NUVOCO®

Shaping a new world

Excellence in Energy Management

Jojobera Cement Plant

Team Members : Rajarshi Banerjee (HOD Production & Process)
Sudhanshu Kumar (Maintenance) & Ramu Rao (CPP)

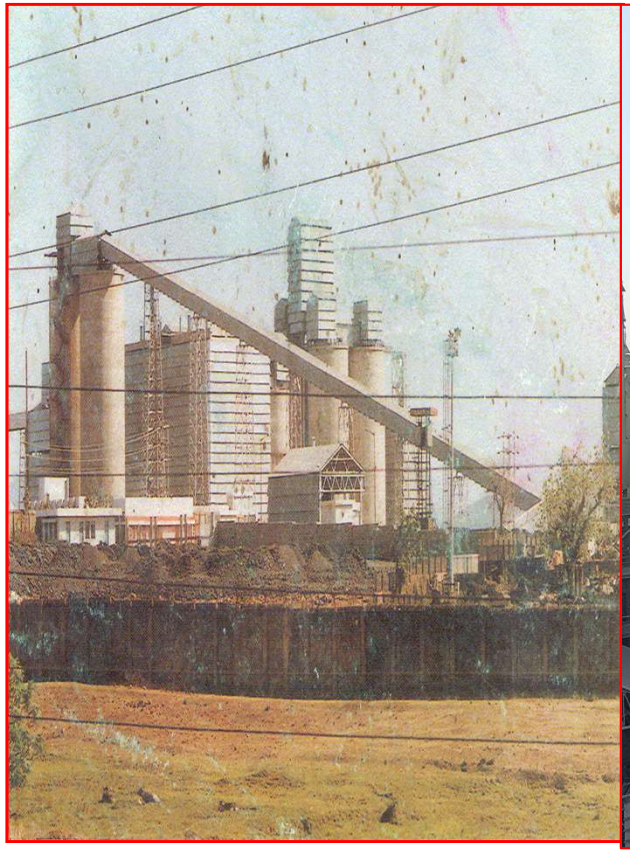
NUVOCO at a glance

11 Cement Plants	Captive Power Plants	Waste Heat Recovery	Solar Power Plants	Ready-Mix Concrete Plants
25 MMTPA	150 MW	44.7 MW	5.3 MWp	58

- Nuvoco Vistas Corporation Limited is a building material company with **Vision** to ***build safer, smarter & sustainable world*** & **Mission** to become ***leading building materials company delivering superior performance***
- Nuvoco stands as 5th largest cement group with a capacity of 25 MTPA by volume
- Its business is classified into three segments :- Cement, Ready mix concrete (RMX) & Modern building material (MBM)
- Nuvoco has 11 cement manufacturing plant across India & 58 RMX plant

Introduction :- Jojobera Cement Plant

1994

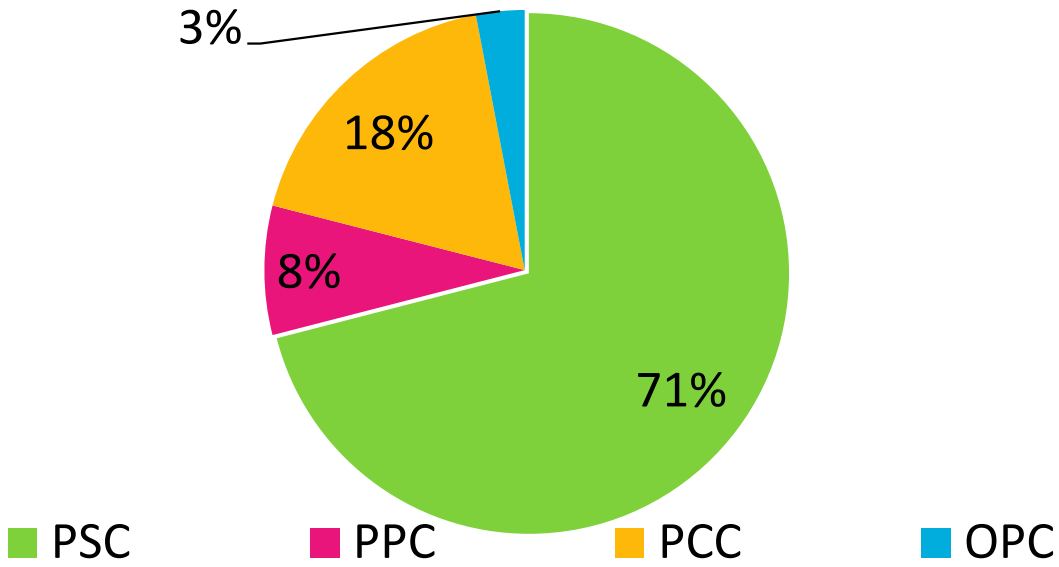


2024

- Plant commissioned in 1994
- Located at Jamshedpur
- 120 km from Ranchi, Jharkhand
- Main Market – Jharkhand , Bihar ,West Bengal, Odisa
- Raw material sources-Tata steel (BF slag),Tata Power – Fly ash
- Clinker – From Mother plant

JCP Product portfolio

- **Production capacity - 6.6 MTPA**
- **Plant commissioning - 1994**
- **Main products are Portland Pozzolana Cement (PPC), Ordinary Portland cement (OPC-53) Portland Slag cement (PSC) & Portland Composite cement (PCC)**
- **Product mix %**



Plant Details

Grinding		
❖ Roller Press	-	04 Nos
❖ Ball Mill	-	02 Nos
❖ Vertical Roller Mill	-	02 Nos
❖ Wagon tippler	-	03 Nos
❖ Coal Mill	-	02 Nos
❖ HAG	-	03 Nos

Packing		
❖ Packer	-	11 Nos
❖ Wagon Loading Platform	-	03 Nos
❖ Wagon Loading Machines	-	32 Nos
❖ Truck Loading Machines	-	08 Nos
❖ Locomotives	-	05 Nos
❖ Railway Track lines	-	32 Km

CPP		
❖ Installed Capacity	-	27 MW
❖ Boiler	-	120 MT
❖ Turbine	-	27 MW
❖ Generator	-	30 MW
❖ Type	-	Thermal

Product Line	Type	Product/Capacity
FG1	RP	Ground slag
FG2	RP	Ground slag
FG3	Twin RP+BM	Ground clinker/PPC
FG4	Ball Mill	PPC / PCC
FG5	VRM	Ground slag
FG6	VRM	CO grinding (PSC & CTO)
CPP	Thermal	27 MW

Major Equipment Details

Wagon Tippler : 3 no's
MAKE : 1 - TRF , 2 - Elecon , 3 - L&T Company
CAPACITY :1-500 TPH, 2 –1200 TPH, 3–1600 TPH

Roller Press : 4 no's[FG1, FG2, FG3A,FG 3B]
MAKE : KHD
CAPACITY : 75 TPH [< 2% Moisture]

Ball Mill : 2 no's [FG 3, FG 4]
MAKE : FG 3- KHD, FG 4 – FLS
CAPACITY : FG3 CLK – 140 TPH
FG3 PPC – 210 TPH
FG4 PPC – 140 TPH

COAL MILL : 2 no's
MAKE – 1.ALSTOM 2. Loesche India
CAPACITY – 15 TPH

STACKER & RECLAIMER – 2 no's
MAKE : 1-TAKRAF, 2- ALSTROM
CAPACITY: Stacker – 1400 TPH,
Reclaimer – 300 TPH

VRM : FG 5 & FG 6
MAKE : Loesche India
CAPACITY: FG 5 Slag 230 TPH
FG 6 Slag 250 TPH

PACKERS
MAKE – FLS / Beumer – Total 11 nos
(08 nos FLS & 03 nos Beumer)
CAPACITY – 240TPH

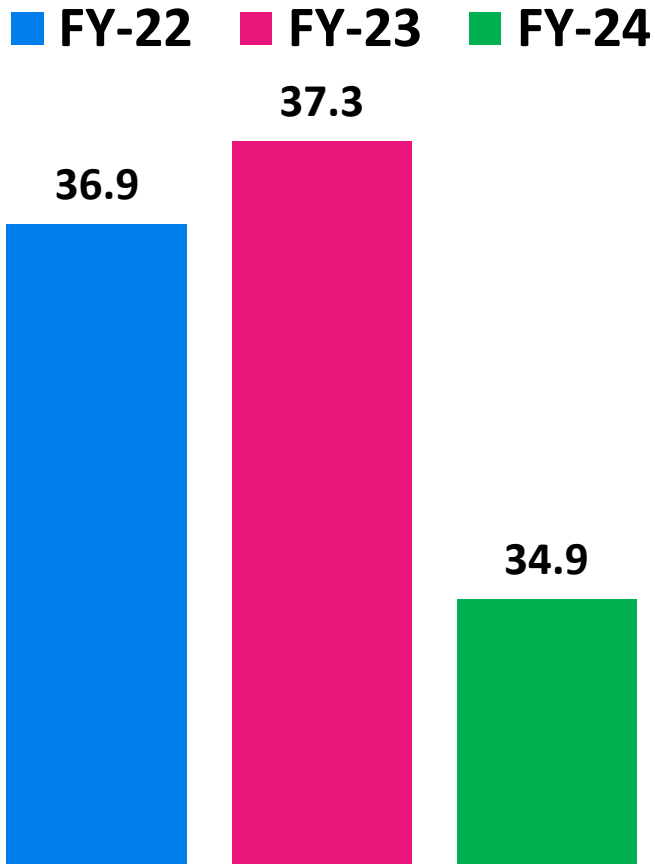
CAPTIVE POWER PLANT
CAPACITY – 27 MW [Thermal]
Boiler : ISGEC -120 TPH
Turbine : Siemens - 27 MW
Generator : TDPS – 27 MW

Jojobera Cement Plant

NUVOCO
Shaping a new world

Energy Conservation Data

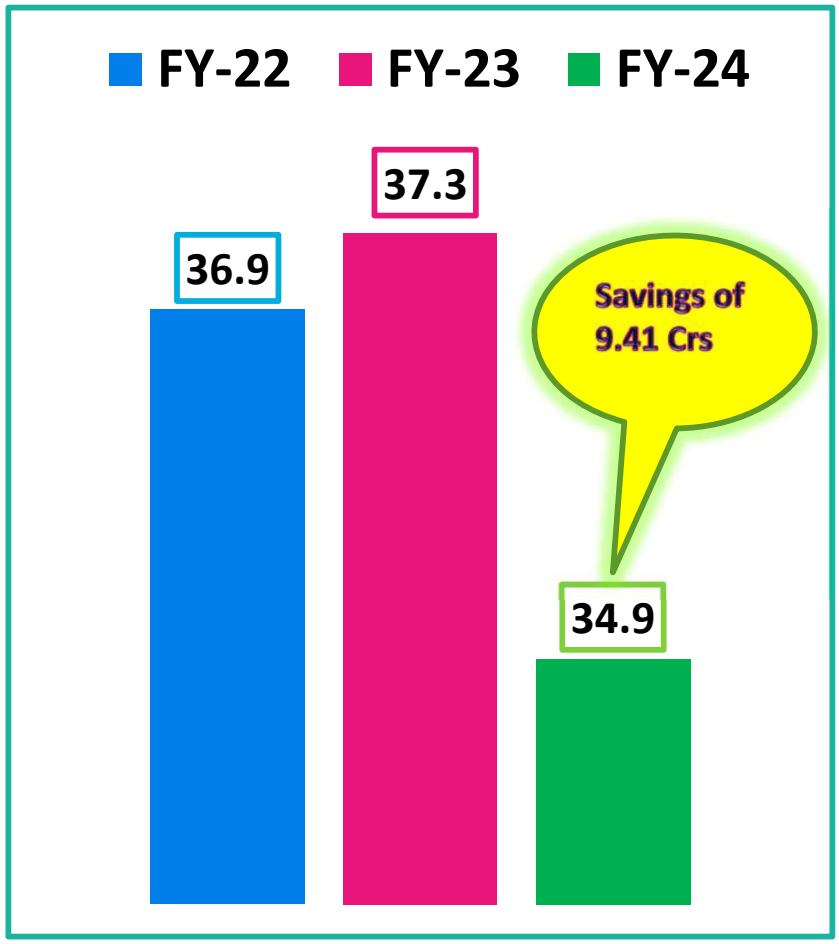
Overall Cement SPC (kWh /MT)-with Packing



Challenges

- ❑ Line -1 HAG was operating with FO , with high operating cost
- ❑LIW of FG-6 was unstable – coal fluctuation found
- ❑High wear & tear of mill internals of FG-6 mill
- ❑Frequent feed chute jamming of FG-5 high moisture in incoming raw material
- ❑Frequent jamming of FG-4 mill inlet
- ❑High moisture of raw material
- ❑ 2.5 km long material handling circuit

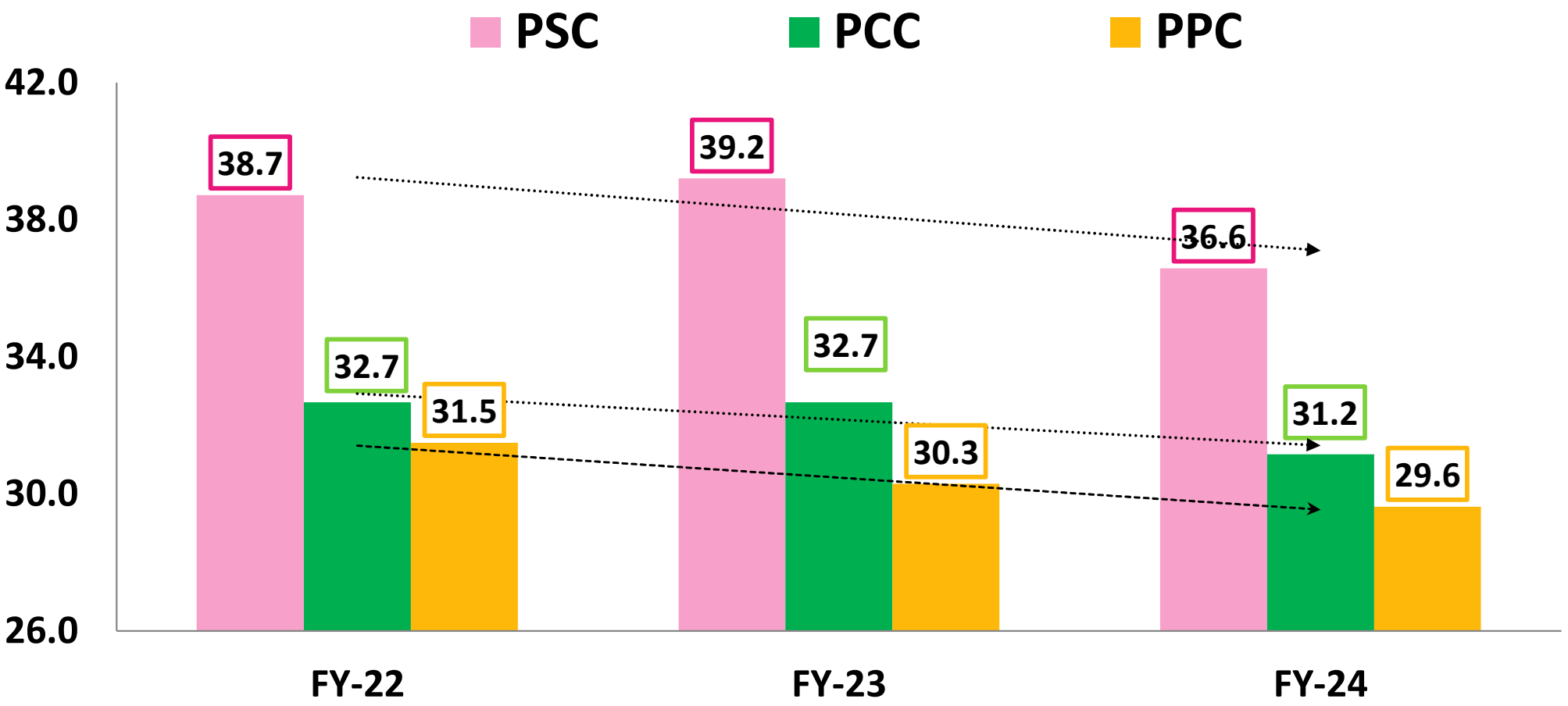
Overall Cement SPC (kWh /MT)



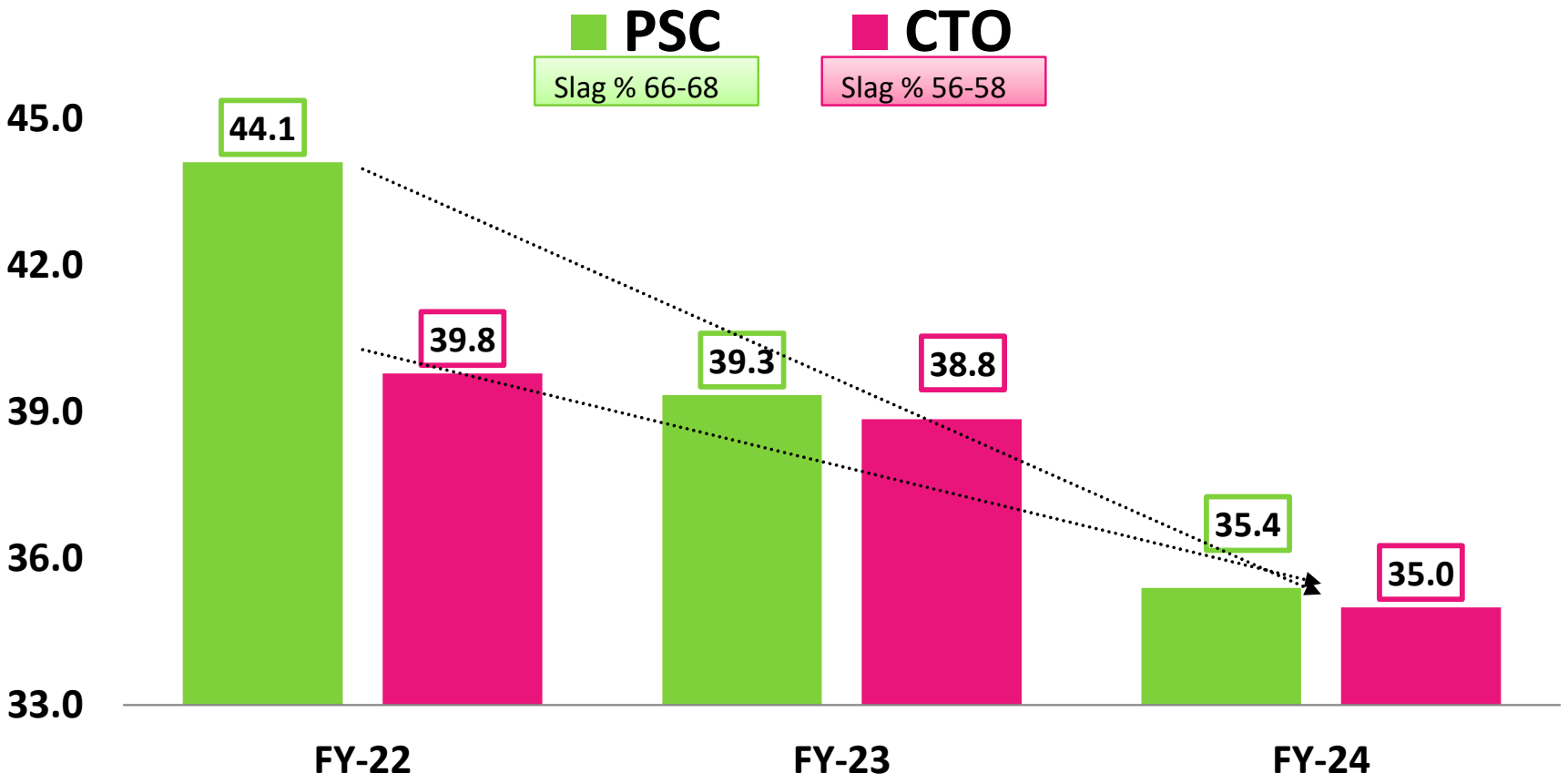
Action taken to minimize SPC

- ❑Formation of CFT (Cross functional team) to analyze data on daily basis & implementing with new ideas.
- ❑Optimized VRM (FG#6) Table & fan power by modifying scatter ring & hot air deflecting plate at mill inlet
- ❑Reduction of Ball mill power by optimizing ball charging pattern
- ❑Minimized false air ingress in FG#5 & FG#6 by regular identification & corresponding correcting the ingress sources.
- ❑FG#5- Feed chute replacement with mirror finished plate
- ❑Managing product balance line wise
- ❑Optimized compressed air consumption by segregating shop wise
- ❑Managed equipment idling & Shutdown power tracking
- ❑Review of all Process fans & optimization

Product wise power consumption



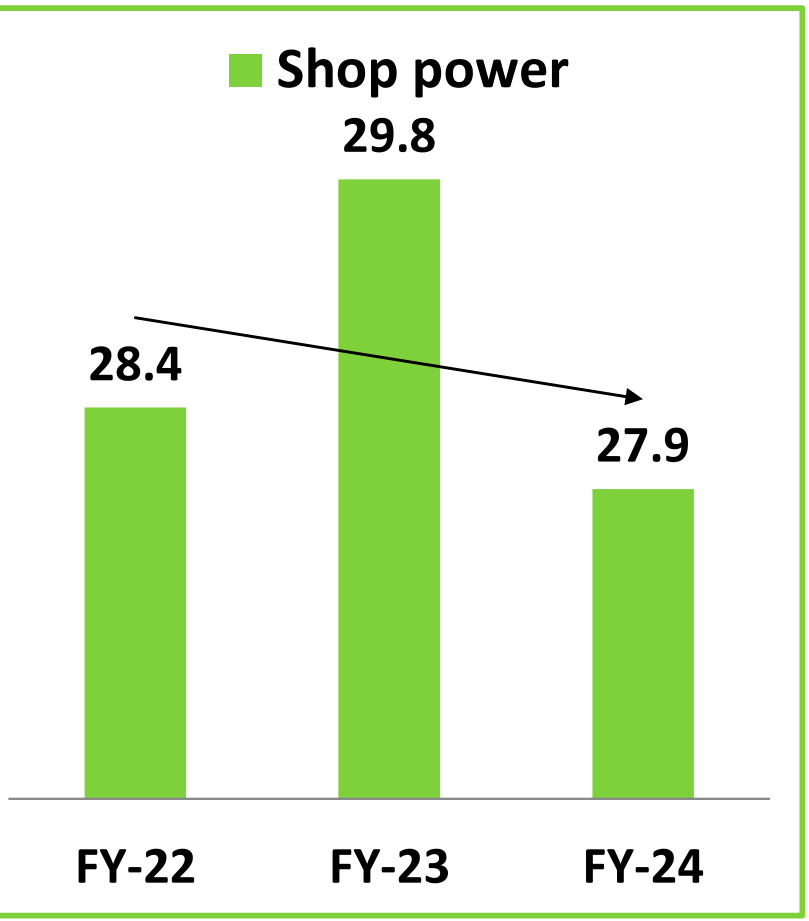
FG#6 Mill packed power (kWh /MT)



FG#6 : Action taken to reduce SPC

- ❑ Removal of support roller from mill
- ❑Modification of nozzle ring & scattered ring **(Fan power dropped down from 1700 Kw to 1250 Kw)**
- ❑Reduction in false air across mill <10 % & bag house < 5%
- ❑Reduction of bag house header pressure & increased pause time
- ❑Table profiling as per wear based
- ❑Optimized ID fan power
- ❑Minimized classifier seal ring gap @ 8 mm
- ❑Modification in feed chute ,liners & installation of air blasters

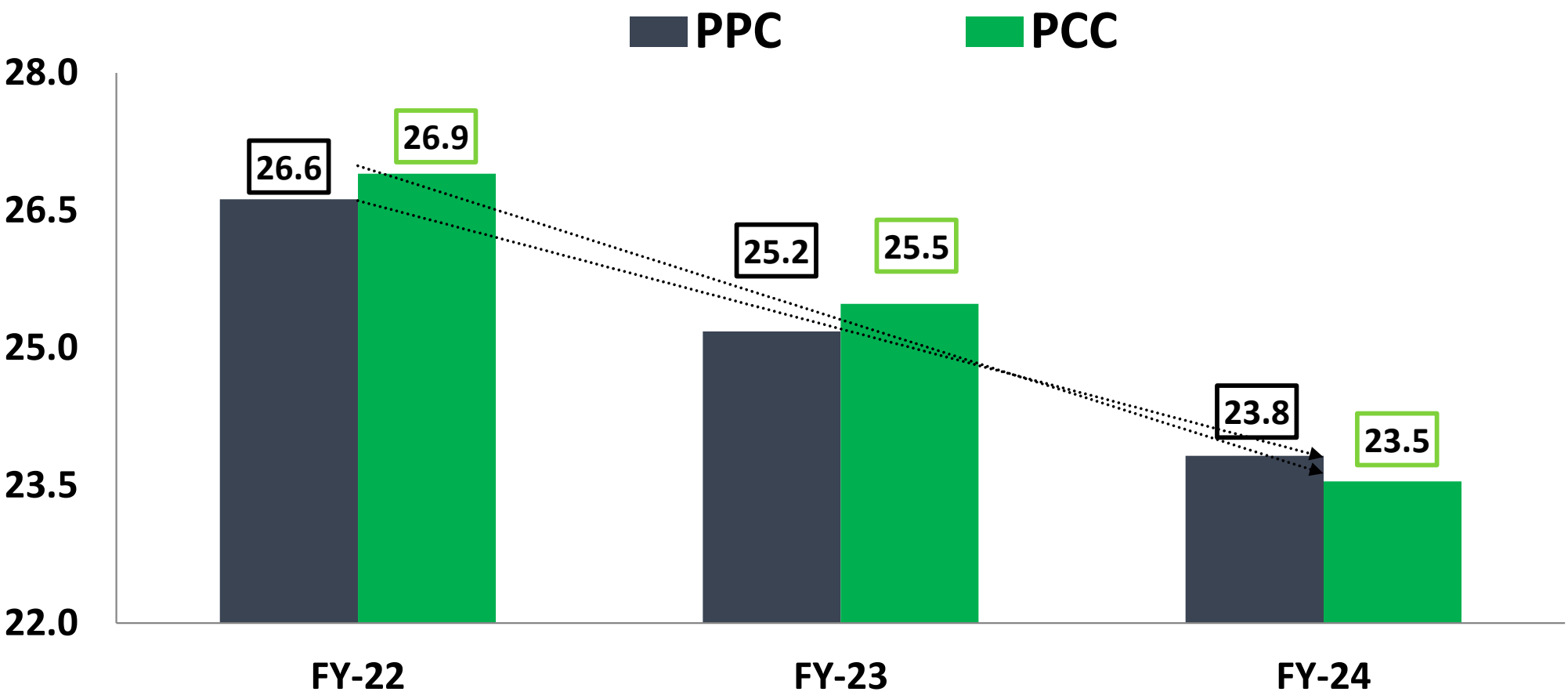
FG#5 Mill shop power reduction



Action taken to reduce SPC

- ❑Changing velocity in nozzle ring with modification in scattered ring
- ❑Table profiling as per wear based
- ❑Modification of feed chute by mirror finished plate
- ❑Modification of grit cone discharge with modification in stump cone
- ❑Reduction of classifier seal ring gap
- ❑Reduction of ID fan cone gap from 22 mm to 8 mm

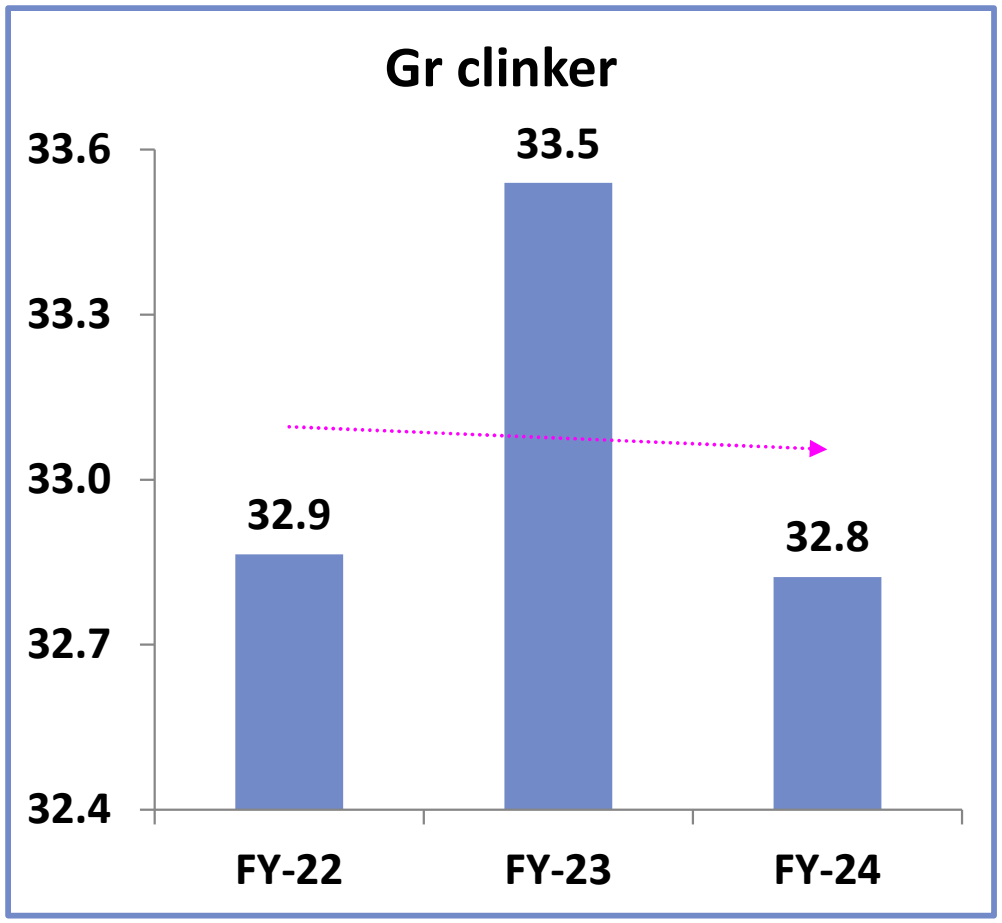
FG#4 – Ball mill shop power

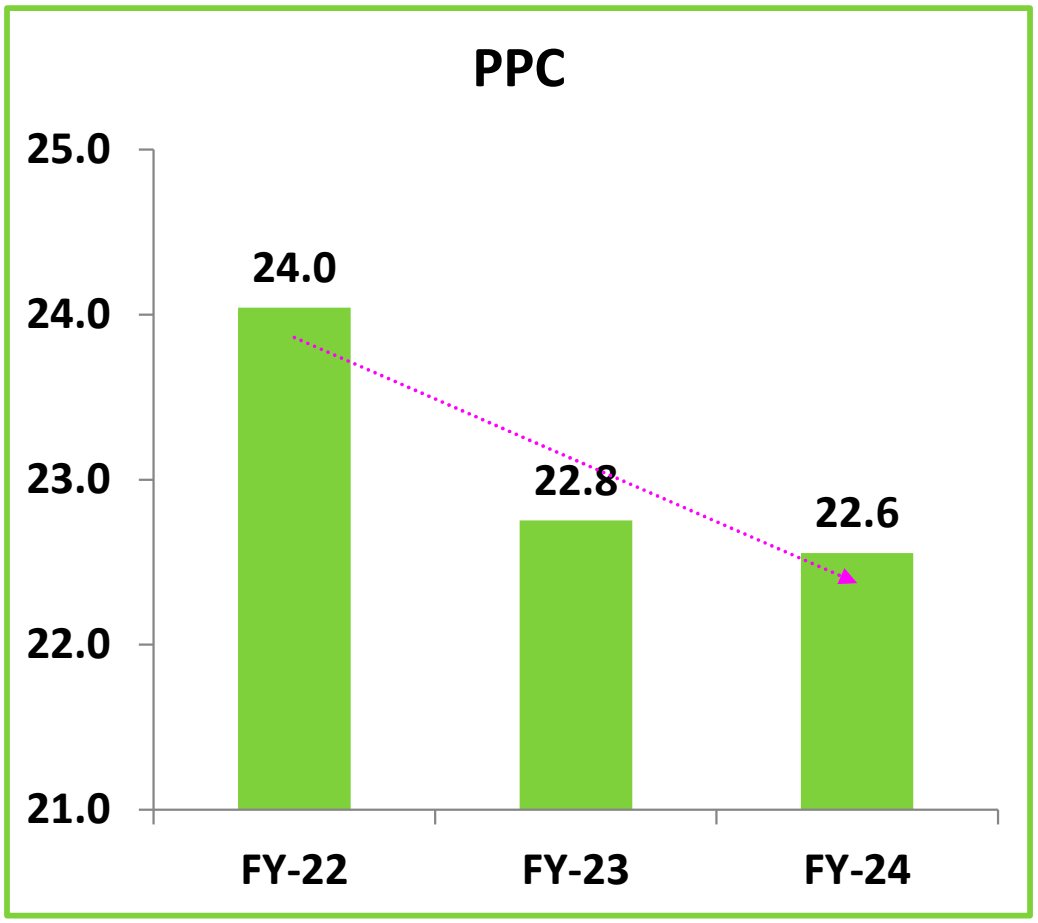


FG#4 : Action plan to reduce SPC

- ❑Optimized ball charge
- ❑Modify mill feed inlet chute to avoid inlet jamming & using of 100% chemical gypsum
- ❑Optimized bag house ON & OFF time based on the product mix
- ❑Develop & optimized partition wall wind screen
- ❑Modify feed scoops in 2nd chamber
- ❑Installation of permanent magnet at mill feed belt to avoid contamination with foreign material
- ❑100 % uses of fly ash at mill outlet

FG#3 – Ball mill shop power

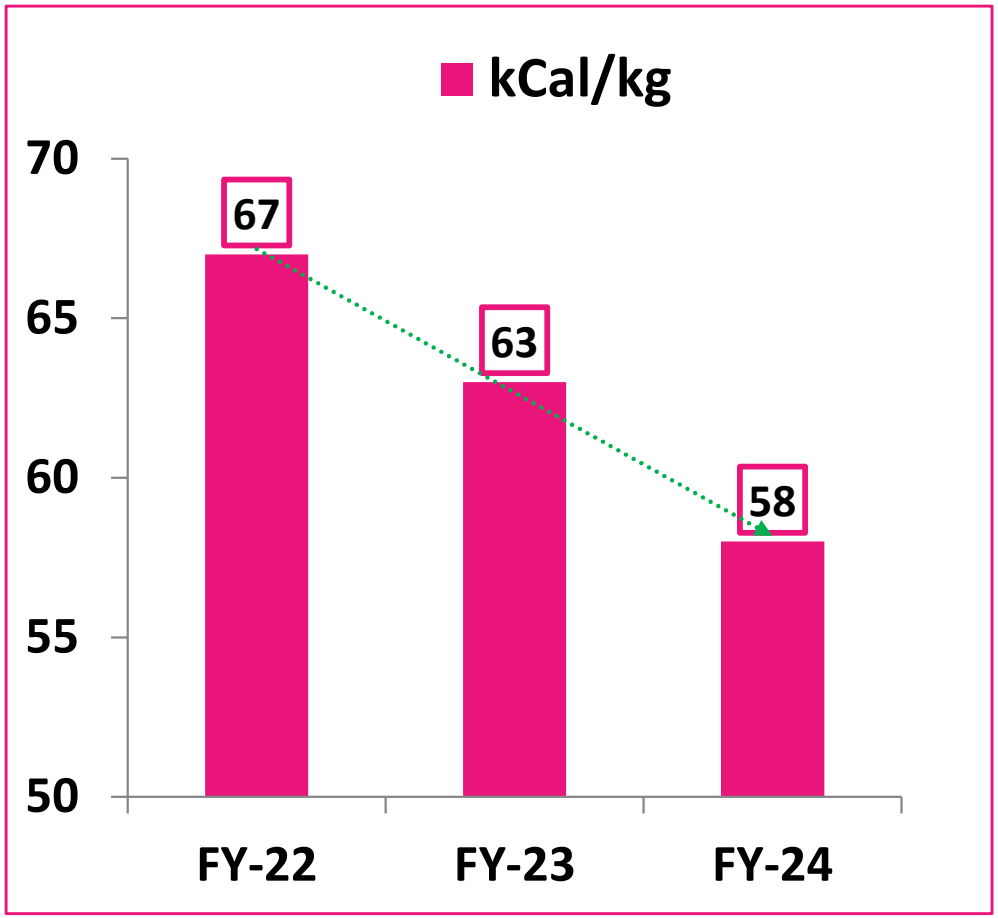


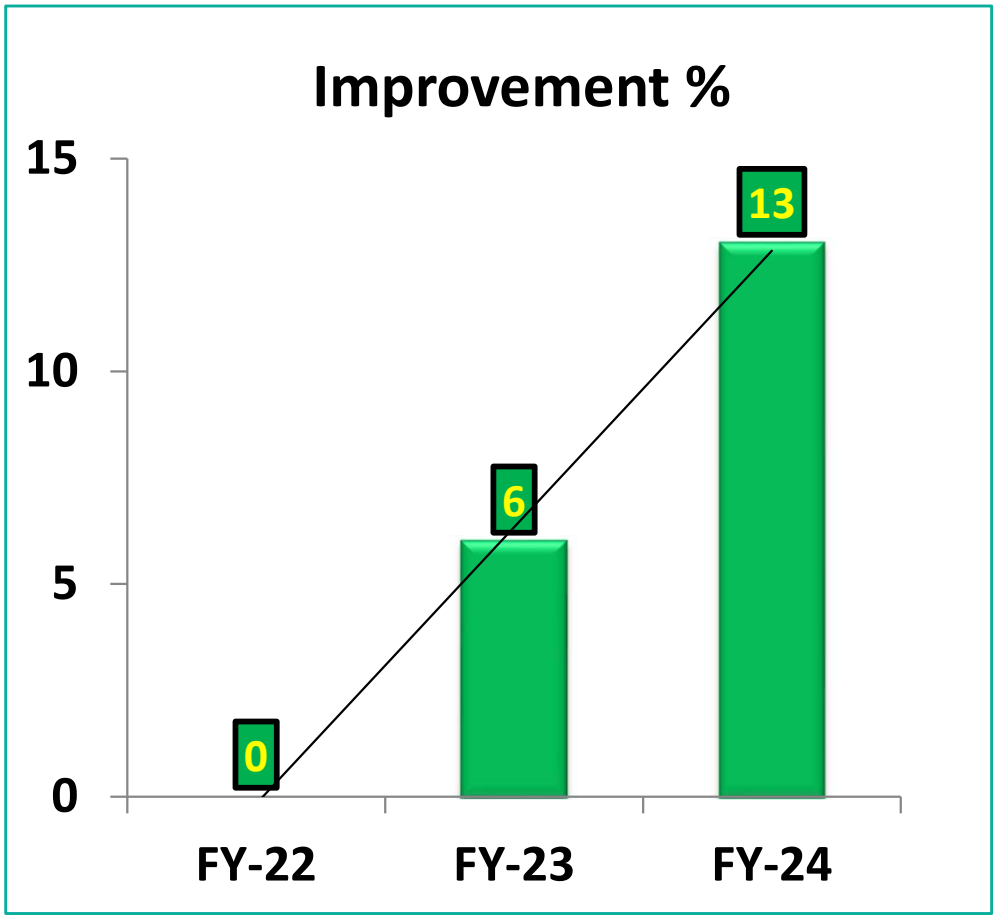


FG#3 : Action plan to reduce SPC

- ❑Optimized mill with fine ball charge
- ❑Modification of V-separator air distribution part to utilize its bottom part
- ❑Optimized bag house ON & OFF time
- ❑Installation of VFD at separator vent bag filter fan
- ❑Optimized roller gaps for clinker grinding
- ❑Installation of permanent magnet at mill feed belt to avoid feed contamination with foreign material

Specific Heat Consumption (kCal/kg)





Action taken to reduce SHC (kCaL/kg)

- ❑Modification of FG#5 Coal HAG
- ❑Installation of coal HAG replacing FO based HAG in line 1
- ❑Reduction of false air in the system
- ❑Connectivity of slag HAG replacing oil based HAG for coal mill 2
- ❑ Heating insulation across V-separator in FG#1 & 2
- ❑ Usage of 100% Indian coal in coal HAG

SUMMERY OF MAJOR PROJECTS TAKEN FOR ENERGY CONSERVATION

FY	No of Energy saving projects	Investment (INR Million)	Electrical savings (Million kWh)	Thermal savings (Million Kcal)	Total Savings (INR Million)	Impact on SEC/ SHC (Electrical kWh /MT cement or Kcal/Kg cement)
FY 2021-22	05	3.5	5.12	-	35.84	0.3 kWh/T
FY 2022-23	06	65.5	1.46	8.9	115.2	7 kCal/kg & 0.5 Kcal/T
FY 2023-24	05	73.5	5.58	22.5	226.1	15 kcal/kg & 2.2 kWh/T

TOTAL SAVINGS (INR Million) = 377.1

ENERGY SAVINGS PROJECTS FY 22

Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)	Estimated Payback Period (months)	Comment
Installation of 4 VFDs in Packing Plant	0.2	-	3.5	10	Implemented
VRM[FG#6]-Optimization	0.3	-	-		In house
Installation of 4 nos. high efficiency fans in FG1,2,3A & 3B	4.5	-	4	20	Implemented
Modification of feed chute in FG1,2	0.1	-	-		In house
Installation of LED lights	0.02	-	0.8	24	Implemented

ENERGY SAVINGS PROJECTS FY 23

Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)	Estimated Payback Period (months)	Comment
Modification of coal HAG in FG5	-	8.9	50	4	Implemented
Feed chute modification in FG6	0.52	-	-	-	In-house
Reactive power management	0.9	-	0.3	6	Implemented
Connectivity of slag HAG with coal HAG in FG#6 mill	0.02	-	-	-	In-house
Installation of new bag filter to improve process productivity in FG#3-567 BF6	0.01	-	0.8	12	Implemented
Optimization of HAG of FG#1 & FG#2	0.01	-	-	-	In-house

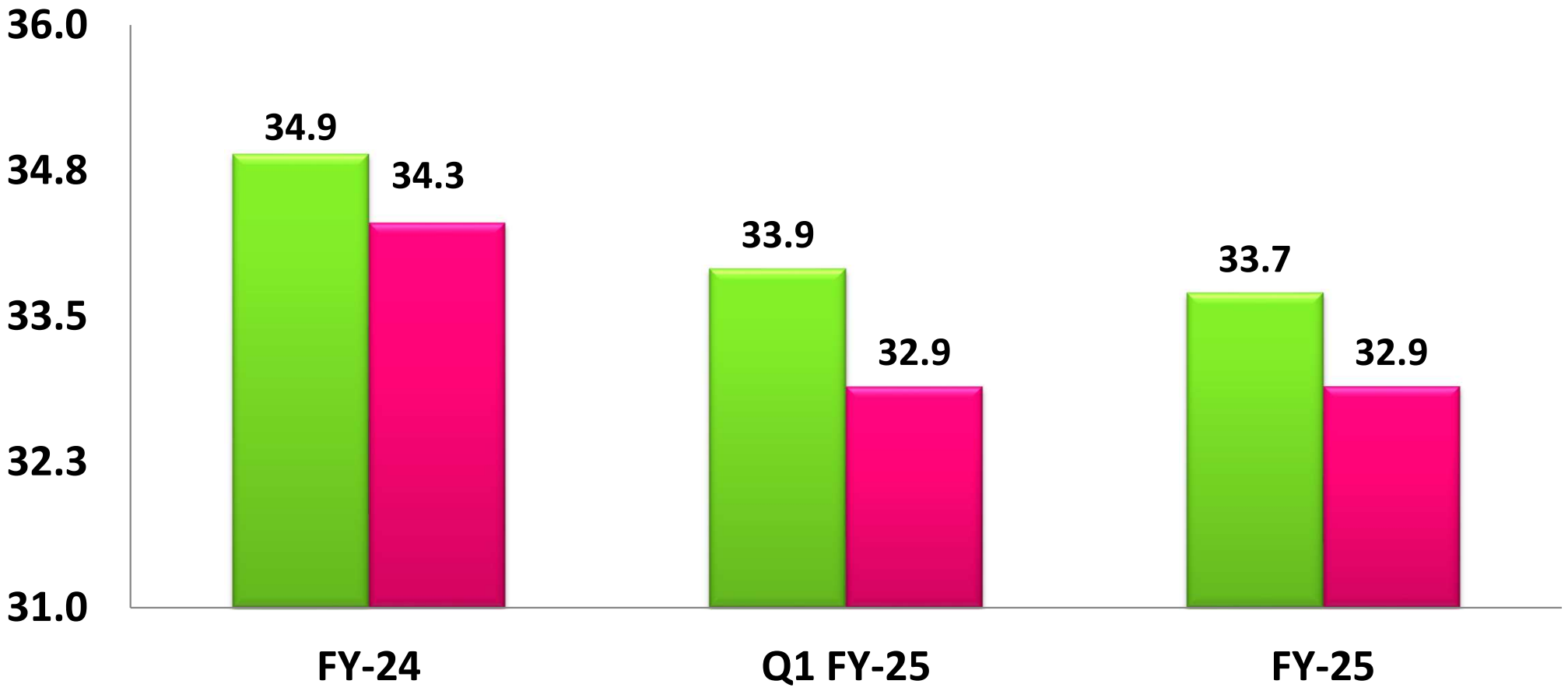
ENERGY SAVINGS PROJECTS FY 24

Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)	Estimated Payback Period (months)	Comment
Installation of coal HAG replacing HFO based HAG in line 1	-	22.5	70	3	Implemented
Modification of scattered ring in FG#6 mill	4.4	-			Inhouse
Installation of VFD in packing plant bag filter fans	0.18	-	3.5	4.3	Implemented
Mill inlet chute & blaster nozzle modification in FG#4 mill	0.60	-			In house
De-rating of FG6 ID fan from 3600 kW to 2500 kW	0.4	-			Implemented

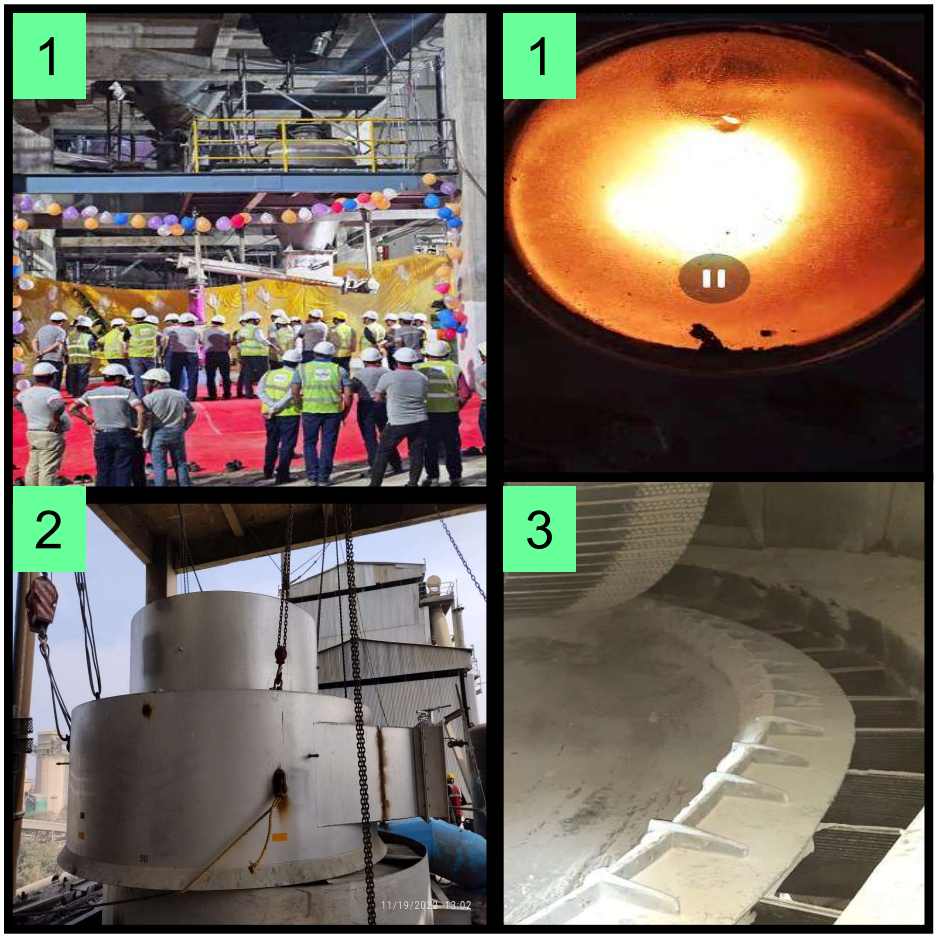
ENERGY SAVINGS PROJECTS FY-25

Title of Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million Kcal)	Investment (Rs in Million)	Estimated Payback Period (months)	Comment
Installation of VRM 5200 Kw motor replacing 4300 Kw motor	0.3	-	12	2.1	Implemented
Change of FG#6 ID fan motor with de-rated KW	0.15	-	7	2.7	Implemented
Modifications of scattered ring in FG#5 mill	0.3	-	-	-	In-house
Installation of Solar project / power	30	-	110	24	Way forward
Reduction of plant lighting load by 10%	0.01	-			In house
PCC production project through FG#6 mill	0.06	-	50	24	Way forward

Cement SPC (kWh/MT) Vs Target in FY25



Top 3 Innovative projects



- **Replacement of FO based HAG with coal HAG**

(Savings of 18.7 Cr/Annum)

- **Modification of FG#5 HAG for usage of high ash coal**

(Savings of 10.5 Crs/Annum)

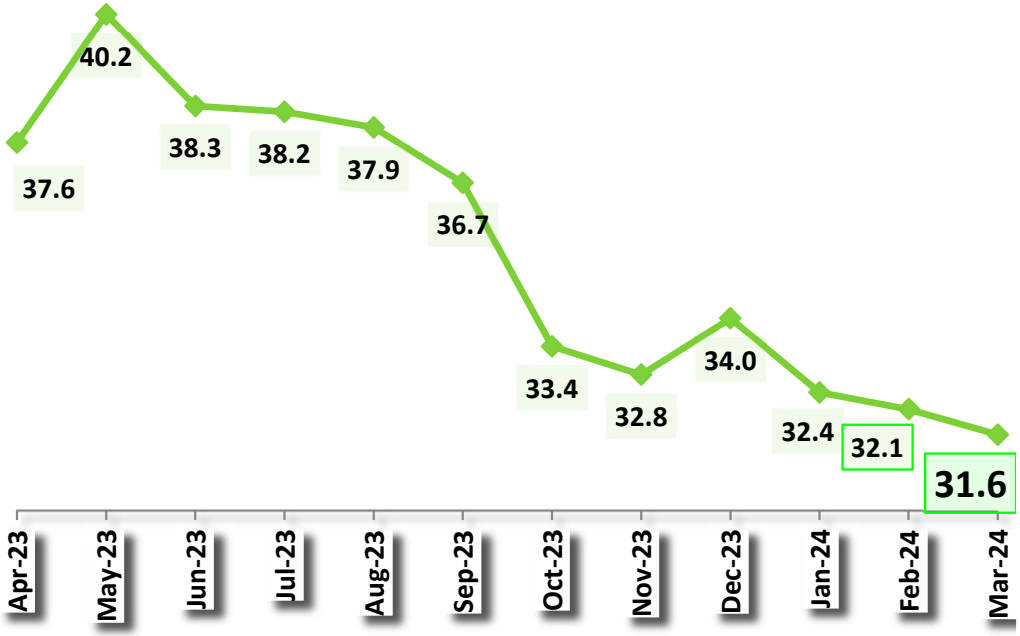
- **Modification of Scattered ring in FG#6 mill**

(Savings of 2.5 Crs /Annum)

FG 6 Mill- Process innovative

JCP FG 6 mill has recorded lowest ever specific power consumption of **31.6** kWh/ MT (packed power) of cement in the month of Mar***'24*** by maximizing throughput and optimized table & fan power

PSC - Packed power (kWh/MT)

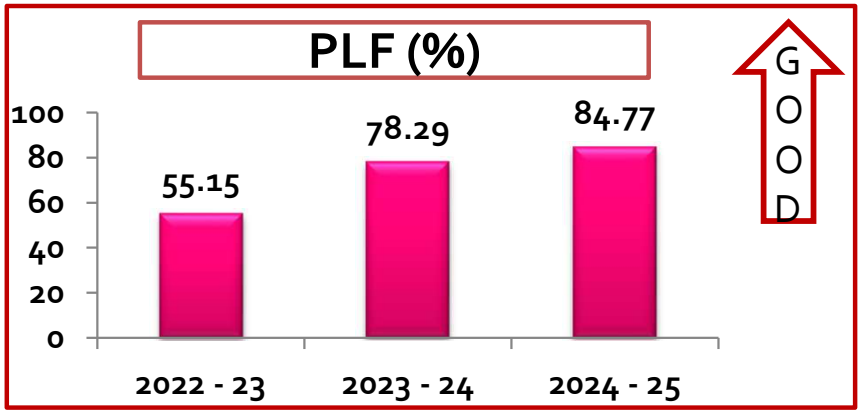


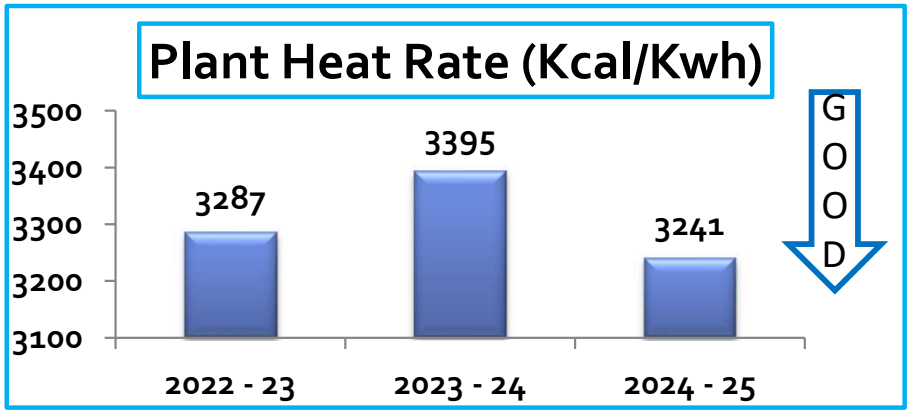
Action taken

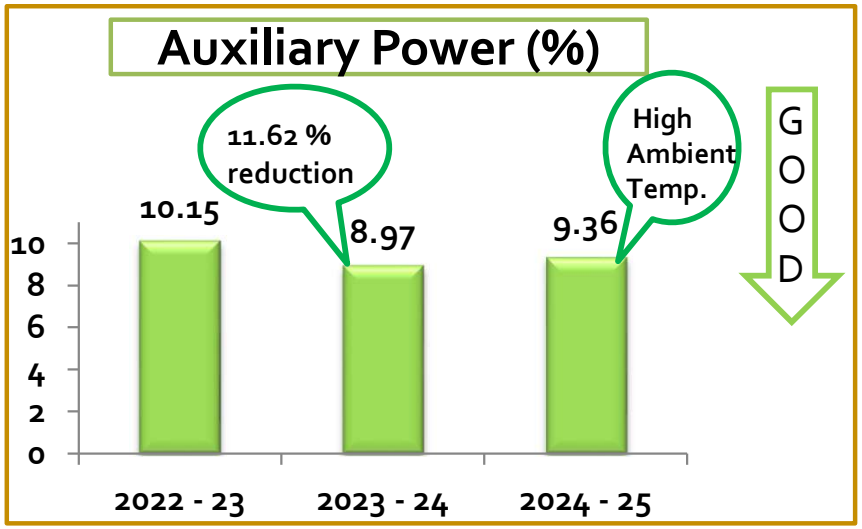
- Optimized operational parameter to maximize mill TPH, reduction of fan & mill power
- Optimized nozzle open area
- Table profiling along with replacement of Tyre
- Installation of mirror finish plate at mill feed chute
- Removal of support rollers from mill
- Modifications of all major discharge chute to maximize mill throughput
- Minimized false air ingress across mill & bag house

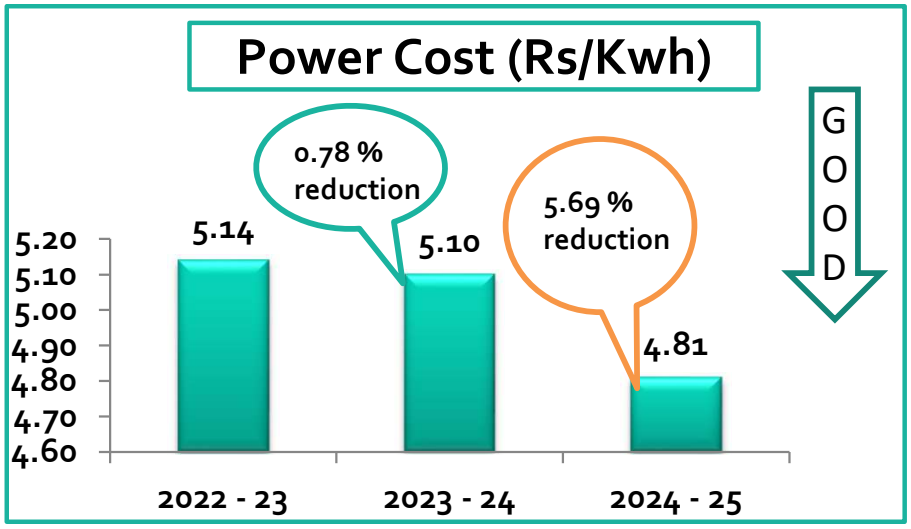
Captive power plant

CPP-Sustainable Plant Performance









Energy Savings Projects with No Investment

SN	Energy Saving Projects	Saving Achieved Electrical Energy (Rs. Lacs)	Saving Achieved Thermal Energy (Rs. Lacs)
1	To reduce auxiliary power by operating BFP through PID logic-BFP with auto drum pres. Set point (+ 6 to 7 Kg/Cm^2)	29.93	-
2	Reduction in auxiliary power consumption by reducing inst air pressure (7.2 BAR to 6.0 BAR)	3.20	-
3	To optimize air consumption of coal Handling circuit.	3.0	-
4	Reduction in LOI by 0.5 % with reject coal firing From 2.1% to 1.6%)	-	22.7
5	Reduction in Heat rate by maintaining ACC vacuum with auto PID through ACC fans	-	5.40
6	PA Fan suction duct modified (Reduced by 2.8 M)	19.70	-
7	SA Fan suction duct modified (Reduced by 2.8 M)	11.15	-
8	Plant run with single compressor by optimize distribution line @ user area	36.63	-

Energy Savings Projects with No Investment

SN	Energy Saving Projects	Saving Achieved Electrical Energy (Rs. Lacs)	Saving Achieved Thermal Energy (Rs. Lacs)
9	Reduction in Aux. Power Consumption by auto set point of CEP discharge pressure through PID	3.90	-
10	Optimize package AC running hours (stopped 2 out of 9)	8.27	-
11	ACC Fan blade angle reduced for winter season (17 Deg to 12 Deg)	4.49	-
12	SA Fan - Secondary Air fan running optimize (Stopped one fan >60% load)	3.45	-
13	Optimize CHP running hrs by in-house modification of Crusher hammer bar	2.10	
	Saving	126.12	28.10

Energy Savings Projects with Investment

SN	Energy Saving Projects	Saving Achieved Electrical Energy (Rs. Lacs)	Saving Achieved Thermal Energy (Rs. Lacs)
1	ACW – Auxiliary cooling pump VFD installation (Pr. reduced from 4.50 – 3.50 Kg / Cm^2)	9.29	-
2	WSB – Wall seal blower VFD installation (Pr. reduced from 3200 to 2800 mmwc)	3.30	-
3	CT Fan – Cooling tower fan VFD installation and run with auto logic with return water temp. (Start at 34 °C and stopped at 31 °C)	2.89	-
4	Bed Ash cooler modifications (Hot air duct connect to economizer hopper)	-	5.92
	Saving	15.48	5.92

Total Saving with All Projects in last 03 years is 175.62 Lacs

Reduction in H/R by auto operation of fan

Opportunity:

Reduction in Heat rate through optimization of ACC Vacuum.

Approach:

We have 08 Module Air cooled condenser for condensing the Turbine exhaust steam with design ambient temperature 42 °C. We were operating 04 fans on full speed and stopping the other fans when ambient temp. is low for saving aux power and not utilizing the total heating surface area of the ACC.

A cross functional team formed and after brain storming it was decided to utilizing total heating surface area of ACC and keep start all fan with auto PID loop with vacuum set point

Results:

Vacuum increased by -0.03 Kg/cm2 with same Aux power.

Heat Rate reduced by 15 Kcal/kwh and saving of 32.07 Lac.

Plant Illumination optimizaztion.

Opportunity:

The Lights of TG building were ON/OFF according to the Timer Settings and it was observed that sometimes illumination level in TG building becomes very poor (Below Safety Norms) due to bad weather conditions and in that situation lights has to be ON manually for proper illumination.

Approach:

After brain storming it is concluded that if lighting of TG building area will be ON/OFF according to Lux Level then problem could be rectify.

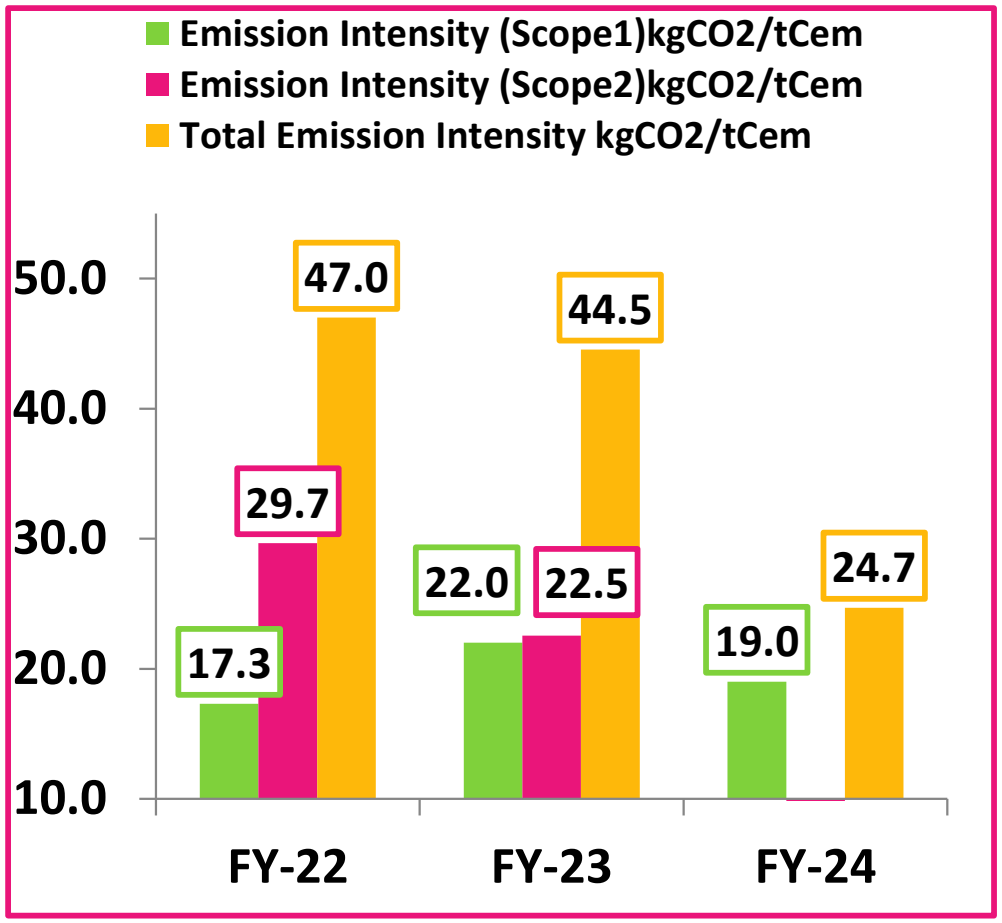
Procured& installed a LDR (Light Dependent Resistor), which control the lighting circuit according to the illumination level.

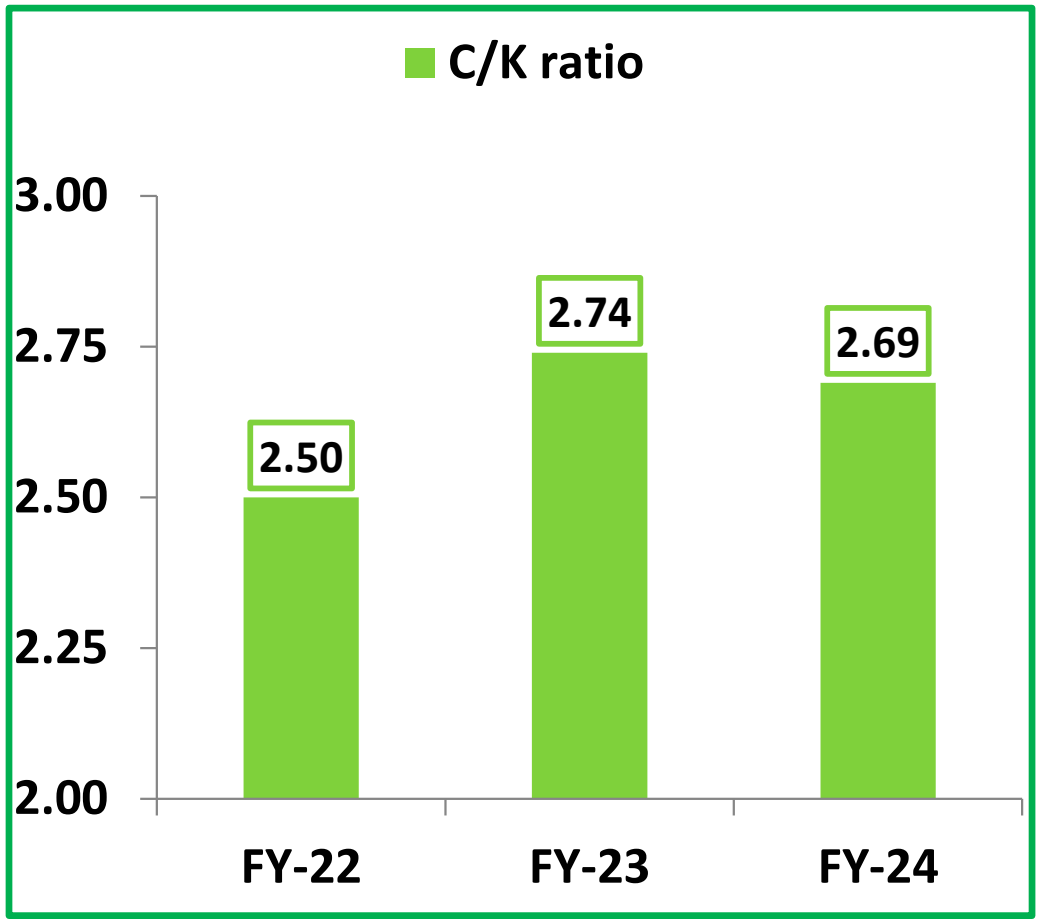
Results:

Auto switch ON/OFF of area lighting to maintain the illumination level, According to weather conditions.

Power saving of 0.4 KWh

Emission Intensity & Clinker factor





Award received in recent years

National Award for Manufacturing Competitiveness (NAMC) by International Research Institute for Manufacturing (IRIM)

NUVOCO
Shaping a new world

Thank You

INTEGRITY

ENTREPRENEURSHIP

COLLABORATION

CARE

OPERATIONAL EXCELLENCE