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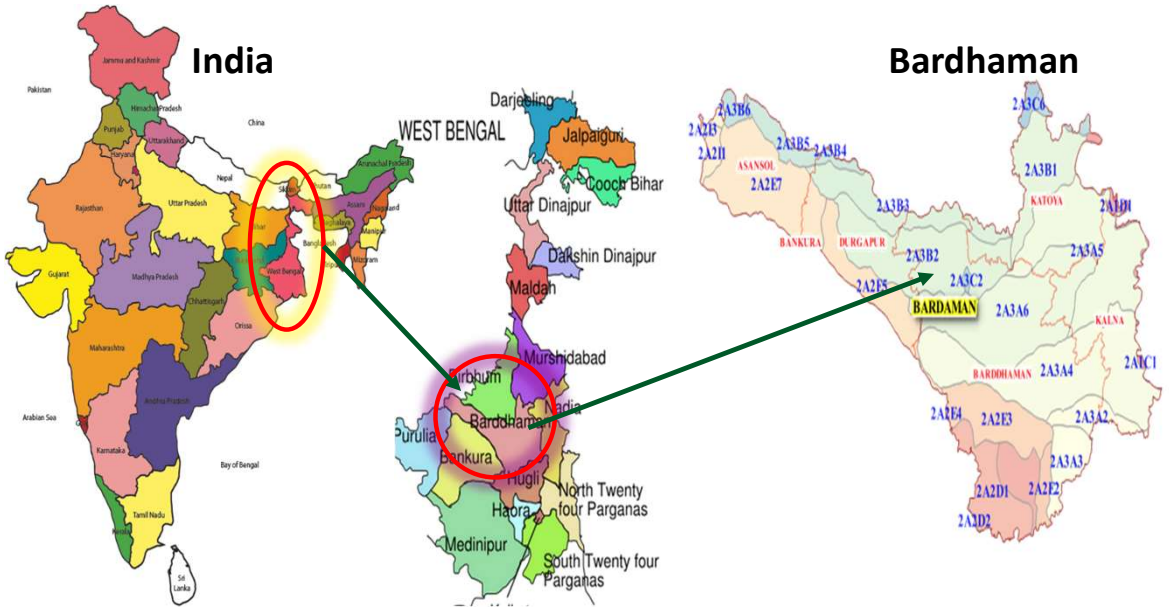
CII National Award for Excellence in Energy Management 2024

Nu Vista Ltd.

Panagarh Cement Plant

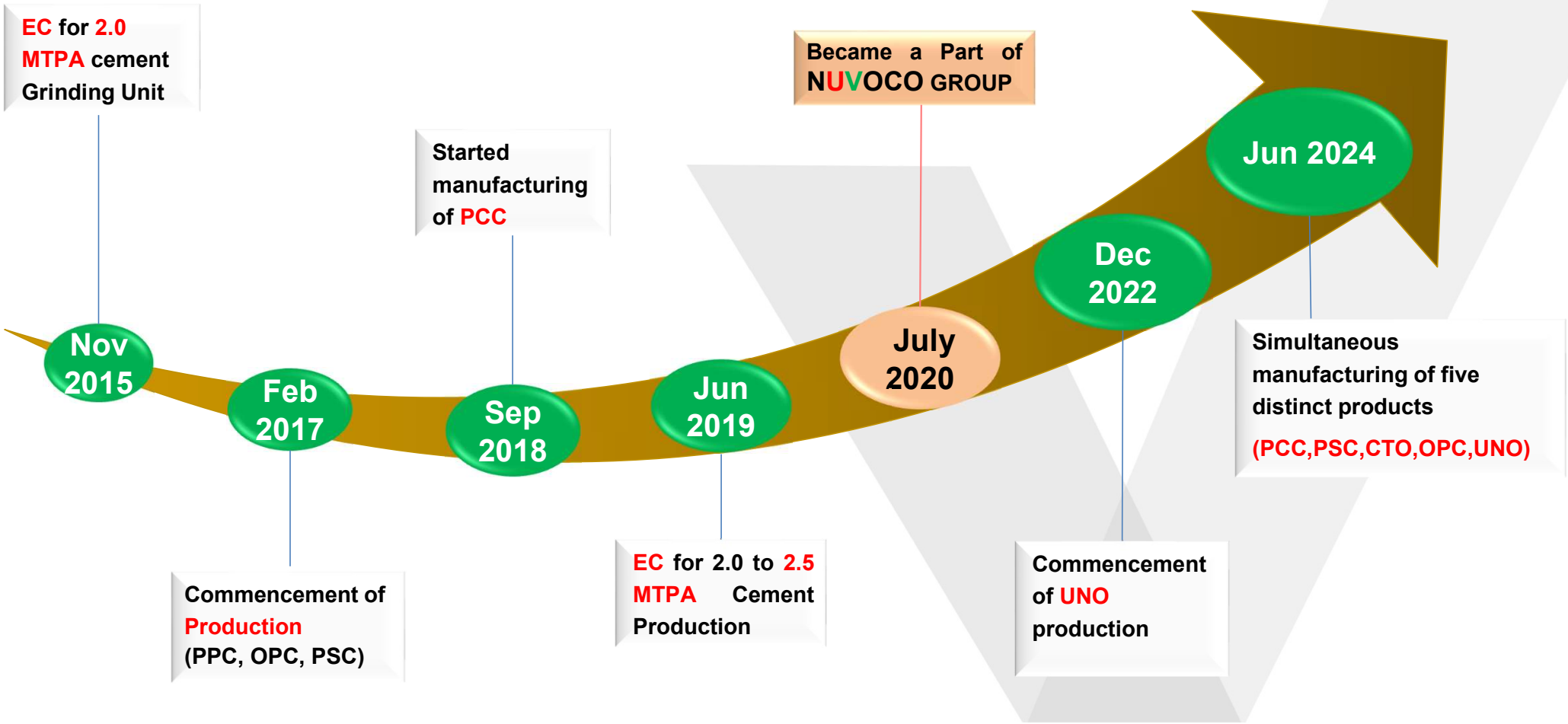
Presenting Team: R. Anantha Nagesh (HOD Production) - 9748972119
Krishnadev Shukla (Process Engineer) - 8770913506

Panagarh Cement Plant - Overview



- NU VISTA LIMITED, Unit-Panagarh is the new state-of-the-art cement manufacturing plant
- The cement manufacturing plant at Panagarh is equipped with cutting edge technologies have been established in collaboration with specialists FLS VENTOMATIC & GEBR Pfeiffer (Germany)
- Commercial Production started in 2017
- We have been granted license to produce OPC43, PSC, PPC, PCC
- The basic Raw Material of Cement is Clinker, Gypsum, Slag, Flyash, etc.

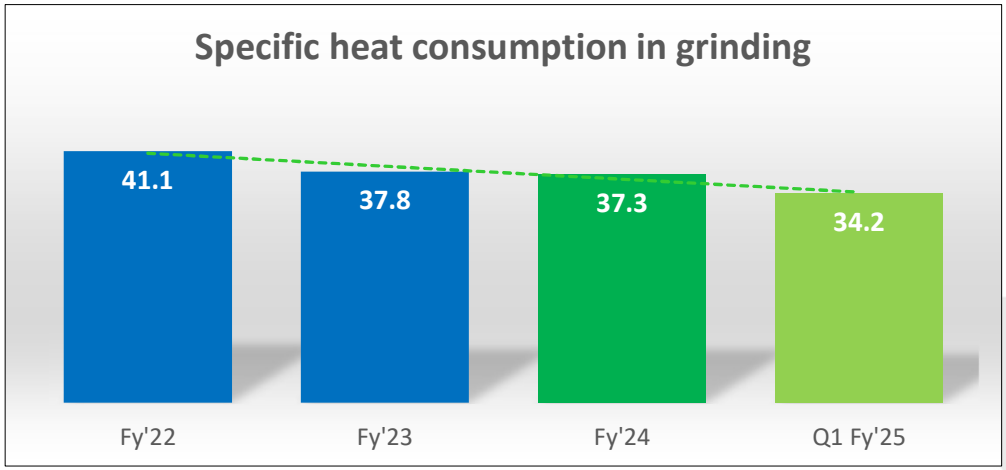
Plant Evolution

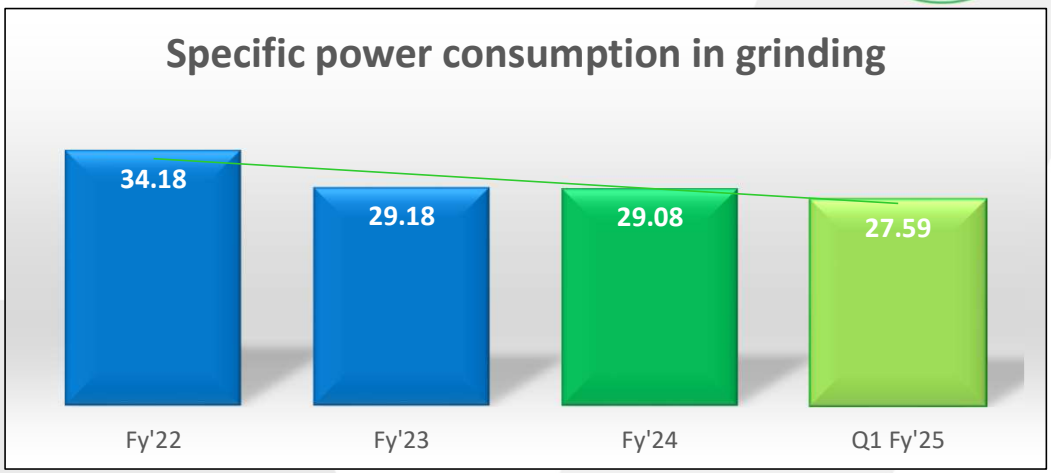


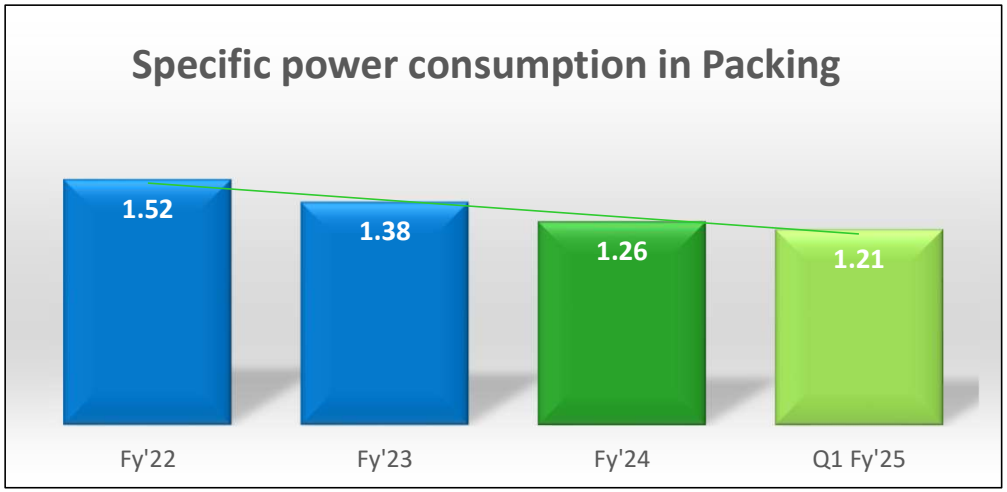
Major Equipments

Equipment	Packer
Make	FLS
Rated Capacity	240
Operating Rate	180

Specific Energy Consumption



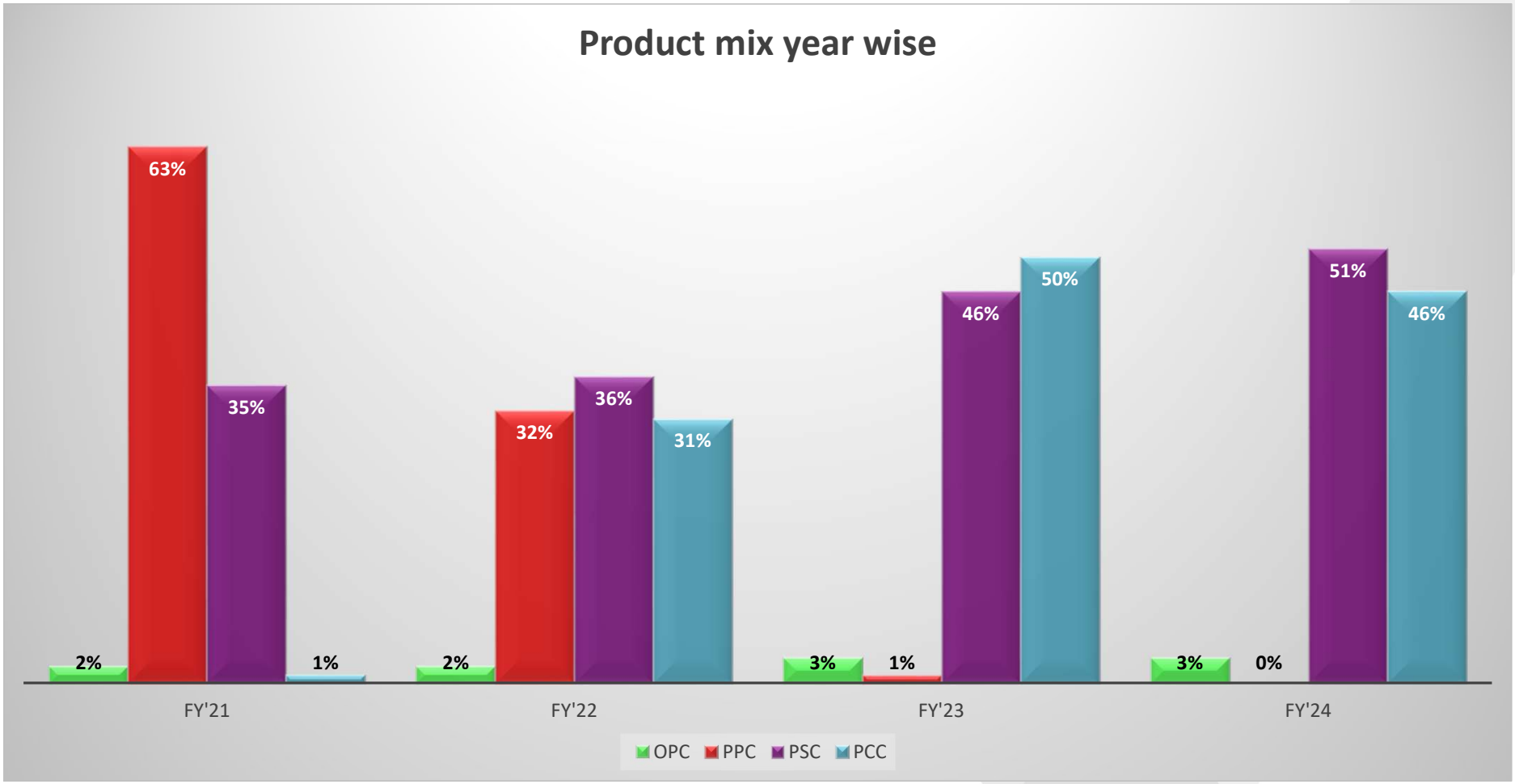




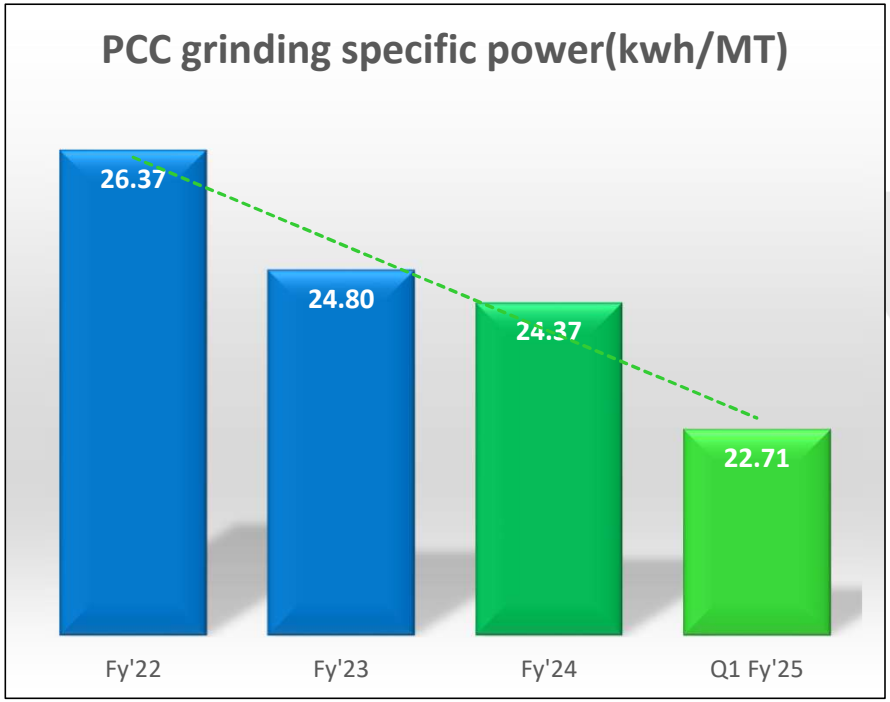
Key action for improvements of SPC and SHC

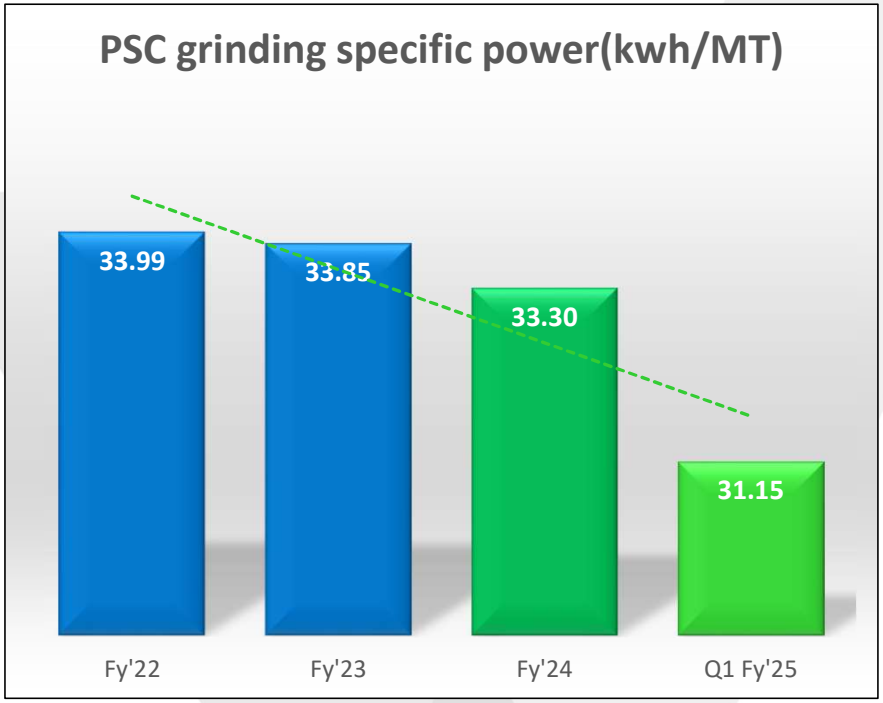
1. Reduction of false air from 13.5% to 11.4% through in-house modification of the roller seal area.
2. Optimization of nozzle ring velocity from 42 m/s to 38 m/s to reduce pressure drop across the mill.
3. Enhancement of bag filter efficiency through VVVFD installation in 5 units of bag filters.
4. Reduction of RMH power by 10% through the study of idle power and improved sequential logic.
5. Software upgraded in Packer for online calibration and preventing start stop of packer drive.
6. Water consumption in PCC reduced by optimized fan flow and nozzle ring velocity.
7. Mill reject circuit modified to stop one feed RAL to reduce false air .
8. Water less grinding of PSC by optimizing damring height , nozzle velocity and mill feed diverter timing.

Product Mix with year wise Production

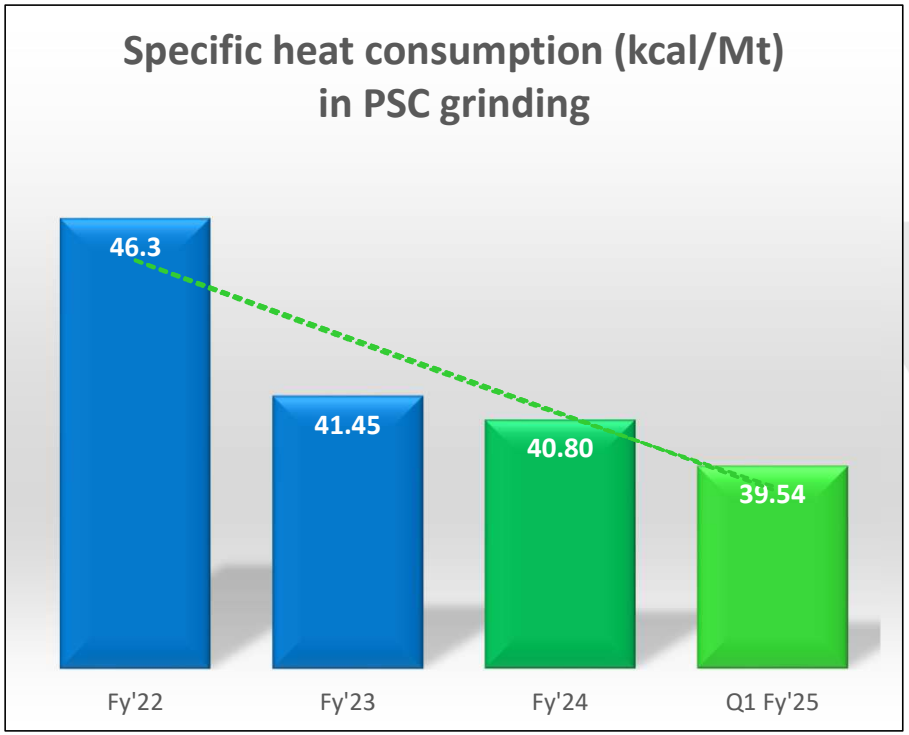


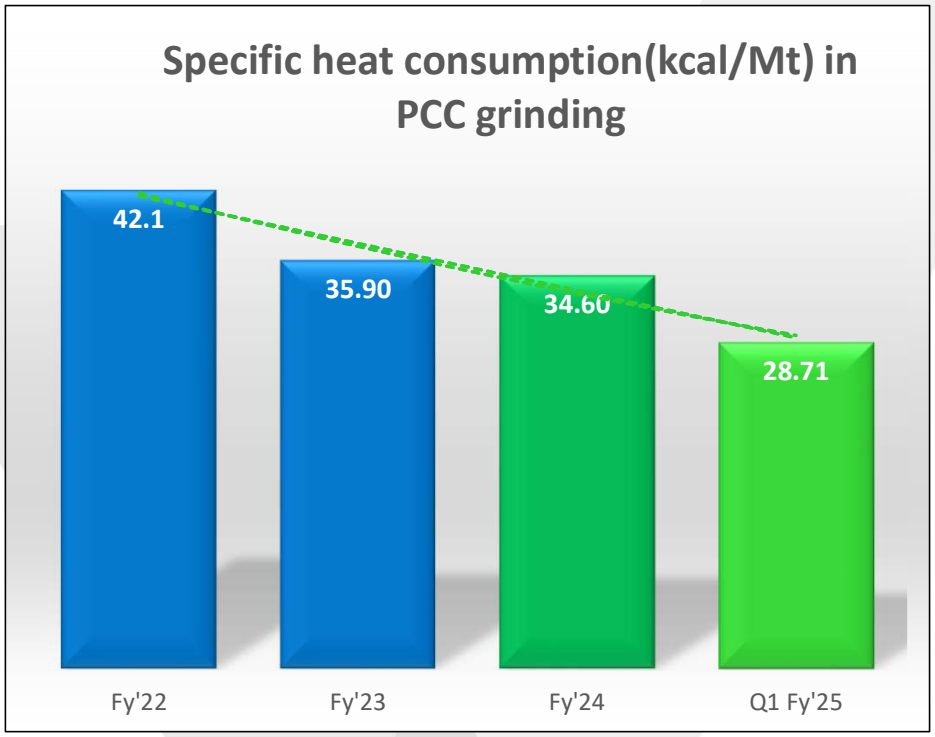
Product wise Power Consumption





Product wise Thermal Energy Consumption





External Benchmarking of Power

Product	UoM	Plant1	Plant2	Plant3	Plant4	Plant5	Plant6	Plant7	Plant8	Plant9	PCP
PSC	kWh/MT	-	32.60		35.80						33.30
PCC	kWh/MT	28.5		29.4	29.5		25.1	39.3		29.6	24.37

Our energy-saving initiative focuses on optimizing fan power consumption and improving efficiency through several strategic modifications, targeting substantial energy savings in line with national and international benchmarks.

Key Strategies and Savings:

Fan Power Optimization:

✓ MV-VFD Implementation: Replacing GRR control with MV-VFD.

✓ Fan Inlet Box Modification: Reducing pressure loss.

✓ Process Optimization

Expected Savings: 20 million kWh annually

High-Pressure Compressor Replacement:

✓ Fly Ash Unloading: Switching to low pressure compressors.

✓ Expected Savings: 9 million kWh annually

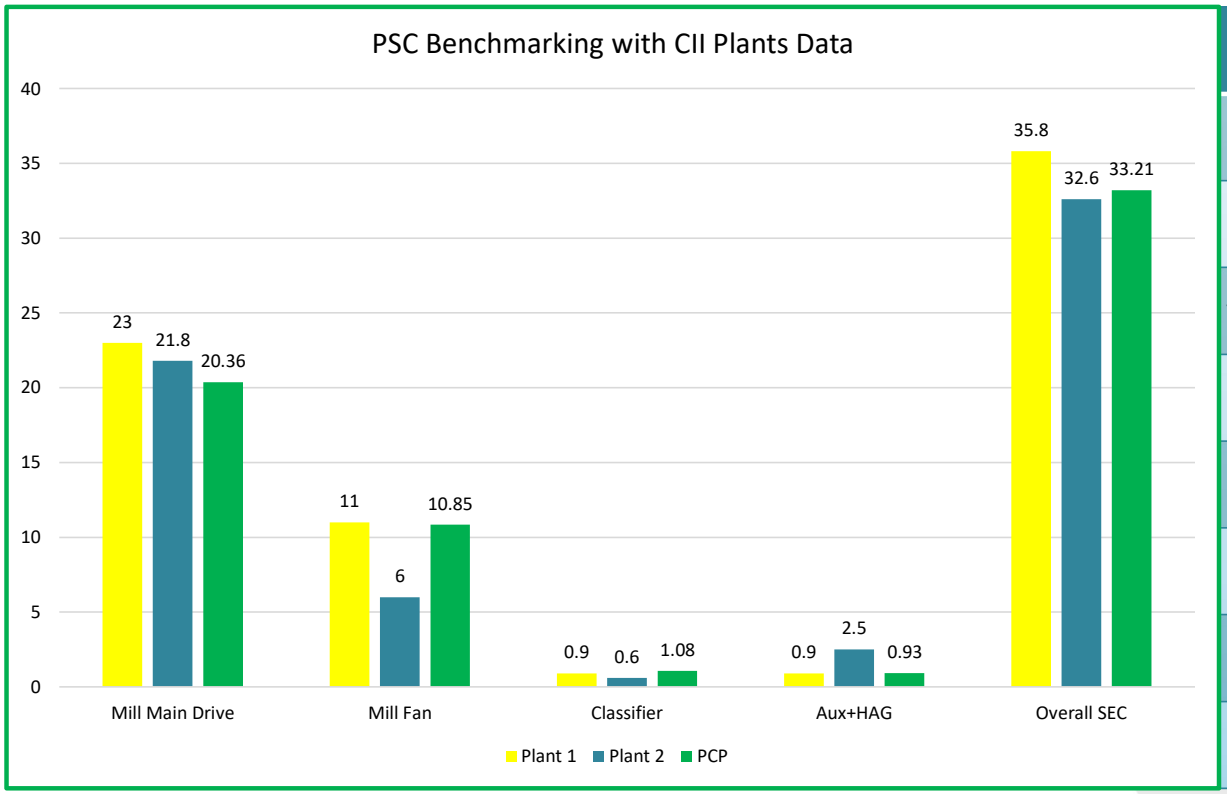
Reduction of False Air:

✓ Reducing false air from 12% to 8%.

Total Energy Savings:

These measures aim to save over 60 million kWh annually, reducing energy consumption by 2.3 kWh per metric ton of cement grinding. This aligns with our commitment to sustainability and setting industry benchmarks for energy efficiency

PSC Bench Marking



	CII plant 1	CII plant 2	PCP
Make	Loesche	Pfeiffer	Pfeiffer
Model	LM 53.3+3s	MVR 6000 C6	MVR 6000 C6
Table dia (mm)	5300	6000	6000
Fan control	VFD	GRR	GRR
Design TPH	150	250	250
Operating TPH	170	260	281
Blaine (m2/kg)	368	390	364
Slag content	62	67%	61%

Remarks –

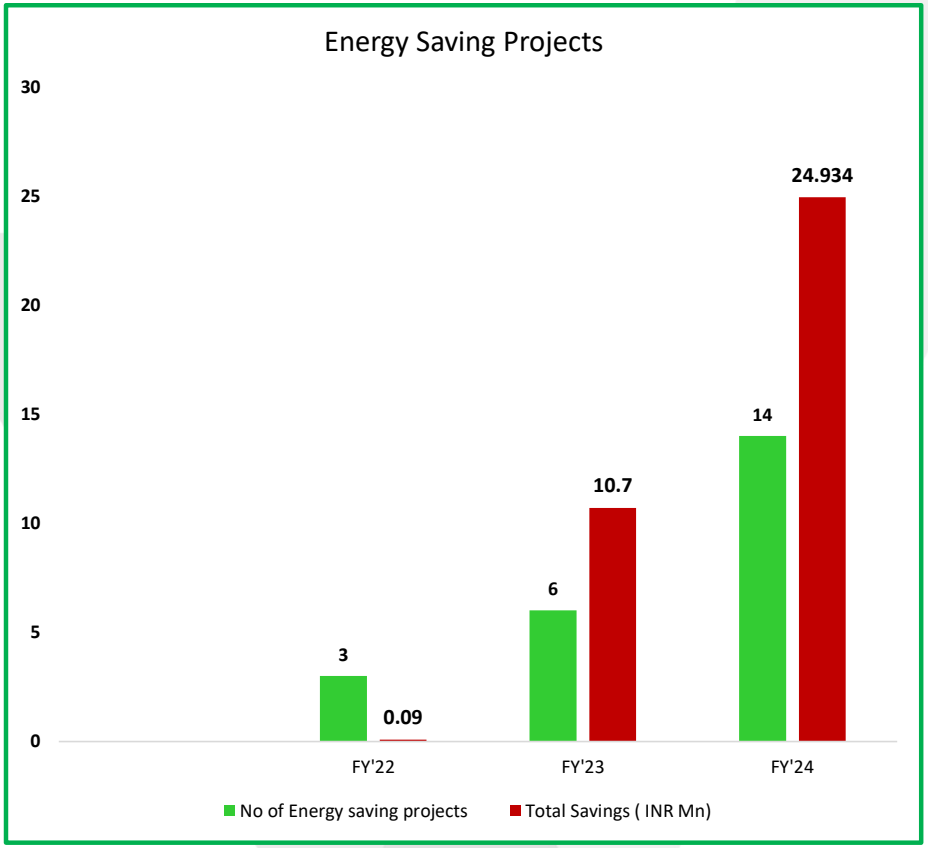
- **PCP NVL is next to the Bench marked plant in PSC grinding and prepared strategies to best in industry.**

Energy Saving projects Planned for FY'25

Title of Project	Annual Electrical Saving (MN kWh)	Annual Thermal Saving (MN kCal)	Investment (MN ₹)	Estimated Payback Period (months)	Comment
MV-VFD installation in place of GRR control	1.67	0	10	13	MV-VFD installation will enable the removal of the fan inlet damper and fan inlet box area modification to reduce pressure drop from the fan inlet.
Reduction of water consumption in cement grinding by 1 ltr/mt	3.5	129	2.5	6	Innovative water nozzles will be installed to improve water spray in the grinding table, enhancing grinding efficiency and saving water consumption.
Power savings by replacing low-pressure compressor	8.45	0	6	16	Currently, 160 kW compressors are in use for unloading dry fly ash bulkers. We will replace the 160 kW compressor with a 90 kW low-pressure compressor.
Energy Efficiency Enhancement by Implementing DP Mode Operation of all bag filters	2	0	0.5	6	Switching from timer mode to DP mode for bag filters can save compressor power by reducing unnecessary purging, based on actual pressure needs, enhancing energy efficiency.
Reducing false air in circuit	11.5	9000	2	12	By reducing false air from 12% to 8%, we can save approximately 300 kg of coal per hour, equivalent to 9000 million kcal of thermal energy, and 11.5 million kcal of electrical energy.

Energy Saving projects in 3 years

Year	No of Energy saving projects	Total Savings (Mn ₹)	Electrical savings MkWh	Thermal savings Mkcal	Investment (Mn ₹)
FY'22	3	0.09	0.17	0	0.082
FY'23	6	10.7	2.14	22410	0.193
FY'24	14	24.93	2.91	12799	5.304



Energy Saving Projects in FY'24

Title of Project	Annual Electrical Saving (Mn kWh)	Annual Thermal Saving (Mn kCal)	Investment (Lakhs ₹)	Payback (months)	Comment
100% utilization of low cost indigenous coal in place of imported coal	0.15	1.68	13	4.3	Installation of high pressure PD blower to enhance mixing of coal and air to improve flame momentum and burning efficiency.
Introducing Vibro feeder in slag circuit	0.47	0	11	5.3	By segregating boulders and lumps in slag mill feed rate will increase by 10 tph and hence reduces main drive SPC by 0.24
Reduction of false air across the circuit through innovative solution	1.01	4161	8	0.7	Innovative roller sealing and tiling at bag house inlet duct to reduce false air by 4%, with monthly checks scheduled to control energy losses.
Software upgradation in packer for online spout calibration	0.07	0	0.25	7.5	Software update enables online spout calibration, ensuring continuous operation, improved accuracy, and enhanced customer satisfaction without disrupting dispatch operations.
Installation of bag counter at truck loader	0.03	0	0.2	14.5	Installing a bag counter in the truck loading bay enhances efficiency and saves energy by ensuring precise loading, reducing repeated stops, and minimizing delays.
Energy Optimization via Circuit Modification for Efficiency and Cost Savings	0.59	0	0.5	0.4	20 NO's of drives reduced through circuit modification .
Encoder based program developed for stacker to avoid point stacking	0.1	0	0.05	6	Idle running was resolved by fixing communication issues between the two PLCs.
PID Control Optimization in HAG Coal Firing System	0.05	8545	0.02	0.01	Implementing PID control in our HAG coal firing system has reduced the firing rate by 300 kg per hour, leading to significant fuel cost savings and improved operational efficiency.
Mill Main Drive Overload Protection logic in operation	0.01	30	0	-	This proactive approach maintains the mill within safe load limits, preventing overcurrent and resulting in zero stoppages, thus enhancing the efficiency and reliability of the milling process.
Mill Feed Diverter Optimization for Metal Detection Events	0.01	30	0	-	Optimizing the mill feed diverter by reducing the gate timer from 6 to 3 seconds prevents mill tripping during metal detection, avoiding over 5000 MT of material recirculation annually and enhancing reliability and efficiency.
Smart Access Initiative	0.01	30	0.02	1.9	The Smart Access Initiative boosts operational efficiency by offering QR code access to control drawings on-site, enabling quick fault diagnosis and resolution. This approach significantly reduces Mean Time to Repair (MTTR) and minimizes downtime.
Green Logistics Initiative	-	-	-	-	Shifting 8% of our material transport from roadways to railways has cut CO2 emissions by approximately 69%, highlighting our commitment to sustainability and reducing our environmental footprint.
Power savings through VVVFD drive installation	0.26	0	20	17	VVVFD drives installed in four bag filter to optimize energy consumption in bag filters.

Energy Saving Projects in FY'23

Title of Project	Annual Electrical Saving (Mn kWh)	Annual Thermal Saving (Mn kCal)	Investment (MN ₹)	Payback (months)	Comments
Burner improvement in horizontal HAG	-	-	0.1	0.01	We have improvised flame momentum by increasing burner air. Introduced additional ash chute to reduce ash accumulation in HAG. Provided two pocking holes at 3 o Clock& 9 o Clock positions to dislodge ash. At present we are firing 70% indigenous coal saving Rs 1.5 Crores in FY23.
Elimination of dead stock of material from mill grinding bowl	21.16	10.5	0	10.5	It is observed the mill load has increased due grinding bowl was filled with fine material . The same is evacuated and table plates are strengthened by wear resistant plate. Bimonthly cross functional inspection and correction is put in place.
345 Nos of 70 W MH lights replaced with 40 W LED lights	0.04	0.19	0.621	0.193	
VVVFD installation for packing bag filter	0.06	0.34	0.53	0.337	Venting volume reduced as suggested by CII Audit team
VVVFD installation in recirculation water pump	0.05	0.26	0.53	0.261	Removed throttle valve in discharge line
VVVFD installation in coal conveying blower to reduce conveying velocity and burner nozzle velocity	0.08	0.4	0.15	35.2	Burner pipe and HAG refractory failure was eliminated after reduction in velocity of coal nozzle .

Energy Saving Projects in FY'22

Name of Energy saving projects	Electrical savings (Mn kWh)	Total Savings (MN ₹)	Investment (MN₹)	Pay Back (Months)
Installation of zero air loss based auto drains for compressed air receivers in place of timer based auto drains	0.04	0.22	0.32	17.8
Installed 94 no's LED lights of 40 W in place of 70 W MH	0.01	0.11	0.5	52.6
Reduction of LT voltage in distribution transformer	0.11	0.54	0	0

Innovative projects

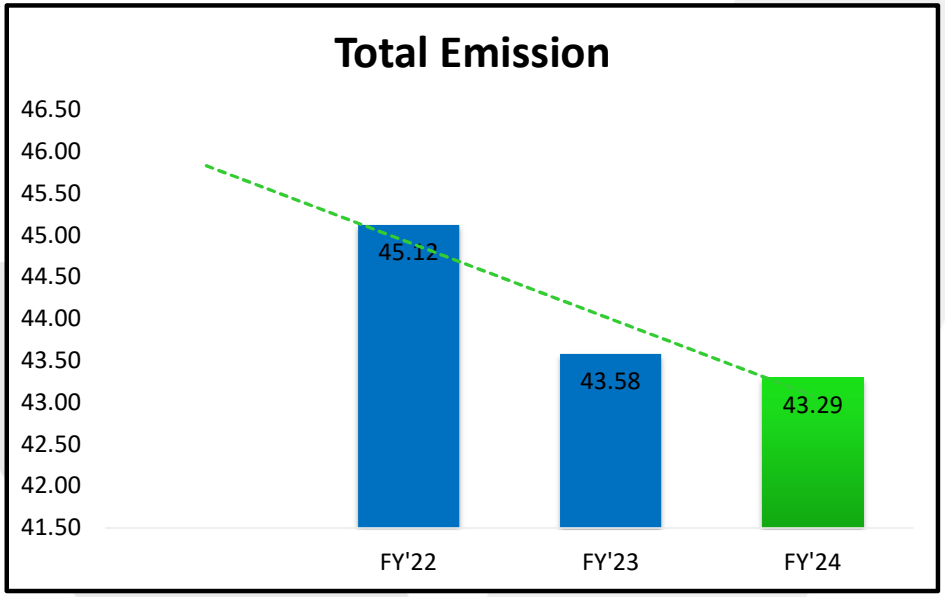
Name of the Project	Brief description on why innovative	Trigger for implementing the project	Select Project category (A/B/C/D)	Replicability	Impact on SEC	Year of Implementation	Annual Savings (lakhs ₹)	Investment (lakhs ₹)
100% utilization of low cost indigenous coal in place of imported coal	The project installs a high-pressure PD blower to resolve inadequate primary air supply, which was causing low flame momentum, slagging, and reduced heat recovery efficiency. This upgrade will optimize air delivery, boost combustion efficiency, and enhance overall energy performance.	The project was triggered by insufficient primary air supply, leading to low flame momentum, increased slagging, and reduced heat recovery efficiency. These issues caused operational inefficiencies and higher energy consumption.	A	Y	1.94 lakhs kwh	2024	137	13
Reduction of false air across the circuit through innovative solution	Our previous brush seals worn out quickly due to rocker arm movement, causing frequent failures. We've now upgraded to a roller sealing system with a fixed plate and flexible seals, reducing sealing area, boosting durability, and improving energy efficiency	The roller sealing upgrade was driven by frequent failures and high costs of the old brush seals. The new system, featuring a fixed plate and flexible shaft seals, reduces sealing area, improves durability, and cuts maintenance costs.	B	Y	10 lakhs kwh saved	2024	58.24	8
Online monitoring of water consumption for entire plant with Cloud based system	Implementing cloud-based online monitoring for water consumption enables real-time tracking and analysis, improving efficiency and resource management.	The need for better oversight and control of water usage prompted the installation of a cloud-based monitoring system.	D	Y	No	2024	-	3

EMS Systems & Other Requirements

Existing energy monitoring system / IOT system	Yes. ISO 50001 accreditation in the process
Level of monitoring	MCC wise energy meters are connected to DCS
Energy Management	Energy Committee of16 members Headed by Plant Head. Action plans are monitored weekly basis.
Frequency of DEA and implementation status of recommendations of last energy audit	CII audit carried out and all feasible recommendations implemented
Learnings from CII energy award or any other award program	SPC reduction of mill fan taken on top priority projects and 1.6 kwh/ T reduced in H1 FY25.
Any Life Cycle Assessment(LCA) conducted	GHG Inventarization & PAT Cycle 6 completed

GHG Inventorisation

Year	Scope 1 Emission	Scope 2 Emission	Scope 3 Emission	Total Emission
FY'22	16.63	28.49	NA	45.12
FY'23	14.97	28.61	NA	43.58
FY'24	14.46	28.83	NA	43.29



GHG Emission Intensity (Kg CO2 / Ton of Product) of peers/competitors (Scope 1+2)
Plant 1 - 69
Plant 2 - 39.8
Nuvoco PCP – **43.29**

Roadmap for GHG reduction

- 5% reduction of Heat consumption by FY'25 over last year
- 5% reduction of Power consumption Optimization in FY'25 over last year
- Exploring feasibility of replacing HAG fuel coal by CBM by Dec'24
- Exploring feasibility of in-house furnace to use bio waste and AFR .
- Implemented 15 no's of Aluminum body cement trucks of 280 dedicated trucks on trial basis
- Increase material transport by rail by 11 % , from existing 69 % to 80 % .
- Increase Solar Energy from 0.035MW to 5.035MW (5 MW Off-site installation)
- Study and optimize vehicular movement in side plant for diesel consumption reduction
- Migrate to EVs for company passenger vehicles fleet FY'25
- Review car loan policy for employees : Electric Vehicles only
- 10,000 Tree plantation in FY'25

Digitally Enabled Nuvoco

- Mill Planetary gearbox online condition monitoring with OEM Flender Germany
- "Site Connect App" for Plant Engineers for real time update on critical parameters
- Spectrum analysis of critical equipments' Health in DCS for quick decisions
- QR code based equipment history cards accessible with mobile
- Autonomous Maintenance/ walk by inspection observations logging through mobile in One drive
- Nuvo Nirman interactive App for customer for " Building Needs"
- Auto Plant- Cement Truck management by RFID based paperless transaction
- GPS based truck management for reduction of TAT till customer end
- Vendor & Dealer portal/ App for transparency and better service
- Digital Nuvoco University for nurturing Talent

Utilisation of Renewable Energy sources

Technology	Year	Installed capacity (in MW)	Consumption (in Million kWh)	% Utilization
SOLAR	2021-22	0.03591	0.0429	100
SOLAR	2022-23	0.03591	0.0451	100
SOLAR	2023-24	0.03591	0.0351	100

Road map :

1. Additional 5 MW Solar plant will be installed in FY'25
2. Location of Solar project has been finalized and vendor visited the designated place.
3. Detailed project report preparation is under process.

Success Story – Simultaneous dispatch of 5 products

❑ ***Background:***

- For CTO UNO dispatches, we need to empty out Silo no 2 for transferring material stored in Silo 6, as Silo 6 is not having any connectivity to any of the 4 packers.

❑ ***Challenges Faced:***

- Addl product dispatch requires 0.5 SPC (250kw) for block period
- Blocking of silos with 4 products

❑ ***Modification done :***

- Connect 612BE1 discharge Air Slide & Packer 2 Air Slides directly through 20 mtr vertical & 13 mtr inclined pipeline.
- Installed 3 way diverter at Air Slide.

❑ ***Benefits:***

- Through in house modification CTO UNO can dispatch directly from Silo 6 (Total cost of this project was 2.3 lacs. Earlier M/S Holtech was proposed a project for the same of budget 2.16 cr)

2. Horizontal HAG Efficiency Improvement

- ***Background:***
  - High SHC due to inefficient combustion & ash accumulation in HAG
- ***Challenges Faced:***
  - Improper burning of coal due to insufficient flame momentum.
  - Blockage of HAG outlet with ash at HAG outlet
  - Fusion of ash in HAG
- ***Modification done :***
  - Installed a high-pressure blower for combustion air, resulting in better mixing and improved combustion.
  - Additional Ash discharge Flap installed at low pressure zone to evacuate ash accumulation.
  - Poking Holes made at both side of HAG at 3 O'clock & 9 O'clock positions to dislodge ash.
  - Air blasters installed at HAG outlet to dislodge ash from outlet.
- ***Benefits:***
  - Increased indigenous coal usage from 3% to 49% in FY'23, **increased up to 80% in FY 24** & **currently running with 100%** indigenous Coal
  - Reduction **in SHC from 37.8 in FY'23 to 37.3 FY'24 - in spite of 5% increase in PSC volume**

Rain Water Harvesting & STP

- Developed Rain water harvesting facility with potential of 3000 m^3 inside Plant to collect roof top water
- Water from rain water harvesting pond used for Process & fire fighting purpose

- Domestic waste water from Truck parking yard treated at Sewage Treatment Plant
- Treated water from STP used for Greenbelt & Horticulture purpose

Rainwater Harvesting System	Capacity (KL)
RWH Pond	3,150

Domestic Waste water Treatment	Capacity (KLD)
Sewage Treatment Plant	25

Greenbelt at Plant Area

Bio Diversity at Plant

Awareness & Brainstorming

Awards


CII
NATIONAL AWARD FOR EXCELLENCE IN ENERGY MANAGEMENT 2023
EXCELLENT ENERGY EFFICIENT UNIT
AWARDED TO
NU VISTA LIMITED
PANAGARH


National Award for 2023
Excellent Energy Effic
CEMENT GRIND
Nu Vista Limited, P


Greentech Foundation
Environment AWARD 2023
WINNER
NU VISTA LTD.
PANAGARH CEMENT PLANT
PANAGARH, WEST BENGAL
CATEGORY: ENVIRONMENTAL EXCELLENCE


23rd Annual
Greentech Environment AWARD 2023
Certificate
This is to certify that
NU VISTA LTD.
PANAGARH CEMENT PLANT
PANAGARH, WEST BENGAL
has been declared
WINNER
for outstanding Achievements in
ENVIRONMENTAL EXCELLENCE
Greentech Foundation
Partners in your Pride & Prestige
K. Sharan
Chairman & CEO
23rd Nov 2023
Sonmarg (J&K)

Certification & Accreditations

TÜV NORD

CERTIFICATE

Management system as per
ISO 9001 : 2015

The Certification Body TÜV NORD CERT GmbH hereby confirms as a result of the audit, assessment and certification decision according to ISO/IEC 17021-1:2015, that the organization

NU VISTA LIMITED
Plot No.B5 A, B6 & B8, Panagarh Industrial Park of WBIDC, Block - Aushgram : II, Village Kota, Dist. Purba Bardhaman, Panagarh - 713 148, West Bengal, India

operates a management system in accordance with the requirements of ISO 9001:2015 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope -

Manufacture and Dispatch of Cement.

Certificate Registration No.44 100 18391974
Audit Report No.2.5-8647/2018

Valid from 05.01.2022
Valid until 13.10.2024
Initial certification 14.10.2018

Certification Body
at TÜV NORD CERT GmbH

Mumbai, 05.01.2022

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

TUV India Pvt. Ltd., 801, Raheja Plaza – 1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086, India www.tuv-nord.com/in

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TUV India Pvt. Ltd., 801, Raheja Plaza – 1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086, India www.tuv-nord.com/in

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operates a management system in accordance with the requirements of ISO 45001:2018 and will be assessed for conformity within the 3 year term of validity of the certificate.

Scope -

Manufacture and Dispatch of Cement.

Certificate Registration No. 44 126 22393440
Audit Report No. 2.5-8647/2018

Valid from 05.01.2022
Valid until 13.10.2024
Initial certification 2022

Certification Body
at TÜV NORD CERT GmbH

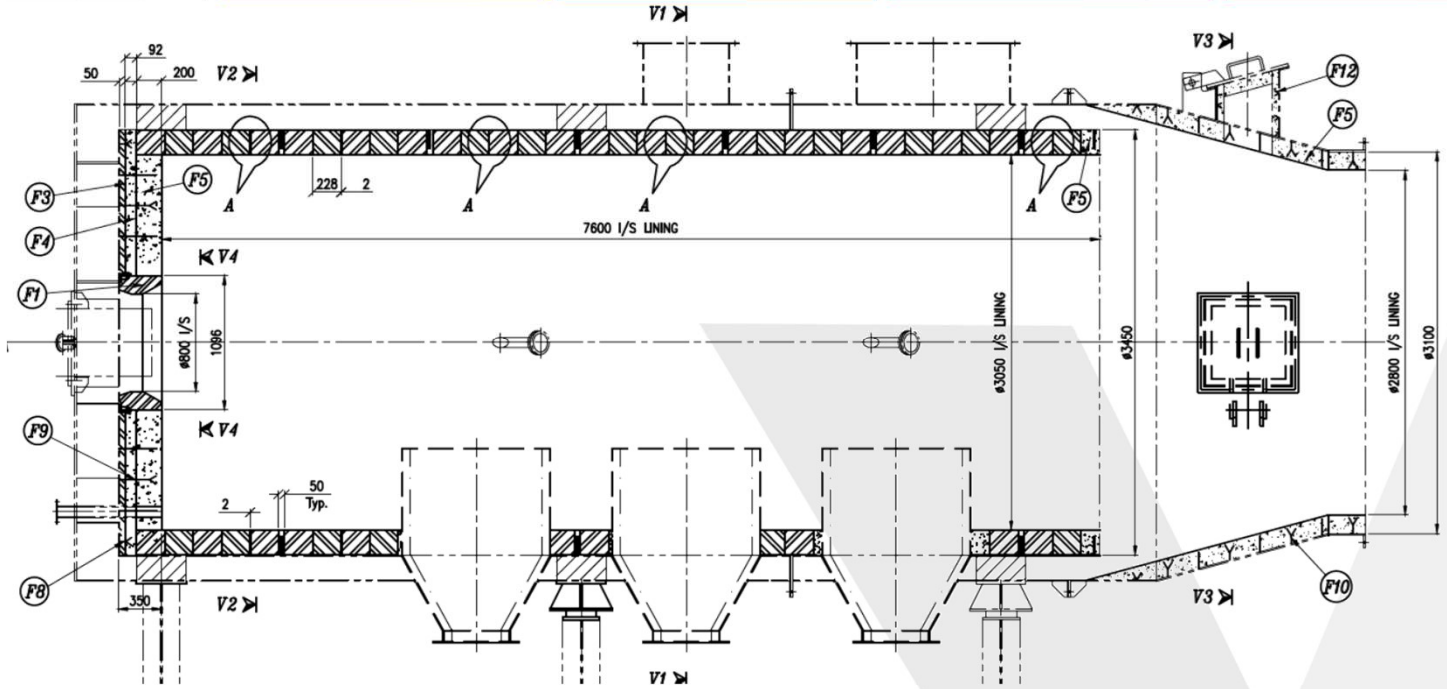
Mumbai, 05.01.2022

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

TUV India Pvt. Ltd., 801, Raheja Plaza – 1, L.B.S. Marg, Ghatkopar (W), Mumbai - 400 086, India www.tuv-nord.com/in

THANK YOU

HAG Modifications for Energy Efficiency



Sl No.	Modification	Reason	Year
1	HAG burning zone bricks changed with ISO alumina bricks 60% in place of ISO alumina 40%	To enhance refractory life	2019
3	FO was replaced with diesel for pilot ignition	Recommended by OEM in 2018 for hag jamming problem	2019
4	Mix use of imported & Indian coal starts @ 1: 1 ratio	To reduce fuel cost	2022
5	VVFD installed in coal firing PD blower	To optimize coal conveying velocity	2022
6	Installation of separate PD blower for HAG burner	Air shortage in burner was identified	2024