



CII National Award for Excellence in Energy Management Ambuja Cement Ltd., Nalagarh

Vision: To be the most sustainable and competitive company in our industry

Presented By:

Alok Sharma(DGM; E&I)

Mentor:

Ankush Dutt (Plant Manager)

11 September 2024



Presentation Contents/Take Away

- Company Profile
- Plant Profile & Major Process Equipment
- H&S Performance and Awards & certification
- Specific Energy Consumption figures & Comparison with Competitors
- Project Implementation methodologies.
- Status of Last three years Energy Conservation Projects
- Major Energy conservation projects planned in 2023-24
- Major site issues having potential of energy saving
- Innovative projects
- GHG Initiatives

Company Profile

- Ambuja Cements Ltd, a part of the Adani group..
- Total cement capacity of 29.65 million tonnes.(05 IPs and 08 GUs).
- Cement Products: OPC, PPC, Kawach & Ambuja Plus Roof Special
- Certified five times water positive.
- Also 3.5 times plastic negative, by burning as much as over 1,26,095 tonnes of plastic waste in its kilns, equivalent to 3.5 times of total plastic used.
- Company generates 6.5% of its energy from renewable resources.
- CSR arm ACF(Ambuja Cement Foundation) with presence in 21 locations spread across 11 states.

Nalagarh at a Glance



Brief About Plant

- Ambuja Cements limited (hereinafter referred to as ACL) Unit: NALAGARH is located at Village Navagraon, P.O. Jajhra, Teh. Nalagarh, Distt. Solan. (H.P.) INDIA.
- ACL Nalagarh plant was commissioned on 27th March 2010. Nalagarh Mill is Loesche LM 56.3+3 with rated capacity of 250 TPH at 4000 Blaine for PPC.
- We have two packers and 4 loaders in place. . Our bagging capacity is 6200 T in a day with 10 different types of bags and two products.
- Plant connected load:15MW; Contract Demand: 8.6MVA
- First cement plant in India certified as ISO 50001-2011.

Plant Profile

- A Grinding Unit situated in Nalagarh, Himachal Pradesh (India) at an altitude of 334 mtr' .Commissioned in March'2010.
- Plant rated capacity is 2.2 Million Ton per annum.
- VRM : Make Loesche -LM56.3+3C; Capacity 250TPH.
- Classifier; Make Loesche –LSKS 102 CS.
- Bag House: Make Redycam; Designed Flow 869000 M3 /hr; Dust Loading 348 gm/M3;
- Packer: Make EEL; Two Nos; 16 Spouts double discharge 240 TPH each.
- Plant connected load :15MW; Contract Demand: 8.6MVA
- First cement plant in India certified as ISO 50001-2011.

Health and Safety Indicators

Leading Indicators	2019-20	2020-21	2021-22	2022-23	2023-24
Near miss	48	43	58	67	84
Hazard Reporting	1284	1196	1226	1296	945
SOT/VFL/VPC	928	916	1124	1108	889
Lagging Indicator	2019-20	2020-21	2021-22	2022-23	2023-24
Fatal	0	0	0	0	0
LTI	0	1	0	1	0
MTI	1	0	1	2	1
MWD	0	0	0	0	0
FAI	1	4	1	3	2

Accolades & Recognitions.....



CII Award for Excellence in Energy Management 2023



1st prize under UdAAAn cost initiative



CII Award for Excellence in Energy Management 2022



CII Green Tech Award for Water Positive



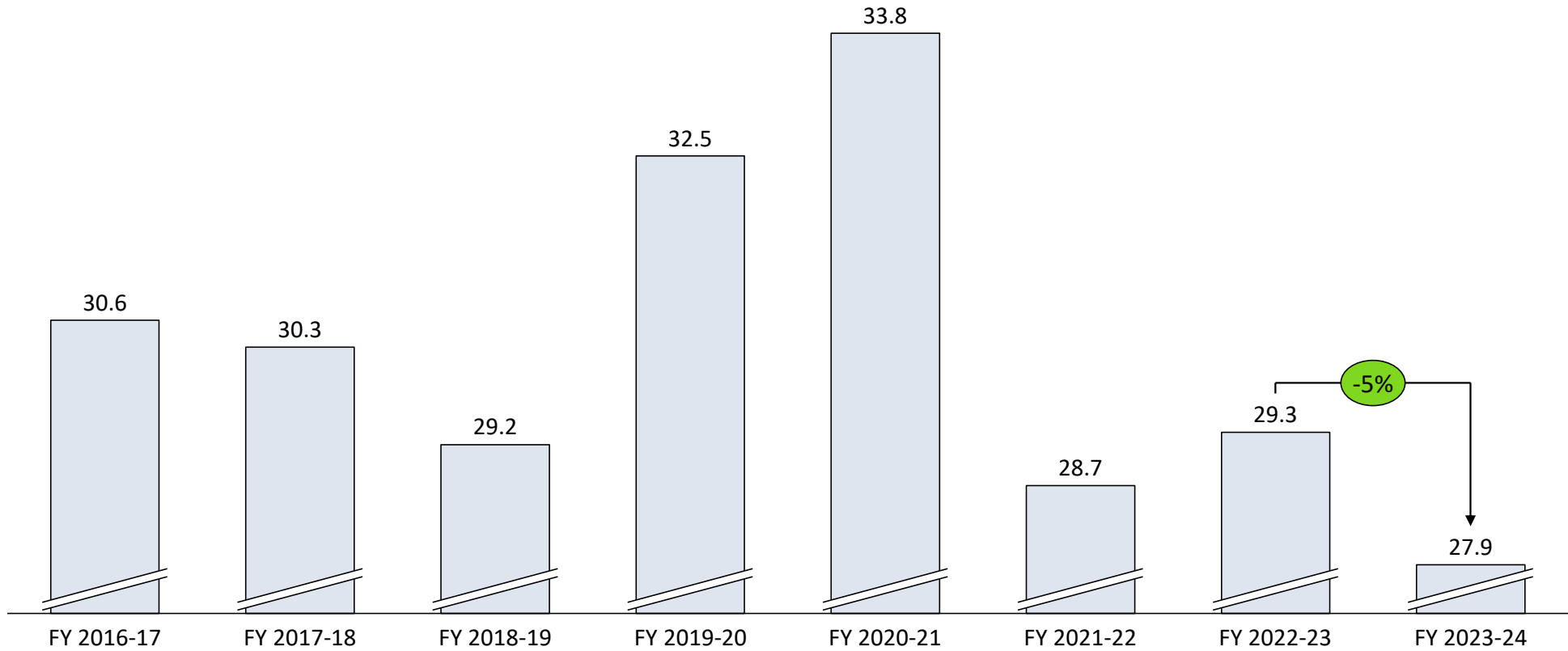
Silver Award for Adani Workplace Management System - 5S



"Most Clean" Unit Award-ACL

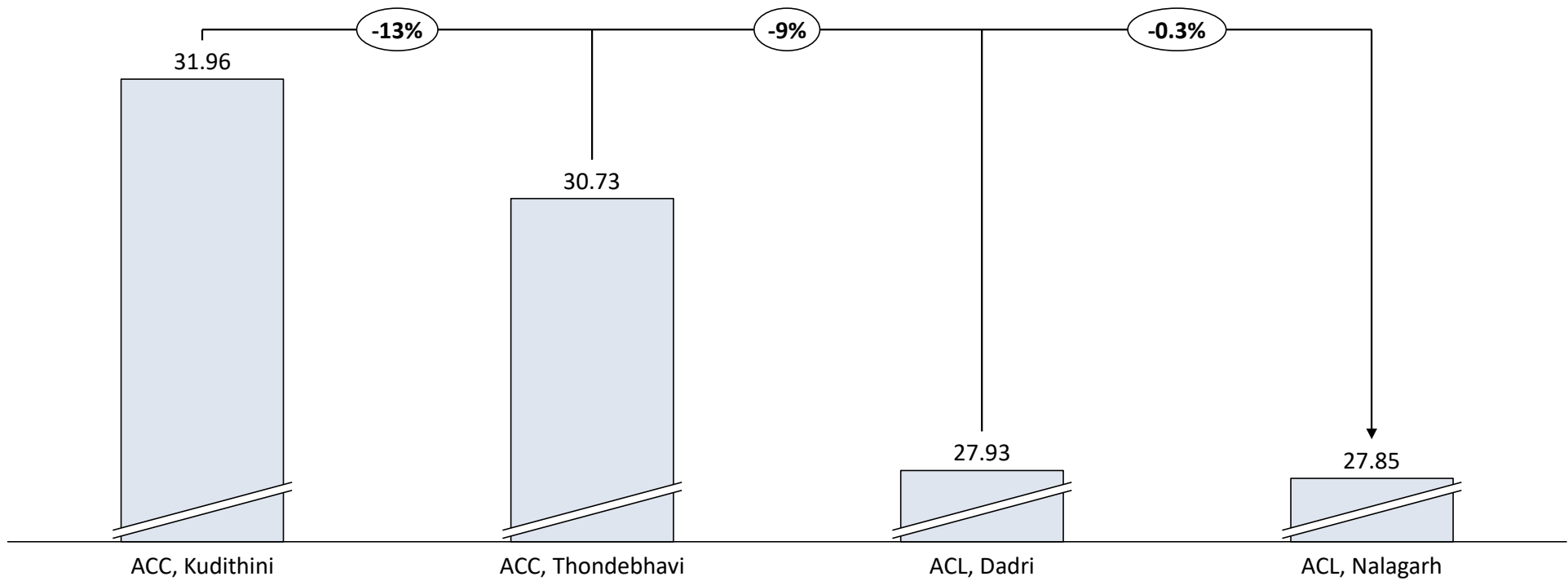


Reduction in Specific Electrical Energy Consumption



Benchmarking with Peers

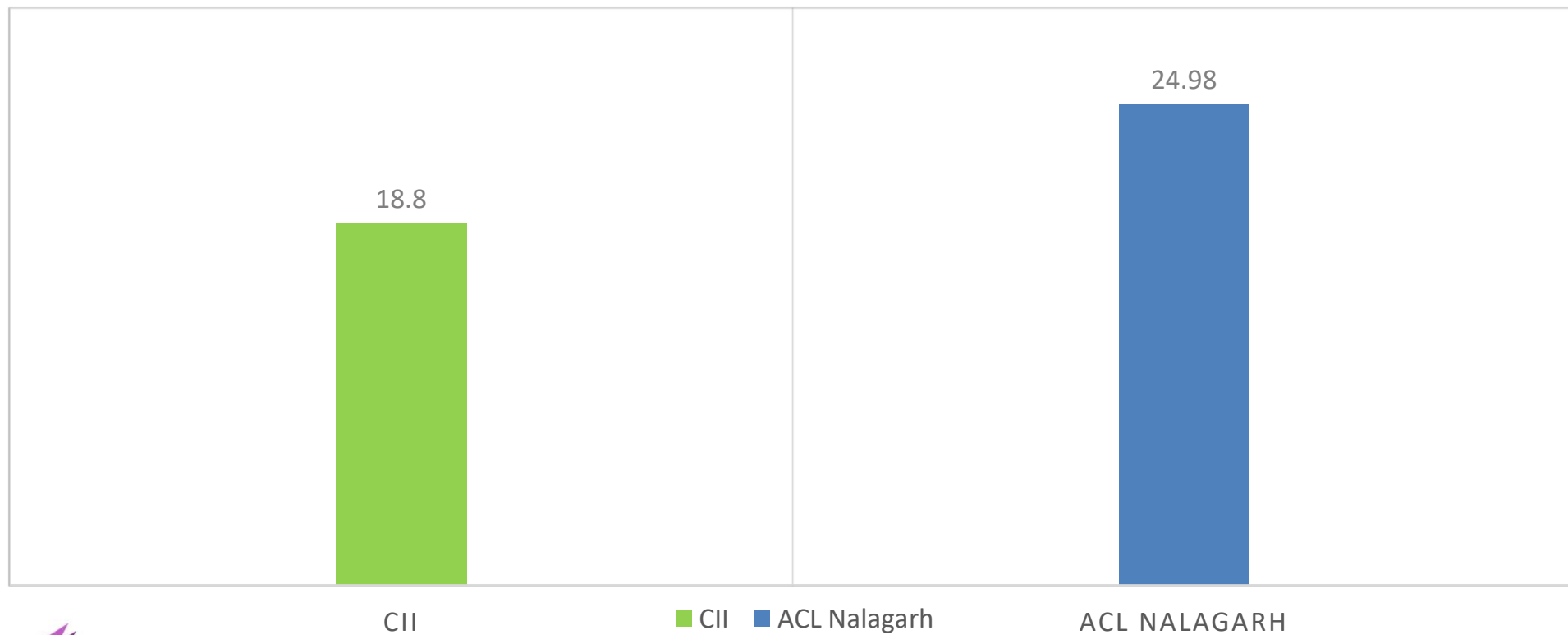
Specific electrical Energy Consumption(kwh/t)



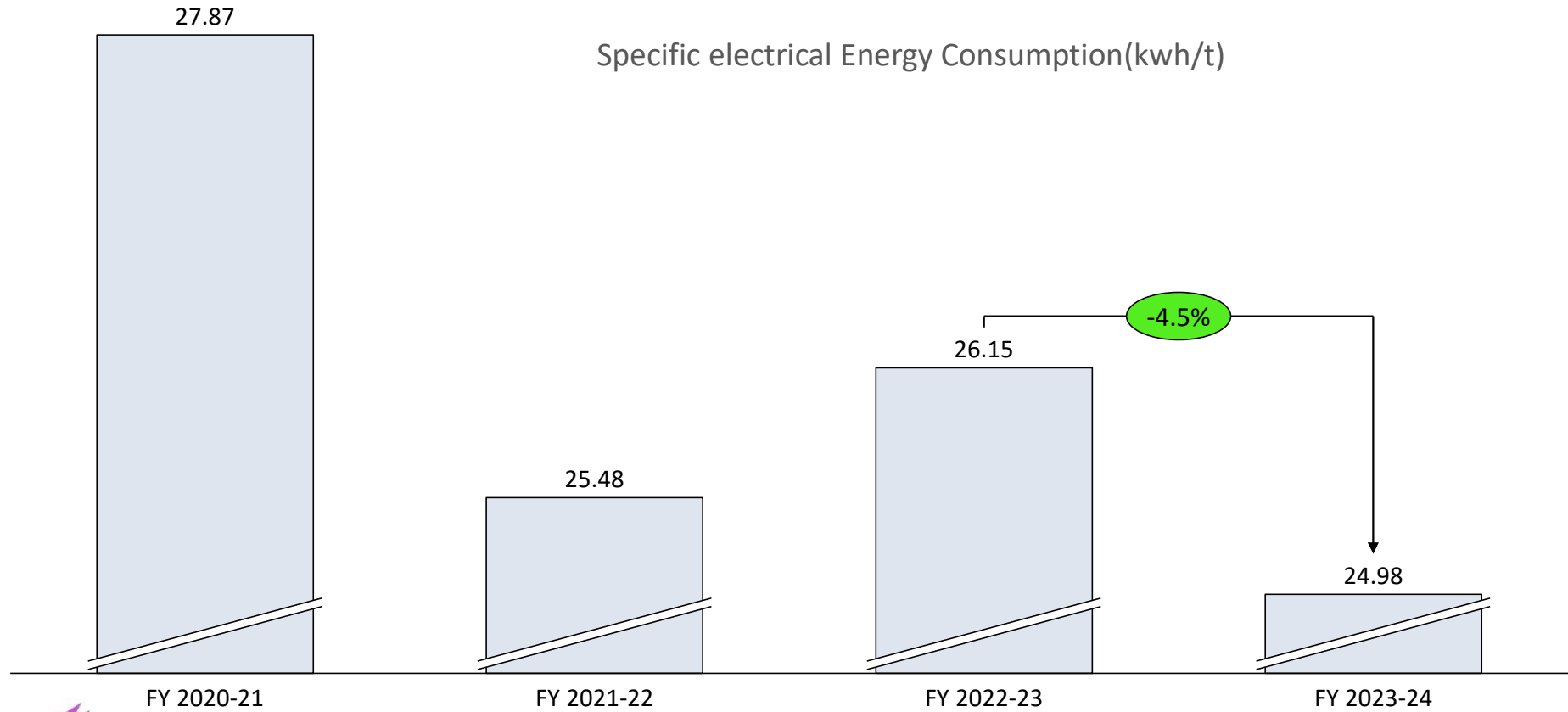
Road Map To Achieve Benchmark

- Optimization of mill parameters.
- Avoiding idle running of equipment.
- Implementation of innovative ideas available in other industries. having potential to reduce SEEC.
- Brainstorming & generation of ideas to find out new avenues of Energy Conservation.

CII Benchmarking

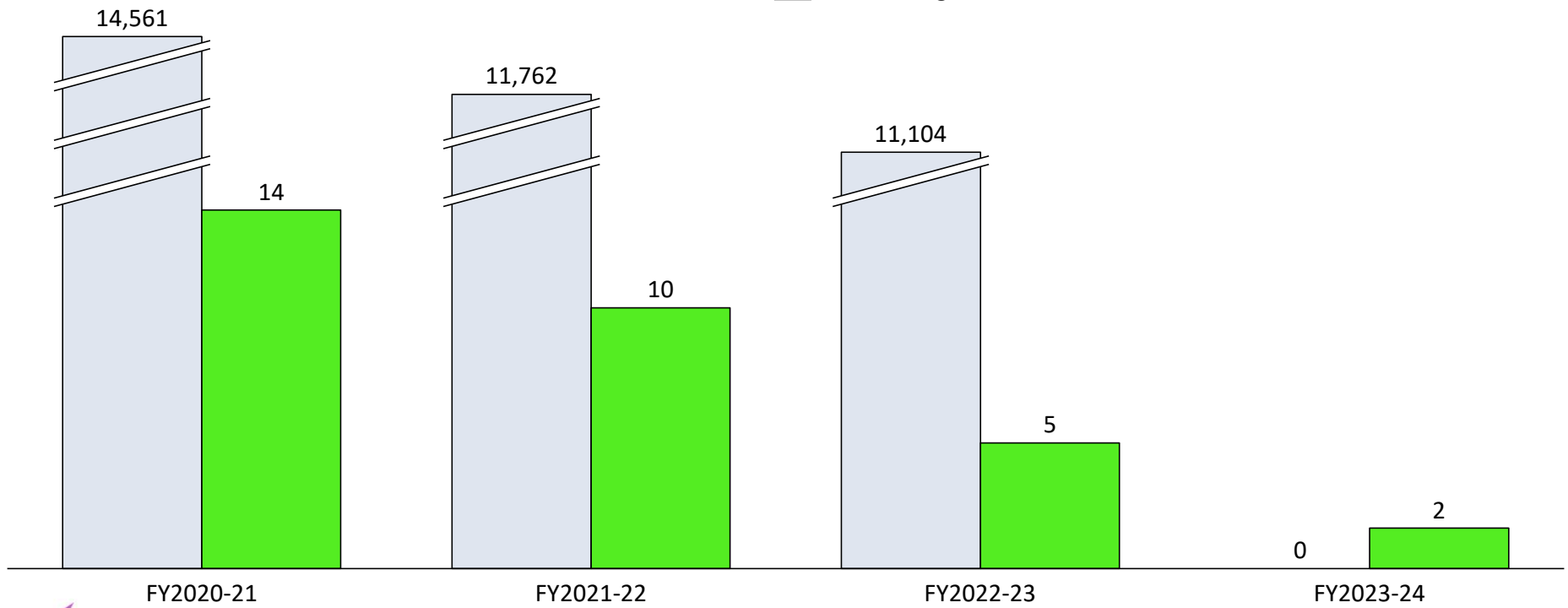


VRM Section Performance

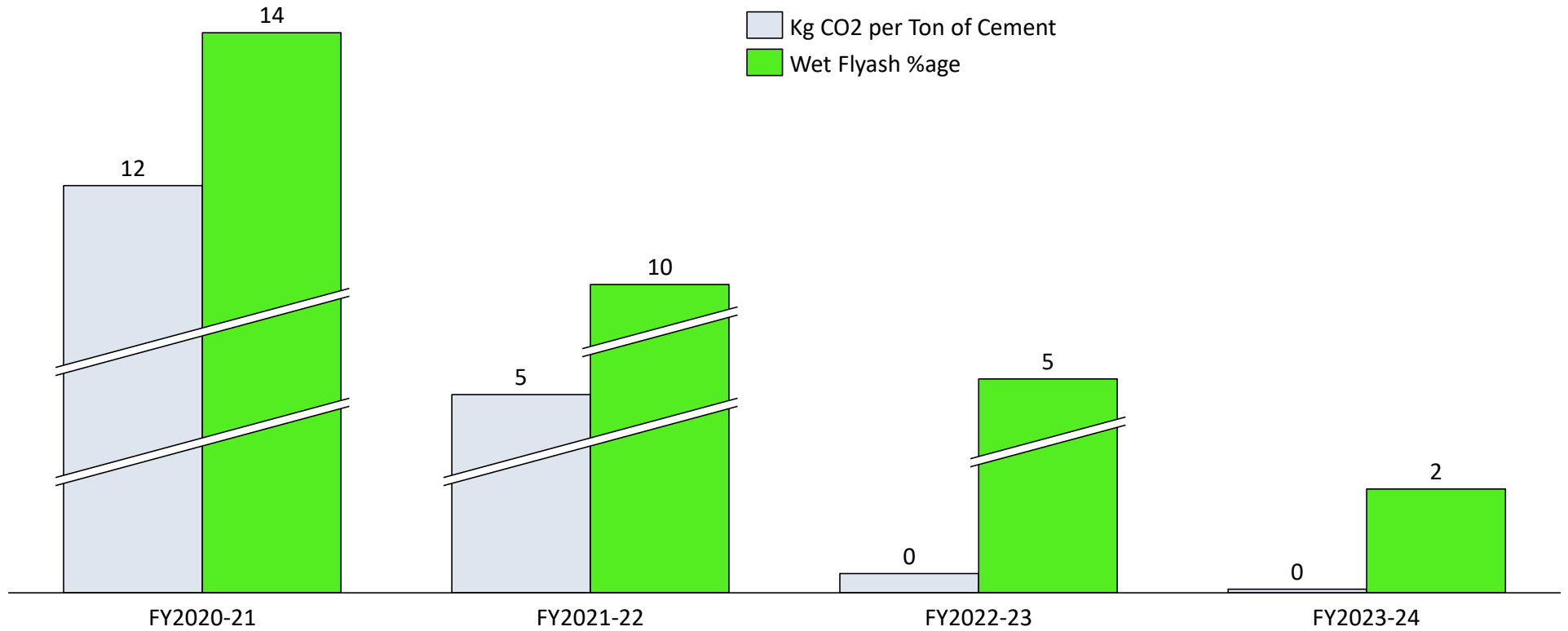


Specific Energy(Thermal) Consumption figures

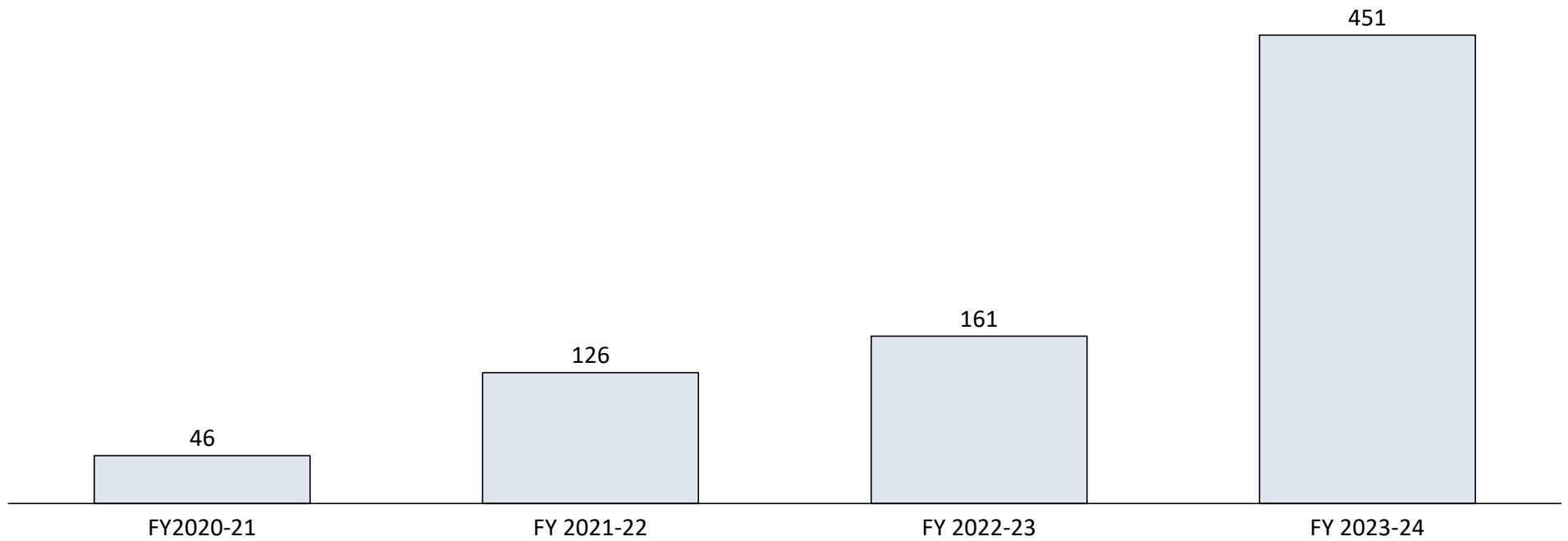
■ Kcal/MT of Cement
■ Wetash %age



Specific CO2 Emmission

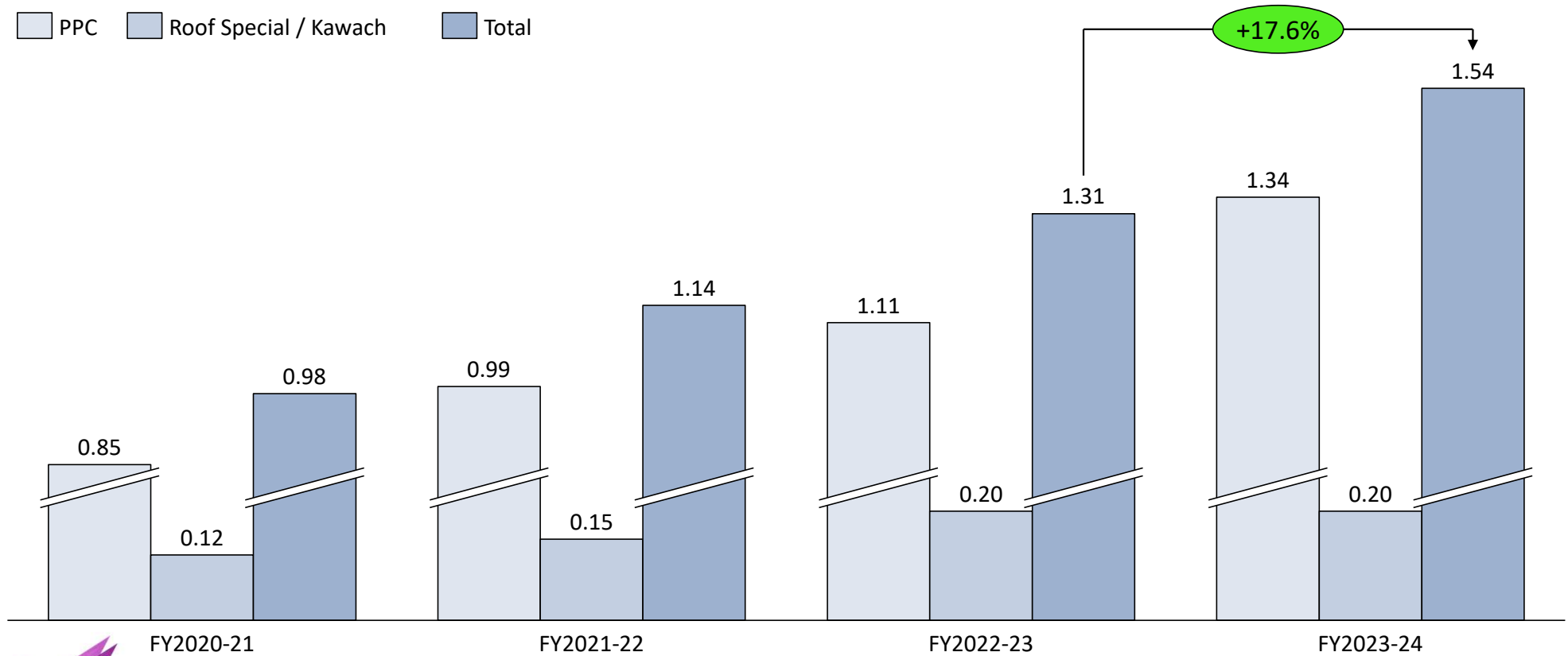


MTBF 12 Month Rolling(Hrs.)



Production – Year wise (Million ton)

PPC Roof Special / Kawach Total

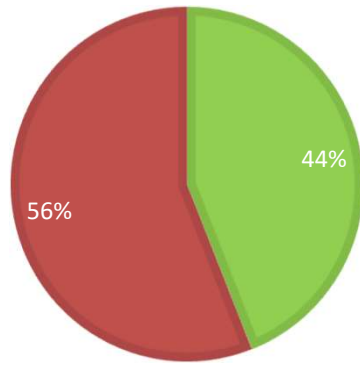


PROJECTS IN LAST 3 YEARS

YEAR	Number of Proposals	Investments (In million INR)	Savings (In million INR)	Pay Back (In Months)
FY 2021-22	13	2.90	8.25	4.22
FY 2022-23	25	0.40	0.41	12.00
FY 2023-24	27	25.00	91.00	8.00

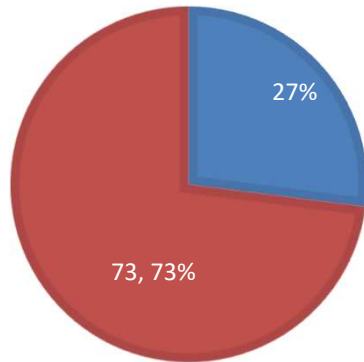
Summary : ENCON Efforts

**NIL INVESTMENT
PROJECTS IMPACT**
SEEC reduction : 0.48
KWh/MT



- No. of NIL investment projects
- No. of Medium Investment Projects

**MEDIUM INVESTMENT
PROJECTS IMPACT**
SEEC reduction : 0.78
KWh/MT



- Saving from NIL investment projects
- Saving from Med. Inv. Projects

Energy Conservation Projects (Summary for last 3 years)

No investment

- No of project implemented : 12
- Saving Kwh/T of Cement : 0.48
- Saving in INR, Lakh : 105

Medium Investment

- No of project implemented : 13
- Saving Kwh/T of Cement : 0.78
- Saving in INR, Lakh : **273**

SUMMARY OF PROJECTS IN FY 2021-22

YEAR	Description of Projects
FY 2021-22	Optimization of drives to avoid idle Running.
FY 2021-22	Optimization of flow at bag filter suction point
FY 2021-22	Optimization of Gypsum & wet flyash group bag filter with moisture i.e stopping bag filter when moisture in gypsum is high.
FY 2021-22	Optimization of DFA bin aeration blowers.
FY 2021-22	S Roller removal from VRM
FY 2021-22	Interlocking cooling tower operation with mill gearbox temperature.
FY 2021-22	VFD installation in rotary screen.
FY 2021-22	Reject belt operation controlled with level sensor.
FY 2021-22	Installation of VFD in cement silo bag filter fan.

SUMMARY OF PROJECTS IN FY 2021-22

YEAR	Description of Projects
FY 2021-22	Replacement of conventional lights with LED lights(=100 nos.)
FY 2021-22	VFD installation in compressor.
FY 2021-22	Installation of VFD in Bag Filter fans.

Total Energy units saved in 2021-22 (in Lakh KWh): 18.35

Saving in terms of KWh/MT: 1.1

SEEC reduction: 1.1
KWh/MT

SUMMARY OF PROJECTS IN FY 2022-23

YEAR	Description of Projects
FY 2022-23	Optimization the flow of P&V for USS(Unit Sub Station).
FY 2022-23	Replacement of conventional lights with low wattage LED lights.
FY 2022-23	Replacement of HT motor cooling blower impellers with FRP.
FY 2022-23	Optimization of Motors as per load requirement.
FY 2022-23	Optimization of clinker extraction drives with switch over modes.

Total Energy units saved in 2022-23 (in Lakh KWh): 8.2

Saving in terms of KWh/MT: 0.65

SEEC reduction:
0.65 KWh/MT

SUMMARY OF PROJECTS IN FY 2023-24

YEAR	Description of Projects
FY 2023-24	Installation of MV VFD for Bag House Fan.
FY 2023-24	Replacement of 37KW water pump with 18.5KW
FY 2023-24	Reduction of BH Fan Purging Cycles From 13 TO 11 cycles per hour
FY 2023-24	Feeding G Aid through water spray nozzle resulting in reduction of SEEC
FY 2023-24	Optimization of Mill Parameters resulted in SEEC reduction.
FY 2023-24	Reduction of nozzle ring area to increase Gas velocities.
FY 2023-24	Wind Mill generator through Bag Filter fan air.
FY 2023-24	Flyash Bulker unloading through Bucket Elevator.

Total Energy units saved in 2023-24 (in Lakh KWh): 23.2

Saving in terms of KWh/MT: 0.6

**SEEC reduction:
0.6 KWh/MT**

Major Encon Projects planned in FY 2024-25

Sr. No.	Description of Projects	Annual Energy Saving (in Lakh KWh)	Annual Saving (INR Lakh)	Investment (INR Lakh)
1	Direct clinker feeding belt from clinker transfer tower to hopper.	3.1	16.8	80
2	Using S rollers as main rollers in addition to existing M rollers	9.0	49.3	2500
3	Installation of blender Mixture at the outlet of cement silo.	1.2	7.1	250
4	Replacement of normal Acs with Inverter ACs	4.1	22.4	10
5	Installation of clinker tippler near clinker silo extraction belts.	3.3	21.2	90

Innovative Project : Grinding Aid Optimization in Kawach

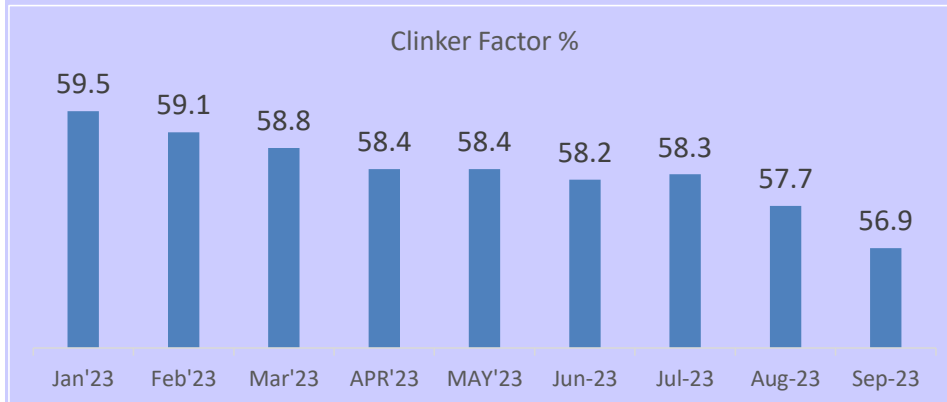
- **Grinding Aid Optimization in Kawach** . Cost savings in Kawach product by Grinding aid optimization, Clinker factor improvement and operational discipline.
- Clinker Factor in Kawach was kept at 58 – 58.5 % to achieve the AQP. Performance enhancing grinding aid could not be added due to pressurization of material conveying circuit and spillages
- **Replication potential:** Yes, It could be replicated at other sites.
- **Reason why Innovative:** In addition to G Aid in Kawach to increase strength, enhancer used to increase TPH which has not been used till now.
- **Impact it created:** Annual Cost saving in G.Aid : Rs. 163 / MT
- Annual Cost saving in Clinker Factor : 41 / MT
- **Annual Saving – Rs. 6.34 Cr**

Innovative Project : Grinding Aid Optimization in Kawach

Results - KPI Improvement (Before & After Trend)

Before: Clinker factor was 58.7 %.

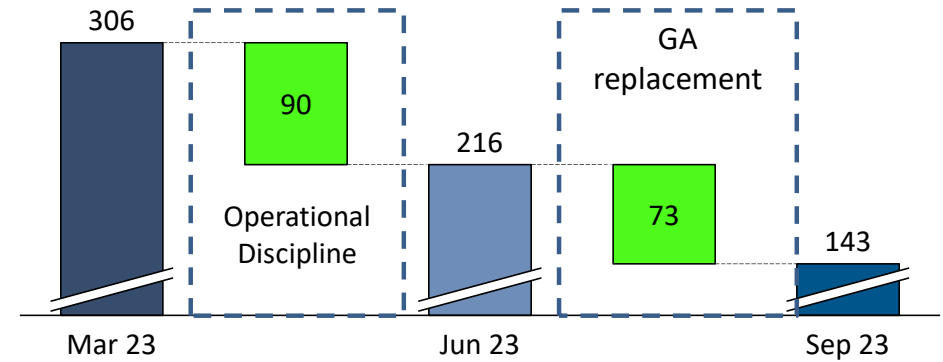
After: Clinker factor in Sep 2023 – 56.9 %



Why improvements will stay (Control Plan)

- Continuous monitoring of the KPI's in PD as well as in shift report
- Clinker factor is sustainable with usage of existing grinding aid complying to AQP.

Benefits (Quantitative/ Qualitative)



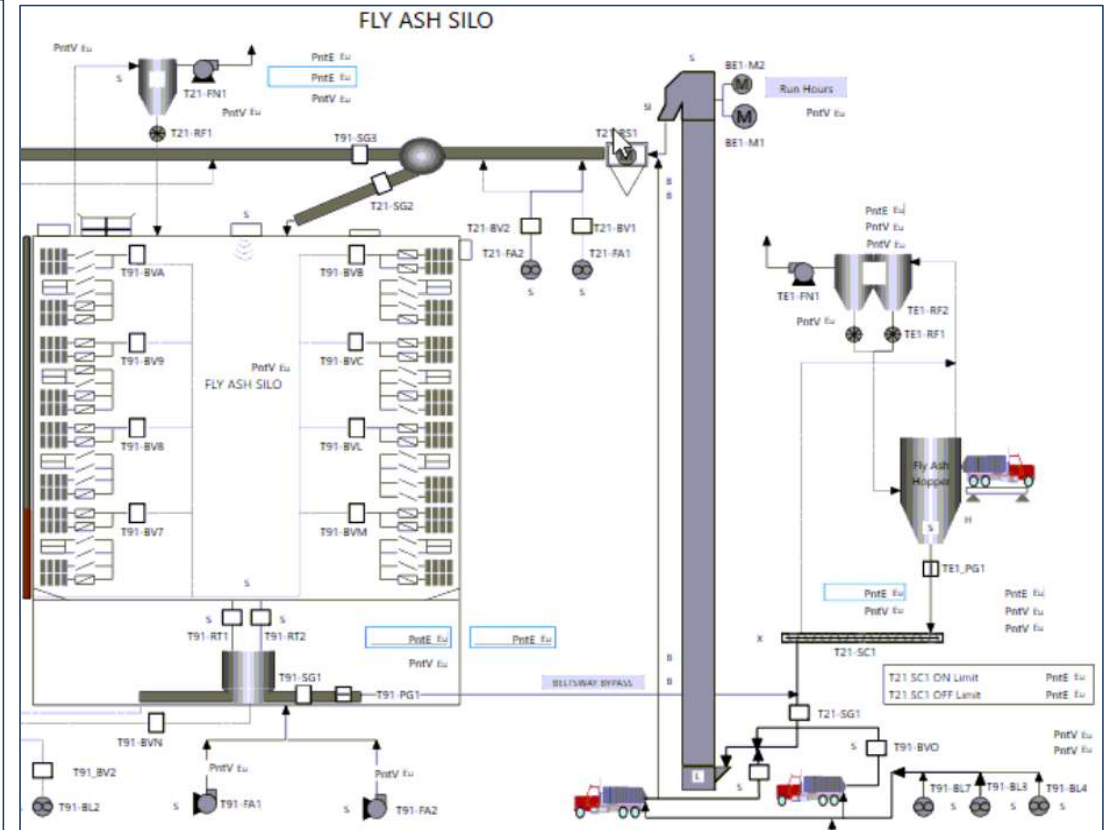
- Rs / t cement – 163 (Grinding aid replacement)
- Rs / t cement – 41 (Clinker factor reduction)
- Rs Cr/ annum – 6.34 Crores

Applicability to other plants / Challenges faced/ Learnings applied to other areas

- Yes, Can be applied to other plants

Innovation : Unloading Dry Fly Ash Using a Blower System Instead of Low-Volume Compressed Air System

- **Fly ash unloading from Bulker & CBT through Bucket Elevator** . Fly ash unloading from Bulker & CBT through Bucket Elevator. Energy saving of 130 KW per hour achieved.
- **Replication potential:** Yes, It could be replicated at other sites.
- **Reason why Innovative:** As Mechanical conveying of material is always cheaper than pneumatic conveying. Earlier we were using 160 KW compressor for unloading of fly ash. Now a 30 KW PD blower is used to unload fly ash from bulker to elevator.
- **Impact it created:** Energy Saving achieved: 130 KWh per Hour.



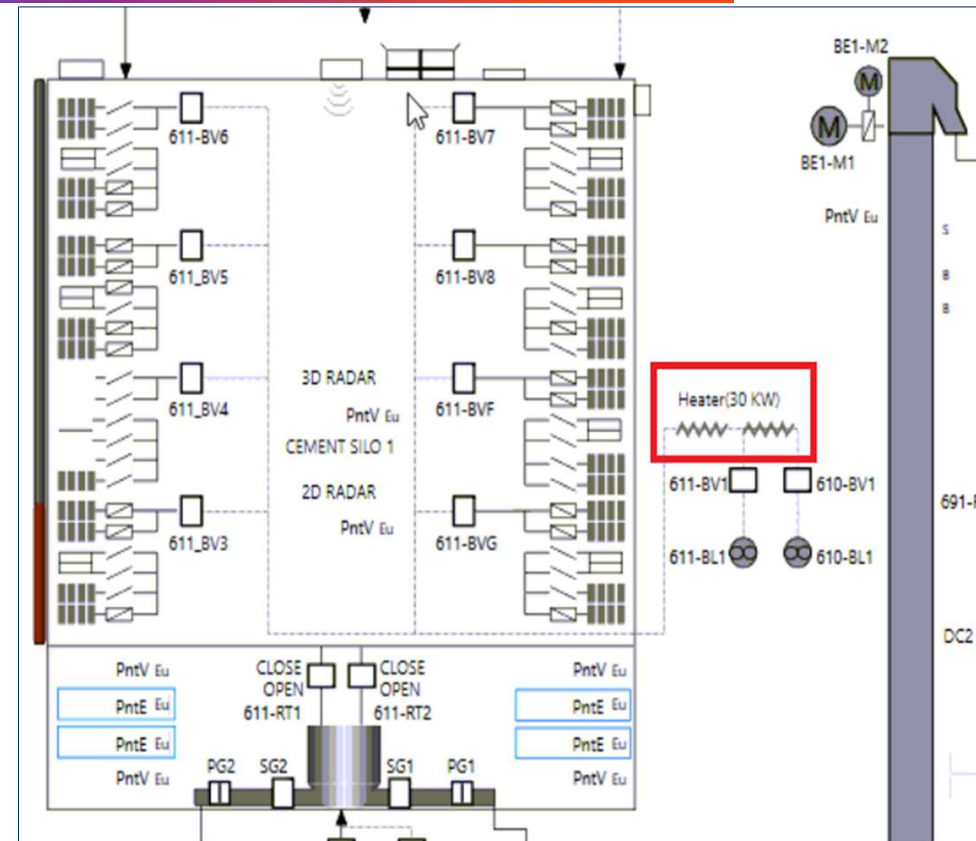
Innovation : Heater installation in PD Blower Lines to reduce Boulder formation in Cement Silos

Reason of Boulder Formation

Positive displacement blower is used to for cement conveying in cement silo. When ambient air is introduced into the silo without heating, especially during colder weather, the temperature difference between the silo walls and the air can cause condensation.

Solution:- Installation of heater in PD Blower(30 KW)

The heater in the PD blower ensures that the air being used in the pneumatic conveying system is warm enough to prevent condensation from forming inside the silo and minimize the risk of the boulder formation.



Plant Operation through Tablet



Brief About Digital Initiatives

The plant operation is done from the site with the help of Tablet, whenever the operator need to attend any critical issue in the plant such as jamming of air slide or any abnormality with equipment.

- During the shift operation, Nalagarh Plant has only one CCR operator.
- In case of material jamming / elevator problem, the Operator need to supervise the job on the field.
- Earlier he used to stop Cement Mill, so that he could supervise the corrective actions at site.
- This situation triggered the idea of operating the plant from site, in case of abnormal situations.

Digital Initiatives

- **Initiatives Implemented**

- Wireless sensors for all critical equipment's.
- Drone for plant surveillance.
- WiFi Cameras for remote locations.
- App for truck drivers
- HLC for mill optimization.

- **Initiatives in Progress**

- AI for improving mill through put based on Golden batch analysis.
- Camera enabled bag counting & bag printing system.
- Robo Lab for improved quality testing efficiency.

Energy Management System



Alok Sharma
(Certified Energy Manager
DGM-E&I)



Vijay Verma



Deepak Dhiman



Jaspreet Singh



Pritam Pal



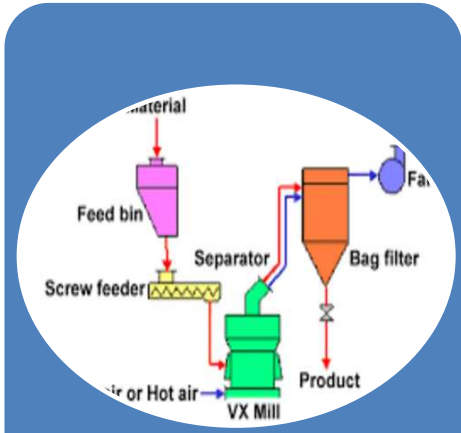
Purushottam Chand



Dinesh Sharma

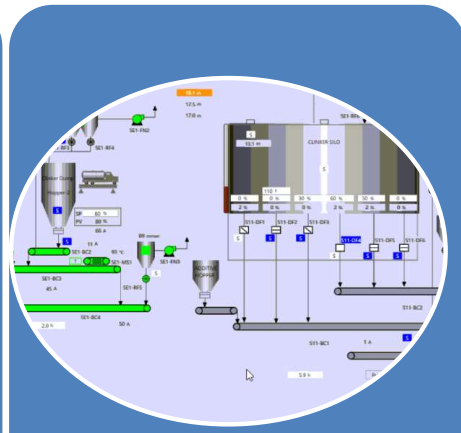
- Perform daily power analysis.
- Conduct internal audits .
- Evaluate new ideas.
- Implement new initiatives.
- Ensure compliance of energy audits points.

Energy Management System



VRM Mill Section

04 Members



Raw Material Handling Section

04 Members



Utilities & Lighting Section

03 Members



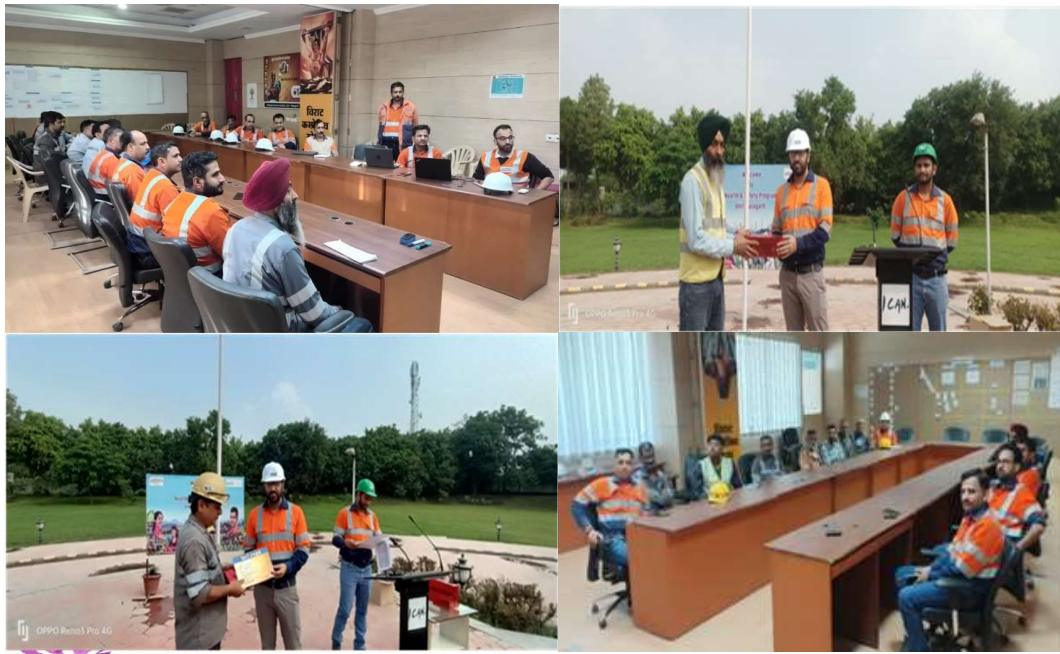
Packing Section

03 Members

- Daily Energy Observation Tour(EOT) to observe any abnormality.
- Ensure timely compliance of points identified.
- Analyze idle running of equipment operation.

Energy Saving Ideas Mela

We received 94 new ideas.
After evaluation, 43 ideas were implemented.
Best ideas have been awarded.



Integrated Management System



Energy Management System

Energy Monitoring System

Ambuja Cement, Nalagarh.

Back
MPSS (Click on Feeder Name to View Details)
Next

Feeder Name	Grid Main Incomer	Grid Main Incomer PM8000	Main Drive	BH Fan	SPRS	TRF-11	TRF-12	TRF-13	TIE Feeder From DG	Outgoing Feeder To MPSS
kVA	7400	7241	4728	2269		578	613	-0	480	
kW	7370	7240	3879	2199		579	607	-0	5	
PF	1.00	-99.99	Lag	Lag		98.71	0.99	-0.00	0.01	
VLL	6388	64074	6405	6400		6402	6407	-0	6400	
Amp	675	65	429	204		52	55	-0	44	
Hz	50	50	50	50		50	50	-0	50	

Feeder Name	Step-Up Transformer DG	DG-1 Main Incomer	DG-2 Incomer	PDB Supply DG	LDB Supply DG	Station Transformer (DG Aux.)	BC-1 Below Belt Feeders MCC-112 (8F-C)	BeltFeederBF3 BelowGypsum MCC-112(3F-E)	BC-12Feeding FromGypsum MCC-112(3F-E)	BC-13Gypsum CrusherToMill Hopper MCC-112(7R-C)
kVA			0				0	0	0	0
kW			0				0	0	0	0
PF							0.00		100.00	100.00
VLL			0				402	403	404	403
Amp			0				0	0	0	0
Hz							50	50	50	50

- 🏠 Home
- ⚙️ Real Time
- 🏭 Equipments
- 📡 Communication
- 👤 Single Line
- 📶 Electrical Health
- 📁 KPI Report

Hum Karke Dikhate Hain

Energy Management System

- EMS system integrated with DCS.
- A system is device to trigger SMS and email, whenever load of a drive exceeds the preset value.

Green Supply Chain Management

- Regular optimization of routes of finished goods transportation to optimize the fuel consumption.
- Motivating transporters to deploy bigger vehicles.
- Procurement of only 5 Star rated appliances.

- Procurement of only IE4/IE5 efficiency motors.
- Dispatch of Loose Cement with Bulkers.

Green Procurement Policy

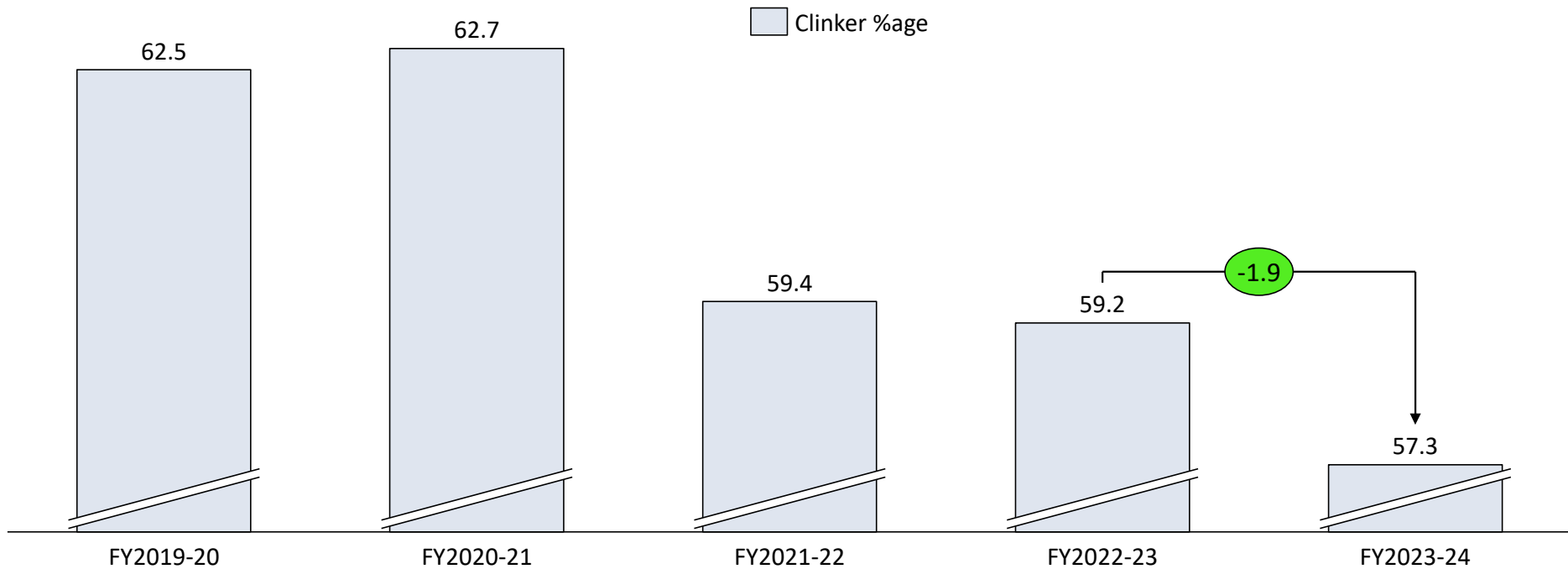
**Ambuja
Cement**

We at Ambuja Cements Ltd. are conscious on environment and believe in the ethical and fair business practices and the philosophy of 'Sustainable Development'. We are committed to make environment an intrinsic part of our decision-making and inspire our Suppliers also to adopt the same fair business practices and in making informed decisions for positive environmental change.

We accomplish this through our Green Procurement Policy and commit to:

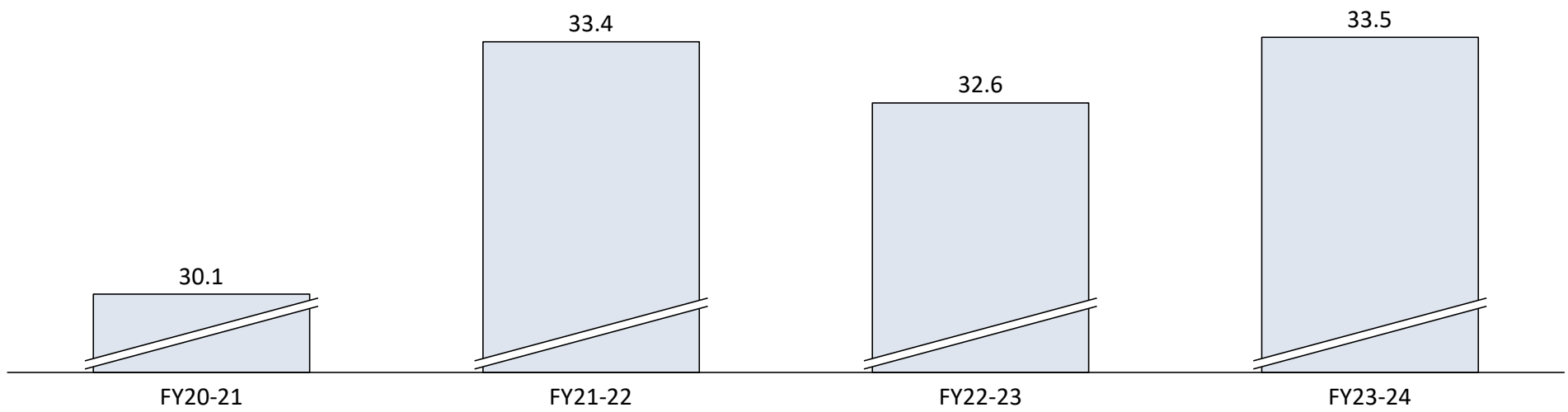
- Select equipment which are environment friendly as far as possible
- Utilise reusable & recyclable materials wherever possible
- Promote environmental awareness amongst suppliers / contractors
- Prefer suppliers with better track records on environment, health & safety
- Legal compliance on environmental matters and labour laws as a criterion in suppliers' selection
- Institutionalise environmental considerations in all procurement decisions
- Encourage our staff to abide by green procurement practices
- Reuse/recycle packaging material of raw material/equipment supplied
- Support suppliers in improving their environmental performance through sharing of best practices.

Benefits with reduction of Clinker Factor



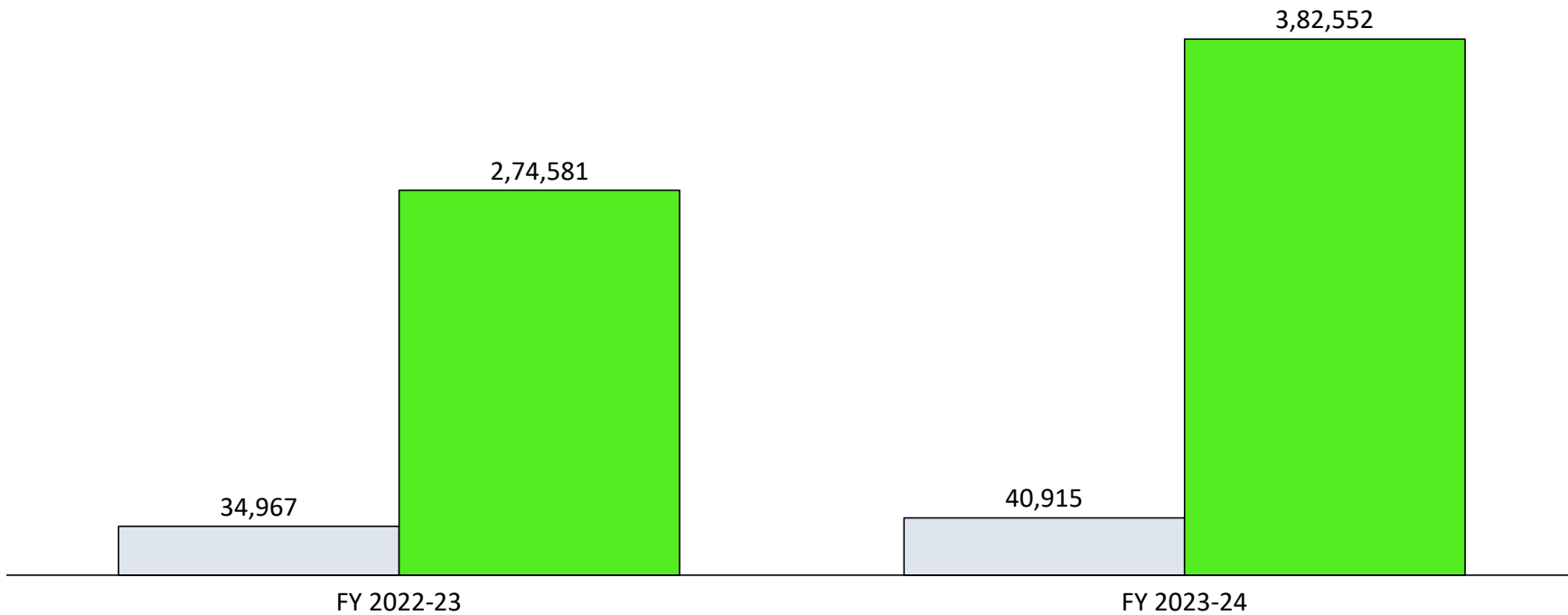
Saving of Rs 9.66 Cr in 2023-24 as compared to 2022-23 by reduction of Clinker Factor.

Flyash Usage (%)



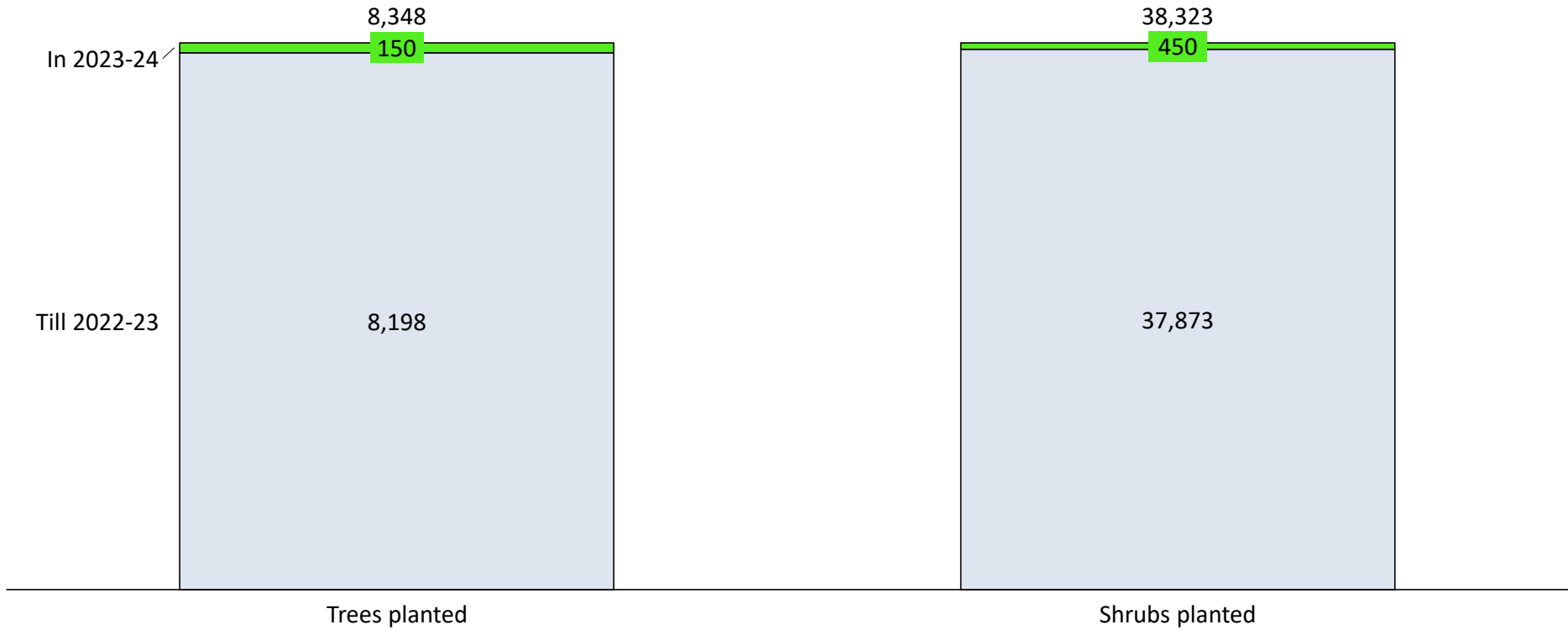
GHG Initiative _ Rain Water Harvesting

ACL Nalagarh Water Consumption ACL Nalagarh Rain Water Harvesting



9.3 times water positive in FY 2023-24 and 7.85 times water positive in 2022-23

GHG Initiative _ Plantation Data



Renewable Energy

- We have set up 200 MW Solar Power Plant at Khevda, Gujarat.
- 7.5 MW Power will be wheeled to Nalagarh from 8 AM to 6 PM.
- 52% of power demand will be met by Solar energy with net saving of Rs. 2 per unit.
- We are also exploring some Hydro Power facilities for cheaper hydro power.

GHG Initiative _ Plant Area: 29Hectare ; Green Area : 35.51 %





**CII National Award for Excellence in Energy Management
Ambuja Cement Ltd., Nalagarh**

Vision: To be the most sustainable and competitive company in our industry

Thank You

