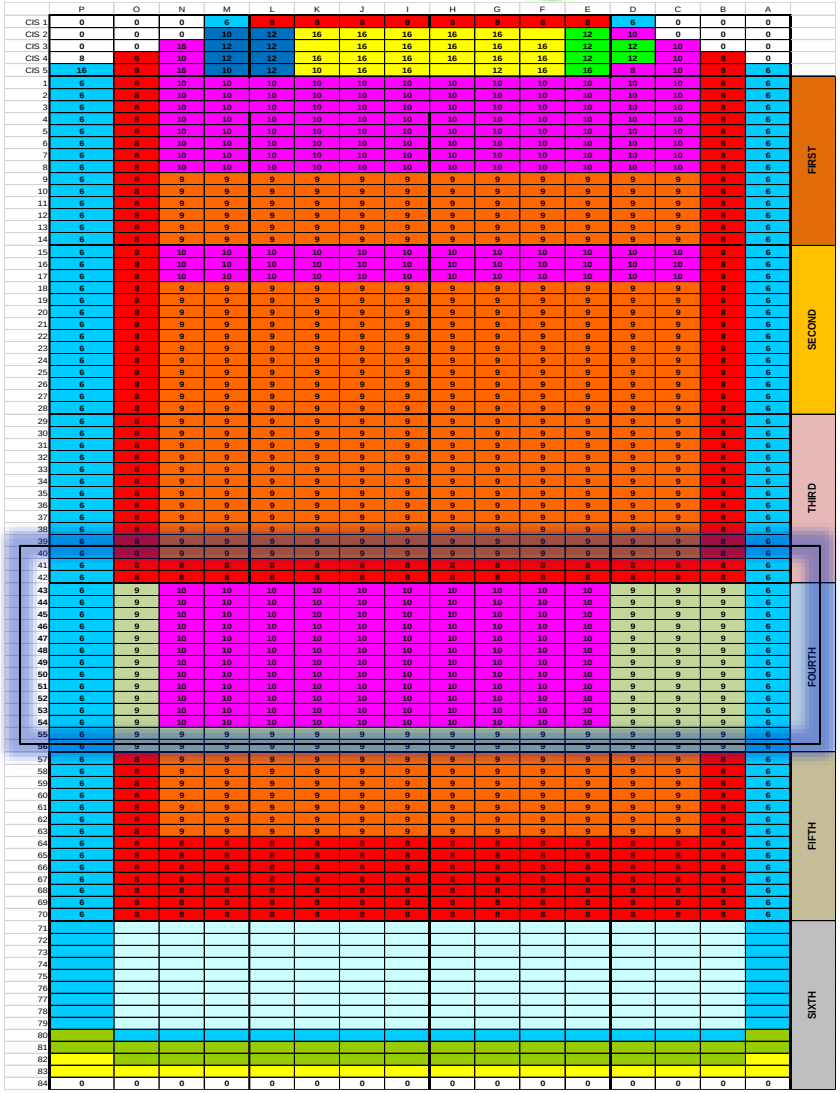
Impact:

- Reduction in cooler heat losses 2.0 Kcal /Kg. Clk. With saving per year 68 lakh INR.
- Rise in 0.1 MWH in AQC Boiler generation With saving per year 42 lakh INR.
- Enhanced life of belt conveyors at Post Clinkersation section due to reduced clinker temperature

Cooler MFR Recondition Before & After :

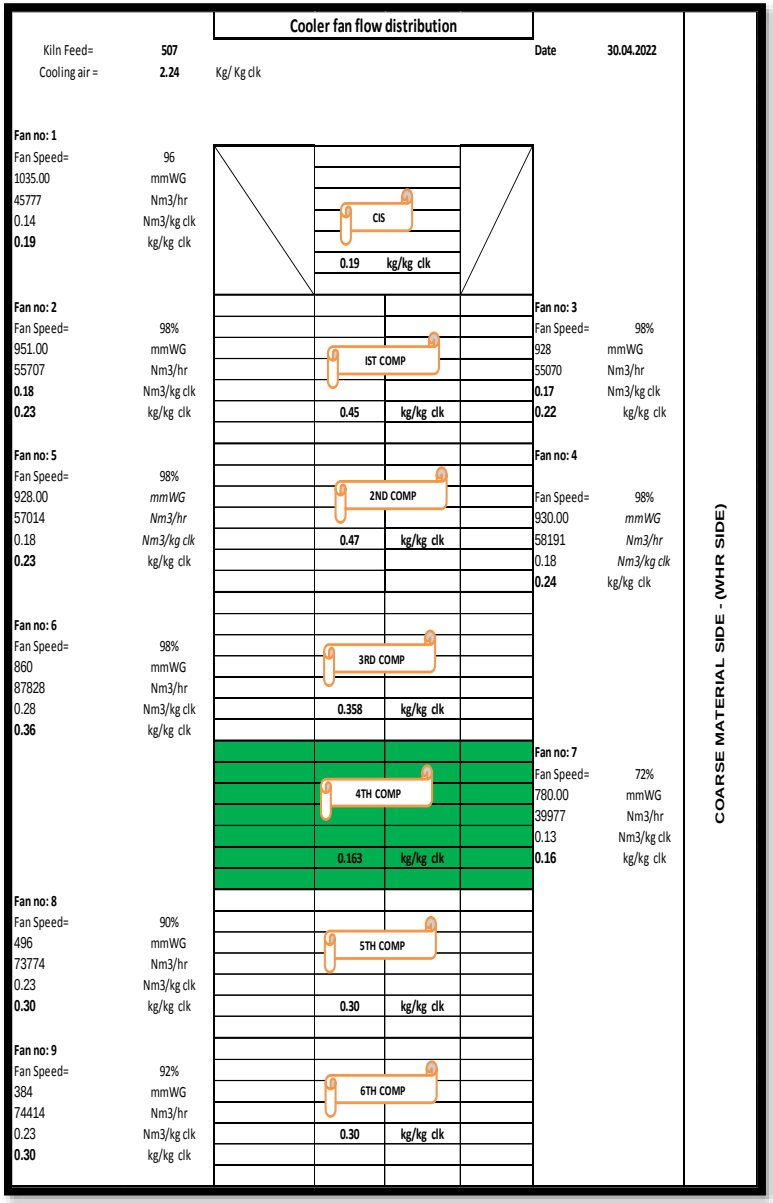


Before



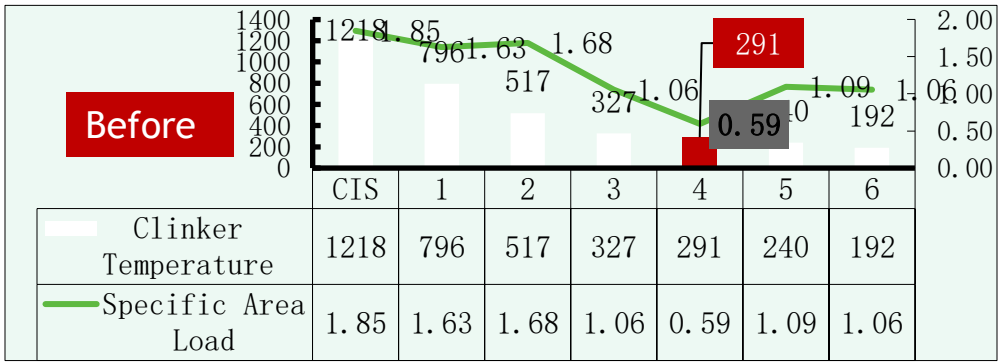
After

Cooler MFR Recondition Before & After :

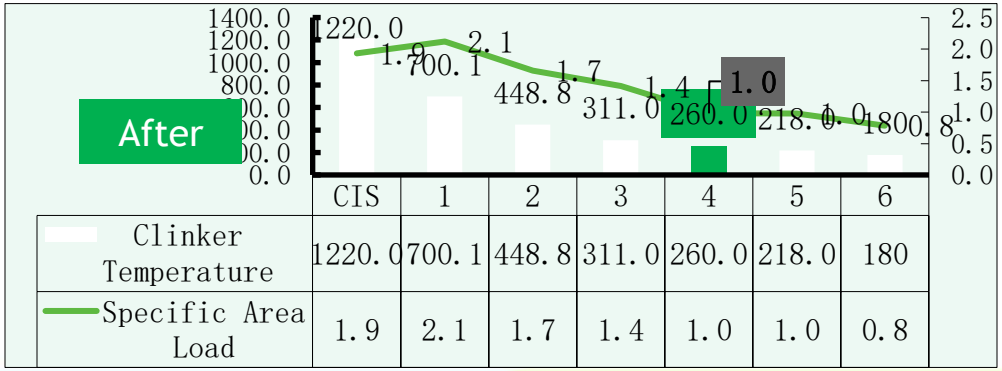


Fourth Compartment- Before MFR			
Size	numbers	%	kg/min
90	144	64.3	1166.4
80	52	23.2	374.4
60	28	12.5	151.2
	224		1692

Fourth Compartment - Changed MFR			
Size	numbers	%	kg/min
100	120	53.6	1080
90	76	33.9	615.6
60	28	12.5	151.2
	224		1846.8



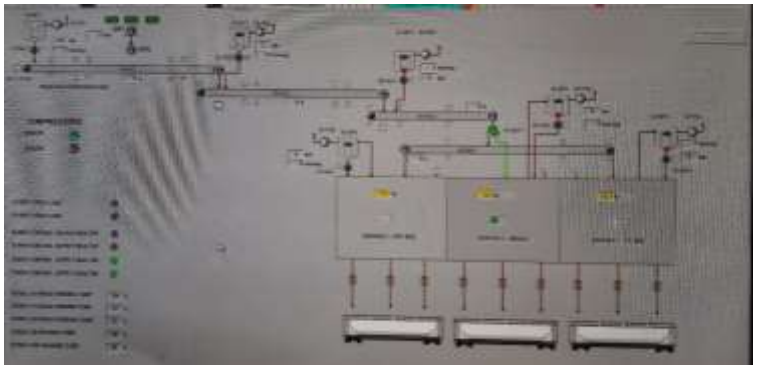
	CIS	1	2	3	4	5	6
Clinker Temperature	1218	796	517	327	291	240	192
Specific Area Load	1.85	1.63	1.68	1.06	0.59	1.09	1.06



	CIS	1	2	3	4	5	6
Clinker Temperature	1220.0	700.1	448.8	311.0	260.0	218.0	180
Specific Area Load	1.9	2.1	1.7	1.4	1.0	1.0	0.8

Innovative Projects Implemented

Innovative project # 2:
Optimization of Clinker loading transport operation



Contribution and efforts:

- Wagon loading group started once informed by site Technician /Engineer after placing of wagon.
- Number of times found, clinker wagon loading hopper level getting down after clinker extraction (after loading started) of 15 to 20 minutes.
- Observed during this time, all belts and bag filters running in Idle

Project details and replication potential:

- SOP made and informed to all the CCR staff, group being started immediately after hopper level get start to down/reduce. There by energy saving 19kWh achieved by optimized operation.
- Auto change over of gate by providing logic with hopper level.

Impact:

- Energy saving achieved 44kWh per wagon loading by optimized operation and total saving of 9750 kWh per year.

Innovative Projects Implemented

Innovative project # 3:
Optimization of RABH Reverse Air fan operation

Contribution and efforts:

- Previous RA fan run hours 5 to 6 hours per day
- Optimization of RABH RA fan internal timer to operate the puppet valve in between two chambers was reduced from 600Sec to 120Sec.

Project details and replication potential:

- Internal timer setting reduced from 600Sec to 120Sec
- RABH DP in with in the control i.e 80 to 90 mmWC

Impact:

- RA run hours reduced from 6 hours to 3 hours per day
- Energy saving achieved 350kWh per day

Renewable Energy Sources

Year	Technology (electrical)	Type of Energy	Onsite/Off site	Installed Capacity (MW)	Generation (million kWh)	% of overall electrical energy
FY 2019-20	Solar PV Module	Solar	Onsite	3	1.34	0.90
FY 2020-21	Solar PV Module	Solar	Onsite	3	5.02	3.64
FY 2021-22	Solar PV Module	Solar	Onsite	3	5.29	3.55

Note: Solar power plant commissioned in Dec'2019 & planned additional 3MW power plant with line-2 project

Waste Utilization Management

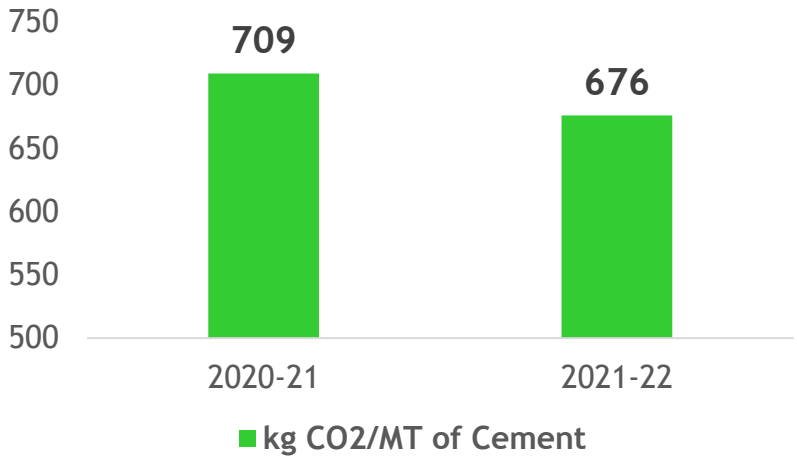
Year	Waste as fuel	Quantity (MT)	GCV (kCal/kg)	Waste as percentage of total fuel
2019-20	High CV Flyash, Solid & liquid waste(pharma), Dolochar	27508	2542	4.84
2020-21	High CV Flyash, Solid & liquid waste(pharma), Dolochar	17281	1515	1.86
2021-22	High CV Flyash, & liquid waste(pharma)	17263	1534	1.68

Waste Utilization Management

Year	Waste as raw material	Quantity (MT)	Replaced material	Waste as percentage of total raw material
2019-20	Redmud &Fly Ash(CPP)	13559	Laterite	0.47
2020-21	Redmud &Fly Ash(CPP)	22842	Laterite	0.42
2021-22	Redmud &Fly Ash(CPP)	20107	Laterite	0.64

GHG Inventorisation

Emission disclosed to public by providing screen



Target (short term/long term) action plan :

- ✓ To Maintain fly ash addition 35% in PPC & 20% in Maxcrete
- ✓ To Increase AFR consumption from 1.68% to 10% (TSR) on phased manner
- ✓ To Increase ARM addition from 0.64% to 3% on phased manner.
- ✓ The overall CO2 reduction can be achieved by 75508 MT per year
- ✓ **Solid waste feeding system installation work completed with a investment of Rs. 243 million and commissioned on 15th August.2022.**
- ✓ Planned to install 3MW additional solar power plant inside the boundary.

AFR Project Commission glimpse

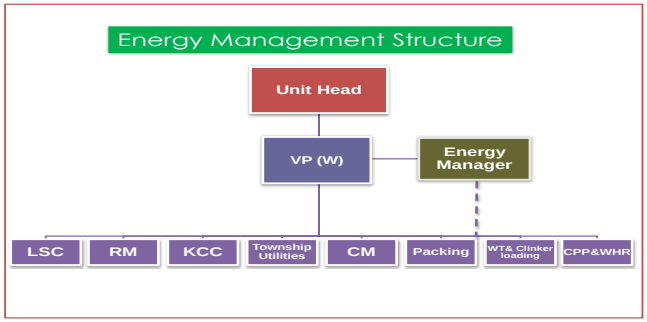
Green Supply Chain Management

- Coal and Gypsum unloaded wagons using for clinker bulk loading
- Outside flyash unloading bowsers are using for cement bulk loading
- Incoming raw materials Laterite/Iron Ore trucks return loading with cement bags
- Procuring laterite near by source Vikarabad instead of long source.
- To improve the rail dispatch instead of road dispatch through trucks.
- To increase dispatch through bulk loading instead of cement bags.
- Focusing on scope -3 GHG emissions apart from scope-1& 2 GHG emissions.
- Creation of awareness about green supply policy to our suppliers and stakeholders.

Team work, Employee Involvement & Monitoring

- Review of production and power -Daily (Unit Head)
  Cross functional team(CFT) – Daily (HOD)
  Encon Team – Weekly (Unit Head)
  Head Office - Daily/Monthly (COO).

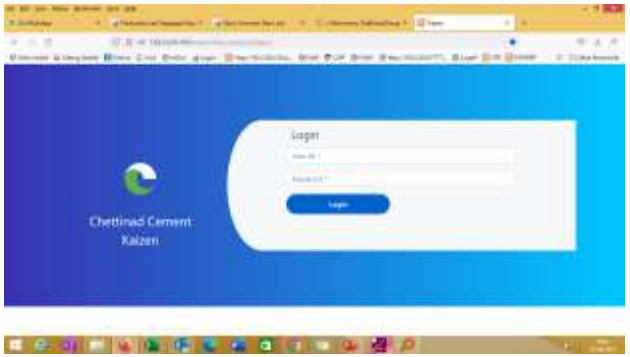
- Separate budget Allocated for Encon activities Rs.7.62 Millions and Rs 243 Millions for AFR project.
- Energy efficiency / Awareness training on energy conservation being conducted monthly once.



- Conducting regular Encon cell meeting with Executives & CFT meeting with workmen.

- Energy Audits (Internal and external).

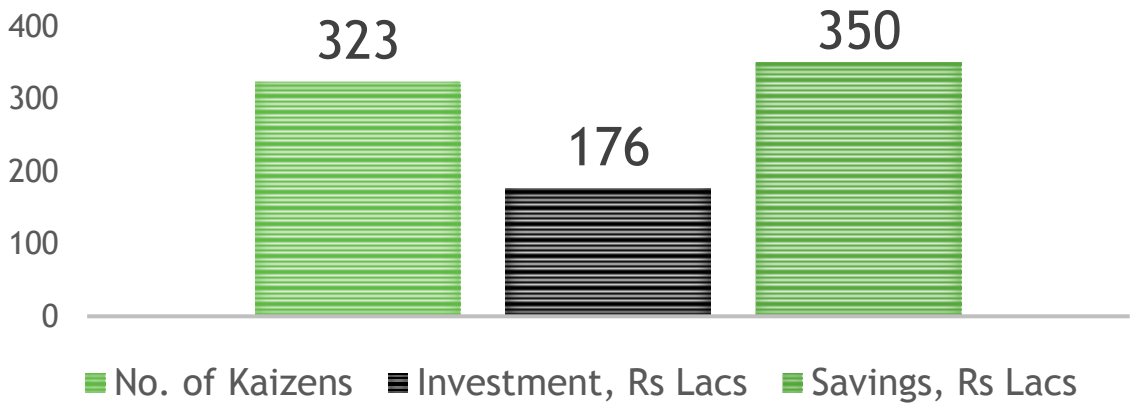
- Kaizen portal.



- Suggestion box at respective section.

Team work, Employee Involvement & Monitoring (Kaizens)

Sl.No	Department	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	YTD Total
1	Mechanical	0	0	1	4	7	10	8	7	11	8	5	4	65
2	Electrical	6	5	2	9	7	11	6	-	08	3	9	-	67
3	Instrumentation	4	3	3	3	3	3	1	3	03	4	9	-	39
4	Operation	0	2	5	6	8	3	2	6	04	-	-	-	36
5	CPP	8	8	6	15	13	13	9	7	11	9	1	-	100
6	Mines	0	0	0	0	2	2	-	-	01	7	-	-	12
7	QUAS	0	0	0	0	1	-	-	-	-	-	-	-	1
8	Civil					1	1	1	1	-	-	-	-	4
Monthly Total		18	18	17	37	42	43	27	24	38	31	24	4	323



Kallur Works Achievements FY 2021-22

Sl.No	Achievement	Achieved figure	YTD
1	Ever Highest Clinker Production in LMT	21.04	2021-22
2	Ever Lowest SEC, OPC43 grinding, kWh/MT Mat	28.03	2021-22
3	Ever Lowest SEC, PPC grinding, kWh/MT Mat	27.43	2021-22
4	Ever Lowest SEC, Maxcrete grinding, kWh/MT Mat	38.71	2021-22
5	Ever Lowest SEC, Overall Cement grinding, kWh/MT Mat	29.57	2021-22
6	Ever Highest Clinker Dispatch-SGU in LMT	10.17	2021-22
7	Ever Highest Maxcrete Production in LMT	1.13	2021-22
8	Ever Highest Maxcrete Dispatch in LMT	1.13	2021-22
9	Ever Highest blended Cement Production- %	34.90	2021-22
10	Ever Highest Blended Cement Dispatch - %	34.97	2021-22
12	Ever Highest No. of Clinker rakes send to SGU in No's	261	2021-22
13	Ever Highest Kiln run days	278.5	2021-22
14	Ever Highest Raw Mill-1 run days	236.7	2021-22
15	Ever Highest Raw Mill-2 run days	233.5	2021-22
16	Ever Highest Coal mill run days	178.5	2021-22
17	Ever Highest LS Crusher run days	143.6	2021-22
18	Ever Highest WHR Gross Generation, MWH	7.37	2021-22
19	Ever lowest WHR Aux. Power Consumption -%	5.66	2021-22
20	Ever Highest Solar Gross Generation, Lac kWh	52.90	2021-22

Implementation of ISO 50001:2018

- Kallur works has been certified ISO 50001 by BSI.
- Quality Management System ISO 9001:2015.
- Environment Management System ISO 14001:2015.
- OHSAS Management System ISO 45001:2018.

bsi.

Certificate of Registration

ENERGY MANAGEMENT SYSTEM - ISO 50001:2018

This is to certify that: Chettinad Cement Corporation Private Limited
Kallur Works, Sangam-K
Bhakthampalli (PO)
Chincholi(TQ)
Kalaburagi (Dt) 585 305
Karnataka
India

Holds Certificate No: **ENMS 701049**

and operates an Energy Management System which complies with the requirements of ISO 50001:2018 for the following scope:

Mining of Limestone, Crushing, Clinkerization, Cement Grinding, Packing & Despatch of Cement & Clinker and Generation of Power through Captive Power Plant and Solar Power Plant.

For and on behalf of BSI:

Michael Lam - Managing Director Assurance, APAC

Original Registration Date: 2019-03-22
Latest Revision Date: 2022-02-22

Effective Date: 2022-03-22
Expiry Date: 2025-03-21

Page: 1 of 1

...making excellence a habit.

Learning from CII Energy Award or any other award program

- We have great learning from CII awards program, by sharing of best practices across other cement plants.
- Installed MV drive for both raw mill separator fan.
- Installed low pressure compressor for fly ash unloading system.
- BFP operation optimized by providing PID loop, drum pressure Vs BFP pressure at CPP
- Good platform for knowledge exchange and implementing best practices from other units.
- Bench mark values across cement industries.
- Recognition from CII when perform better than other plant.

Awards & Accolades

MEMC week 2021-2022 prizes list (Group-1)

Overall performance	-	**1st Prize**
Mineral conservation	-	**1st Prize**
Stock and waste dump management	-	**1st Prize**
Afforestation	-	**2nd Prize**
Energy conservation	-	**3rd Prize**

Chettinad cement

Thank You

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