CII National Energy Conservation Award 2022

Zuari Cement
HEIDELBERGCEMENT Group

Zuari Cement Limited
(Solapur Grinding Unit)

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INDIA

Participant List – Zuari Cement Ltd, Solapur

CII National Energy Award 2022 – Cement Sector , Grinding Unit

Mr. Deepak Kakkar
Plant Head

Mr. Rudramuni Aradhayamath
HOD Production

Mr. B. Kamalakar
HOD E&I

1. Brief introduction Heidelberg Cement and Zuari Cement unit

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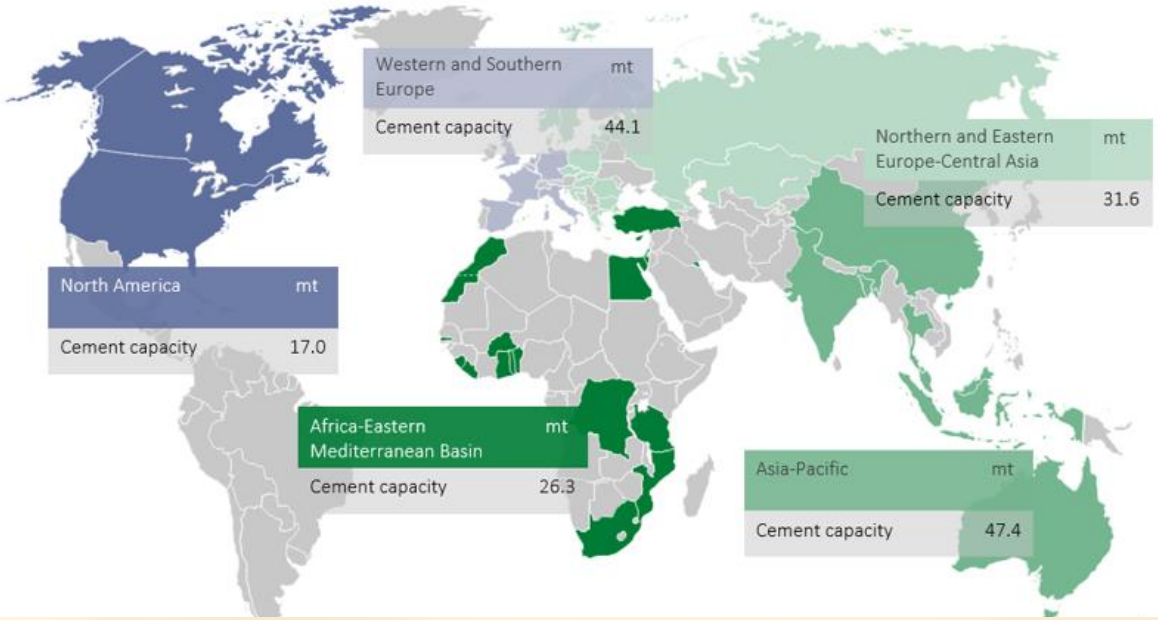
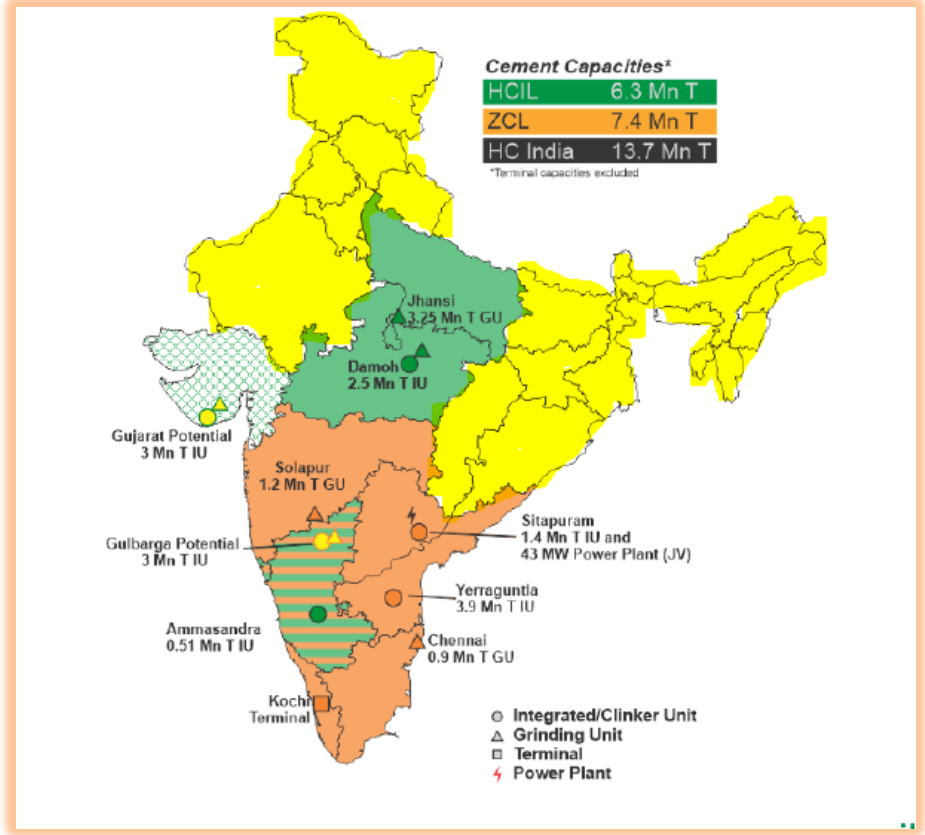
Cement capacity of 184 mt (incl. joint ventures)



HeidelbergCement is one of the world's largest building materials companies

#2 in cement, #2 in aggregates, #2 in ready-mixed concrete



Our Focus

- **To be on on the path to carbon-neutrality.**
- **progressive minds with the ambition to drive transformation**

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Unit Profile

- Cement Grinding Unit with **installed capacity of 0.95** MTPA , commissioned in 2015
- Dry Fly ash from Nearby NTPC super Thermal Power Solapur Grinding Unit is having
- **Art of technology** like High Efficiency motors, compressors, MV drives, VFD, IOT etc.
- Wagon loading system installed in Feb 2022

Major Equipment


Clinker Silo


Fly ash Silo


Cement Silos


Packing Plant


Gypsum Yard


Wagon Tippler


Cement Mill


Wagon loading


Fly Ash Silo

Equipment Details:

- **Cement Mill** : FLS Ball Mill,1No. Installed Capacity 110 TPH
- Running Capacity – 160 TPH
- **Packing Plant** : FLS Vento Matic Roto-Packer- 2Nos., 12 Spout each of 180TPH.
- **Wagon Tippler**: Elecon-1No. With capacity 25 Wagons per hour.
- **Wagon Loading**: FLS, 8 Nos. of wagon loading machines with 120TPH each
- **Clinker storage Silo** : 20000 MT.
- **Cement storage Silos**:
  OPC silo 6000 MT.
  PPC silo 6000 MT.
- **Fly Ash silo** : 1500MT.

Solapur Unit - Milestone

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Commissioned in 2015
Green belt development initiated. Zuari cement take over to **Italcementi** Group

FY2016

FY2017

Bulk Cement Dispatch improved & ISO standards Implementation Globally merger in Heidelberg cement Group.

Clinker Wagon tippler upgradation & Incorporation of **Energy efficiency** motors while procuring.

FY2018

FY2019

60% of dampers removed for avoiding the damper losses. Energy Efficiency measures taken like LEDs

Process optimization & Monitoring of Online Specific Energy Consumption.

FY2020

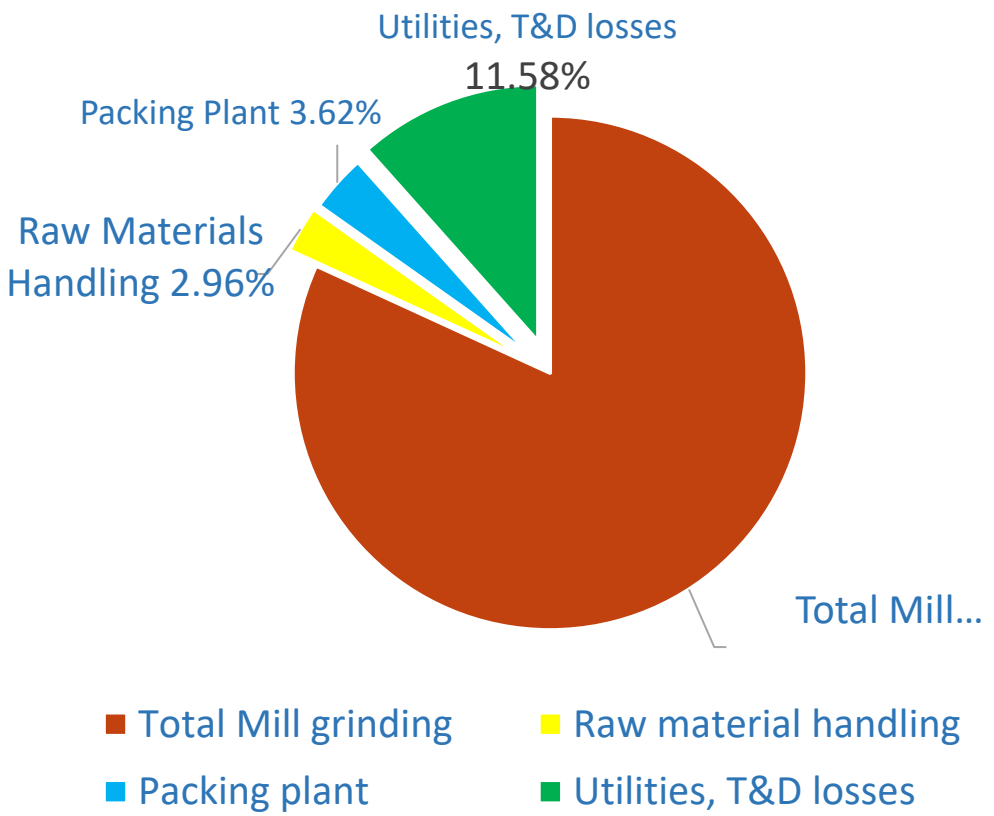
FY2021

FY 21-22
Upgradation of Packer(Single discharge to double discharge)
Installation of OHE
Installation of Cement wagon loading

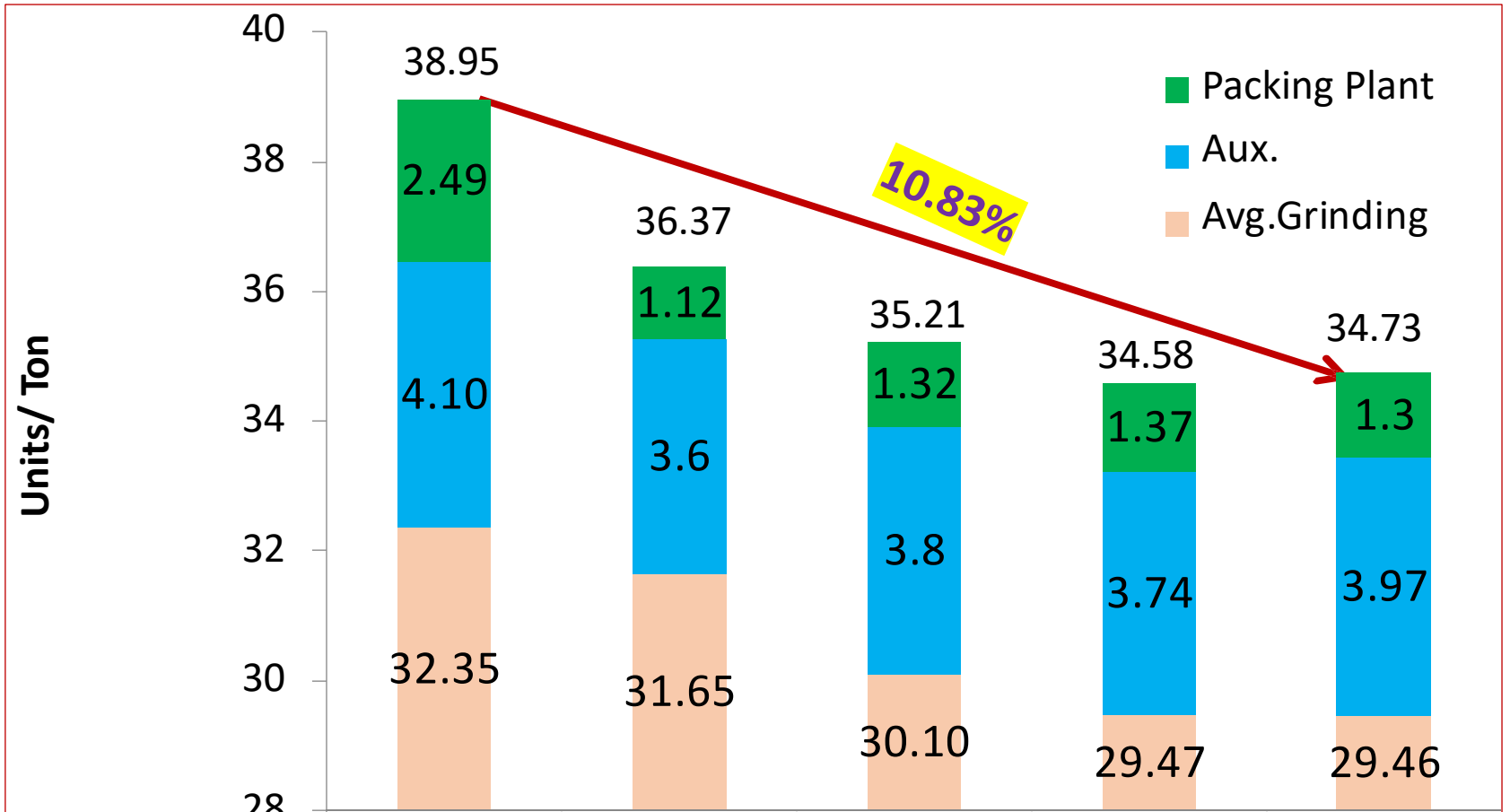
Major Power Consumption

Energy Consumption (Grid power)

- **Total Mill grinding**
- **Raw material handling**
- **Packing plant**
- **Utilities, T&D losses**

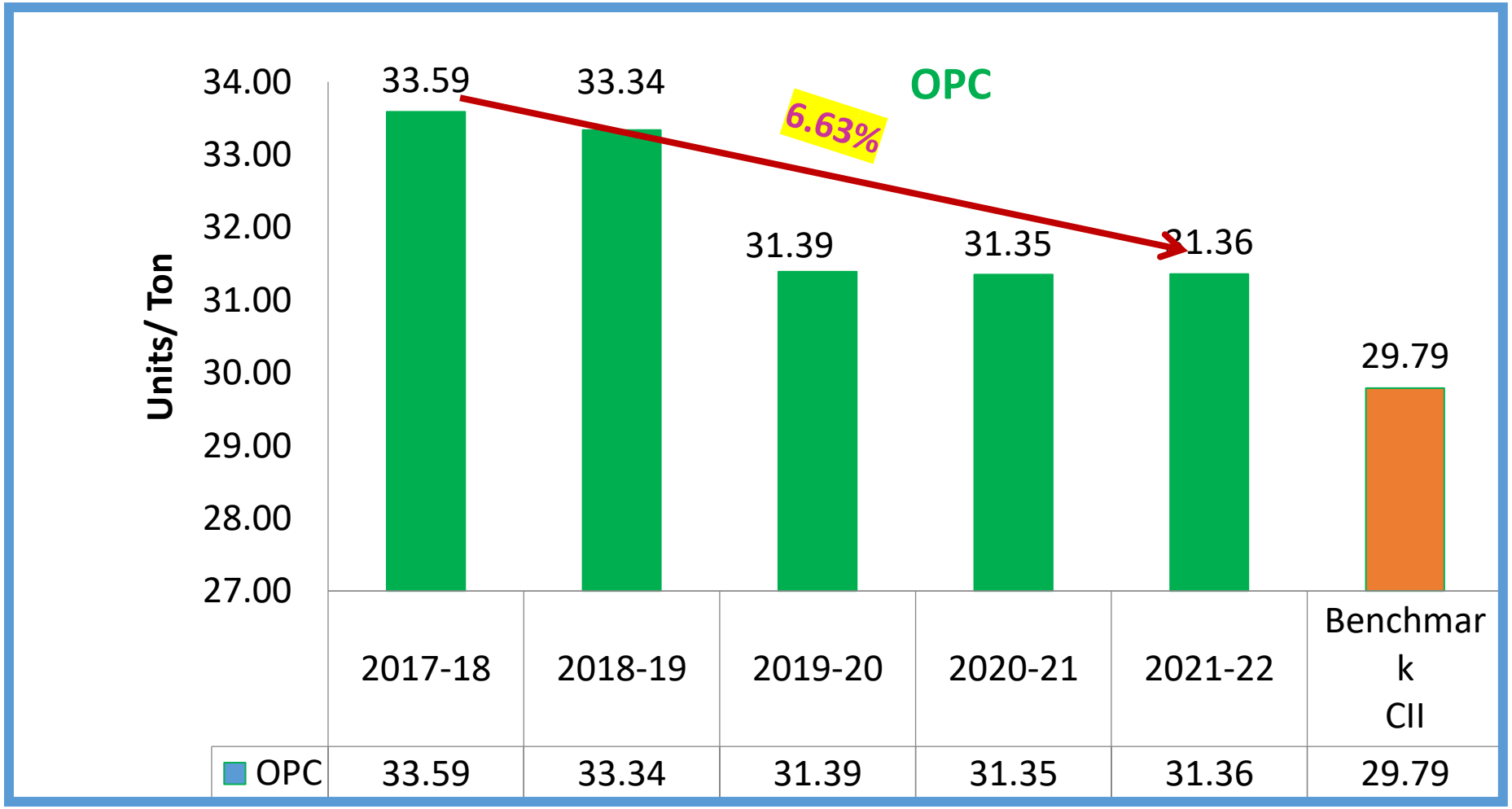


2. Overall Specific Power Consumption Kwh/T

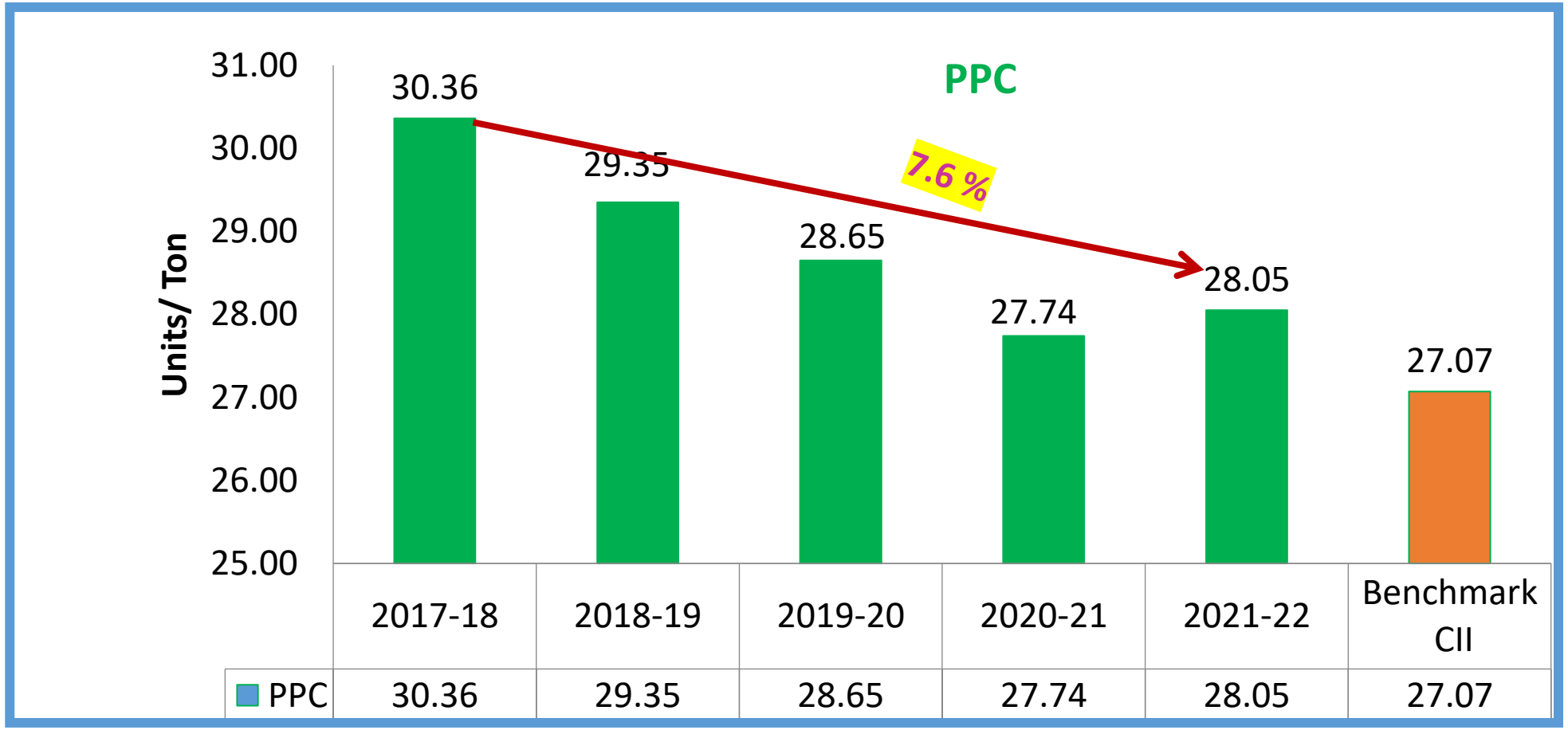


	2017-18	2018-19	2019-20	2020-21	2021-22
Packing Plant	2.49	1.12	1.32	1.37	1.3
Aux.	4.10	3.6	3.8	3.74	3.97
Avg.Grinding	32.35	31.65	30.10	29.47	29.46

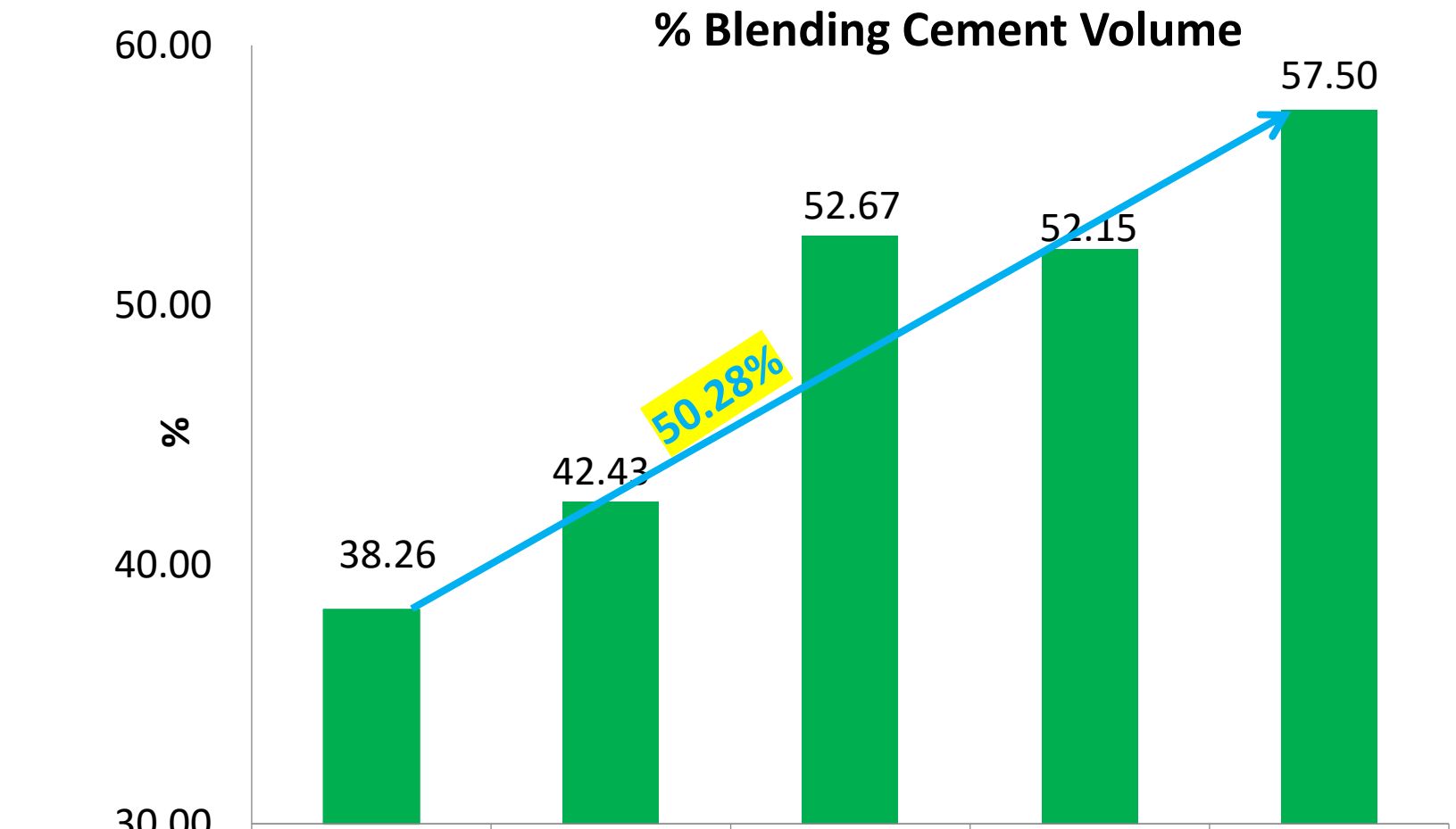
2. Specific Power consumption Trend OPC & Benchmark



2. Specific Power consumption Trend PPC & Benchmark



Blending Cement Volume (%)



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Benchmark & Road Map

3. Specific Power consumption Trend OPC & PPC & Benchmark

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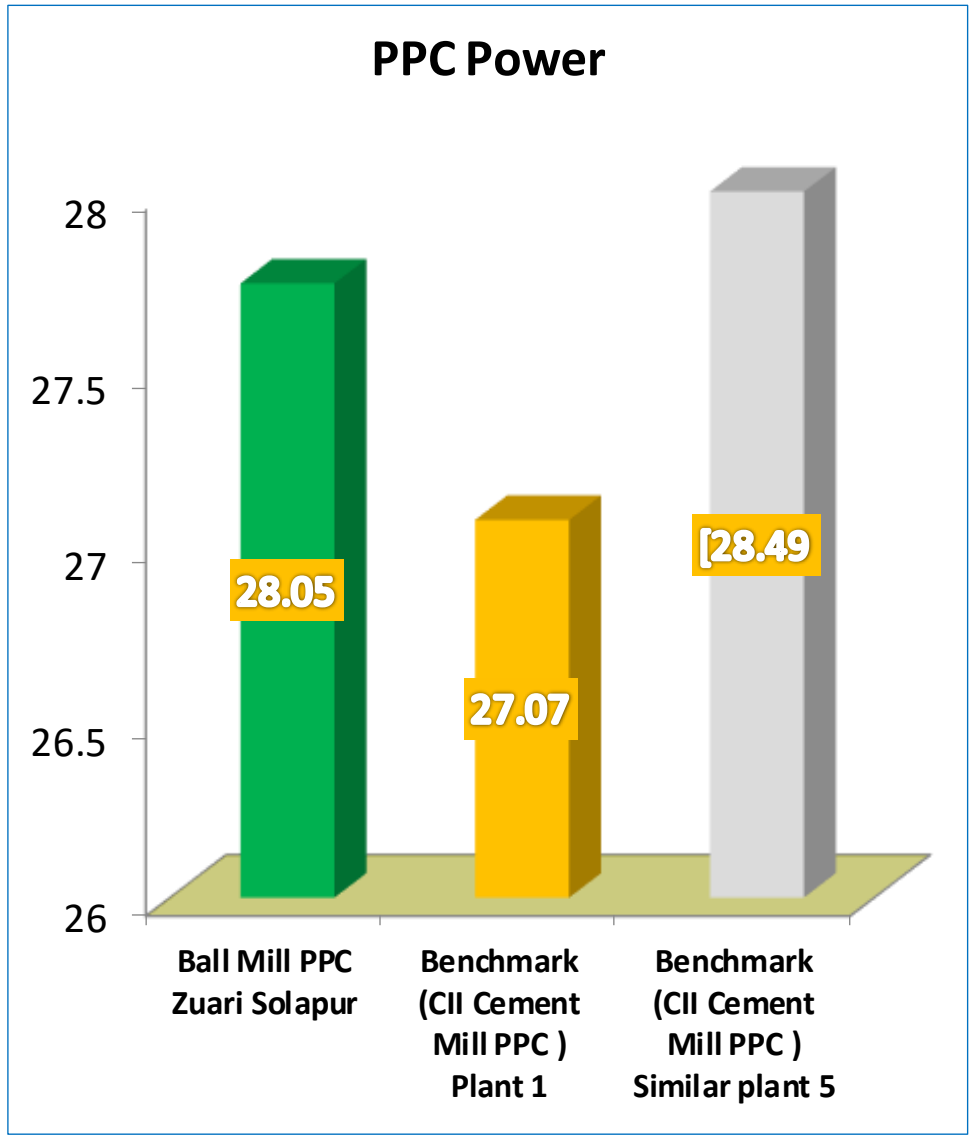

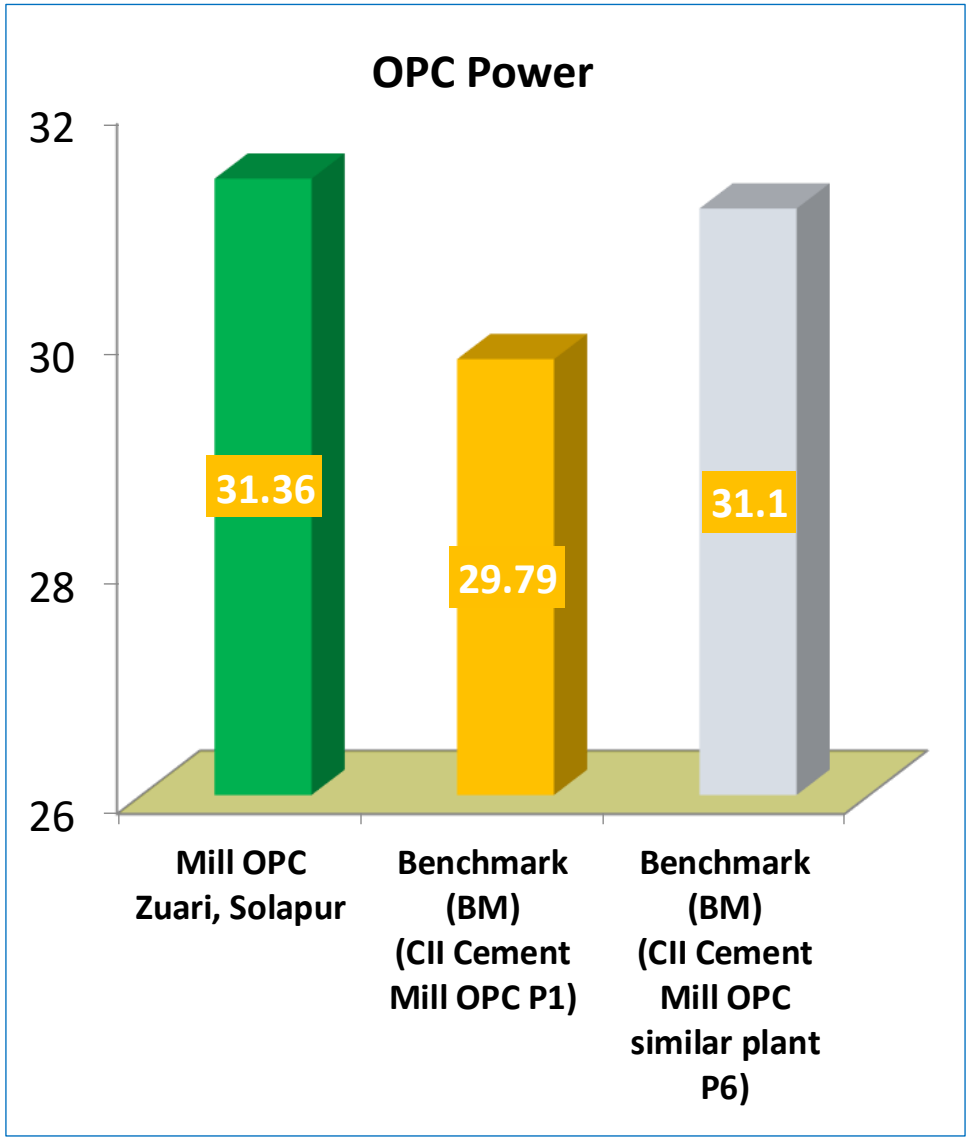

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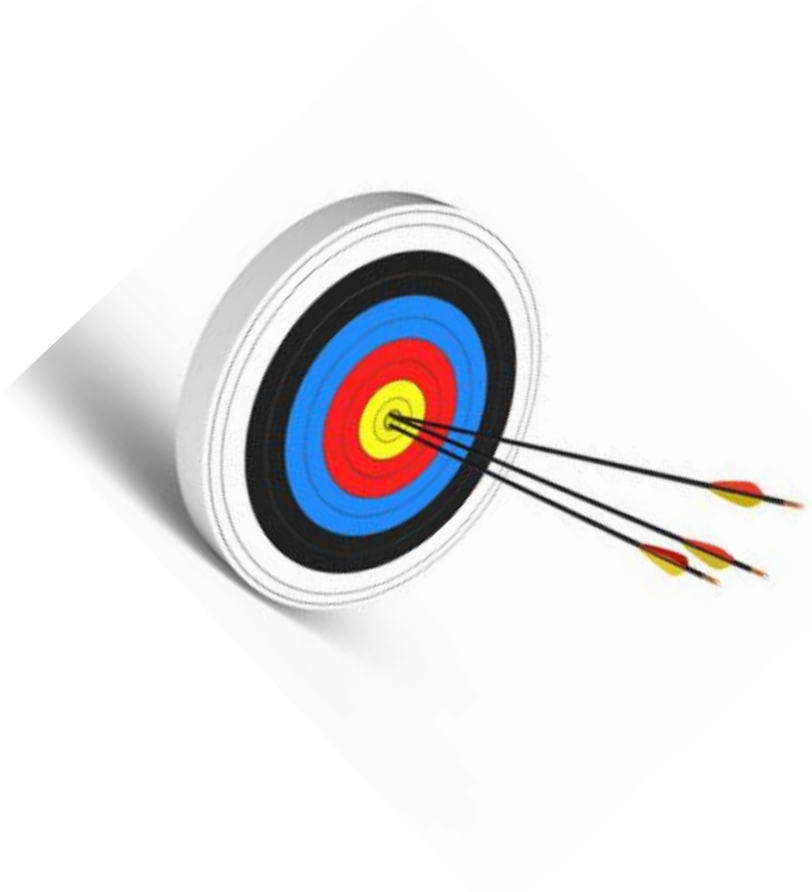
Road Map to achieve the Benchmark by Encon Projects



1. Fly ash Unloading compressor replace from HP to LP.
2. Diverting of Mill vent Bag filter discharge to Silo feed Elevator
3. **Packer 1&2 Screw Conveyor Replacement With drag chain/Air Slide**
4. Increase the **Blended Cement** sales
5. Separator Vent Bag Filter Screw Conveyor With Drive
6. VFD 400 Kw For Separator Drive

Target - 27.07 U/T of PPC

Present 28.05 U/T of PPC

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Energy Saving Projects

4. Energy Saving projects implemented in last three years

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YEAR	No of Energy Saving Projects	Investment (INR Million)	Electrical Saving (Million Kwh)	Saving (INR Million)	Impact on SEC (Kwh/T of Cement)
FY 2018-19	6	0.112	0.035	0.281	0.07Kwh/T
FY2019-20	11	0.514	0.147	1.176	0.27Kwh/T
FY2020-21	6	0.51	0.614	4.91	1.50Kwh/T
FY2021-22	6	42.15	0.36	2.9409	0.30 Kwh/T
Total	29	43.286	1.156	9.3079	2.14Kwh/T

Energy Saving Projects 2019-20

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No	Title of Project	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Comments
1	System false air reduced from 25% to 21%	29200	0.234	0.2336	0.125	Air leakages arrested at Expansion joints & flanges
2	Compressor leakage reduced from 47% to 38%	21900	0.175	0.1752	0.1	leakages arrested by identified with soap water test
3	Bagfilters operation taken into DP mode(Mill section)	25550	0.204	0.2044	0.07	Purging mode changed
4	Spillage conveyor removed under the BC-32 after modification	8030	0.064	0.06424	0	spillage conveyor removed by modification of discharge chute
5	Wagon tippler two screw conyors stopped based on BF hopper level	2640	0.021	0.02112	0.07	Interlock developed with hopper high/low level
6	Main Bag House Purging operation changed from timer mode to DP Mode	6600	0.053	0.0528	0.035	purging mode changed
7	Mill Water spray system stopped	12210	0.098	0.09768	0	by adjusting sources of gypsum addition into the Mill
8	One Airslide blower permanently stopped by modification of airslide airline ducts	12210	0.098	0.09768	0.025	one airslide blower completely stopped
9	Interlock modified for Process water pump	16060	0.128	0.12848	0	modified the interlock with mill bearing temperature after Mill stop
10	Auto Drain provided for Air Receiver tank	5940	0.048	0.04752	0.045	Auto drain system provided for 9 compressed air receiver tanks
11	Replaced 20 No. LED street Light	6570	0.053	0.05256	0.044	20 LED street lights changed
	Total	146910	1.176	1.17528	0.514	

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Energy Saving Projects 2020-21

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No	Title of Project	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Comments
1	During PPC grinding, we stopped FK pump & Flyash conveying blower by adding/diverting the flyash to Mill outlet airslide.	511000	4.088	4.088	0.1	Flyash diverted to Mill outlet through airslide
2	Compressor leakage reduced from 38% to 28%	21900	0.175	0.1752	0.0265	leakages arrested by identified with soap water test
3	Air blaster(100liters) installed	29200	0.234	0.2336	0.125	Material is accumulated at horizontal duct between separator and cyclones.for avoiding of accumulation we installed the air blaster
4	Gypsum hopper &Clinker belt conveyors(BBC-9&10) vent line modification	18250	0.146	0.146	0.072	Vent lines modification
5	Bagfilters operation tanken into DP mode(Packing plant section)	21900	0.175	0.1752	0.105	Bag filter purging operation sequence changed from timer to DP mode
6	Replaced 35 No. LED street Light	11498	0.092	0.091984	0.077	LED lights installed
Total		613748	4.91	4.909984	0.5055	

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Energy Saving Projects 2021-22

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No	Title of Project	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)	Comments
1	Process optimization by sorting of Grinding media.	88800	0.71	0.71	2.5	42.25	Regrading of grinding Media
2	Replaced the chain bucket elevator to belt bucket elevator for Mill recirculation.	17760	0.142	0.142	10	845.07	Replaced recirculation Chain elevator by belt elevator
3	Cement wagon loading machines installed	10000	0.08	0.08	25	3,750.00	wagon loading system installed
4	Highmast convention replaced to LED	13687	0.1095	0.1095	0.15	16.44	Flood light replaced by LEDs
5	Power factor improved from 0.980 to 0.997	221000	1.768	1.768	2.5	16.97	Repair of capacitor banks and monitoring
6	conventional lighting replaced to LED panel lighting with motion sensor in admin building	16425	0.1314	0.1314	2	182.65	Conventional light replacement by LEDs
	Total	367672	2.9409	2.9409	42.15	171.99	

Reason for Specific Energy reduction over last three years

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- Process Optimization
- Minimisation of frequent start stop
- FK pump optimisation
- Replacement of recirculation chain elevator to belt bucket elevator
- Packer double discharge from single discharge
- Grinding media regradation /Sorting on annual basis and quarterly recharge
- Two spillage conveyors removed by modified the vent lines & discharge chutes.
- Two screw conveyors stopped in Wagon tippler BH based on the Baghouse hopper level by providing interlock.
- Bag filters purging operation changed from timer mode to DP mode.
- Mill Water spray system stopped by **process optimization**
- System pressure drop reduced by providing air blaster in horizontal duct from Separator fan to Cyclones where the material is accumulated.
- Flyash conveying blower & FK pump stopped permanently by providing airslide from Flyash silo bin to Mill outlet.
- Compressor leakage reduced to 28%
- System false air reduced
- Replacement of conventional lights by LEDs.
- Motion sensors provided for plant & offices

List of Encon projects planned in FY2022-23

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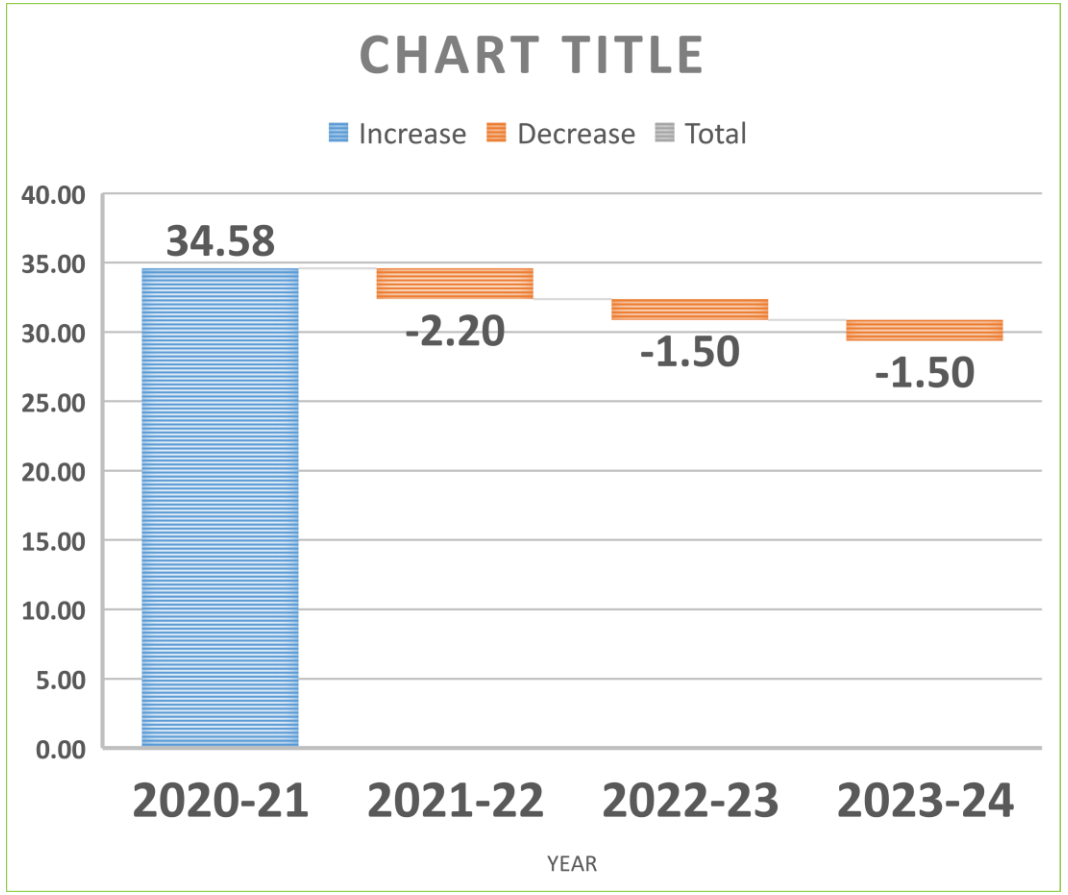
- Fly ash Unloading compressor replace from HP to LP.
- Diverting of Mill vent Bag filter discharge to Silo feed Elevator
- **Packer 1&2 Screw Conveyor Replacement With drag chain/Air Slide**
- Increase the **Blended Cement production**
- Separator Vent Bag Filter Screw Conveyor With Drive
- VFD 400 Kw For Separator Drive

Long/ Short Term Power reduction plan



- Optimisation of Mill Productivity by monitoring process variable / parameters and start / stop
- Shut off valve for packer compressed air line and silo
- Minimise the operation of FK pump
- Monitoring auxiliary power and plan reduction
- Installation of VFDs in Bag filter fan PL2023
- Replacement of Fly ash unloading compressor from HP to LP.
- Mill bag filter discharge material to be diverted to silo feed bucket elevator directly.
- Fly ash SFM capacity enhancement from 60MT to 90MT
- Volume of Blended cement increases to 100%
- Cement rake loading to be improve up to 30%

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Innovative Projects

5. Innovative Project 1 – Installation of Belt conveyor trainers at mill feeding belt to avoid frequent tripping /belt sway problem

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❖ **Specific Power consumption reduction due to frequent stoppage:**

Observation :

- ❖ During operation of the cement mill BC-32 feed belt at Solapur Grinding Unit, frequent belt sway problem is being face. This results in belt tripping and mill feed is getting stopped. This affect the performance of the mill and starvation.
- ❖ Length of the belt conveyor is 500 meter. Belt sway is being observed mostly at head drum or tail drum side. This also affect life of the belt as belt corner edges worn-out due to frequent belt sway.
- ❖ After belt sway there is huge amount of spillage material spread entire portion of the belt and require regular cleaning and extra manpower deployment and power consumption.

Optimisation:

- ❖ Based on a various ideas and vendor discussion, we have installed three belt trainers as per following:
- ❖ 1. Near head drum
- ❖ 2. Center position of the belt
- ❖ 3. Near to incline portion of the belt
- ❖ Since installation of belt trainer, belt is running smoothly at center position, and frequent belt sway problem has been resolved. Material spillages is also completely stop

Innovative Project 1 – Installation of Belt conveyor trainers at mill feeding belt to avoid frequent tripping /belt sway problem

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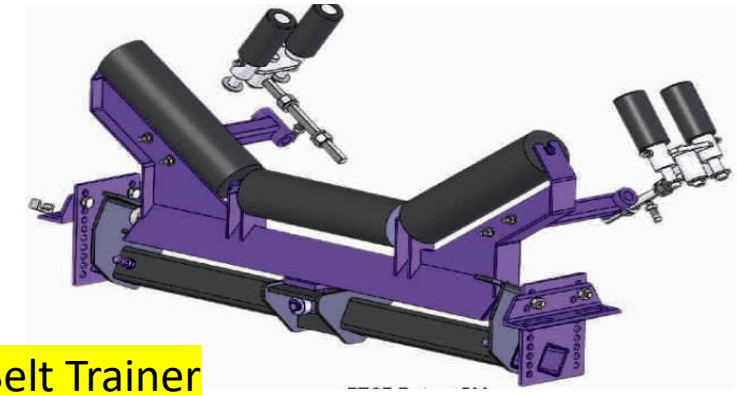
❖ **Specific Power consumption reduction due to frequent stoppage:**

Tangible & Intangible Benefits:

❖ Conveyor belt mis tracking is a common problem that spans a variety of industries. Even the slightest movement or change in a conveyor operation could cause a belt to mistrack. Preventing mistracking is essential, as even slightly misaligned conveyor belts can lead to spillage, excessive wear of the belt, and major damage to equipment or even the structure.

❖ Frequent stoppages and feed material starvation avoided which has resulted in power saving.



Belt Trainer

Belt running in center position without any drift or material spillage

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Innovative Project 2– Fly Ash Feeding Airside to recirculation bucket elevator

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❖ **Specific Power consumption reduction due to FK pump stoppage:**

Observation :

- ❖ Frequent jamming of airslide for fly ash feeding to recirculation elevator in cement mill.
- ❖ We were frequently facing the problem in fly ash feeding due to jamming of air slide. Earlier, recirculation chain elevator was installed at mill discharge with arrangement of fly ash feeding air slide discharge, opposite to the feeding point of the elevator.
- ❖ In 2021, chain elevator was replaced with belt elevator. According to the OEM design, feeding point of the fly ash should be lifting side of the elevator. But there is obstruction in route because mill outlet HLPC unit installed near to feeding point. Further, airslide slope should be kept at 9 degrees according to the suppler in order to avoid jamming tendency. As per site condition, it is difficult to maintain desired slope angle.
- ❖ This all above condition lead to feed the fly ash by FK pump directly in separator which results in increase of power consumption by 100 KW

Innovative Project 2– Fly Ash Feeding Airside to recirculation bucket elevator

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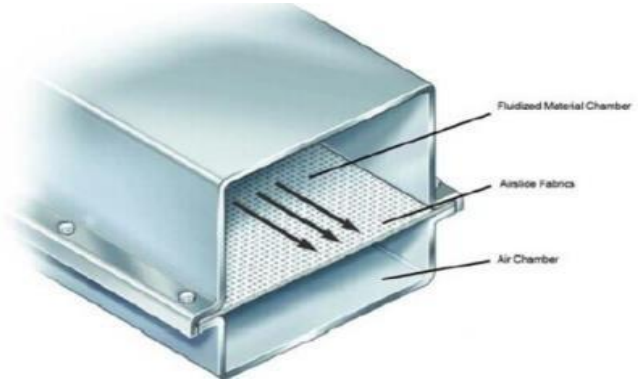
❖ **Specific Power consumption reduction due to FK pump stoppage:**

Optimisation & Benfits:

- ❖ Based on brainstorming ideas, we shifted the outlet HLPC unit from its original position towards opposite end of the feeding side of the elevator enable us to re-route the fly ash feeding air slide at lifting side of the elevator.
- ❖ Divert the airslide in order to maintain angle of slop 9 degree according to recommendation of the supplier for free fly ash flow subsequently maintain the air balance by providing the venting line as well and stopped extra aeration blower. Distribution box was also removed by directly connecting both the air slide with straight air slide.
- ❖ Power saving upto 100 KW per hour



Layout of airslide

Airslide installed after modification

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Utilization of Renewable Energy sources

6a. Utilisation of Renewable Energy sources

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Year	Technology (electrical)	Type of Energy	Onsite/Offsite	Installed Capacity (MW)	Generation (million)	% of overall Electrical energy
FY 2019 -20	Electrical	Solar PV	On site	0.005	0.01825	0.1
FY 2020 -21	Electrical	Solar PV	On site	0.005	0.0292	0.2
FY 2021 -22	Electrical	Solar PV	On site	0.005	0.0365	0.26

Year	Technology (Thermal)	Type of Energy	Installed Capacity million kcal	Usage (million Kcal)	% of overall Thermal energy
FY 2019 -20	Furnace	Thermal	Uninstalled	600	100
FY 2020 -21	Furnace	Thermal	Uninstalled	728	100
FY 2021 -22	Furnace	Thermal	Uninstalled	690	100

6b. Utilisation of Renewable Energy sources

Proposed solar Park for Group Captive Green Power

- PPA off site Group Captive 7.5 MW solar plant is in process for 100% Green Power utilization
- 7.5 MWp ground mount Solar Power plant
- estimated optimum renewable energy, annual generation from the Solar Power (photovoltaics) plant approximately 12.15 million Units per year at generation (Solar Plant Bus Bar) point

6b. Utilisation of Renewable Energy sources – Improving Day Light & Ventilation

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Transparent sheet and Turbo Ventilators have been provided in Mill Building, Packing plant Wagon tippler, Bag Godown, Store etc to improve day light and Energy saving

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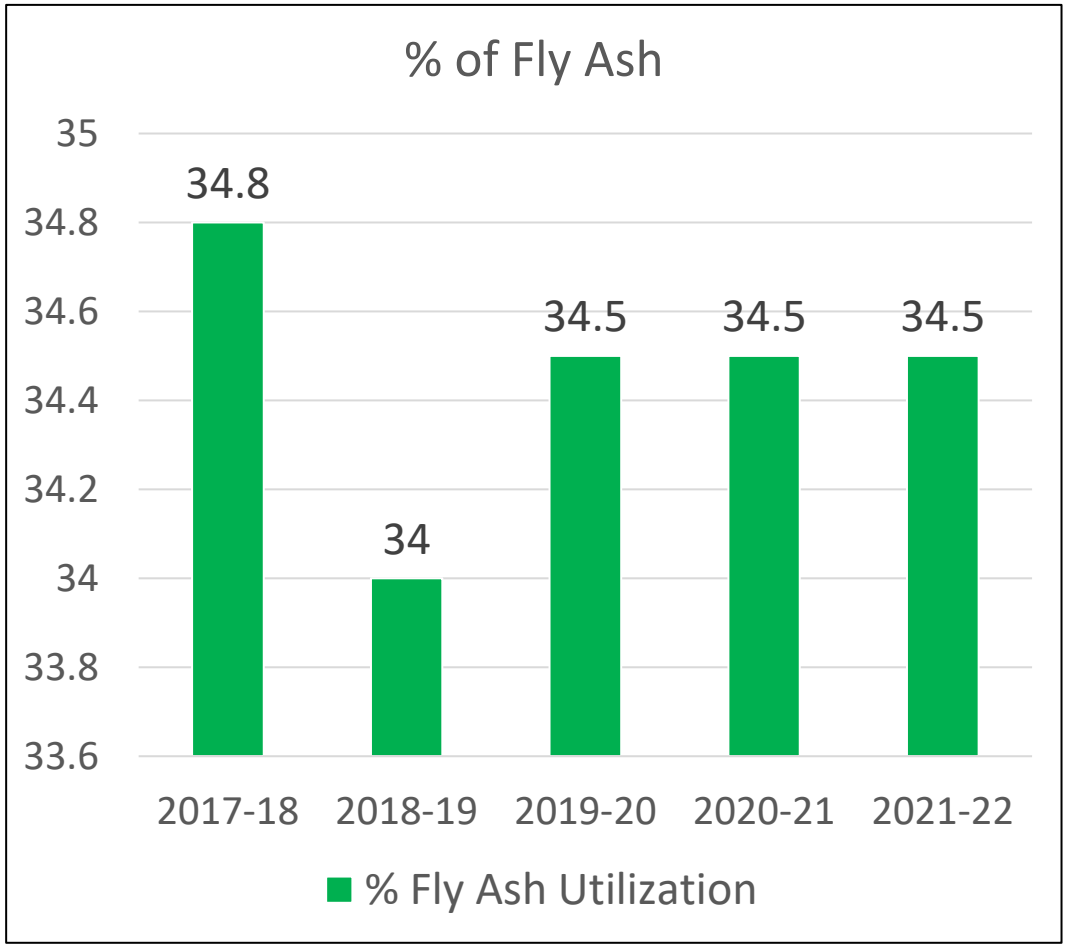
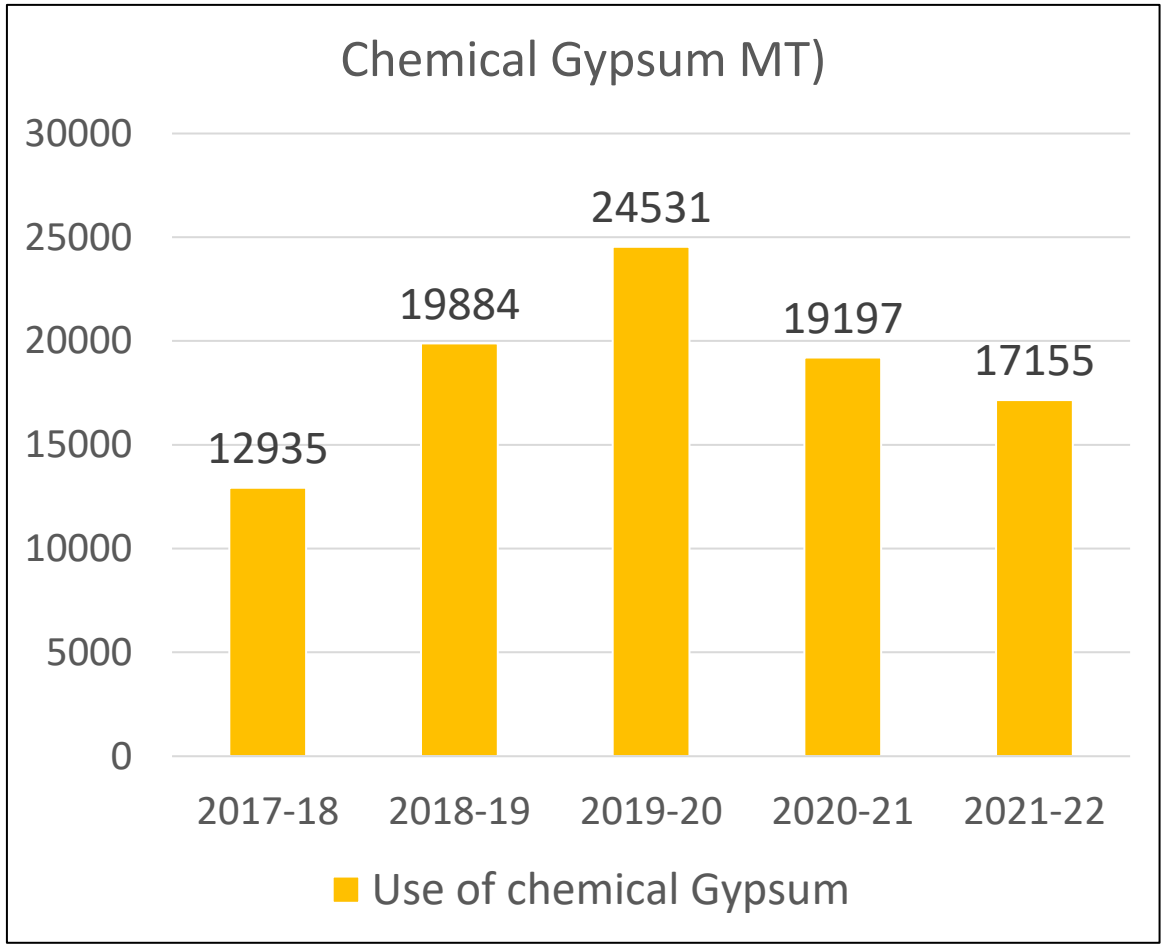
Utilization of Waste material

Use of Waste Material Fly Ash & Chemical Gypsum





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GHG Inventorisation

Focus and Target

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Sustainability Commitments 2030

Six topics characterise HeidelbergCement's commitment for sustainable growth, environment and society

SUSTAINABILITY COMMITMENTS 2030

- Driving Economic Strength and Innovation
- Achieving Excellence in Occupational Health and Safety
- Reducing our Environmental Footprint
- Enabling the Circular Economy
- Being a Good Neighbour
- Ensuring Compliance and Creating Transparency

CO_2 target for 2030:

400 kg CO_2/t
Cement

Key levers		
	Products	Reduction Clinker incorporation
	Process	Use of Altern. fuels /Biomass fuels
	CCUS	10 mt CO_2 captured (cumulative)

HC India Sustainability Dashboard

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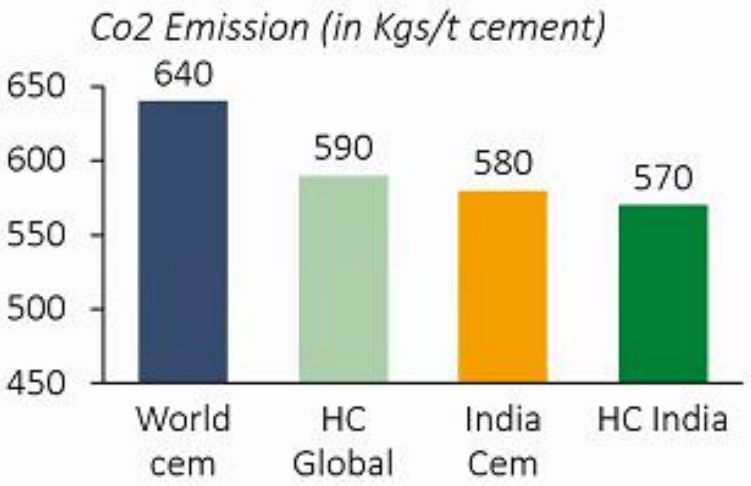
HC INDIA BEING ENVIRONMENTALLY RESPONSIBLE

Environment Footprint



1500+ trees Geo-tagged

6.5 MW - Green
23 MW WHRS in construction

40% -WHRS (Max.)
5.5 MW – Solar (Upcoming)

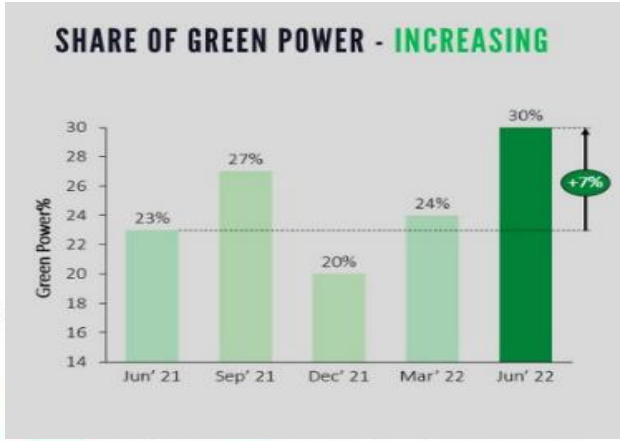
Green Power
70% - Amsa
85% - CGU

Alternate Fuels - Increase in TSR to 6.2%

1.2 °C – Plants cooler than 1 Km away

5.2x Water Positive

HC mines – a home to 117 bird species



Being Environmentally responsible

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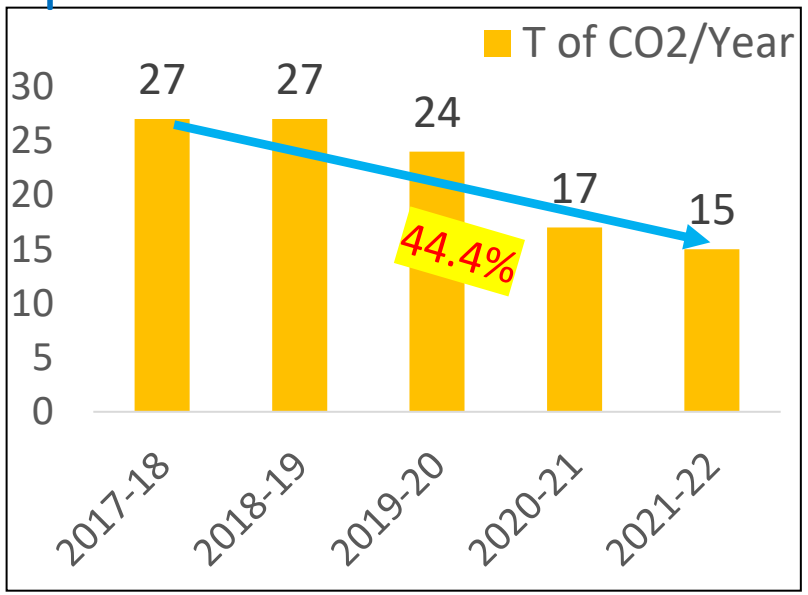
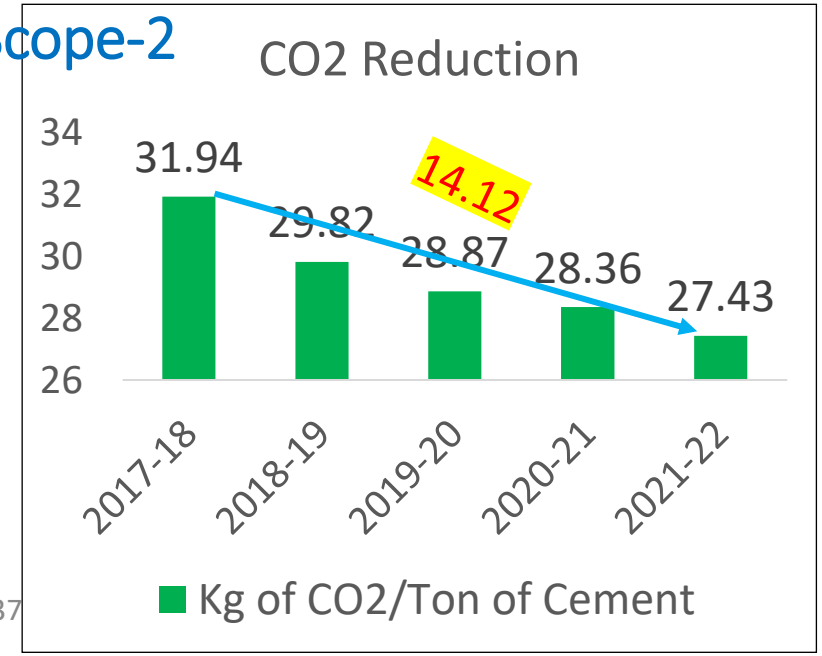
7. GHG Emission Intensity reduction 2017 -22(Scope-1 and 2)

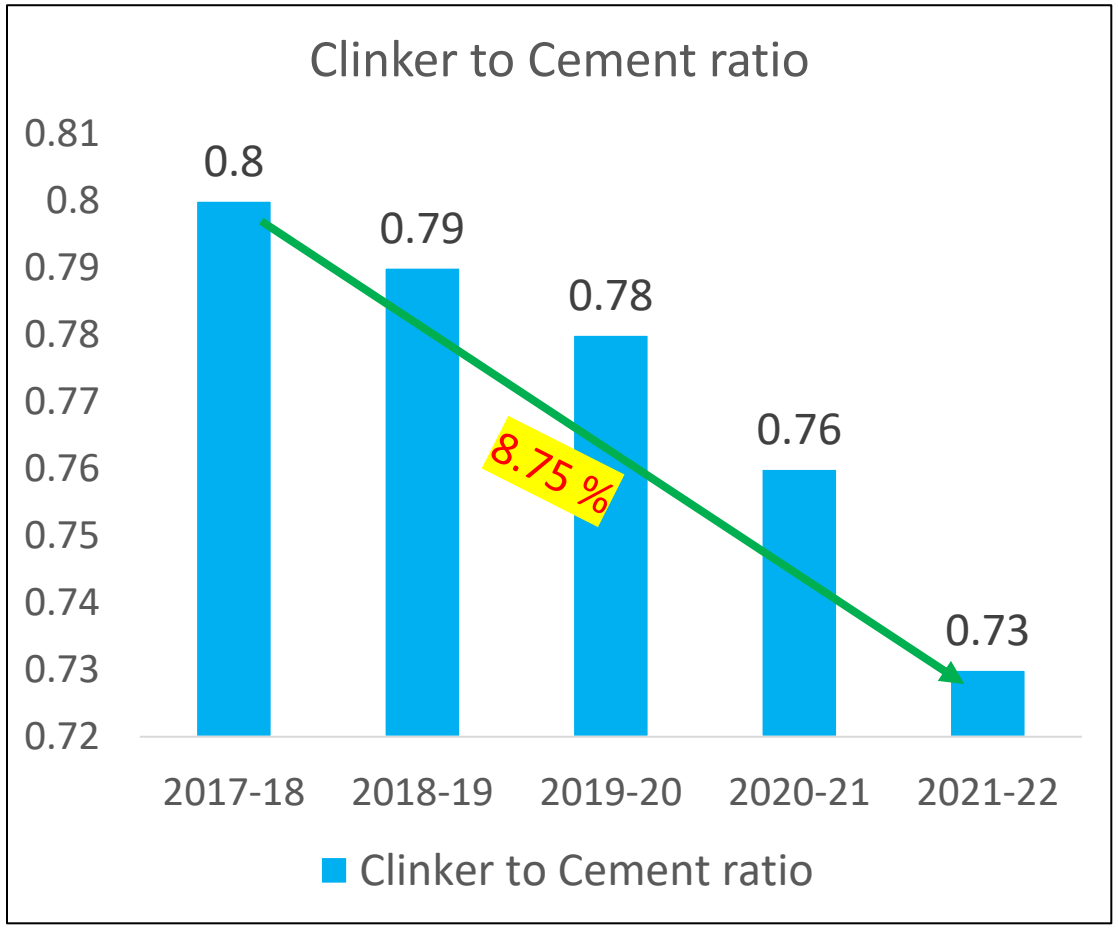
Scope-1



We are having one DG set with the capacity of 500KVA and being used only for lighting purpose when ever power cut.

Scope-2





7. GHG Emission Intensity reduction (Scope - 3)

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Inbound Logistics

- **Raw materials**
- **Clinker:** Lead distance reduced from 730Kilometers to 300 Kilometers by swapping the Clinker with ACC Limited,Wadi.
- **Chemical Gypsum:** Lead distance reduced by 100Km by reducing the Vedantha Gypsum and increases the Bhageria Industries Limited.
- **Dry Flyash**: lead distance is 30Km
- **Packing Bags:** Lead distance reduced by 150Km by developing the local vendor.
- **Spares Parts & Others:** We developed the local vendors

Outbound Logistics

- Cement wagon loading system installed and plan dispatches by 30% through rail.
- Pool Vehicle for Employee shift travel operation
- Employee commuting and business travels have been drastically reduced since last one year.
- All the trainings and official works communicating through teams only.

GHG Emission Intensity reduction plan 2022-23

Sr. No.	Description	Saving	CO2 reduction (Ton)
1	Group Captive solar plant offsite	1000 K units/ month	9480
2	Packer Upgradation	0.3 Units/ ton	148
3	Upgradation of fly ash unloading system	0.8 Units/ ton	85.3
4	Grinding media degradation	0.3 Units / Ton	148
5	Plantation / Greenery development	4000 Tree / year	

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Green Supply Chain

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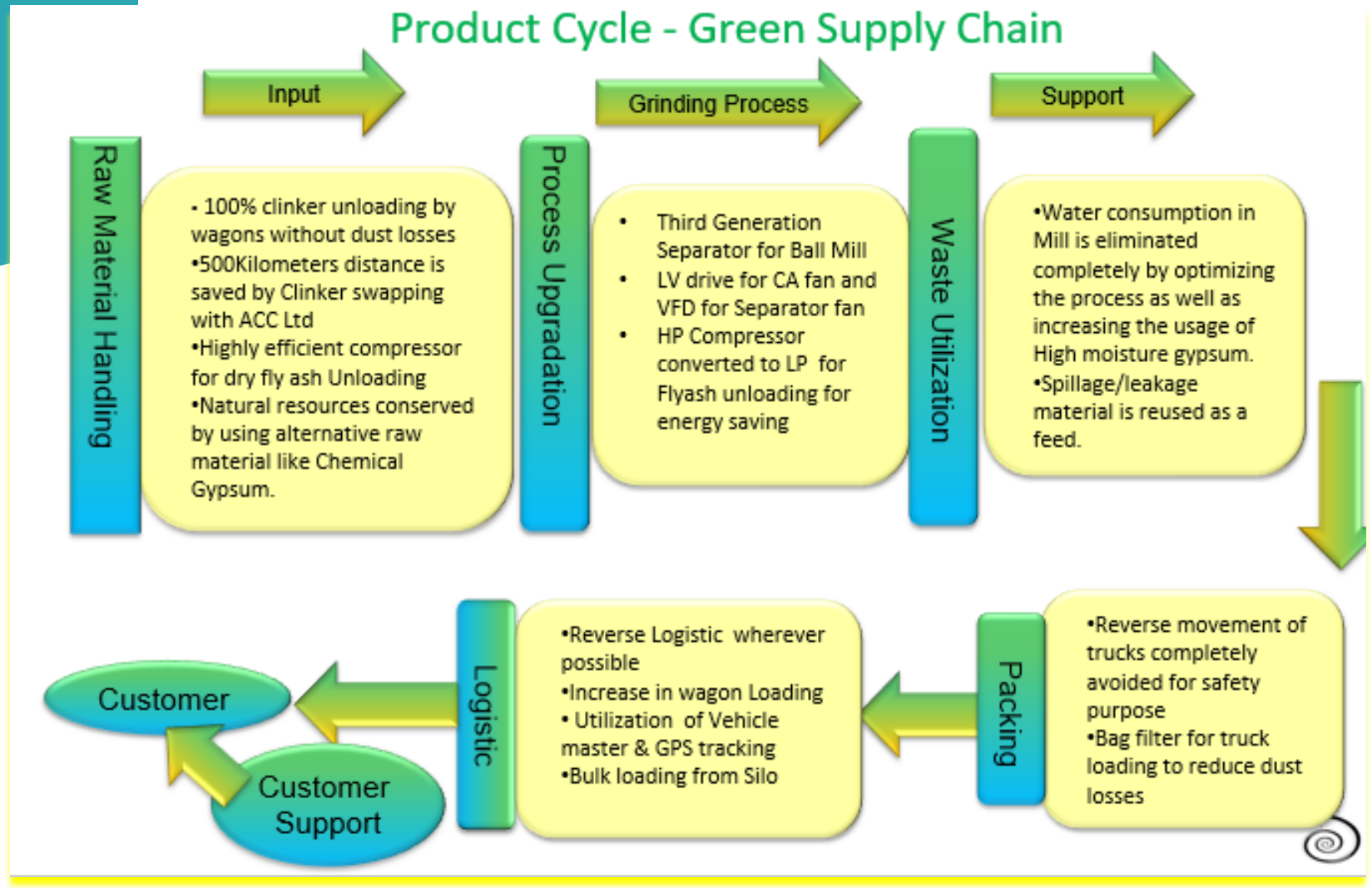
Green Supply Chain

Green Procurement Policy

- Procurement of Energy efficient motors IE3 .
- Purchase of LED lights only.
- Energy efficient product above 3 star rating



8.Green Supply Chain Project

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Sr No.	Title of Project	Investment made in Million INR	Benefits description
1	Cement Bulk loading	2	20% of Cement dispatches through bulk loading which was saving 0.4Kw/T of electrical energy consumption & Minimizing the PP bags usages for environmental degradation/Waste minimization
2	Procuring Chemical gypsum 40000 MT/Year	Same cost	Substitution of Alternative raw materials with Natural resources
3	Installation of Cement Wagon loading Machines	25	Substituting 30% of cement dispatches through rail.
4	OHE(Over Head Electrification) of railway yard	3	Diesel engine avoided which is used for 22 Kilometers of distance from railway station to Plant wagon tippler area.
5	Clinker quantity swapping with ACC Ltd Approx: 4 lakh/Year	0	Clinker rake transportation reduced by 500Kms (from destination to destination) after swapping with nearby plants. Each Clinker rake 500Kms transportation saving. Minimum 100number of Clinker rakes received from ACC Ltd through swapping per Year.

Green Supply Chain

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Fly ash utilisation

- **Maximization of fly ash blending up to 35%** by using dry fly ash by operation and maintenance & long-term contracts with NTPC
- Mineral conservation due to usage of fly ash

Machinery & spare procurement

- **Encouraging local vendors** to reduce carbon footprint & inventory
- Vendor Stocking to have just in time concept i.e., Lubricants , PP Bags, etc
- **ARC contract for fast moving spares**
- **Procurement of Energy Efficient Motors for Plant** & Technology upgradation
- LED lights installation and solar panel procurement
- **Drip irrigation to reduce water consumption**

Scrap Disposal

- Carbon foot reduction through **paper less working** -E auction, RFQ Ease Portal

Inbound Logistic

- **Swapping of clinker rakes with ACC**
- Transport pooling to reduce carbon footprint

9.Teamwork, Employee Involvement & Monitoring

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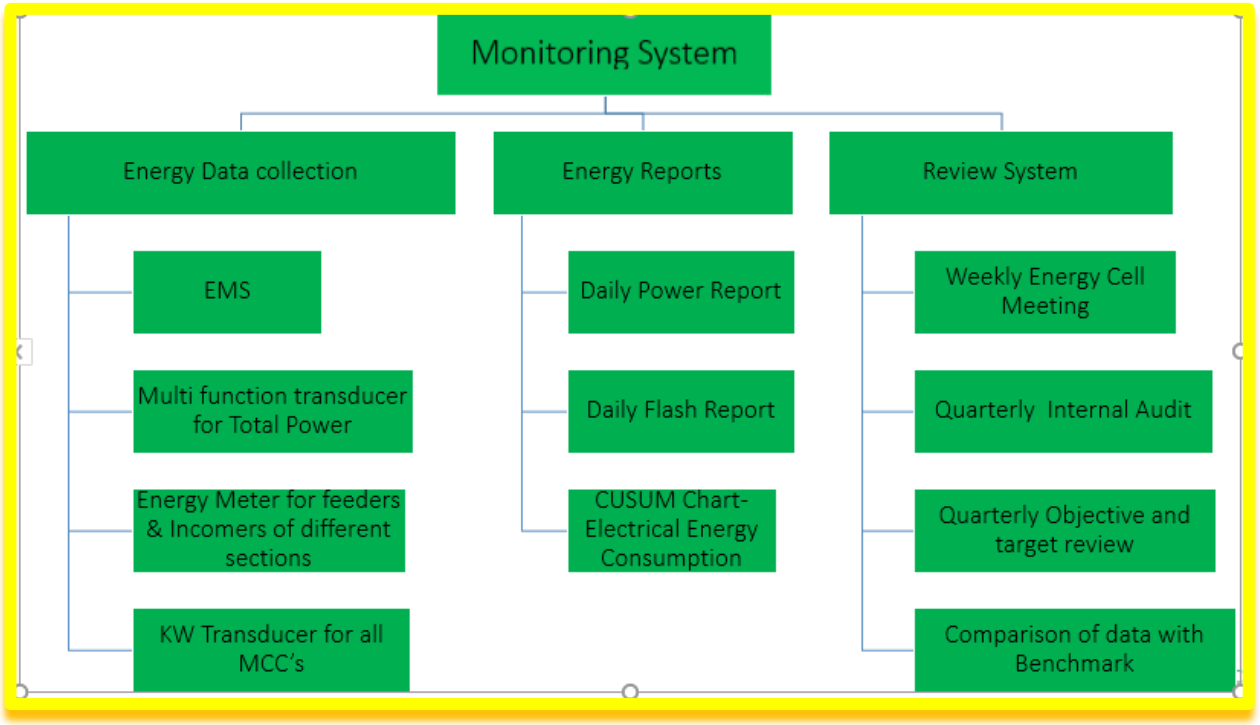
Energy Circle

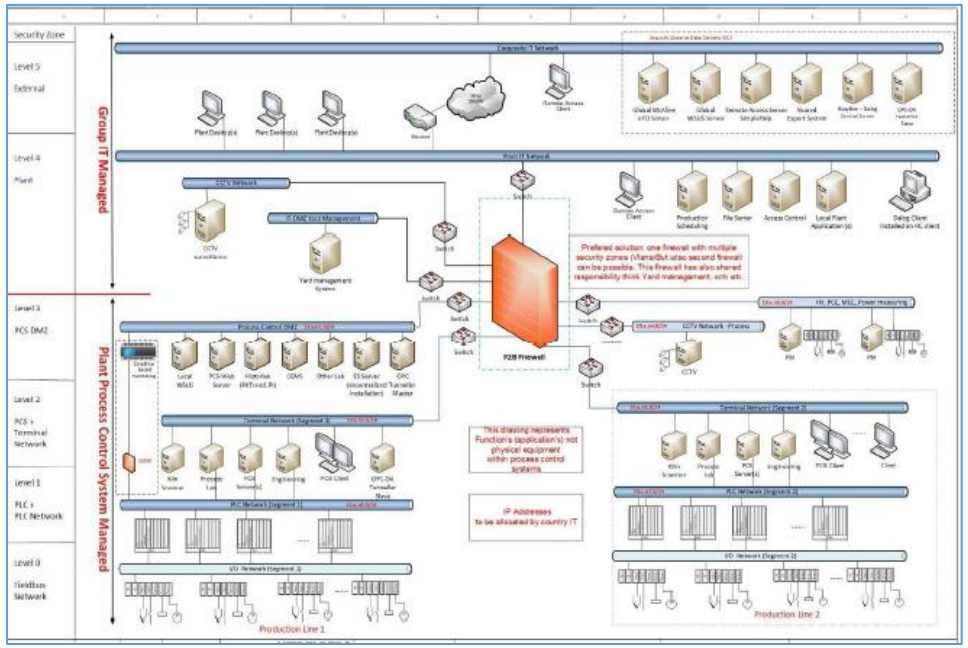
- **Daily Energy Observation Tour(EOT)** to observation any abnormality
- Ensure timely compliance of points identified
- **Analyze idle running of equipment** operation
- Training for shop floor employees on energy conservation

Employee Involvement Projects Implemented through Kaizens:

- 15 Number of Kaizens from workers & 10 Numbers from staff. Total : 25.
- Total 10% of budget allocated for Energy conservation projects. If the ROI is less than 1Year, then fast approval of CAPEX Projects.

Energy Monitoring System



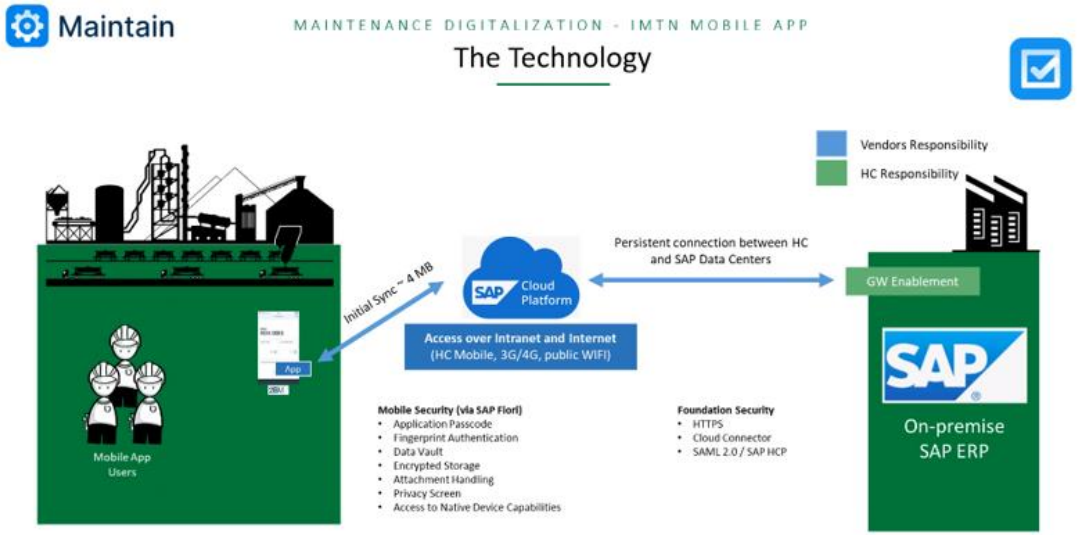


- IOT System is used for daily monitoring the plant data . Plant is having 25 Nos networked digital energy meters connected to plant DCS. All major equipment have meters and connected to DCS and Day wise & Product wise Electrical energy report is generated.
- Production meeting held on daily for plant performance and improvement discussion.
- Energy conservation budget allocated along with Capex budget.
- Energy audit by authorized external energy auditors is conducted in every 3 years.

Implementation of I0T Technology

- ✓ **ImTN mobile App for maintenance**
- ✓ **HDIGICUBE application for concrete testing**
- ✓ **SimpleHelp tool for remote access**
- ✓ Magma tool for case access land records
- ✓ Mobile Sales Force Application
- ✓ On line portal for Rake Planning Application
- ✓ GPS Installed in Transport Vehicles
- ✓ Online submission of Offers by Vendors
- ✓ Negotiations through E-Auction
- ✓ Plant remote control and monitoring

Innovative I0T Technology



Implementation of Digital Signature on Cement outward documents

- We have been manually signing all Tax Invoices, and Delivery Challans on sale/despatch of cement / clinker.
- Now, all sales related documents including Debit note and Credit Note are digitally signed by the system.
- There is no need for keeping office copy resulted into saving of >100K A4 size papers per annum; contributes to save Environment.
- Retrieval of documents in future becomes very easy.

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Implementation of ISO 50001/ Green Co/IGBC rating

10. Implementation of ISO 50001/Green Co/IGBC rating

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ISO Certifications by TUV

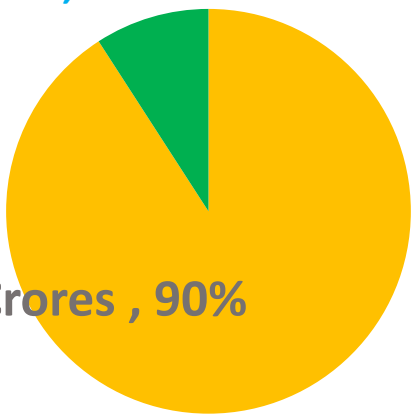
ISO 9001:2015 ISO 14001:2015 ISO 45001:2018

ISO 50001:2018

Turn Over & Investment

FY 2021-22

Rs. 20 Crores, 10 %



Rs. 200 Crores , 90%

Turn Over

Encon Investment

HEIDELBERGCEMENT INDIA

11. Learning from CII Energy Award

CII Energy Award helps in receiving recognition from the cement industry for the company's contribution towards energy conservation and green environment. We have learnt various innovative ideas and energy saving measures being adopted in cement industry to reduce carbon foot print. Some of the learnings are as follows:

1. Sequential operation of clinker silo gate
2. Local start stop push button provided for all flyash compressors at flyash unloading area. Operator can stop compressor immediately after completion of unloading. Idle run hours are minimized.
3. Installation of hooter at wagon loading machine for Bag divertor for diversion of bags towards desired Wagon Loading machine
4. Auditing of load centre / MRSS/ VFD room air conditioning system
5. Leakage test of compressed air line
6. Regrading of Grinding media on yearly basis.
7. Change of diaphragm plates to avoid nips formation

12. Awards : CII Energy Efficient Unit 2021

CII
Confederation of Indian Industry

22nd National Award for Excellence in Energy Management 2021

This is to certify that

Zuari Cement Limited, Solapur

has been recognized as

"Energy Efficient Unit"

This acknowledgement is based on the evaluation by panel of judges at the "National Award for Excellence in Energy Management" held during 24 - 27 August 2021.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

12. Greenery

MATERIAL
TO BUILD OUR FUTURE

Safety is our foremost priority