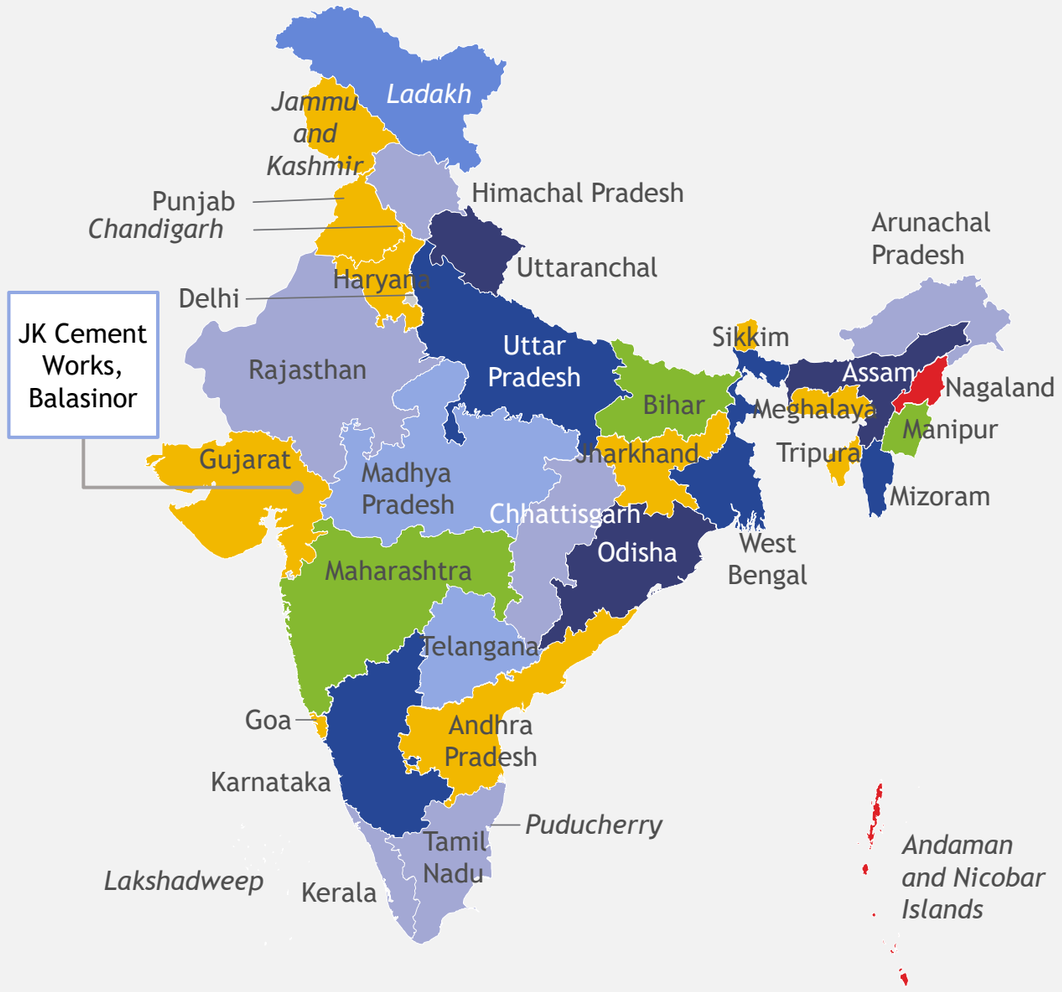
# 24th CII National Energy Award for Excellence in Energy Management 2023

## JK Cement Works, Balasinor (Gujarat)


Presented By:
Mr. Gopal Gupta (Unit head)
Mr. Rahul Dad (Head – E&I)

Confederation of Indian Industry

# Company profile




## Group Established

- JK Cement's operations commenced with commercial production at its flagship grey cement unit at Nimbahera, Rajasthan in May 1975


## Group Cement capacity

| | |
|---|---|
| Grey Cement | 20.67M TPA |
| White Cement | 1.51M TPA |
| Wall Putty | 1.20M TPA |

## JK Cement Works, Balasinor

| | |
|---|---|
| Capacity | 0.80M TPA |
| Commencement | Oct-2020 |
| Production FY'23 | 0.60M TPA |
| Contribution of PPC | 100 % |

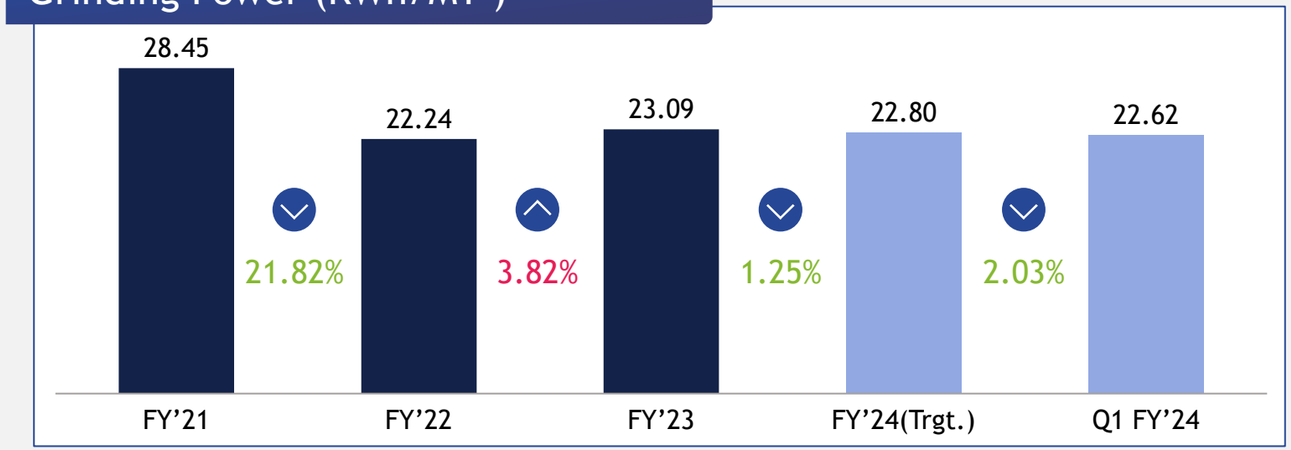
# Overview of JK Cement Ltd. Balasinor

| | Material Unloading (BRU) | Vertical Roller Mill | Packing Plant |
|---|---|---|---|
| Make | Schenck Process | FLSmidth | Beumer |
| Model No | HTU-MARK-IIIC | OK 40-4 | Fillpac RV 16 |
| Capacity | 250 Tons | 100 TPH | 240 TPH |

# Energy consumption

## Energy break-up

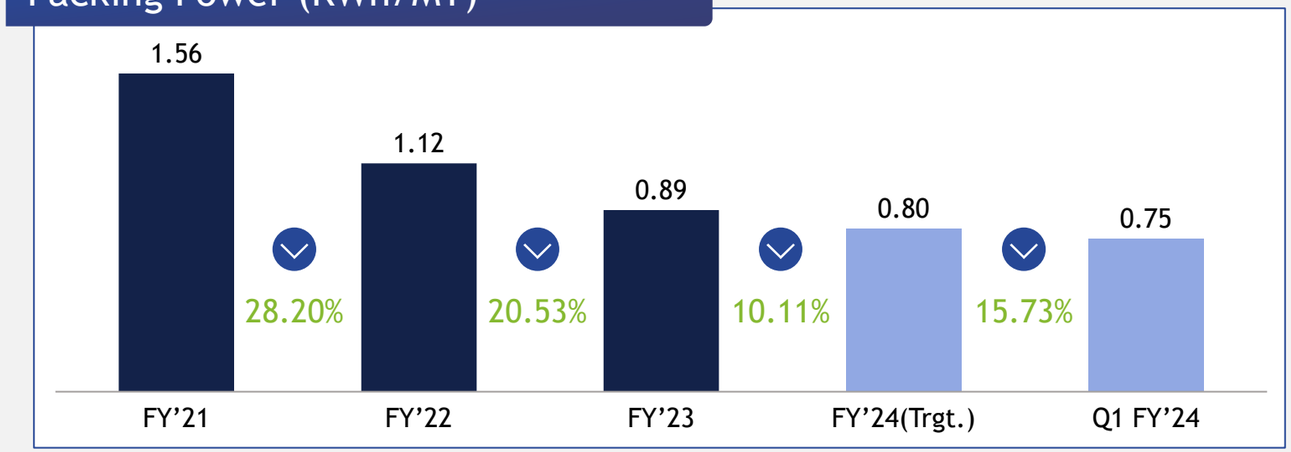
### Grinding Power (KWh/MT )




### Remarks

| S. No | Description |
|---|---|
| 1 | Chemical gypsum consumption increased by 2.2% to 4.4% on cement basis |
| 2 | Plant operates on lower temp. 80 $^{0}$C |

### Packing Power (KWh/MT)



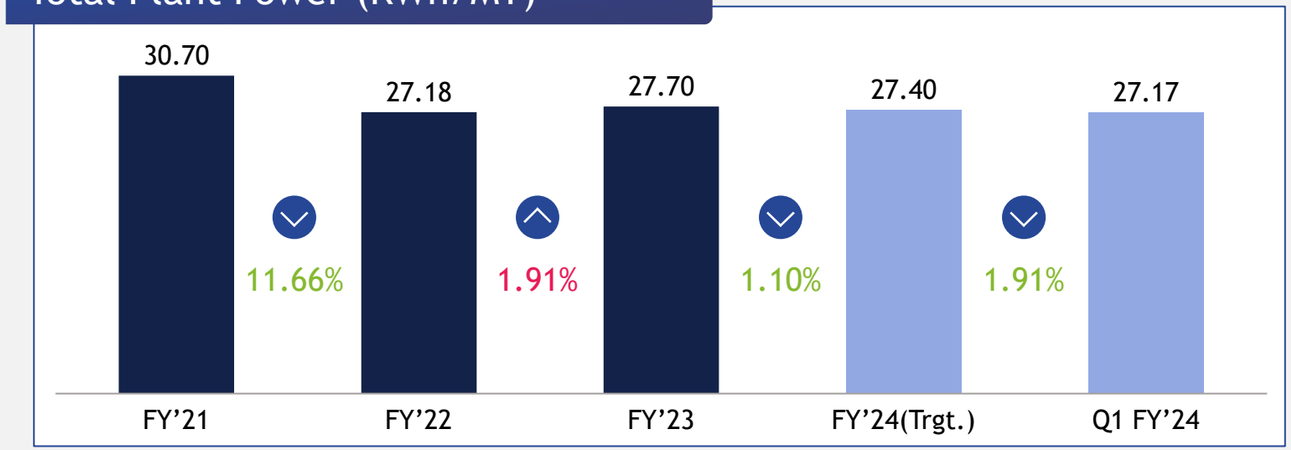

### Remarks

| S. No | Description |
|---|---|
| 1 | Energy optimization (VFD, drive reduce) |
| 2 | Bulk dispatches increases |

# Energy consumption

Energy break-up

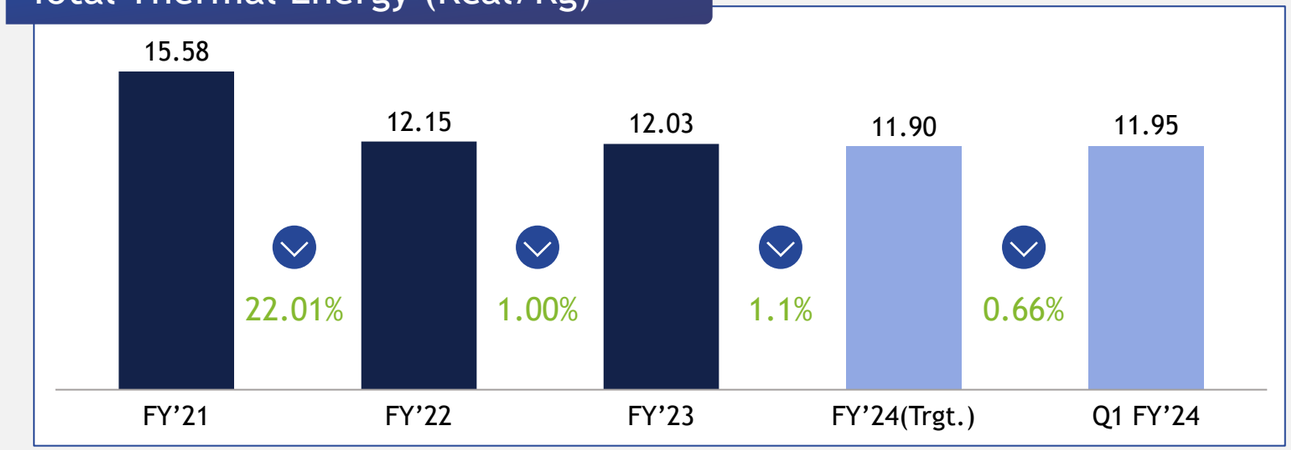
## Total Plant Power (KWh/MT)




## Remarks

| S. No | Description |
|---|---|
| 1 | Grinding power increased (FY'23) |
| 2 | Packing power reduced (FY'24) |
| 3 | Compressor power optimized (FY'24) |

## Total Thermal Energy (Kcal/Kg)




## Remarks

| S. No | Description |
|---|---|
| 1 | Plant operates on lower temp. 80 $^{0}$C |
| 2 | Increase in recirculation volume |
| 3 | Water consumption reduced |

# Competitors & National Benchmark

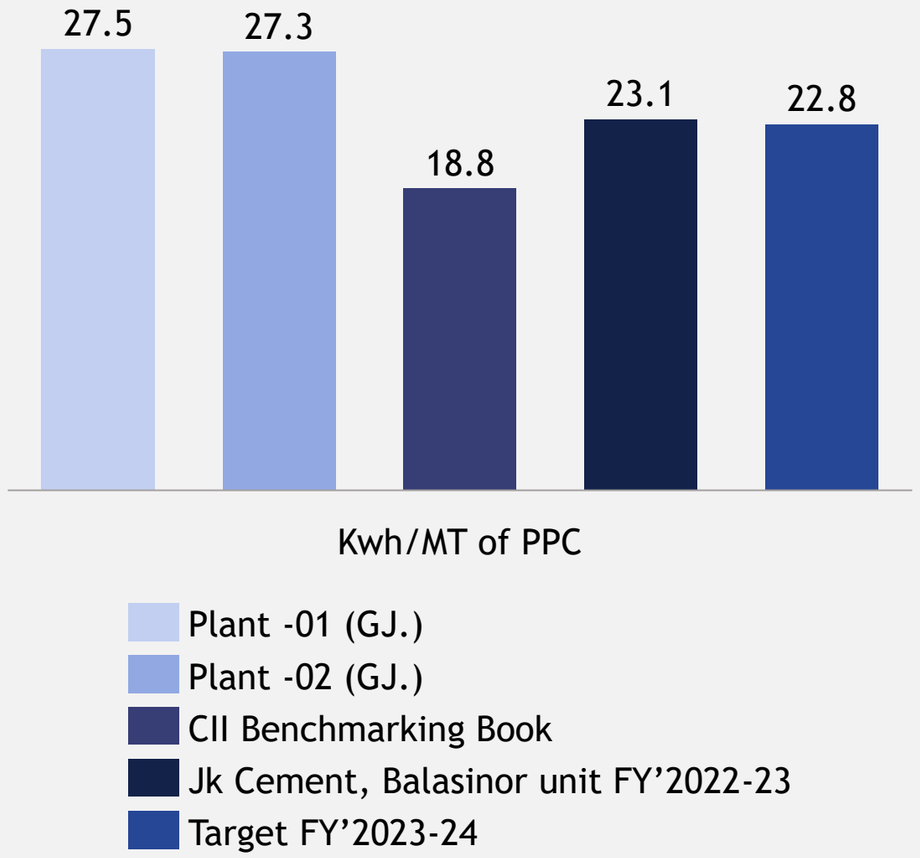
## Details of external benchmarking

| Name of Competitors | Kwh/MT of PPC |
|---|---|
| Plant-01 (GJ) | 27.5 |
| Plant -02 (GJ) | 27.3 |
| CII Benchmarking Book (source: CII) | 18.8 |
| JK Cement, Balasinor FY'2022-23 | 23.1 |
| Target FY'24 (with 60% chemical gypsum mix) | 22.8 |

## Action plan to achieve energy target's FY'24

| S.No. | Planning |
|---|---|
| 1 | Improving Clinker quality to reduce CF by 0.5% |
| 2 | Installation of VFDs (4nos) for power Reduction |
| 3 | Process fan power reduction through fan inlet velocity optimization |
| 4 | Mill Circuit pressure drop reduction |
| 5 | Dry flyash unloading circuit power optimization |
| 6 | Optimization of classifier efficiency |

**Competitors in cluster & National benchmark**



# Road Map to Achieve Internal Benchmark

## 1 Raw material preparation

- Sun drying for moisture removal
- Selection of raw material

## 2 Testing of raw material

- Automation of sampling and testing
- New SOPs for RM testing

## 3 Quality advancement

- Separator optimization for residue control
- Real time product quality measurement

## 4 Energy

- 100% Renewable energy uses
- 100% Bio-mass utilization
- Idle power optimization.
- VFD installation
- PF optimization

## 5 CCR Operations

- 100% utilization of Expert control system
- KPIs Monitoring & analysis
- Auto data fetching and storage

## 6 PM Cell

- Industry 4.0
- Predictive maintenance
- Advance sensor to improve life of equipment
- SAP PM module utilization.

## 7 Cement Grinding & packing

- Real time variable product cost
- Real time weighing system error monitoring.
- AI based bag counting
- RFID & Auto plant operation

| Indicators | FY-23 | Target FY-24 |
|---|---|---|
| Throughput | 106 TPH | 110 TPH |
| SEC-Grinding | 23.09 | 22.80 |
| SEC Total | 27.70 | 27.40 |

# List of major EnCon project planned in FY’24

Major EnCon project planned FY’24

| S. No | Title of Project | Annual Saving (Lac kWh) | Investment (Rs in Las) |
|---|---|---|---|
| 1 | Enlargement of fan inlet duct box area to reduce fan inlet velocity and impeller replacement work | 4.00 | 30.00 |
| 2 | Optimization of the classifier of the mill | 1.00 | 4.00 |
| 3 | CFD study of mill outlet duct to reduce pressure drop | 0.18 | 3.00 |
| 4 | Direct unloading of dry fly ash to the bin bypassing the fly ash silo circuit | 0.32 | 0.50 |
| 5 | Installation of VFDs (4nos) for power reduction | 1.42 | 8.20 |
| 6 | Mill water spray pump to be stopped | 0.06 | 0.10 |
| 7 | Switch off one power transformer | 0.13 | Nil |
| 8 | Reject control gate to avoid false air entry in the mill | 0.40 | 6.00 |
| | Total | 7.51 | 51.8 |

# List of Energy Saving Projects Implemented

Energy Saving Projects

| Year | No. of Energy saving projects | Investments (INR Million) | Electrical savings (Lacs kWh) | Thermal savings (Kg/MT cement) | Savings (INR Million) | Impact on SEC (Electrical kWh/MT cement) |
|---|---|---|---|---|---|---|
| FY' 21 | 2 | 0.00 | 3.56 | — | 3.10 | 1.60 |
| FY' 22 | 23 | 1.70 | 20.71 | 0.30 | 21.20 | 3.87 |
| FY' 23 | 11 | 1.00 | 2.66 | 0.01 | 13.13 | 0.45 |

Energy saving Project List

# Innovative Project 1-Installation of Agro waste HAG

| Description | Impact | Savings (INR in lacs) | Investment (INR in lacs) |
|---|---|---|---|
| Objective<br>To reduce plant operating cost with green innovative approach | Fuel cost reduced by INR 50/MTcem | | |
| Solution<br>We introduce a new green technology of Agro Waste HAG which replace the hydrocarbon oil with bio mass fuel. We have installed fluidised bed bio-mass HAG which is able to burn Agro waste, saw dust shrubs and briquettes | Plant CO2 emission reduced from 9.2 to 0.4 Kg/MTCementitious (FY'24) | 195.13 | 132 |

HAG


HAG Chamber

# Innovative Project 2-Wireless Communication for Packer

| Description | Impact | Savings (INR in lacs) | Investment (INR in lacs) |
|---|---|---|---|
| **Objective**<br>To increase packer reliability and reduce maintenance cost<br>**Problem statement**<br>The Packer communication slip rings worn out within 6 months and causes frequent communication faults in the packer<br>**Solution**<br>The Wireless Antenna configured as the alternate way (Wi-Fi base) to establish communication in the packer. The configured setting/arrangement is live for 10 months without any failure | The packer operation reliability increased | 0.67 | 0.15 |

## Communication ring position and worn out ring

## Wireless antenna installation pics

# Innovative Project 3-Utilization of AC drain water

| Description | Impact | Savings (INR in lacs) | Investment (INR in lacs) |
|---|---|---|---|
| Objective<br>Reduction in ground water extraction | Water Savings<br>≈ 125 KL/Year | | |
| Solution<br>We are collecting water from split & Package AC, using it as distilled water for lab equipment, and draining it into electrical earth pits, which reduces the extraction of groundwater | Power savings<br>≈ 1.1 Lac/Year | 1.30 | 0.10 |
| | Inventory Savings<br>≈ 0.2 Lac/Year | | |

Drain Water collection from AC

Pipe lines connected to Earth pits

# Utilization of Renewable Energy Sources

## Group Renewable energy capacity

| Site | WHRS (MW) | Solar/Wind (MW) |
|---|---|---|
| Nimbahera | 13.20 | 7.02 |
| Mangrol | 29.10 | 6.93 |
| Gotan | - | 0.30 |
| Muddapur | - | 25.00 |
| Jharli | - | 0.30 |
| Aligarh | - | 4.50 |
| Balasinor | - | 1.80 |
| Katni | - | 1.00 |
| **Total (MW)** | **42.30** | **46.85** |

## Utilization of Renewable Energy at Balasinor

| Year | Energy | Off site | Installed Capacity (MW) | Generation (Million kWh) | % of overall electrical energy |
|---|---|---|---|---|---|
| FY' 21 | NA | NA | NA | NA | NA |
| FY' 22 | Wind | Off site | 1.8 | 0.784 | 5.39 |
| FY' 23 | Wind | Off site | 1.8 | 3.15 | 19.00 |

# Energy Monitoring System


## Energy Data Collection

- EMS
- Total 25 Energy Meters for all section and major drives
- Section wise power capturing from IMCCs

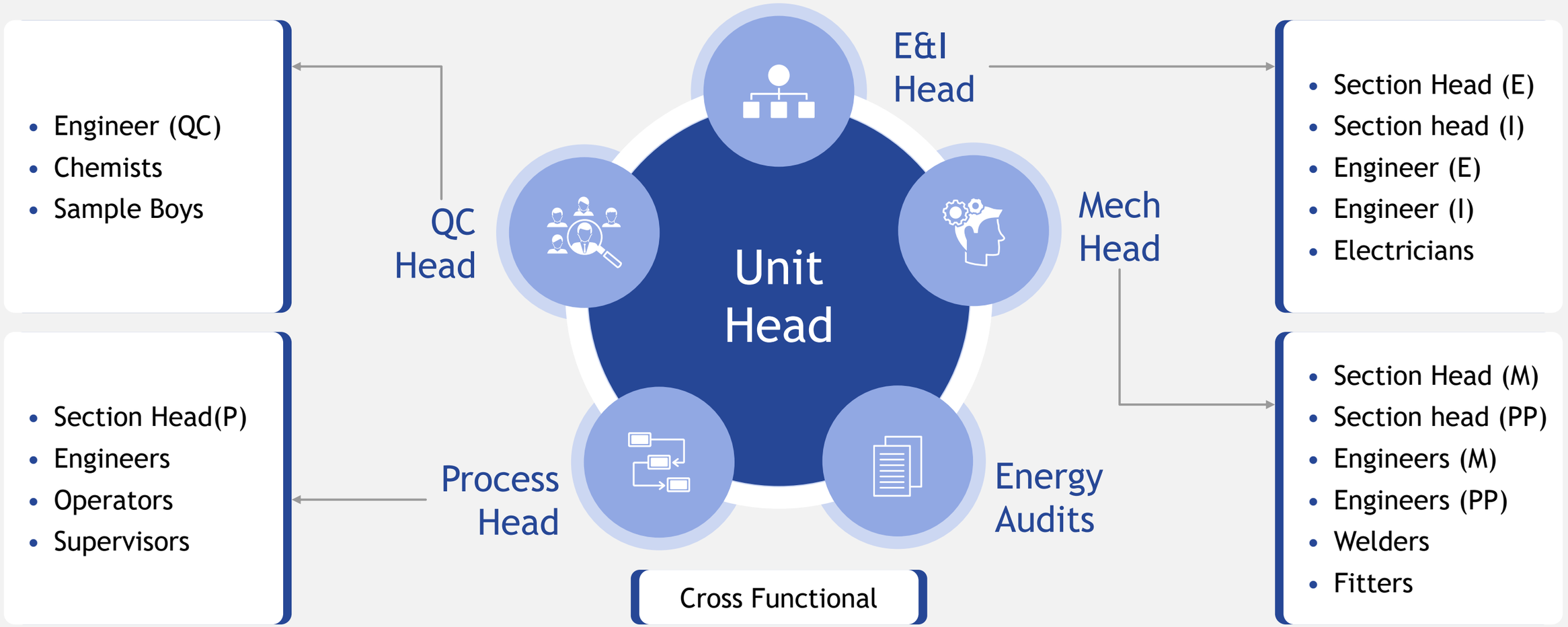
## Energy Reports

- Daily Power Report
- Real Time display of equipment's power

## Review System

- Daily Variance analysis in power
- Daily Production meeting and Power review
- Monthly Review Meeting with MH sir.
- Comparison of data with internal benchmark

# Energy Monitoring Cell



# Digitization at JK cement Balasinor

Internet of things (IoT) in manufacturing


IoT in manufacturing will play a key role in predictive maintenance

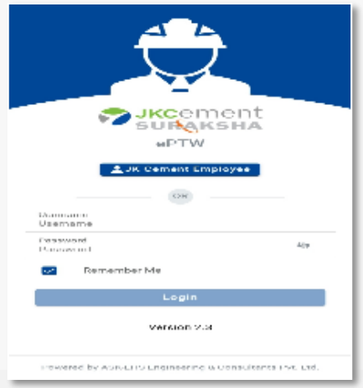
| S. No | Implemented digitalization Projects |
|---|---|
| 1 | Various Mobile Apps for plant |
| 2 | IT-OT Integration for data traffics |
| 3 | Web –Ux web page for live plant screen |
| 4 | CMS for Mill Main gear box |
| 5 | E-LIMS system for Quality data recording |
| 6 | Cement live variable cost, Weigh feeder’s live error, & Live power factor display on CCR operator screen |
| 7 | Group level Portal for kaizen's & energy saving projects |

# Digitization at JK cement Balasinor

## Mobile Application

### SURAKHA Apps

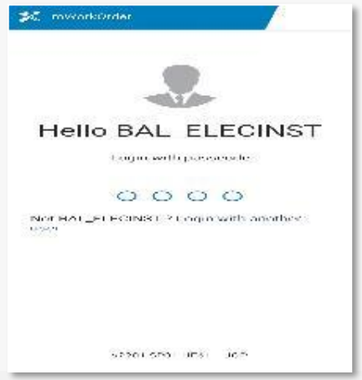

### PTW App




### EHS App


### Maintenance Apps

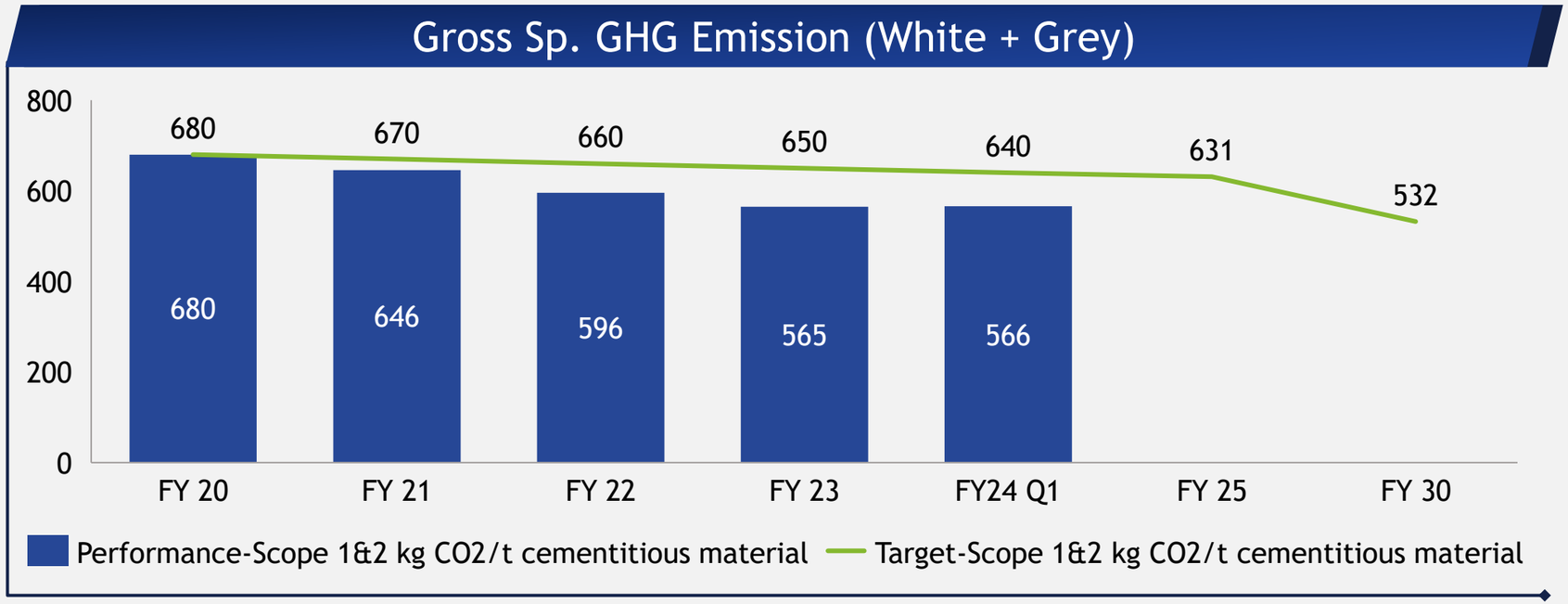
### mWork Order App




### Vibration Analysis App

# GHG Inventorisation-JK Cement ltd.

Gross Scope-1 & 2 GHG Emission Committed SBTi in FY2021 (Under Validation)




SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

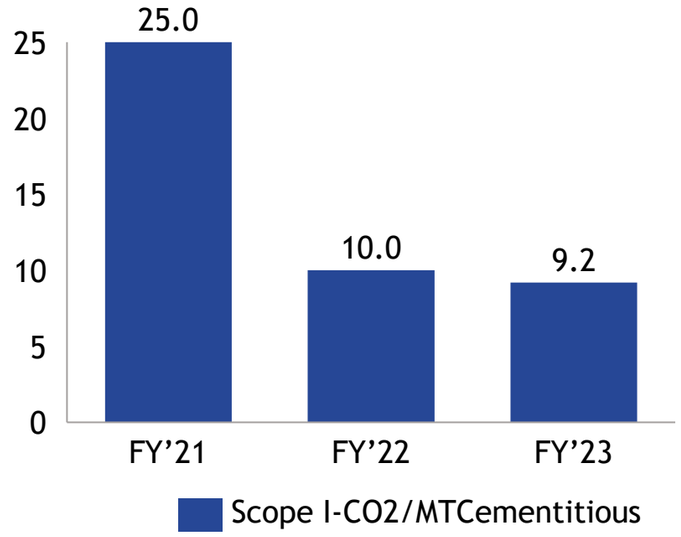
**Target: 21.7% reduction by FY30 from base year FY20**

**Achieved: 16.8% reduction by FY24 Q1**

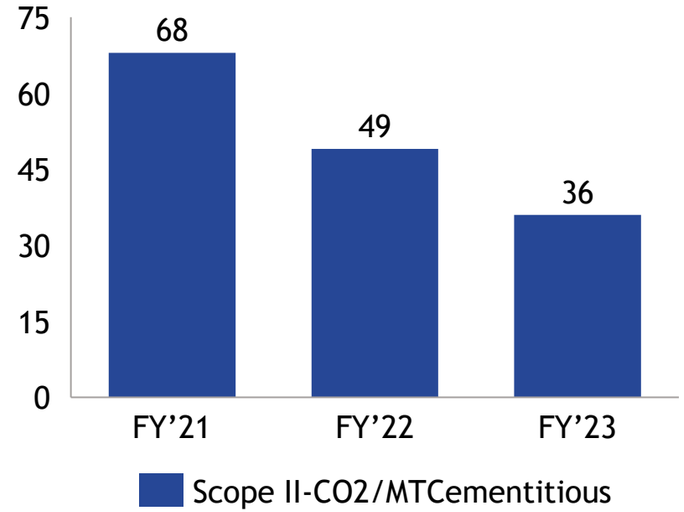
Aligned business model with UN's 2030 agenda for Sustainable Development and have committed SBTi in March, 21 for business ambitions well below 2°C to lower the Scope 1&2 emissions to the tune of 532 kg CO2 per ton of cementitious material by 2030, a reduction of 21.7% compared to 2020 level of 680 kg CO2 per ton of cementitious material

# GHG Inventorisation-JK Cement Works, Balasinor

## Scope I-CO2/MTCementitious




## Scope II-CO2/MTCementitious




## CO2 reduction in FY23:

- Bio-Mass (AFR) HAG installed and oil based HAG uses reduces (commissioned in March'23)
- Clinker factor reduced by 2.85% (58.65 to 55.80)

## Note:

- Scope II-CO2 emission is reduced by increased in renewal energy consumption

# GHG Inventorisation-JK Cement Works, Balasinor

Action Plan towards reduction of CO2 emission

## Short Term

| S.No. | Action plan |
|---|---|
| 1 | Maximize uses Bio Mass (AFR) HAG ≈ 90% |
| 2 | Clinker factor reduction by 0.5% |
| 3 | Procurement of new BLDC AC instead to conventional AC |
| 4 | Uses of high capacity vehicle for inward and outward |
| 5 | Additional 20% Incentive offered to employees for purchase of Electrical Vehicles |
| 6 | Reverse logistics is being used for material transportation |

## Long term

| S.No. | Action plan |
|---|---|
| 1 | Industry 4.0 |
| 2 | 100% Renewable energy uses |
| 3 | 100% Re-cyclable bags of recycled raw material |
| 4 | 45% of plant area for plantation |
| 5 | Total plant power consumption < 23 Kw/MtCem. |

# Achieve Net Zero Target (2030-2050) – JKCL

- Fully development of Net Zero Technologies at Industrial Scale
- CCUS
- Green H2/Kiln Electrification
- C&D Waste Utilization

| Net Zero | CF <0.60 | %TSR >50 | kwh/t <60 | Clean Power 100% |
|---|---|---|---|---|

# Voluntary initiatives & commitment

## Reporting Framework

| | |
|---|---|
| Global Reporting Initiative | Our 1st first report was published in FY 2013-14 |
| INTEGRATED REPORTING <IR> | Our 1st report published in FY 2020-21 |
| TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES | Our 1st report was published in FY 2022-23 |
|   | Our 1st BRSR report is published in FY 2022-23 |

## Global Goals and Protocols

| | |
|---|---|
| SCIENCE BASED TARGETS DRIVING AMBITIOUS CORPORATE CLIMATE ACTION | We are aligned with SBTi |
| gcca | As a global member of GCCA, we committed for 2050 Net Zero roadmap |
|   | We are aligned with the SDG road map developed by WBCSD for Indian Cement Sector |
| ENERGY COMPACTS UN | We committed UN-Energy Compacts in FY 2021 to drive the progress on the achievement of SDG7 |

## ESG Ratings

| | |
|---|---|
| S&P Global Ratings | We participate in S&P Global Corporate Sustainability Assessment (CSA) |
| CDP | We participate in globally accepted CDP. Disclosed for FY23 |

# Implementation of ISO 50001:2018



LRQA

Current issue date: 10 January 2023
Expiry date: 11 August 2024
Certificate identity number: 10455206

Original approval(s):
ISO 9001 - 12 August 2021
ISO 14001 - 12 August 2021
ISO 45001 - 12 August 2021
ISO 50001 - 12 August 2021

## Certificate of Approval

This is to certify that the Management System of

**J. K. Cement Works**

Tahsil – Balasinor, Ahmedabad Indore Highway, Village - Vadadala, Balasinor, 388265, Dist – Mahisagar, India

has been approved by LRQA to the following standards:

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

Approval number(s): ISO 9001 – 00032089, ISO 14001 – 00032086, ISO 45001 – 00032087, ISO 50001 – 00032088

**The scope of this approval is applicable to:**

Manufacture of Pozzolana Portland cements at Balasinor.

Luis Cunha

Area Operations Manager - North Asia & SAMEA

Issued by: LRQA Limited

UKAS MANAGEMENT 006

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LRQA

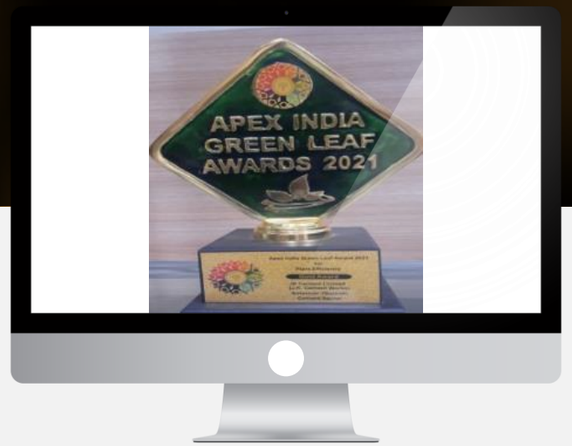
**Certified by 50001:2018**
**Validity: 11 August 2024**

ISO 50001 brings an effective process to measure and manage energy use in order to Reduce/manage energy usage and operating costs

# Learning from CII Energy Award Program

| S.No. | Project Title |
|---|---|
| 1 | PLC based Plant Lighting auto start stop from CCR |
| 2 | Sequential operation for clinker silo gate’s |
| 3 | Potable compressor installation for Clinker unloading system |
| 4 | Installation trans vector nozzle for cleaning applications |
| 5 | Installation of energy efficient BLDC AC |

# Awards and Recognition




## 2021

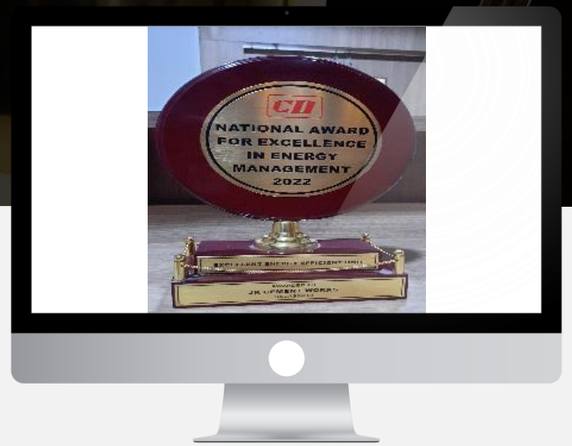
**“Gold Award”**

**Apex India** Green Leaf Award for plant efficiency


## 2022

**“Gold Award”**

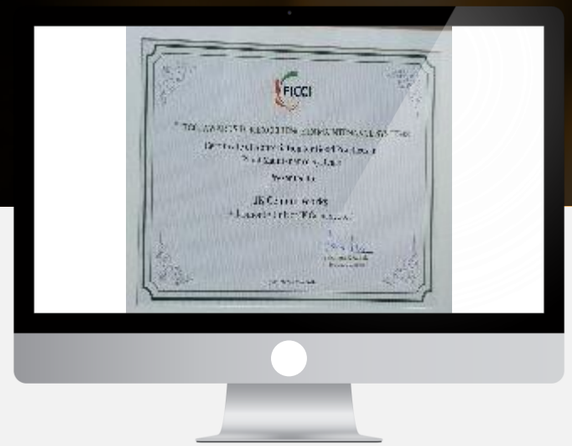
**Apex India** Occupational Health & Safety Award




## 2022

**“Excellence Award”**

**CII** National Award for Excellence in Energy Management




## 2023

**“Appreciation Award”**

**FICCI** Excellence in Maintenance Systems


JKcement

JK SUPER
CEMENT
BUILD SAFE


BUILD SAFE
#YehPuccaHai

*Thank You!*