“25th National Award for Excellence in Energy Management 2024”

HEIDELBERGCEMENT

Zuari Cement Limited,
Chennai Grinding Unit

Guided by: Mr S. Venugopal Reddy (Unit Head)

Presenter : Mr S.P. Ramesh babu (Head Production)

ZUARI CEMENT LIMITED - CHENNAI

Lead Presenter

Heartly Welcome to All

25th National Award for Excellence in Energy Management 2024

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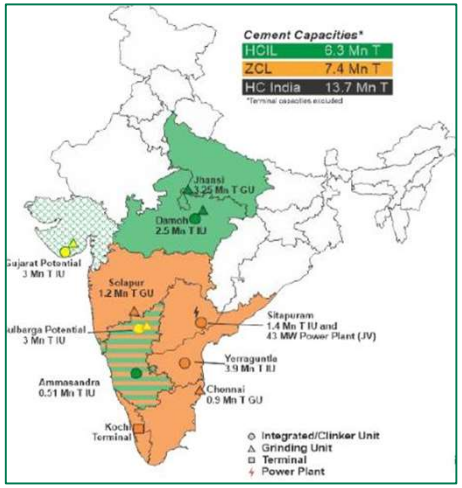
ZUARI CEMENT LIMITED – CHENNAI GRINDING UNIT

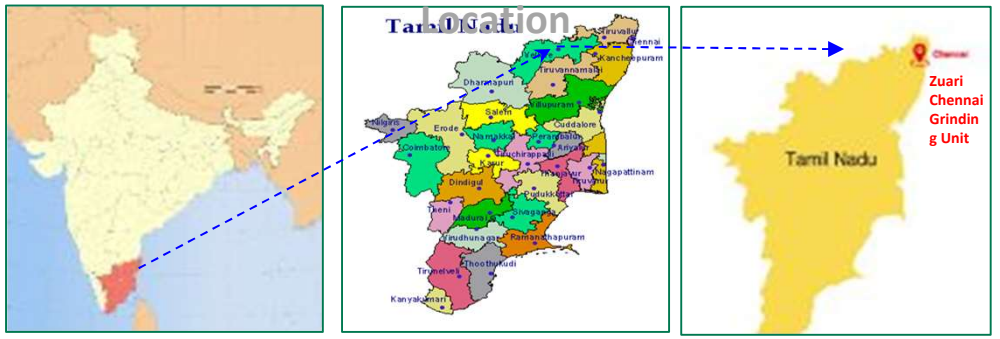
Worldwide Heidelberg Materials

- 51,000 Employees Globally
- Leading market Position in Aggregates, Cement and Ready Mix – Concrete
- 3000 Production Sites in More than 62 Countries
- Cement Capacity 184 MnT (including of Joint Ventures)
- Aggregates resources and reserves 19.2 BnT.

Heidelberg Materials Presence in India



Zuari Cement Limited - Chennai Grinding Unit - Location



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

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ZCL CGU PLANT PROFILE

2011
Plant Commissioned

2011
Italcementi 100% Share holder in Zuari Cement Limited

2016
Management took over by Heidelberg Group

- Zuari Cement – Chennai Grinding Unit is the group company of Heidelberg Materials which is spread in 62 countries across the globe have been committed to green environment and reduction in CO2 footprint.
- Zuari Cement – Chennai Grinding Unit established and started the commercial Production from 2011 by adopting latest state of art technology.
- 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 group 1st plant to surpass the target.
- Zuari Cement has signed a Power Purchase Agreement for purchase of wind energy. Wind Energy Generator will supply 17 GWh/a to Chennai plant till 2026. This electricity supply will meet 90% of the annual electricity demand of the Chennai Grinding Plant. This is second manufacturing facility in Heidelberg Cement India to have such high share of Green Electricity. The expected CO2 savings on consumption of electricity would be in the range of 10,000 tonnes to 12,000 tonnes per annum. The Power Purchase Agreement is another step for HC on the way to achieving Carbon Neutrality.

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Zuari CGU Plant Key Equipment and Specification of Major sections

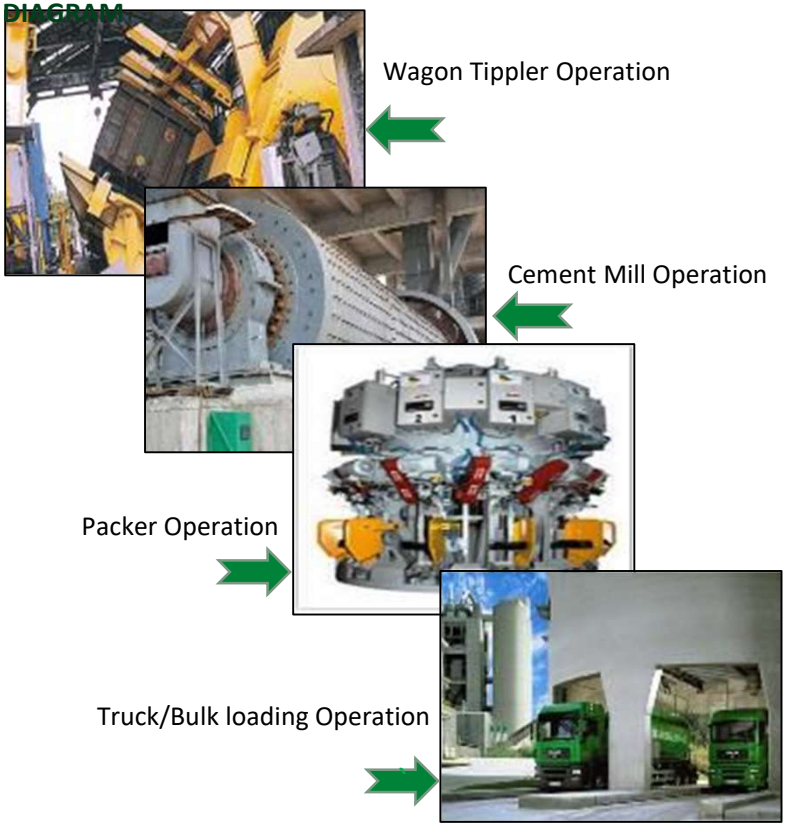
Cement grinding, Wagon Tippler & storage

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 tph
Clinker Silo		Storage Silo	20000 Tons * 1 no
Cement Silos		Storage silos	7500 Tons * 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)

CGU – PROCESS FLOW DIAGRAM



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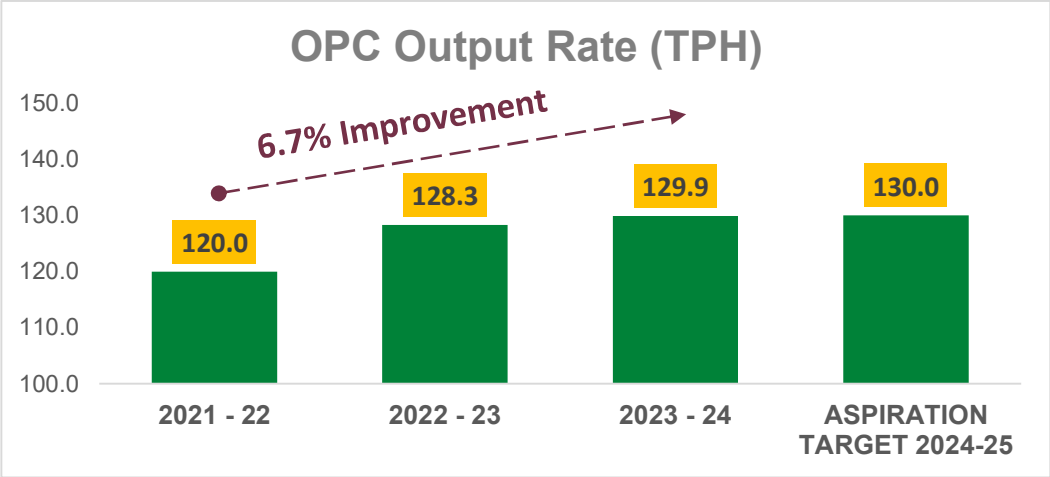
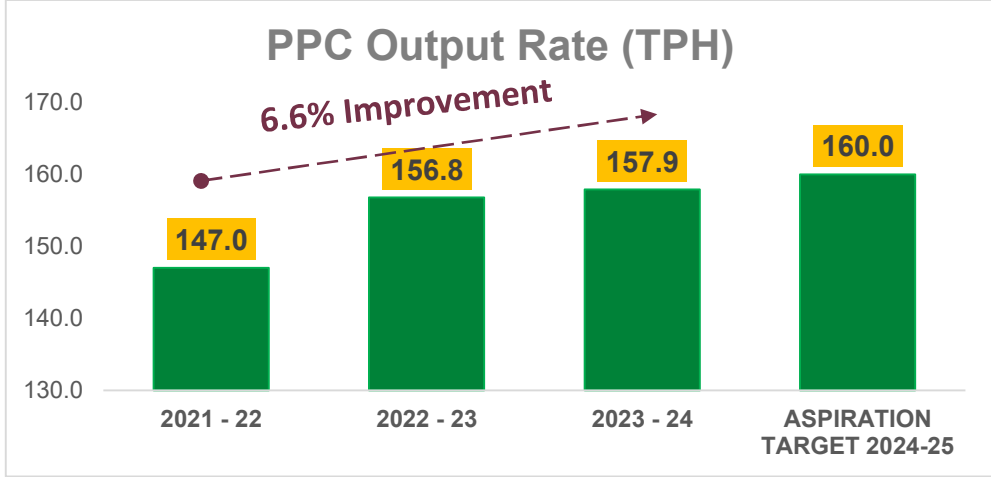
SPECIFIC ENERGY PERFORMANCE DATA SHEET





FY 23-24

OPC Productivity (TPH)

OPC - Highest Output Rate

Since commissioning

FY 23-24

PPC Productivity (TPH)

PPC – Highest Output Rate

Since commissioning

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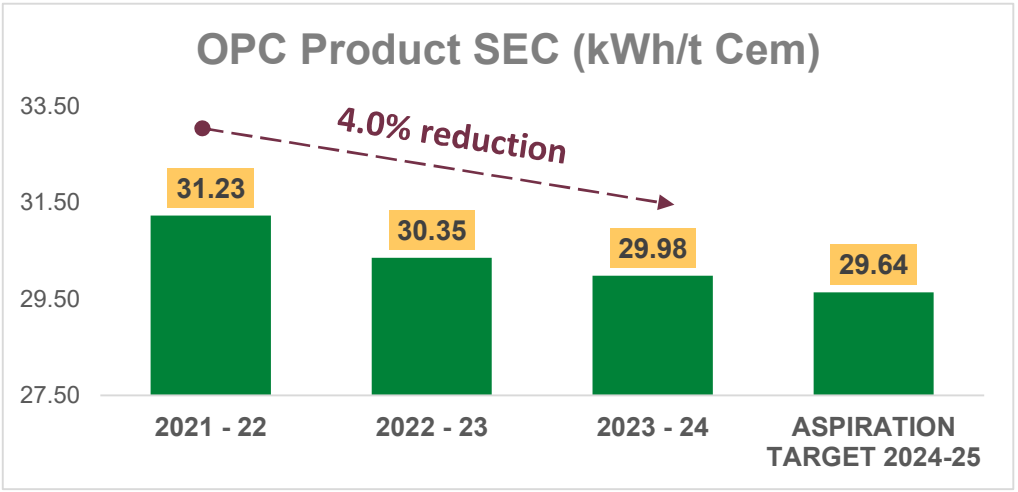

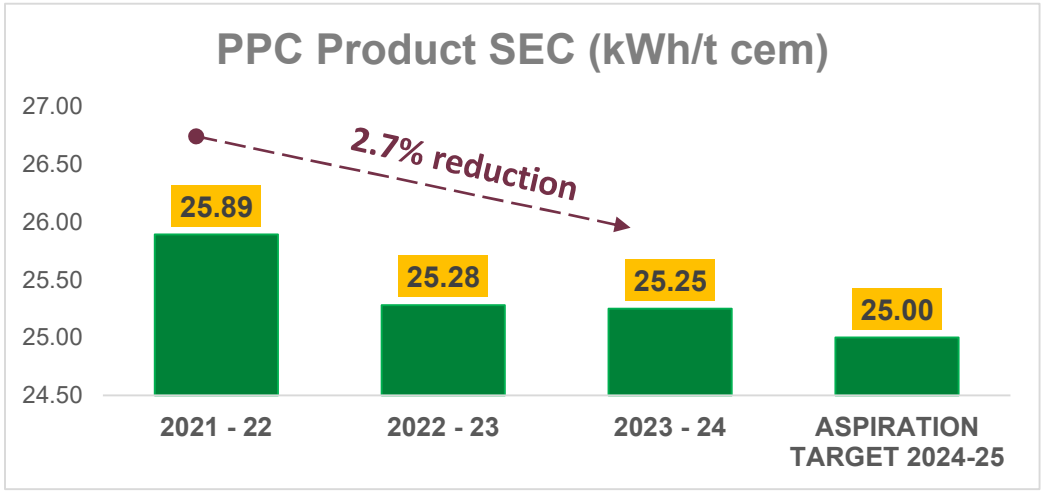

FY 23-24

OPC Product

Lowest Specific Electrical Energy Consumption Since commissioning

FY 23-24

PPC Product

Lowest Specific Electrical Energy Consumption since commissioning

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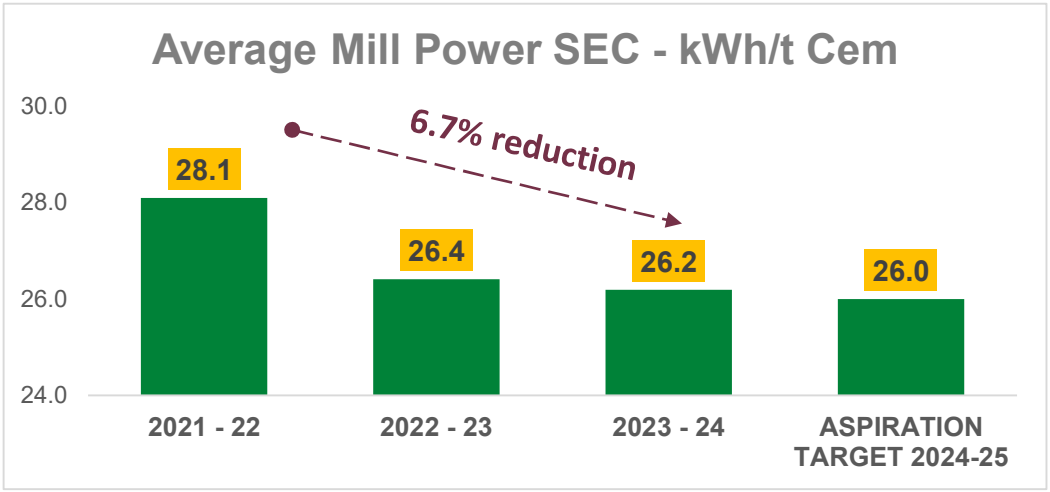
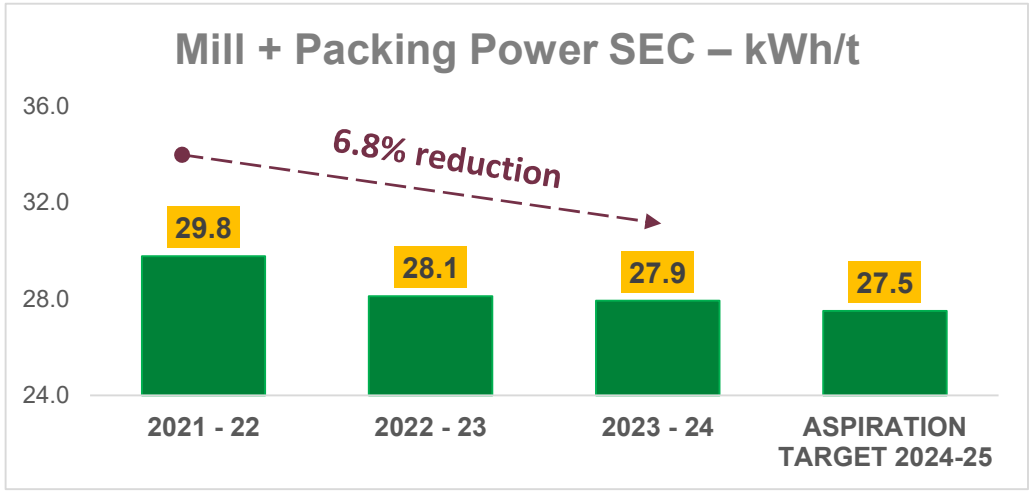
SPECIFIC ENERGY PERFORMANCE DATA SHEET





FY 23-24

Average Mill Power

Best Specific Electrical Energy Consumption Since commissioning

FY 23-24

Overall SEC (incl. Packing & MD)

Best Specific Electrical Energy Consumption since commissioning

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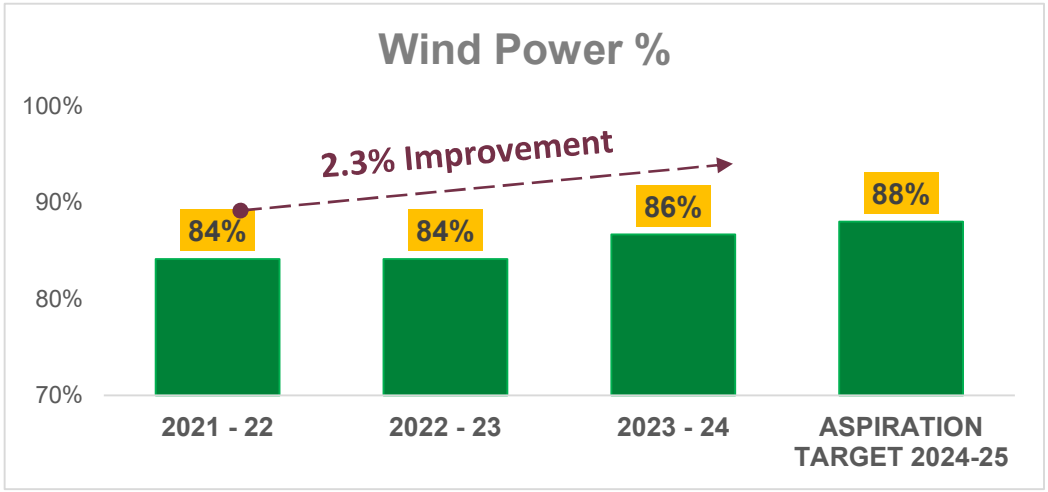
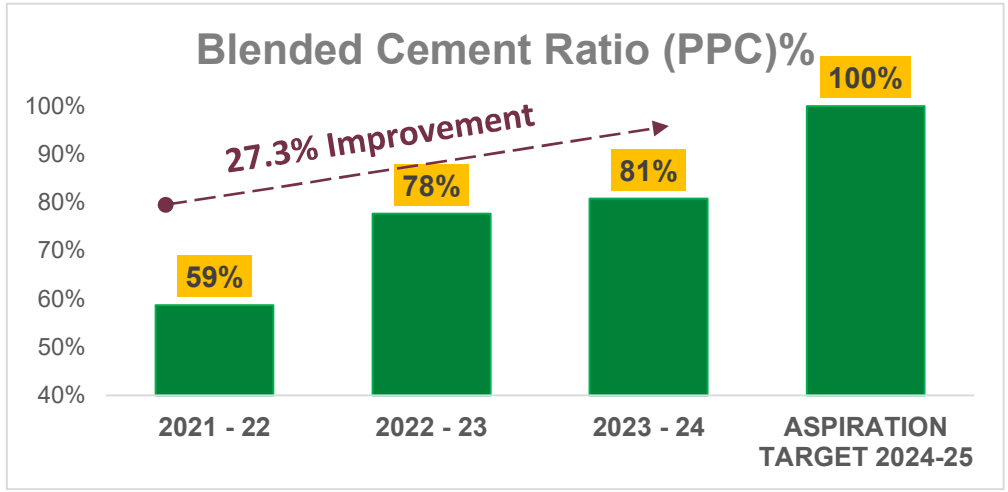
SPECIFIC ENERGY PERFORMANCE DATA SHEET





FY 23-24

Wind Power %

% of the total consumption of plant is g highest utilized wind power, since 2020

FY 23-24

Blended Cement Ratio (PPC)%

ighest Blended Cement Ratio% Since Commissioning

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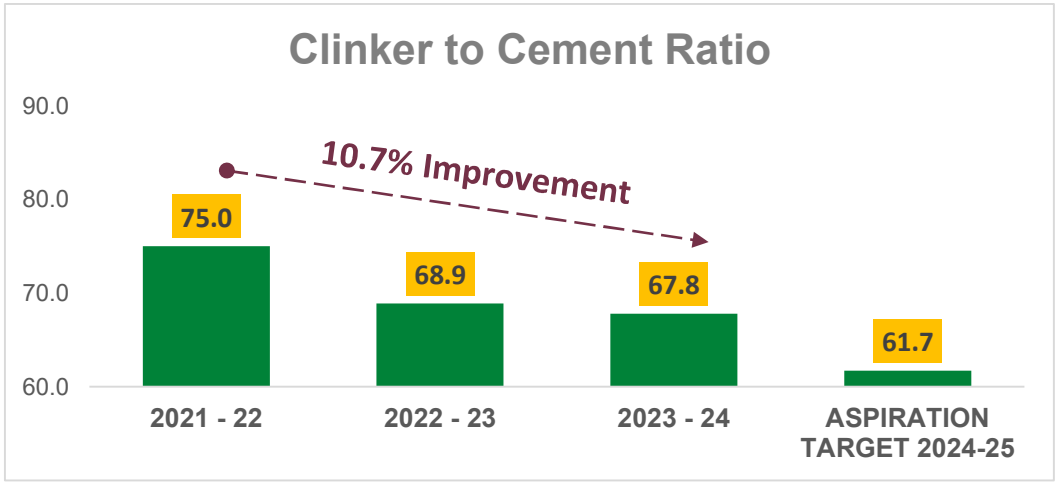
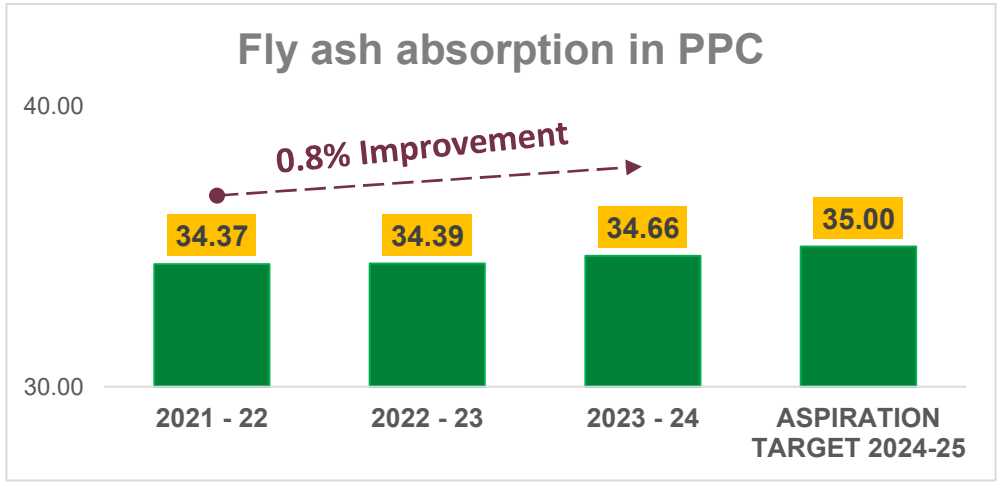
CLINKER TO CEMENT RATIO & FLYASH % IN PPC - PERFORMANCE DATA SHEET





FY 23-24

erall Clinker to Cem. Ratio(%)

Lowest Overall Clinker Factor

Since commissioning

FY 23-24

Fly ash Absorption in PPC(%)

ighest fly ash feeding in PPC

Product, Since commissioning

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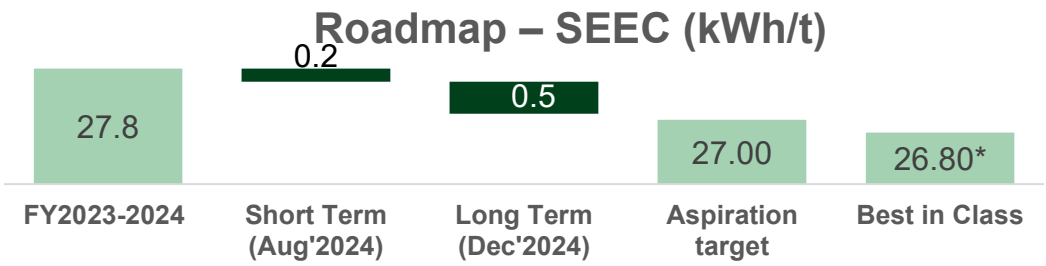
Information on competitors, National & Global benchmark

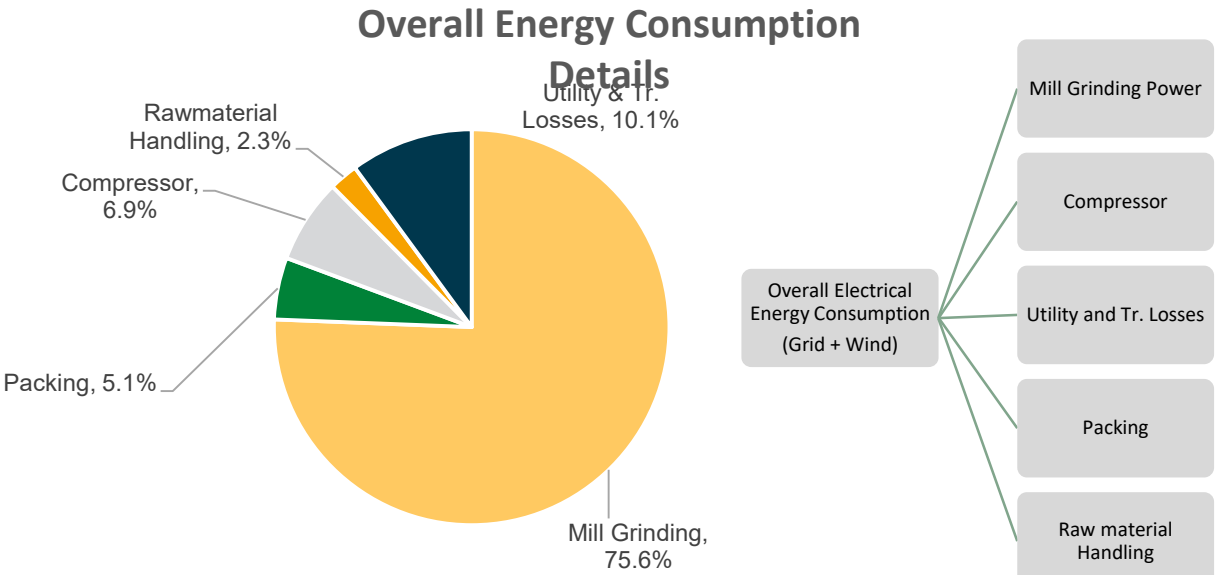
Grade	Present SEC (kWh/MT)	Internal Benchmark (kWh/MT)
OPC	30.15 (Lowest in ZCL)	29.64
PPC	25.26 (Lowest in ZCL)	25.00 (24.05 – CII benchmark)

Type	Present SEC (kWh/MT)	External Benchmark	Short Term (kWh/MT)	Long Term (kWh/MT)
CM-1	27.8	26.8	27.5	27.0

- External Benchmark Source: In reference to CII Energy benchmarking for Indian Cement Industry **V6.0**

- Short Term: Improving the productivity by *Optimization with GA* before Aug'2024)
- Long term: Replacement of Existing Roto Packer with New double discharge Roto packers.





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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)	Power Cost (Rs/kWh)	Total Power Cost Savings (INR Million)	Payback period (Month)
FY 2021 – 22	4	5.2	0.5	9.1	3.8	16
FY 2022 – 23	2	3.7	0.3	9.3	3.3	13
FY 2023 – 24	3	25.5	2.8	8.2	22.6	14

Year	No of Energy Saving Projects	Investment (INR Million)	Electrical Savings (Million kWh)	Power Cost (Rs/kWh)	Total Power Cost Savings (INR Million)	Payback period (Month)
FY 2021 – 22	Replacement of outer diaphragm plate slot gap from 12 mm to 8 mm to increase the residence time of Material	3.23	0.32	9.1	3.05	12.7
FY 2021 – 22	Installation of Water Spray System in the Mill outlet system to reduce the Mill outlet temperature	1.50	0.15	9.1	1.23	14.6
FY 2021 – 22	Installed Manual flow control valve in Mill discharge to direct feeding arrangement in Packer and bulk bin	0.45	0.07	9.1	0.41	13.2

ENERGY SAVING PROJECTS IMPLEMENTED IN LAST 3 YEARS

Year	Project Description	Investment (INR Million)	Electrical Savings (Million kWh)	Power Cost (Rs/kWh)	Total Power Cost Savings (INR Million)	Payback period (Month)
FY 2021 – 22	Use of 7.5KW water pump instead of 18.0 KW pump for process water for mill operation	0.12	0.10	9.1	0.1	14.4
FY 2022 – 23	Process Bag filter product material diverted from Mill outlet to Silo feed bucket elevator	3.70	0.36	9.3	3.35	13.3
FY 2022 – 23	Installed 7.5 Kw compressor in Girth gear spray system to reduce the compressor air usage from 110 kW Mill compressor	0.47	0.03	9.3	0.30	18.8
FY 2023 – 24	DCS Upgradation	23.5	2.8	8.2	20.2	14.0
FY 2023 – 24	Installation of Magnetic Separator for Mill Feed Belt	1.0	0.1	8.2	1.1	10.9
FY 2023 – 24	Replacement of Twin Lobe Blower to Tri Lobe Blower	1.2	0.3	8.2	1.3	11.1

MAJOR INNOVATIVE PROJECTS FOR FY 2023 – 2024

PROJECT DETAILS NO - 1

Project Name	Replacement of Twin Lobe Blower to Tri Lobe Blower	Category	Replacement
Project No	214151	Investment Cost	1200 KINR

Issue:

- It has shaft power at duty point is 48.9 kW
- Wear parts for frequent replacement is 28 nos
- Noise level of the blower is 80 Db

Benefits:

- Reduction of 12.5 kW per blower can be achieved
- Reduced inventory value from 157 KINR to 61 KINR.
- Reduction in noise level of 18 dB

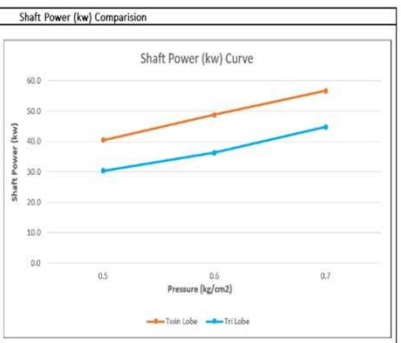
Major Learning or Project Reference:

- ❑ Project learning received from Heidelberg Material Group

Shaft Power (kw) Comparision

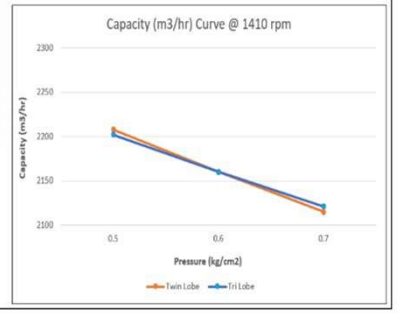
Twin Lobe		Tri Lobe	
Speed	1410 rpm	Speed	1410 rpm
Pressure (kg/cm2)	Shaft Power (kw)	Pressure (kg/cm2)	Shaft Power (kw)
0.5	40.5	0.5	30.4
0.6	48.9	0.6	36.4
0.7	56.7	0.7	44.8

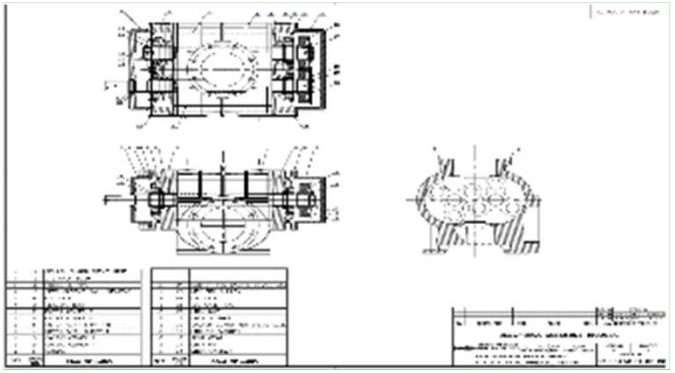
Power Saving @ Pressure = 0.6 kg.cm2	
Twing Lobe	48.9 kw
Tri Lobe	36.4 kw
Savings	12.5 kw



Capcity (m3/hr) Comparision

Twin Lobe		Tri Lobe	
Speed	1410 rpm	Speed	1410 rpm
Pressure (kg/cm2)	Shaft Power (kw)	Pressure (kg/cm2)	Capcity (m3/hr)
0.5	2208	0.5	2202
0.6	2160	0.6	2160
0.7	2115	0.7	2121





Description	Value
Investment, MINR	1.2
Savings, MINR	1.3
Payback Period, Months	11.1

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MAJOR INNOVATIVE PROJECTS FOR FY 2023 – 2024

PROJECT DETAILS NO - 2

Project Name	DCS Upgradation	Category	Replacement
Project No	182753	Investment Cost	23500 KINR

Issue:

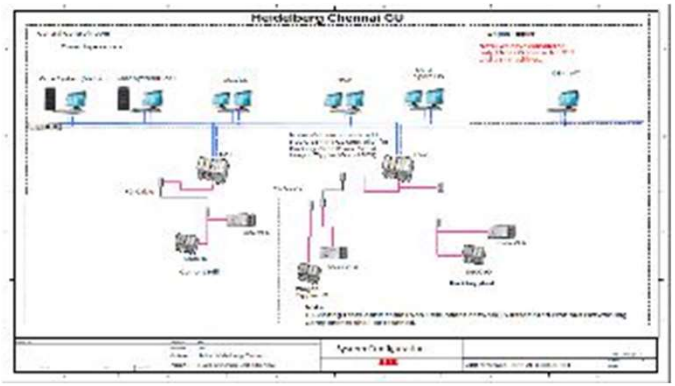
- Existing DCS is M/s Honeywell Supplied, installed and commissioned in the year 2011. All the Operating stations are working on Microsoft Windows XP and Servers are working with Microsoft Windows Server 2003.
- Existing Operating System Microsoft XP and Microsoft Windows server 2003 are obsolete and there is no support from OEMs.
- Presently There is no service support from Honeywell for Hardware and DCS software despite of continuous follow up with Honeywell. Also Service / Spare cost of Honeywell is too costlier

Risks:

- Since there is no support from both Honeywell and Microsoft for the obsolete Hardware and software. Any problem in the software or Hardware may bring the plant to standstill condition and will lead to loss in business.
- Lead time for installing and commissioning new Hardware & software is more than 6 months.

Major Learning or Project Reference:

- ❑ Project learning received from Heidelberg Material Group



Description	Value
Investment, MINR	23.5
Savings, MINR	20.2
Payback Period, Months	14.0

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MAJOR INNOVATIVE PROJECTS FOR FY 2023 – 2024

PROJECT DETAILS NO - 3

Project Name	Installation of Magnetic Separator for Mill Feed Belt	Category	Improvement
Project No	168562	Investment Cost	1000 KINR

Issue:

- Mill Feed Belt Conveyor that is conveying clinker from clinker silo bottom to Mill Inlet is highly critical in nature for Mill Operation. Also the metal components that are entering to ball mill damages shell liners and center mesh of 1st chamber.
- Damage to center mesh result in mixing of grinding media at both chambers of mill which leads to inefficient grinding.
- It is important to eliminate metal particles to enter into belt conveyor and ball mill to avoid hampering of mill operation and to increase reliability of equipments. To eliminate metal particle entry it is required to install magnetic separator in the Mill Feed Belt Conveyor.

Benefits:

- Eliminated the foreign particle Entry into the Mill first Chamber

Major Learning or Project Reference:

- Project learning received from Heidelberg Material Group

Description	Value
Investment, MINR	1.0
Savings, MINR	1.1
Payback Period, Months	10.9

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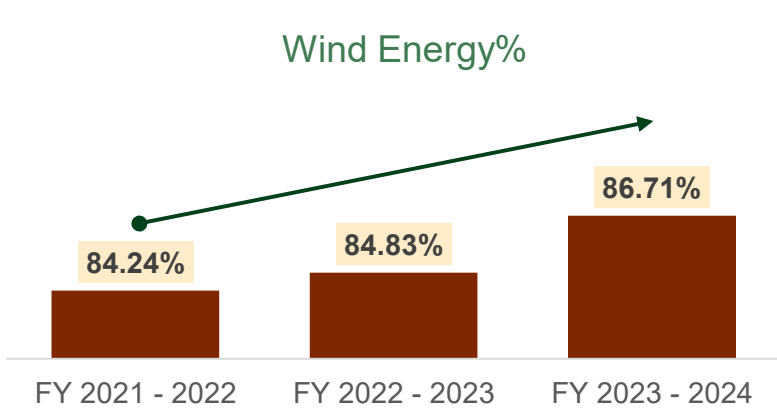
LIST OF ENERGY CONSERVATION PROJECTS FY 2024-2025

	Project Description	Investment Million INR	Proposed SEC kWh/MT	Section/ Area of Project	Planned Financial Year
1	Reduction in Ball Mill first chamber length by 0.5 meter.	5.5	0.5	Cement Mill	2024-2025
2	Replacement of existing Roto-packers (2 Nos) with new double discharge Roto Packers.	48.8	0.6	Roto Packer	2024-2025
3	Modification of Mill inlet chute (Step Chute arrangement liner extended)	0.6	0.1	Cement Mill	2024-2025
4	Replacement of first chamber Middle diaphragm plate from 12 to 6 MM Gap	3.1	0.2	Cement Mill	2024-2025

Utilization of Renewable Energy Sources

Financial Year	FY 2021 - 2022	FY 2022 - 2023	FY 2023 - 2024
Type of Energy	Wind	Wind	Wind
Onsite/Off Site	Off Site	Off Site	Off Site
Wind Energy%	84.24%	84.83%	86.71%

- 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.
- 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



ENERGY MANAGEMENT ROAD MAP PLAN

2011

- Plant Commissioned in 2011
- Plant Running with 80% OPC Grinding with less output

YTD Mill Average SEC: 48.07 kWh/t

2016

- Fly Ash feeding system changed from Pneumatic to Mechanical system, Airslide arrangement

YTD Mill Average SEC: 28.75 kWh/t

2020

- Multiple to Single compressor in Operation with common Header line for Mill and Packer Operation

YTD Mill Average SEC: 27.48 kWh/t

2022

- Modified Intermediate and Discharge diaphragm slot gap from 12mm gap to 6-8 mm to increase the residence time

YTD Mill Average SEC: 26.79 kWh/t

2026

- Replacement of First Chamber Liner plate along with segregation of both chamber

YTD Mill Average SEC: 25.85 kWh/t

2025

- 100% PPC to be dispatched.
- Installation of Solar system in Technical CCR buikding

YTD Mill Average SEC: 25.85 kWh/t

2024

- DCS upgradation
- Remote Desktop Monitoring
- Digital RCA

YTD Mill Average SEC: 26.02 kWh/t

2023

- Process Bag filter product diverted from Mill outlet to silo as final product.
- Replacement of blower

YTD Mill Average SEC: 26.36 kWh/t

ENERGY TRAINING PROGRAM CONDUCTED

ISO 50001: 2018 EnMS Refresher training Program

- Importance of ISO50001:2018
- Review the Effectiveness of policy
- Continually improve Energy Management

01

Optimization Cement Mill Operation

- Expert System Usage in Mill Operation
- Trouble Shooting of Mill operation
- Effective usage of classifier

02

Utilization of compressor air system

- Effective usage of Variable Flow Speed
- Calculation of loading and unloading of compressor

03

Optimization of Grinding Aid usage in PPC product

- Productivity with consistent quality
- Improvement in PPC product SEC with less dosage of grinding Aid

04

Optimization Auxiliary Power consumption

- Monitoring & avoiding Ideal Running equipment
- Effective usage of Pump and Fan

05

Optimization of Grinding media in Cement Mill

- Particle size analysis check through Chamber Sampling analysis
- Optimize the Grinding Media pattern

06

Energy Awareness Training Program conducted to Management Staffs and Contract Labors

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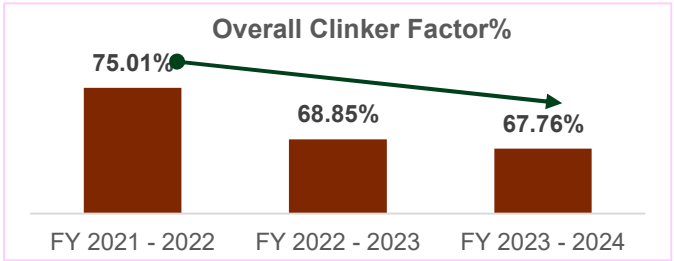
GHG inventorisation

	Financial Year	FY 2021 - 2022	FY 2022 - 2023	FY 2023 - 2024
1	SPM Value (mg/Nm^3)	10.6	10.8	10.4
2	Scope – 1 (CO_2/t)	2.7	2.7	2.7
3	Scope – 2 (CO_2/t)	4.9	4.7	4.1
4	Scope – 3 (Kg of CO_2/t of Cement)	610.9	560.9	550.7

Action Plan for FY 2024 – 2025:

- Reducing the clinker to cement ratio
- Increasing the PPC volume ratio from 72% to 100%
- Increase Plantation in plant premises
- Implementation of identified energy conservation Project
- Global responsibility to keep temperature rise < 2 C



- Currently we are circulated to publicly and connected to CPCB
- * Scope 1 - CO_2 Values calculated from JCB diesel consumption source.
- ** Scope 2 - CO2 Emission from Grid Power.
- *** Scope3- CO2 Emission from Clinker factor.

Lowest Overall Clinker to Cement Ratio FY 2023-24, since commissioning

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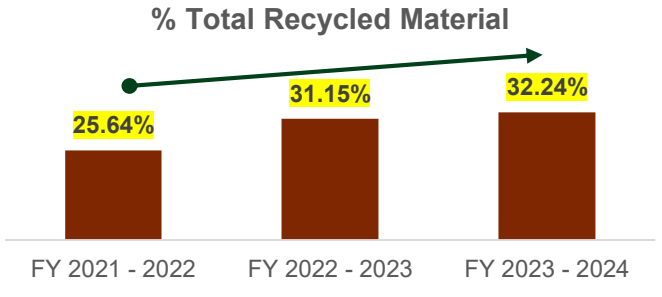
WASTE UTILISATION AND MANAGEMENT

	Financial Year	FY 2021 - 2022	FY 2022 - 2023	FY 2023 - 2024
1	Gypsum Consumption (MT)	21643	20956	19786
2	Fly ash Consumption (MT)	119629	157884	156941
3	Recycled Material (MT)	141273	178842	176727
4	Total Recycled Material (%)	25.64%	31.15%	32.24%

Initiatives taken in Supply Chain to reduce Energy Consumption

Action Plan for FY 2024 – 2025:

- To sustain 35% Fly ash in PPC production long term contract agreement made with NTPC and NTECL power plants for lifting dry fly ash.
- 100 % Chemical Phospho Gypsum - Fertiliser plant Waste product for our cement Production.
- 100 % Conversion from paper bag to enviro-friendly BOPP/BBB bags.
- Implementation of SAP for paper less procurement procedure
- STP treated Water is used in Plant Gardening



%of Total Recycled Material - FY 2023-24 Since Commissioning

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Green Supply Chain – Product Cycle

Green Supplier Selection	RAW MATERIAL HANDLING 1	❑ New gypsum feeding conveyor installed and commissioned to avoid the reverse operation of JCB for Safety, diesel consumption. ❑ 100% Clinker unloading by Wagons with dust free environment ❑ All raw materials stored in silos and covered shed – dust free environment.
Green Manufacturing	PROCESS UPGRADATION 2	❑ 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
Green Inventory	WASTE UTILIZATION 3	❑ Water consumption in Mill is eliminated 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
Green Packaging	PACKING 4	❑ 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.
Green Logistics	SALES AND DISTRIBUTION 5	❑ Increased the bulk ratio to reduce the SEEC. ❑ Weighment Sensor installed and commissioned to improve the correct Weighment of each trucks and bulker..
Green Customers	CUSTOMER SUPPORT 6	❑ Developed and supplied the PRIMO - GreenCem Product ❑ Introducing new product of Greencrete Product in HM group

ZUARI CEMENT LIMITED - CHENNAI – WATER HARVESTING

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 1350 to 2432 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

STAR Team - 1

Energy Efficiency Improvement

Sam Isaac

Ram babu

Prasanna

Paneer

Contract Workman: 5 Nos

DIAMOND Team - 2

Productivity Improvement

Rameshbabu SP

Venkatesan

Raja

Vijay

Contract Workman: 5 Nos

LOTUS Team - 3

Reliability Improvement

Dhandapan

Prasath

Gopal

Bala

Contract Workman: 5 Nos

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ENERGY MONITORING – EMS & OTHER REQUIREMENTS

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

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

Energy Reports

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

Learning from CII

Energy Award is the best platform for the organizations to explore the new ideas/innovation in the area of energy efficiency & to motivate individuals, stakeholder to strive for the best in the field.

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

ZUARI CEMENT LIMITED - CHENNAI – ENERGY TEAM

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
- Review of Energy consumption on daily basis.

ENCON Methodology

Daily Power Report Circulated to Technical, Finance and Management Team.

ZUARI CEMENT LIMITED - CHENNAI

ENERGY SAVING - REWARD AND RECOGNITION

Best CIP and SS award received from Honourable our Heidelberg Materials Managing Director and Director HR & Upcoming Award published from CGU Plant Head

HEIDELBERGCEMENT INDIA

ZUARI CEMENT LIMITED - CHENNAI

REWARD AND RECOGNITION



Appreciation award received from Honourable our CGU Plant Head



HEIDELBERGCEMENT INDIA

Implementation of ISO 50001:2018

ENERGY MANAGEMENT SYSTEM

ISO 50001:2018
Certificate
Validity Till 28-02-2025

ZUARI IMS
POLICY

- 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 2023-24 (Rs. Million) - 699

ENCON Projects FY 2023-24 (Rs. Million) – 22.6

Investment % - 3.2%

HEIDELBERGCEMENT
INDIA

ZUARI CEMENT LIMITED - CHENNAI – GREENERY DEVELOPMENT

GREEN BELT DEVELOPMENT

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.

Sapling Distribution: We have distributed 2345 Saplings in the Attipattu village community

HEIDELBERGCEMENT INDIA

Award & Accolades

CII – CGU awarded Excellent Energy Efficiency Units - 2023

SEEM – CGU awarded Excellent Energy Achievement Award 2023

CII – CGU awarded Best Energy Efficiency Units - 2022

Outstanding Achievement in Promotion of Education

Safety Appreciation Award

PPC product certificate from GRIHA Council

CSR Education Award

BIS Award

CII Award

HEIDELBERGCEMENT INDIA

Thank You

Mr Rameshbabu SP

Head Production

Email: p.rameshbabu2@zcltd.com

Phone No: 8825678714

MATERIAL
TO BUILD OUR FUTURE

Safety is our foremost priority

HEIDELBERGCEMENT
INDIA