HEIDELBERGCEMENT

“23rd National Award for Excellence in Energy Management 2022”

Zuari Cement Limited, Chennai

Lead Presenter

Hearty Welcome to All

23rd National Award for Excellence in Energy Management 2022

Mr. Y. Nagendraprasad

Plant Head

Mr. S.P.Rameshbabu

Asst. General Manager - Production

Mr. R.Samisaac

Senior Manager –E&I

Brief Introduction

Zuari Cement
HEIDELBERGCEMENT Group

2011
Plant Commissioned

2011
Italcementi 100% Share holder in Zuari Cement Limited

2016
Management took over by Heidelberg Group

25 May 2022

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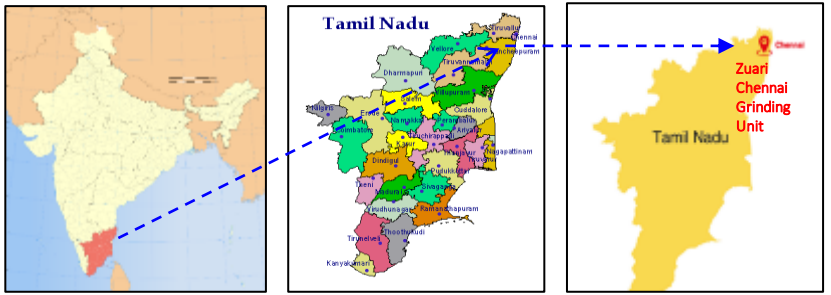
YEARS WITHOUT LOST TIME INJURIES SINCE COMMISSIONING

Plant Capacity: Cement : 1 MTPA



Nearest Railway station : Athipattu ,2.3 km from the plant.
Nearest Airport : Chennai, 64.2 km from the plant.

CO_2 Label on Cement bags:

- Global responsibility to keep temperature rise < 2°C
- Reduction on our impacts on air, land and Water

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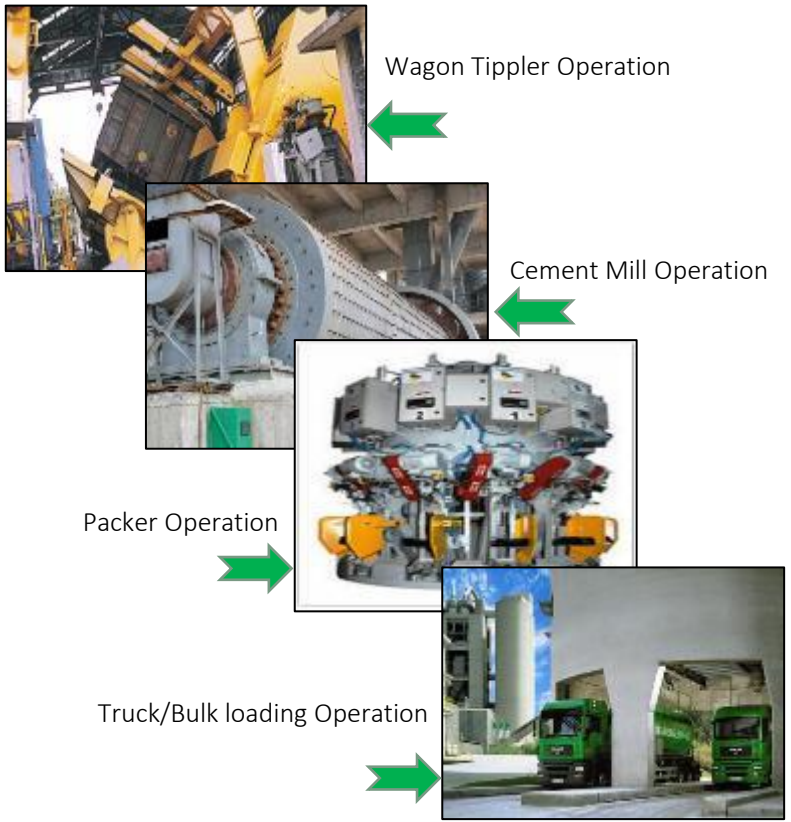
INDIA

Zuari CGU Plant Key Equipment and Specification of Major sections

CGU – PROCESS FLOW DIAGRAM



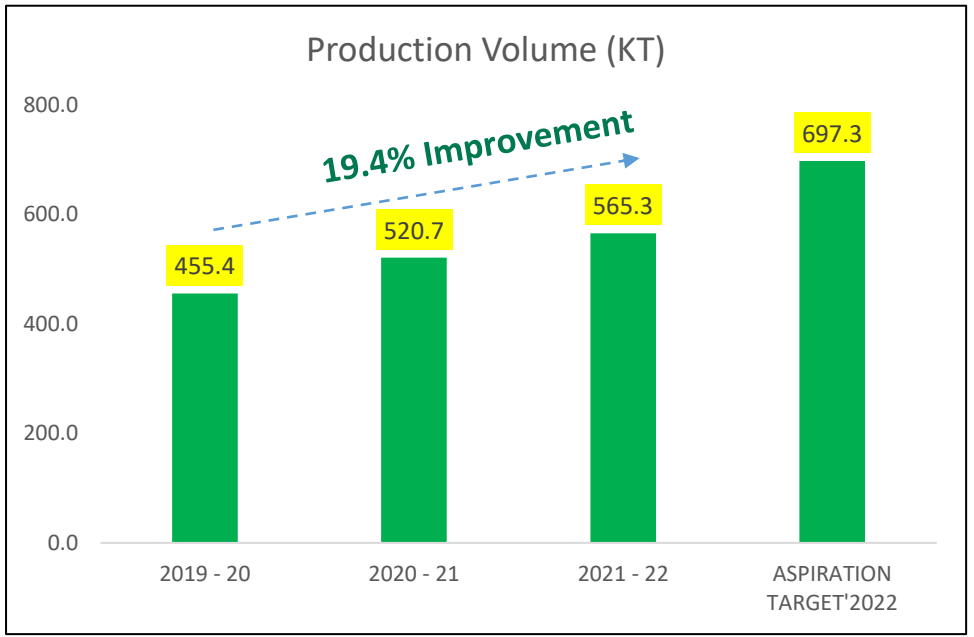
Cement grinding, Wagon Tippler & storage

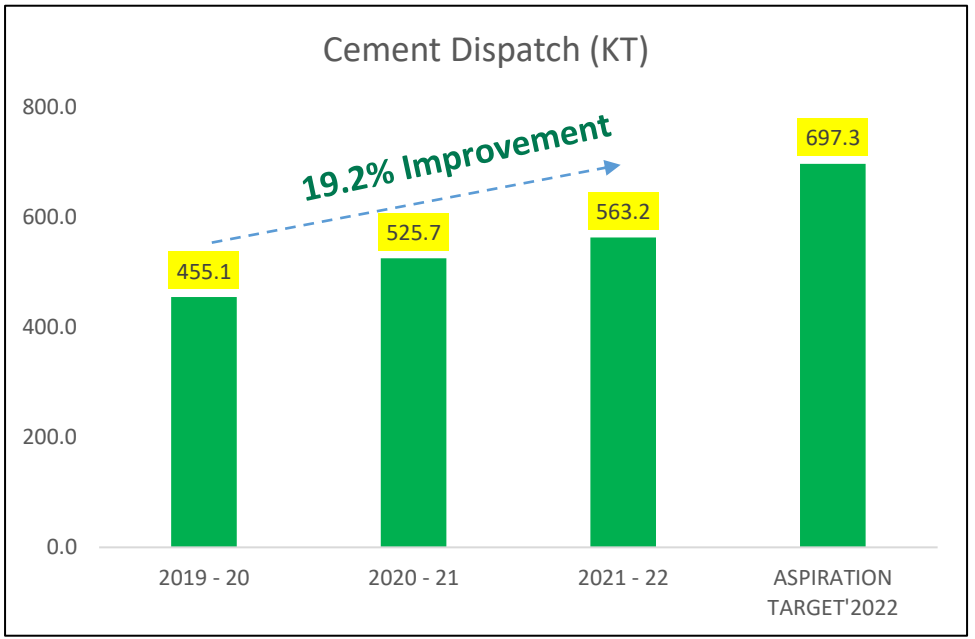
Equipment	Supplier	Type	Design Capacity (tph)
Wagon Tippler	Elecon India Private Limited	Clinker Unloading	1200 tph
Ball Mill	Walchandnagar Industries	Cement mill 4.4 m Dia * 15 m Length	120 MT
Clinker Silo		Storage Silo	17000 * 1 no
Cement Silos		Storage silos	7500 MT * 2 no's

Packing and Loading

Equipment	Supplier	Type	Capacity (tph)
Packers 1	FLS - EEL	10 spouts,Roto packer	120 tph
Packers 2	FLS - EEL	10 spouts,Roto packer	120 tph
Bulk loading station	Sartorius weighing India Pvt. ltd	2 loading stations	140 tph (each)

Cement Production and Cement Dispatch Volume

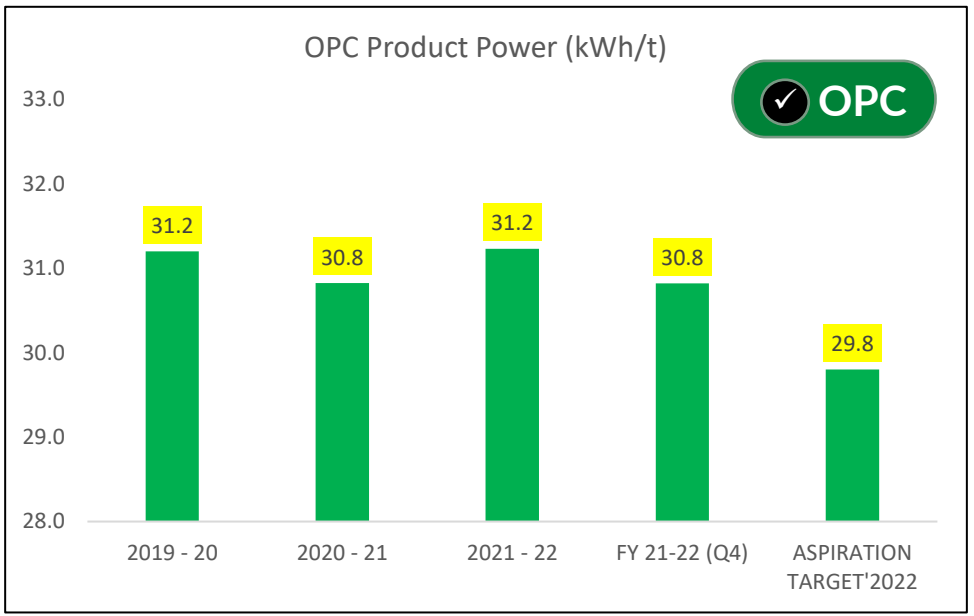


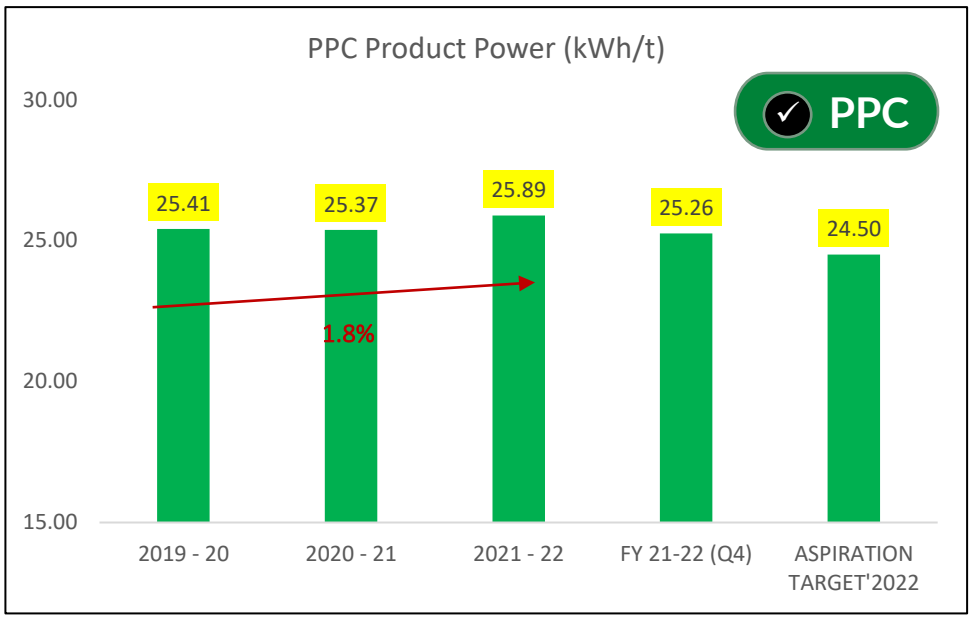


PRODUCTION AND DISPATCH VOLUME ACHIEVEMENT TREND

- Highest Cement Production volume and Cement Dispatch Volume for the FY 2021 – 2022 since FY 2019 - 2020

Productwise Specific Power Consumption

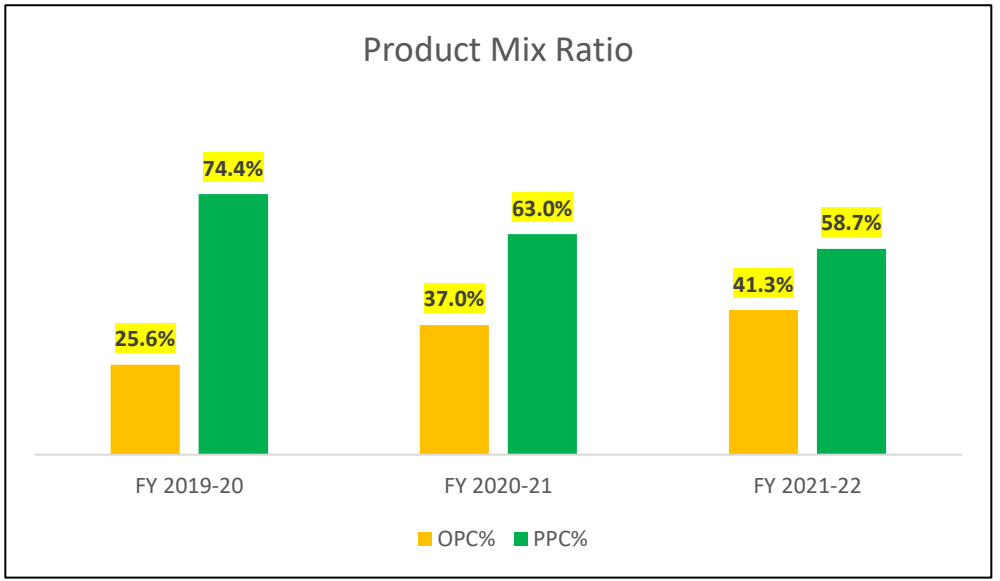


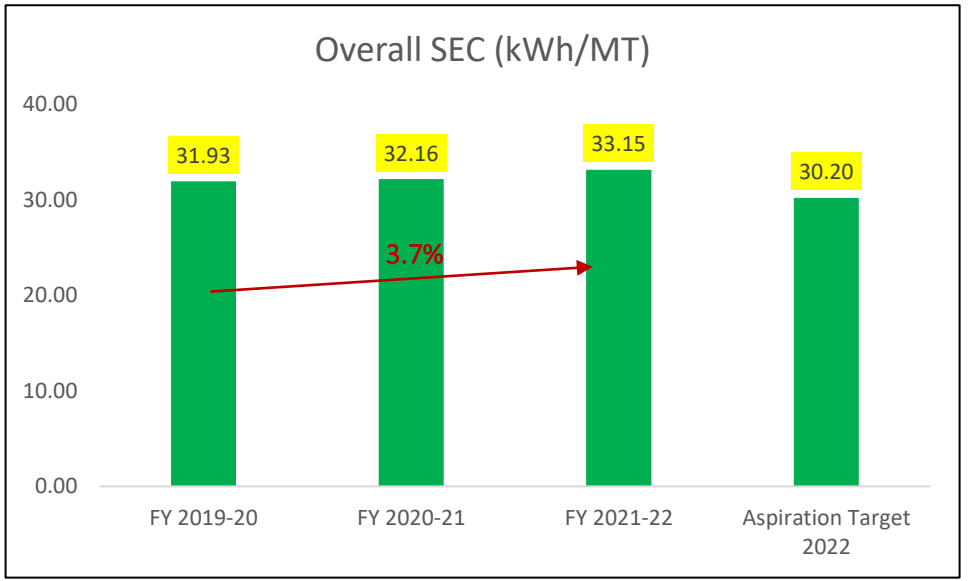


PRODUCTWISE POWER TREND

- Q4 – Achieved the less specific power consumption of OPC and PPC Product.
- FY 2021 – 2022 – High SEC due to Silo feed bucket elevator maintenance for the period of Jul to Aug'2021.

Product Mix ratio and Overall SEC





PACKING AND UTILITY POWER TREND

- FY 2021-22 – Specific Electrical consumption is high SEC due to following reasons:
  (i) OPC product mix ratio is high (ii) Silo feed bucket elevator maintenance for the period of Jul to Aug'2021.

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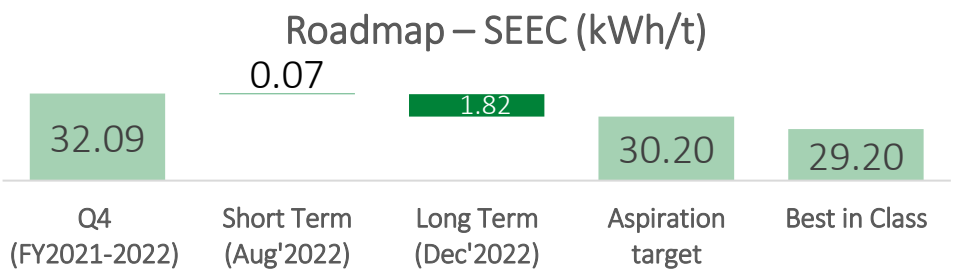
Information on competitors, National & Global benchmark

Grade	Present SEC (kWh/MT)	Internal Benchmark (kWh/MT)
OPC	30.84 (Lowest in ZCL)	30.84
PPC	25.26 (Lowest in ZCL)	25.34

Type	Present SEC (kWh/MT)	External Benchmark (kWh/MT)
CM-1	32.09	29.20

- External Benchmark Source: In reference to CII Energy benchmarking for Indian Cement Industry Version 4.0

Type	Present SEC (kWh/MT)	Short Term Target (kWh/MT)	Long Term Target (kWh/MT)
CM-1	32.09	32.02	30.20



- Short Term will be completing on before Aug’2022
- Long term will be completing on before Dec’2022 *(Heidelberg Mission Possible projects)*

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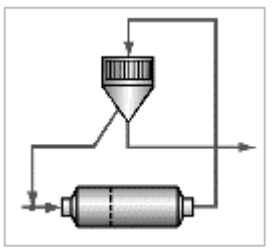
Major Innovative Projects planned for FY 2022 – 2023

Savings: 1.8 kWh/ t
Cost: 3.8 MINR/annum



Mill Process bag filter product diverted to cement silo

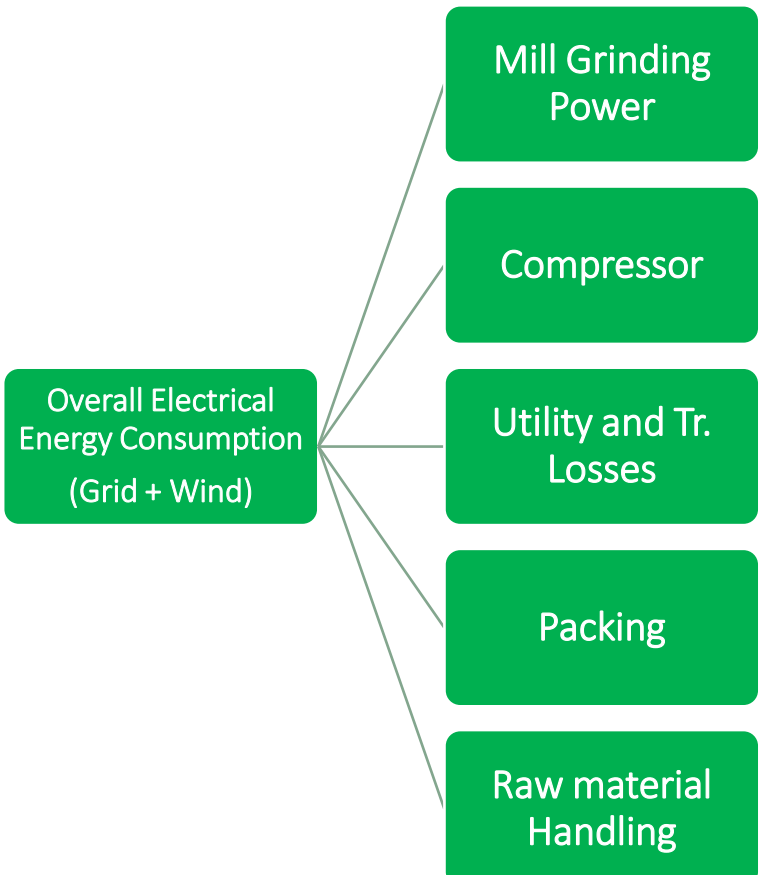
Benefits:

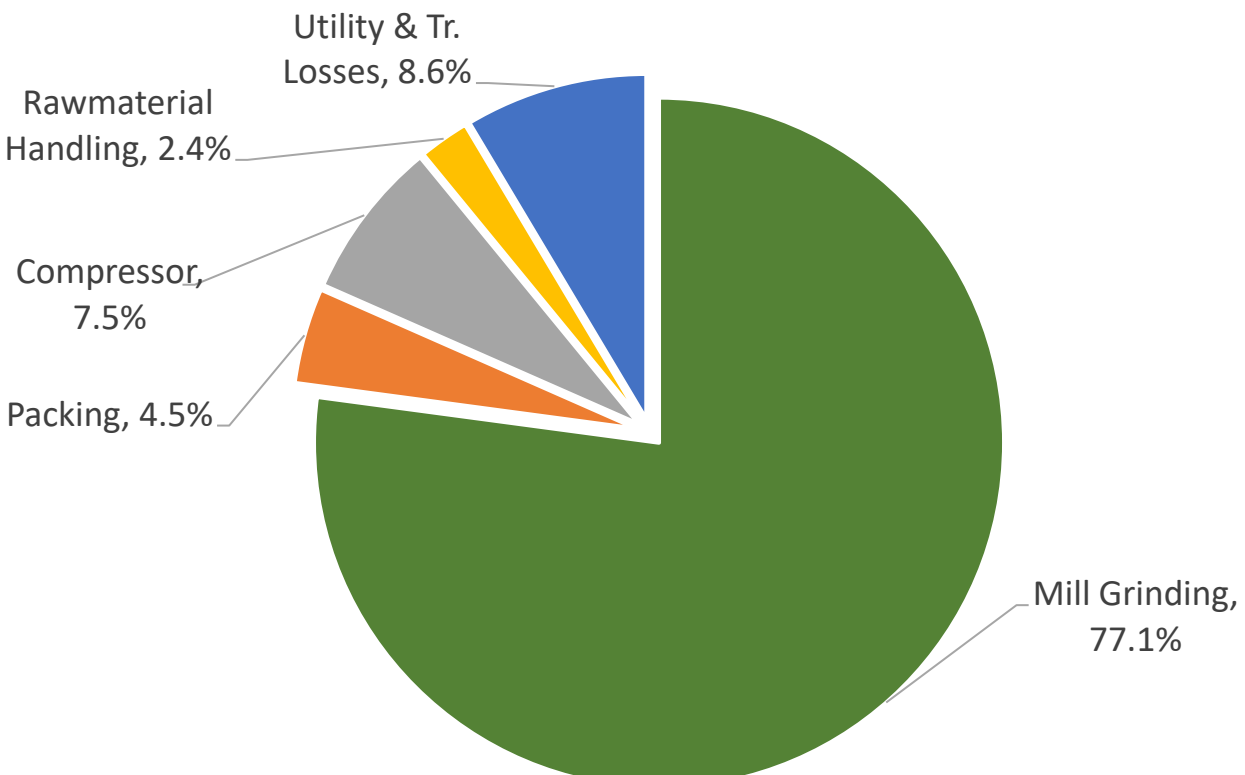
- Installation of Screw conveyor and Air chamber for conveying the product of Mill process bag filter to final product air slide and final to Cement Silo.
- This will reduce the load on classifier as a reject material to the Mill got reduce & Subsequent increase in mill output.
- There will be reduction of Specific power consumption by 1.8 kWh/t.
- Total Annual Saving is 38 Lacs

Major Learning & Project Reference from CII:

- CII – 21st Award for Excellence in Energy Management – 2020 from Sirohi Cement Works

Overall Energy Consumption Details





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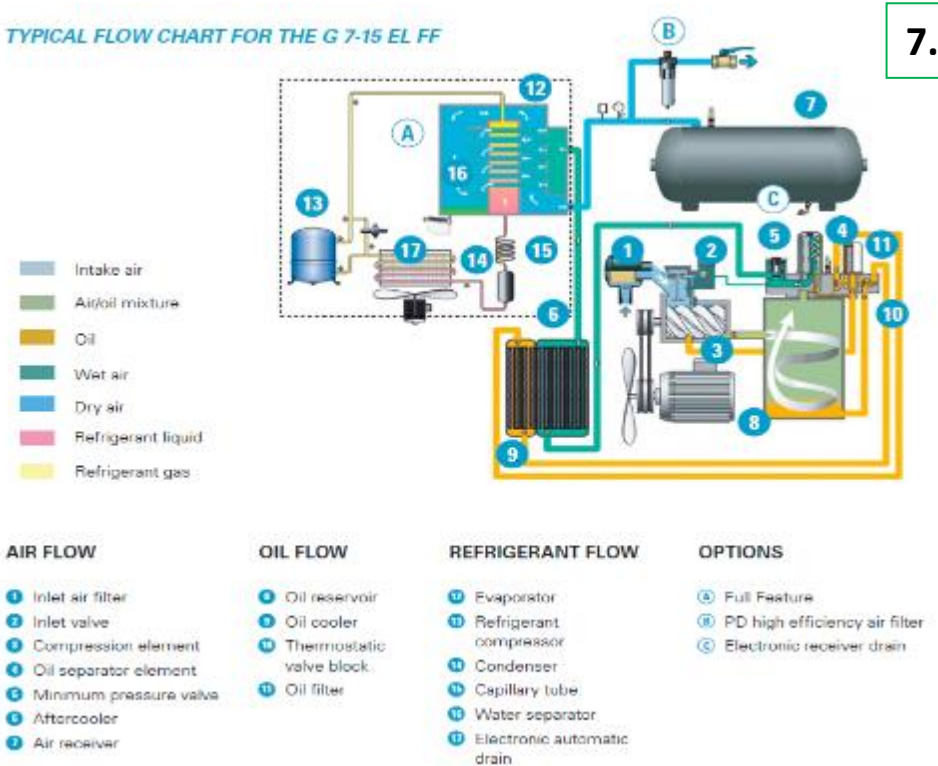
ENERGY SAVING PROJECTS IMPLEMENTED IN LAST 3 YEARS

Year	No of Energy Saving Projects	Investment (INR Million)	Electrical Savings (Million kWh)	Savings (INR Million)	Impact on SEC (kWh/t)
FY 2019 - 20	3	0.85	0.01	1.52	0.19
FY 2020 – 21	5	5.58	0.08	4.89	1.07
FY 2021 – 22	2	4.73	0.07	3.35	0.84

Innovative Projects Implemented



7.5 kw Screw compressor for Cement Mill Girth Gear System

ISSUES:

- Girth gear and Pinion assembly is one of the critical component of cement mill drive system.
- One of the main reason for damage to gear tooth is poor lubrication.
- We are using common compressor to supply compressed air to all mill & packing plant circuit equipment's & accessories that includes girth gear lubrication system.
- Reduction in compressed air pressure due to increase in usage at other different location like packing & silos.
- Low compressed air pressure delivers improper lubrication to girth gear assy.
- Works Completed

Benefits:

- Reduced the SEC of Compressor
- Increase in life of girth gear assy.
- Increase equipment reliability.

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Innovative Projects Implemented

Before Feeding system Arrangement

Separate Feeding System arrangeement

Installation of Gypsum feeding system

ISSUES:

- Gypsum is fed to dump hopper with help of pay-loader machine in wall-to-wall condition by travelling in high slope ramp with reversing operation where vehicle movement and human movements also happens.

Risk involved:

- With existing gypsum handling procedure, vehicle collision / hitting by vehicle hazards are involved which has high level of risk and may leads to fatal accident.
- Due to handling, spillage and spreading of gypsum in surrounding area.
- Diesel consumption increased due to Pay-loader run hours increased.

Action Taken:

- New Gypsum feeding arrangement made.

Benefits:

- Dust and Spillage avoided
- Diesel consumption has reduced due to movement has reduced.
- Avoided Reverse movement from Ramp (Safety)

Innovative Projects Implemented

Before modification

Abnormal Wear in Flow Control Gate Rotor

After modification

Abnormal Wear in Flow Control Gate Casing

Damaged Surge Bin Material chamber

Dedusting System for Cement Silo Extraction System (2 Nos)

ISSUES:

- At present we are having Pneumatic transporting system for extraction of Cement from Cement Silos.
- Old arrangements of System is not having venting facility for cement extraction systems. This results in Silo Surge Bin gets pressurized very frequently and leads to frequent failure of fabrics, high wear rate in flow control gates resulting fugitive dust emission from extraction system.
- To avoid the frequent wear and tear problems and to maintain dust free work environment, We have installed the de-dusting equipment (Works completed)

Benefits:

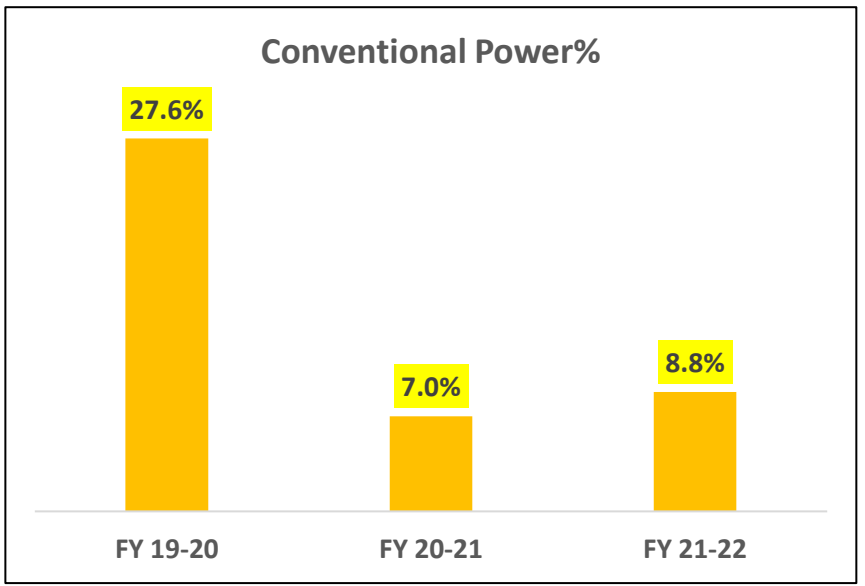
- Dust free Environment
- Avoiding pressurization
- Avoiding frequent start stop of equipment

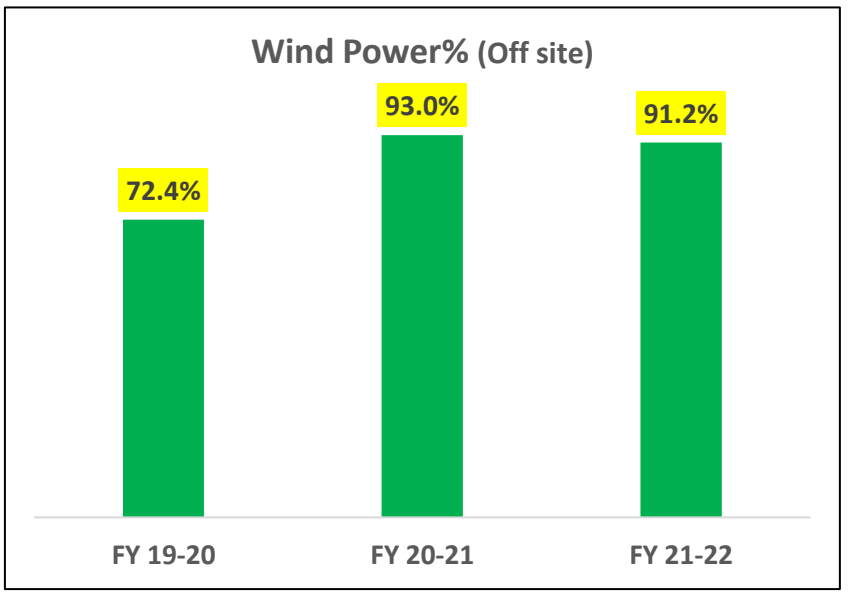
(a) Utilization of Renewable Energy Sources

Sl No	Year	Type of Energy	Onsite/ Off Site	Renewable Energy Consumption	
				MWH	%overall
1	FY 2019 – 2020	Wind	Off site	10.53	72.4%
2	FY 2020 – 2021	Wind	Off site	15.57	93.0%
3	FY 2021 – 2022	Wind	Off site	17.08	91.2%

- We have made Share holding agreement and power purchase agreement under GCPA scheme with M/s Echanda Urja Pvt Ltd, is subsidy of M/s Nouvus Energy Limited Mumbai. M/s Nouvus Energy is Limited having 105MW capacity of wind turbines in southern part of tamilnadu.

(b) Utilization of Renewable Energy Sources





- We are holding 10% of Shares with M/s Echanda Urja Pvt Limited and able to consume **10% of total energy generation** of M/s-Echanda Urja Pvt Limited.
- Share holding agreement and Power purchase agreement will be renewed every five years and next renewal is June 2026

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GHG inventorization

Year	SPM Value* (Ball Mill Stack Monitor) Mg/NM_3	CO_2 Value ** Kg CO_2/MT
FY 2019 – 2020	11.4	8.4
FY 2020 – 2021	11.1	2.2
FY 2021 – 2022	10.5	2.8

- * Currently we are circulated to publicly and connected to CPCB
- ** CO_2 Values calculated from Grid Power source – Scope-2

Initiatives for Carbon capture and reduction in FY 2022 - 2023

- ❑ Reducing the clinker to cement ratio
- ❑ Increasing the PPC volume ratio from 60% to 80%
- ❑ Increase Plantation in plant premises
- ❑ Increasing from 3.5% to 5.0% performance improver (flyash) in OPC
- ❑ Implementation of identified energy conservation Project
- ❑ Global responsibility to keep temperature rise < 2 C

CO_2 Reduction initiatives – Sustainable Development

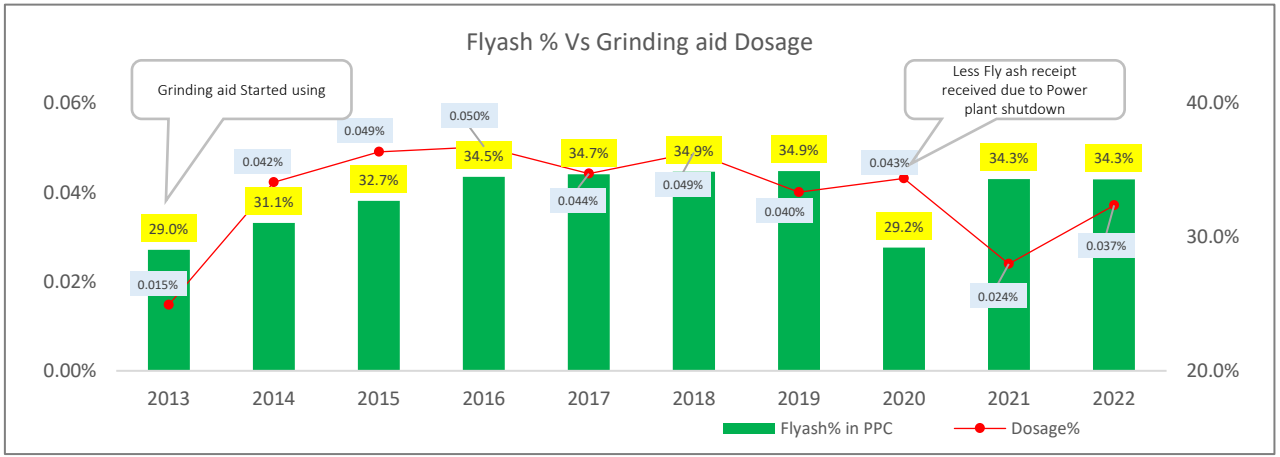
PERFORMANCE ENHANCER
Properties:

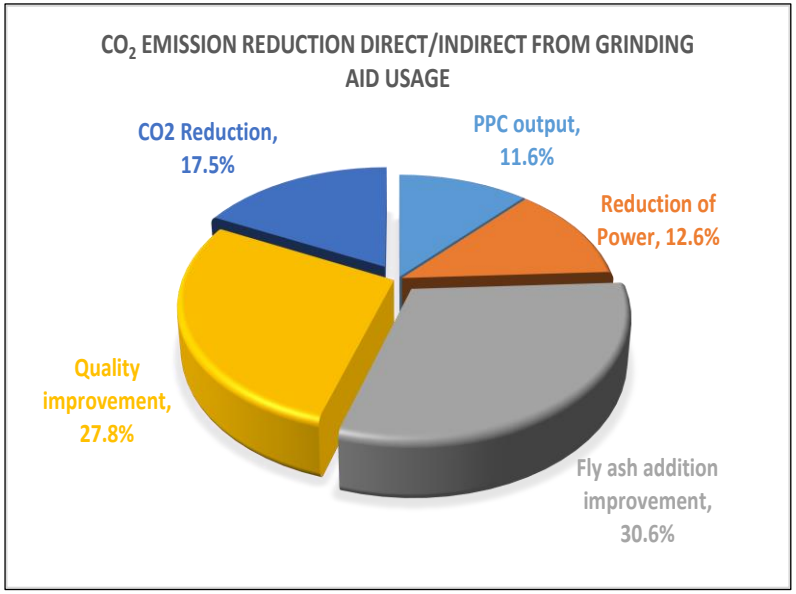
- ❑ Active ingredients: Aqueous solution of Organic components
- ❑ Density at 20 C: 1.195 kg/dm3
- ❑ pH at 20 C: 8.5 (+/- 1.5)
- ❑ Alkali content: <10% Na_2 O equivalent

Grinding Aid Usage **(Performance Enhancer)**

Improved the efficiency of Cement production

- ❑ Increased the PPC output rate from 146 to 158 TPH (6-8%) at same Blaine's
- ❑ Reduced Energy Consumption from 27.1 kWh/t to 25.0 kWh/t (8-10%) in PPC grinding
- ❑ Sustaining 35.0% of fly ash addition in PPC grinding.





Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Grinding Aid Dosage (%)	0.01%	0.04%	0.05%	0.05%	0.04%	0.05%	0.04%	0.04%	0.02%	0.04%
Flyash addition (%)	29.0%	31.1%	32.7%	34.5%	34.7%	34.9%	34.9%	29.2%	34.3%	34.3%
PPC 1D Strength in MPa	14.3	13.8	12.6	11.6	11.4	10.8	11.2	14.6	9.4	11.3

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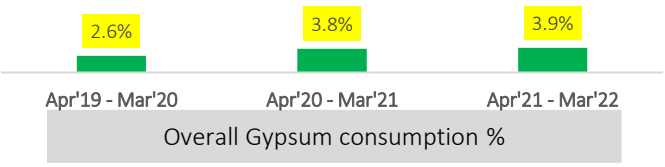
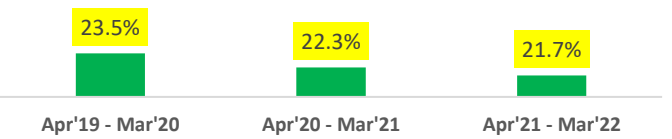
Green Supply Chain Management

Material Description	Units	Apr 19-20	Apr 20-21	Apr 21-22
Gypsum	MT	13762	17287	21643
Fly ash	MT	122132	101745	119629
Total recycled Materials	MT	135894	119032	141273
Cement Production	MT	520711	455391	551065
Total recycled Materials	%	26%	26%	26%



Overall Gypsum consumption %



Overall Fly ash consumption %

Initiatives taken in Supply Chain to reduce Energy Consumption

- 35% Fly ash using in our PPC production
- Long term contract agreement for lifting the dry fly ash from NTPC and NTECL power plant has been done.
- 2.6% to 3.9% of Chemical Phospho Gypsum from Fertiliser plant Waste product using in our cement Production
- Implementation of SAP for paper less procurement procedure
- STP treated Water is used in Plant Gardening

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Green Supply Chain – Product Cycle

RAWMATERIAL HANDLING

- New gypsum feeding conveyor installed and commissioned to avoid the reverse operation of JCB for Safety, reduce the JCB run hours and diesel consumption.
- 100% Clinker unloading by Wagons with dust free environment

PROCESS UPGRADATION

- Third Generation classifier for Ball mill operation
- Variable Flow drive for fly ash unloading compressor for Energy Saving
- Natural Resources conserved by using alternative raw material like Chemical Gypsum
- XRF analyzer to monitor the quality

WASTE UTILIZATION

- Water consumption in Mill is eliminated completely by optimizing the process as well as increasing the usage of High Moisture gypsum
- Spillage/ Leakage material is reused as a feed if any.
- Reduction on our impacts on air, Water and land

PACKING

- Truck Loader No:1 out of 4, the Reverse movement operation of trucks completely avoided for safety purpose
- Bag filter for truck loading to reduce dust losses.

SALES & DISTRIBUTION

- Increased the bulk ratio to reduce the SEEC.
- Weighment Sensor installed and commissioned to improve the correct Weighment of each trucks and bulker.

CUSTOMER SUPPORT

- Developed and supplied the PRIMO - GreenCem Product

Water Pond Development & Rainwater Harvesting




- Commissioned in June'2011, CGU, is a young plant with basic infrastructure and industry best practices in place.
- Plant is water positive, with neutral water reservoirs development at CGU plant site for rainwater harvesting
- Green belt development since plant commissioning, with annual plantation of 1200 to 1500 saplings

WATER PRIORITY ACTION TAKEN:

- Reduce the demand for freshwater consumption
- Improving Water Capture and Storage
- STP Water is being used for Plant Plantation

ENERGY COMMITTEE TEAM

Rameshbabu SP
Energy Circle Coordinator

EC Team - 1

Energy Efficiency Improvement

Sam Isaac

Ponnusamy

Prasanna

Paneer

Total Members: 4

EC Team - 2

Productivity Improvement

Rameshbabu SP

Venkatesan

Raja

Venkatesulu

Total Members: 4

EC Team - 2

Reliability Improvement

Dhandapani

Prasath

Gopal

Bala

Total Members: 4

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ENERGY MONITORING – TEAMWORK & EMPLOYEE INVOLVEMENT

ENERGY MONITORING SYSTEM

Energy Data collection

- EMS
- Multifunction Transducer for total power
- KW Transducer for all MCC's
- Energy Meters for feeders

Energy Review Meeting

- Weekly Energy Circle Meeting
- Management review Meeting
- Quarterly Objective and Targets
- Data Comparison with Benchmark

Energy Reports

- Daily Flash Report
- Daily Power Report
- Open Access Power report

Energy Excellence Performance

- Daily Energy performance review Meeting chaired by Plant Head
- Monthly Energy Performance review Meeting chaired by MD

- Section Covered during Review SEC Meeting: Main Drive Power KPI Product wise, Packing and Utilities

ENERGY MONITORING – TEAMWORK & EMPLOYEE INVOLVEMENT

ENCON Methodology: Daily Power Report Circulated to Technical and Management Team.

CGU - DAILY FLASH REPORT

Figures In Tonnes		Plan Apr'2022	OD	MTD	YTD
OPC Grinding		21435	0.00	1920.00	67874.00
PPC Grinding		32152	1078.00	17100.00	113060.00
Total Grinding		53586	1078.0	19020.00	180934.0
OPC Despatch-Total		21435	391.13	5935.13	68260.91
PPC Desp -Total		32152	1186.00	17242.50	115673.26
Bulk cement despatch %			5.91	12.64	23.57
Bag cement despatch %			94.09	87.36	76.43
PPC Despatch %		60.0	75.20	74.39	62.89
		53586	1577.13	23177.63	183934.17
POWER CONSUMPTION					
UNITS Consumption (KWH)	kWH		32078	650196	5829173
Power Consumption for cement grinding (KWH)	kWH		26956	486476.00	4942797.00
Power Consumption for Packing (KWH)	kWH		2434	35412.00	288235.00
Power Cons.for Aux.(KWH)	kWH	Target	2688	128308.00	598141.00
Power Cons. For Mill (KWH/T of Cement)	kWH/t	27.5	25.0	25.6	27.3
OPC Power (KWh/T of cement)	kWH/t	30.8	0.0	30.7	30.8
PPC Power (KWh/T of cement)	kWH/t	25.3	25.0	25.2	25.3
Power Consumption for Packing (KWH/T of cement)	kWH/t	1.6	1.5	1.5	1.6
Power Cons.for Aux. (KWH/T of Cement)	kWH/t	3.0	2.5	6.7	3.3
Total Power Consumption (KWH/T of Cement)	kWH/t	32.14	29.0	33.9	32.19

Award for best energy saving of 2021 received from CGU Plant Head

ZUARI CEMENT LIMITED
CGU
OPERATING PLAN'2022

PARTICULARS	UOM	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	OP 2022
Cement Mill-1														
Cement Prodn -OPC	MT	19,825	23,494	22,078	21,435	19,130	22,832	24,939	25,558	26,661	22,181	24,659	25,995	278,785
-PPC	MT	29,737	35,241	33,117	32,152	28,695	34,248	37,408	38,336	39,991	33,271	36,988	38,993	418,178
Total	MT	**49,562**	**58,736**	**55,195**	**53,586**	**47,825**	**57,080**	**62,347**	**63,894**	**66,652**	**55,452**	**61,647**	**64,988**	**696,963**
Power-Cement Grinding														
OPC - Mill	Kwh/t	30.84	30.84	30.84	30.84	30.84	30.84	30.84	30.84	30.84	30.84	30.84	30.84	30.84
PPC - Mill	Kwh/t	25.34	25.34	25.34	25.34	25.34	25.34	25.34	25.34	25.34	25.34	25.34	25.34	25.34
Average -Mill 1&2	**Kwh/t**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**	**27.54**
Power -Cement Packing	Kwh/t	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Auxiliary	Kwh/t	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Total Power	Kwh/t	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**	**32.14**

OPERATING PLAN 2022 TARGET

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ENERGY MONITORING – TEAMWORK & EMPLOYEE INVOLVEMENT

Plant head addressing team to increase awareness towards reduction in energy consumption

Best Practices:

- Monthly energy meeting is being held all technical persons are member of it. Individual suggestions are invited and being implemented to save energy and increase productivity.
- RCA meeting is held monthly.
- Energy saving awareness training programs are being conducted time to time/ weekly basis for technicians and plant workers.
- Maximize the Cement Bulker loading

Best Energy Saving Ideas:

Appreciation Awarded in Monthly Gate Meeting

Team of the Month Award for best energy saving of 2021 received from CGU Plant Head

Implementation of ISO 50001:2018

ENERGY MANAGEMENT SYSTEM


CERTIFICATE

The Certification Body of TÜV SÜD South Asia Private Limited certifies that

HEIDELBERGCEMENT
Zuari Cement Ltd
Alipalla - Village Porvoi - Taluk
Tiruvallur – Dist. – 601103, Tamil Nadu, India

has implemented Energy Management System in accordance with ISO 50001:2018 for the scope of

Grinding and dispatch of Cement

This certificate is valid in conjunction with the main certificate from 2022-02-21 until 2025-02-20
Issue Date: 2022-02-21

ISO 50001:2018 Certificate

ZUARI IMS POLICY


HEIDELBERGCEMENT Group

Integrated Management System Policy

We, at Heidelberg Cement are fully committed towards customer satisfaction, environmental protection, providing healthy & safe work environment, energy conservation, and social responsibility to all concerned and therefore put our best efforts to:

- Produce quality cements that exceed statutory standards and customer expectations and promote use of environment friendly construction products & solutions.
- Deploy energy efficient & eco-friendly technologies, products, services and designs for energy efficiency and performance improvement.
- Contain pollution with increased emphasis on repair, recycle and reuse.
- Proactively address water sustainability issues by minimizing its water footprint.
- Maintain desired water quality during processes and discharges, if any.
- Comply with all applicable legal, social, energy efficiency, energy performance and other stake holder's obligations.
- Conform to the requirements related to Corporate Social Responsibility following the Principles and Guidelines.
- Train human capital with a view to upgrade their skills in all areas including safety.
- Regularly set and review objectives and targets for continuous improvement in areas of quality, productivity, work environment, health & safety performance, energy performance and evaluating voluntary initiatives for social responsibility.
- Ensure availability of necessary resources and relevant information to achieve Objectives and Targets.
- Prevent occupational injuries and ill health, by eliminating hazards and reducing OH&S risks.
- Promote consultative management practices by involving workmen.

This policy has been communicated to all the employees and is available to the public and interested parties on demand.

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- ISO 5001:2011 Certified from 2014 and upgraded to ISO 50001:2015.
- Reduced the operational and overhead costs lead to increase the profitability;
- Reduced the air emissions, such as greenhouse gases;
- Enhanced overall employee engagement for achieving the operational excellence.

ENCON Project budget allocation %

Total turnover CGU FY 2021-22 (Rs. Million) - 3586

ENCON Projects FY 2021-22 (Rs. Million) - 14

Investment % - 0.4%

GROUP PLANTATION – PLANT PREMISES

Plant's temperature is 2.1°C lower than 1 Km away.

- HeidelbergCement India have a target to achieve 2°C lower ambient temperature within CGU plants compared to 1 Km away.
- Our consistent efforts to increase our green cover followed by weekly temperature monitoring have made our **Chennai Grinding Unit** achieve a difference of 2.1°C and became the 1st plant to surpass the target.

Award & Accolades

Safety Appreciation Award

PPC product certificate from GRIHA Council

Safety Appreciation Award

Thank You

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Safety is our foremost priority

MATERIAL TO BUILD OUR FUTURE