ADITYA BIRLA

UltraTech

UltraTech Cement Limited

Unit : Aditya Cement Works

Energy & Carbon Efficiency

Milestones Achieved

- First ISO:50001:2018 certified unit among the ABG cement units
- PAT cycle DC registration & Compliance (0.087 TOE/Ton)
- Combined Clinker SPC 55.63 kWh/MT Clinker in YTD FY23
- Combined Clinker SHC 706 kcal/kg Clk in YTD FY23
- TPP APC 7.13% in YTD FY23
- WHRS Specific Generation 18.9 kWh/ MT Clk

Electrical Energy Sources for Plant Operations

Plant Facility Including Grid import & DG

Sr No	Energy source	Capacity
1	Grid	40 MVA
2	TPP-1	23 MW
3	TPP-2	25 MW
4	TPP-3	25 MW
5	WHRS	16.05 MW
6	Solar plant at Mines	8.0 MW
7	Solar plant at colony	0.1 MW
8	DG Set	12 MW

System Certificate, Unit Energy & IMS Policy

DNV

MANAGEMENT SYSTEM CERTIFICATE

UltraTech Cement Limited (Unit : Aditya Cement Works)

ISO 50001:2018

Manufacture & Dispatch of Cement

ISO 50001:2018 Certificate

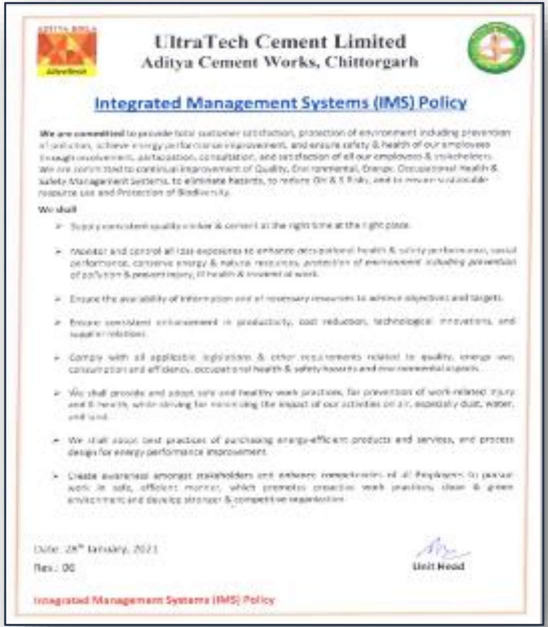
ADITYA BIRLA

UltraTech

Energy Policy

Unit Head

Energy Policy



UltraTech Cement Limited

Aditya Cement Works, Chittorgarh

Integrated Management Systems (IMS) Policy

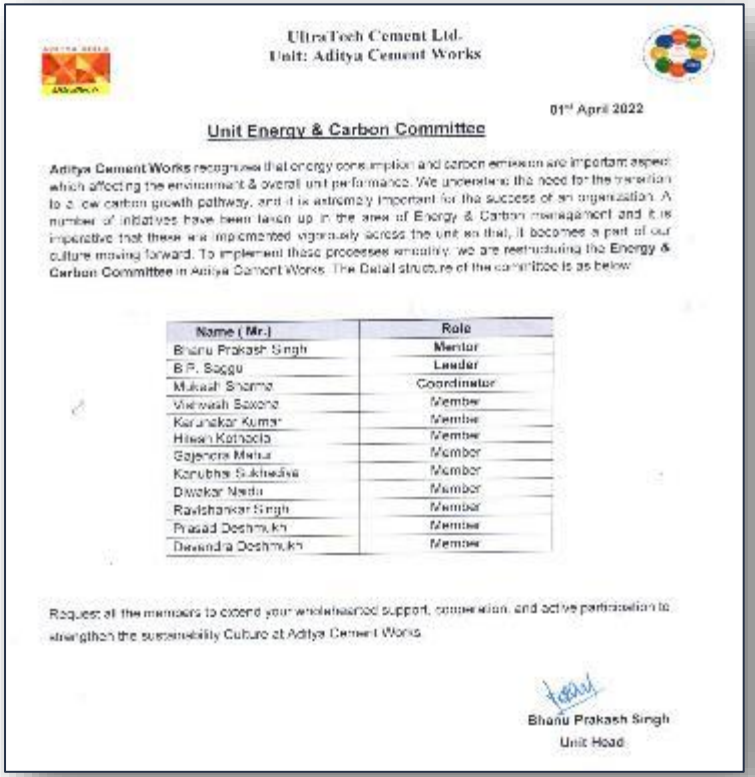
We shall

Unit Head

Integrated Management Systems (IMS) Policy

IMS Policy

Energy & Carbon Committee



UltraTech Cement Ltd.
Unit: Aditya Cement Works

01st April 2022

Unit Energy & Carbon Committee

Aditya Cement Works recognizes that energy consumption and carbon emission are important aspect which affecting the environment & overall unit performance. We understand the need for the transition to a low carbon growth pathway, and it is extremely important for the success of an organization. A number of initiatives have been taken up in the area of Energy & Carbon management and it is imperative that these are implemented vigorously across the unit so that, it becomes a part of our culture moving forward. To implement these processes smoothly, we are restructuring the Energy & Carbon Committee in Aditya Cement Works. The Detail structure of the committee is as below:

Name (Mr.)	Role
Bhanu Prakash Singh	Mentor
B.P. Saggu	Leader
Mukesh Sharma	Coordinator
Vishwash Saxena	Member
Karunakar Kumar	Member
Hiren Kothadia	Member
Gajendra Mehta	Member
Karubhai Sukhadia	Member
Diwakar Nadu	Member
Ravishankar Singh	Member
Prasad Deshmukh	Member
Devendra Deshmukh	Member

Request all the members to extend your wholehearted support, cooperation, and active participation to strengthen the sustainability Culture at Aditya Cement Works.

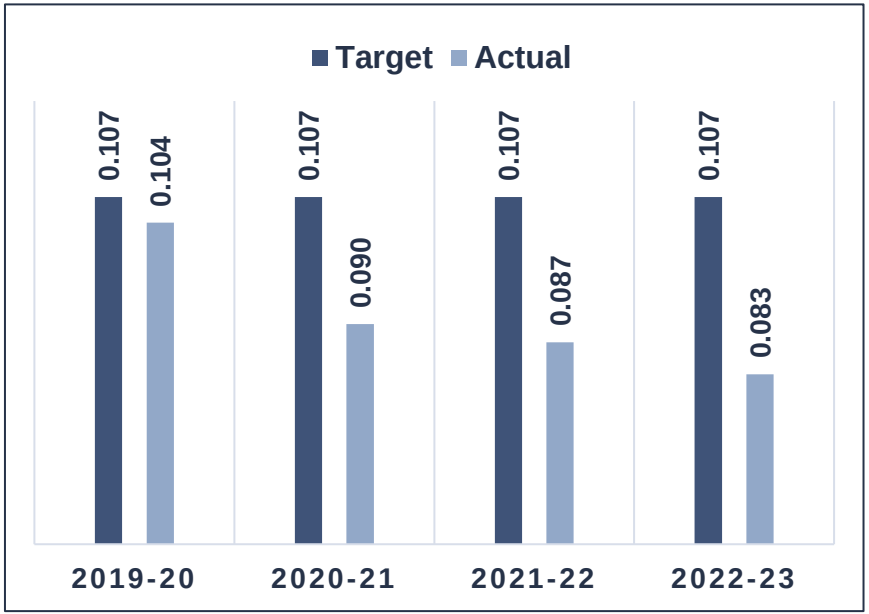
Bhanu Prakash Singh
Unit Head

Focus Area

- ❑ To institutionalize a Energy Saving culture through involvement of employee at all levels.
- ❑ To review the Energy performance of the unit as per sustainability management frame work.
- ❑ To identify equipment with scope for improvements
- ❑ To identify innovative projects for Energy conservation
- ❑ Collection of Energy Consumption & Benchmarking data
- ❑ To support the implementation of Best practices for Energy saving

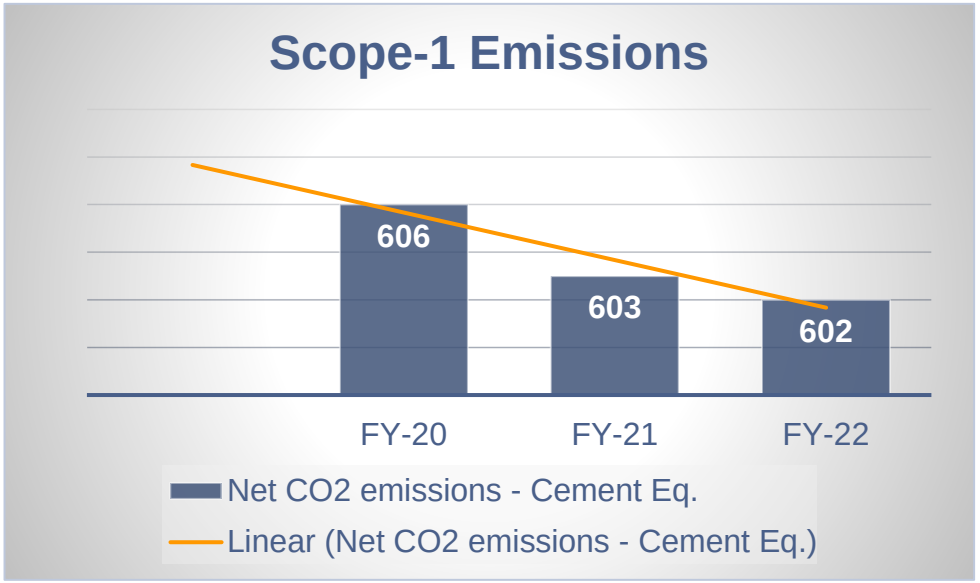
PAT Cycle result Summary-Aditya Cement

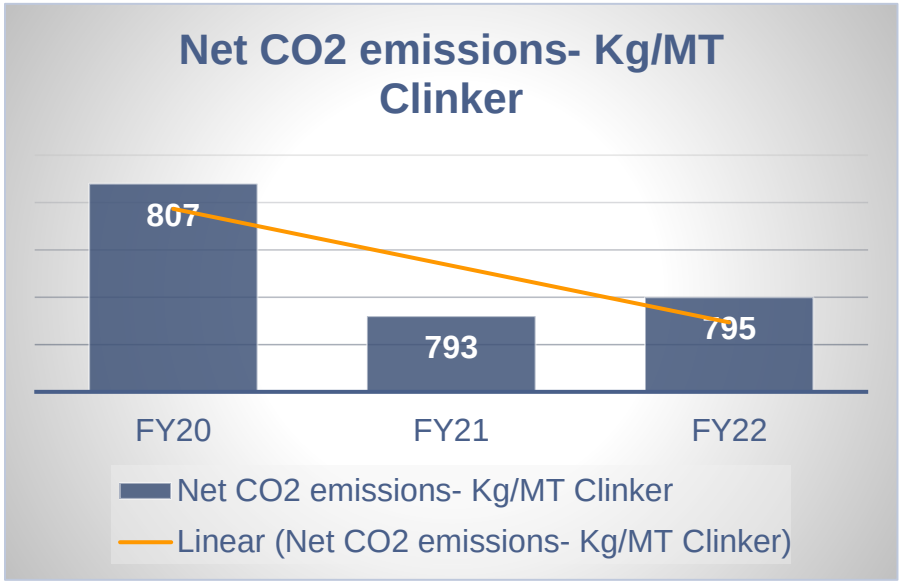
Baseline (2018-19)	TOE/Tonne	0.1070
Major Cement Product in baseline	Cement Grade	PPC
Target (PAT Cycle-VII)	TOE/Tonne	0.1027
Achieved(Without normalization) AY22	TOE/Tonne	0.0862
Achieved(With normalization) AY22	TOE/Tonne	0.0873
Baseline Production (2018-19)	MT	66.77
Expected Production (2022-23)	MT	73.79



Gate to Gate Specific energy consumption in TOE/Ton

Direct Emissions: Scope-1





- Scope-1 emissions impacted by less market demand for blended cements in Cluster
- PPC grinding stood at 40.63% in FY22 against 48.13% in FY21

Best Practices- Energy Conservation

Raw Meal grinding SPC reduction

Theme

Raw mills SPC reduction through in-house modifications & optimization

Problem

High Raw grinding SPC leading to high Up-to Clinker Power consumption

Solution

Brainstorming with cross functional teams & learning from peer units

RM-1 grit cone and table gap reduction by 250 mm

RM-3 water spray bridge pipe height from table reduced from 400 mm to 300 mm

Separator front seal gap reduction by felt material insertion in RM- 2 & 3

RM-2 & 3 Cone stump dead material inspection and removal

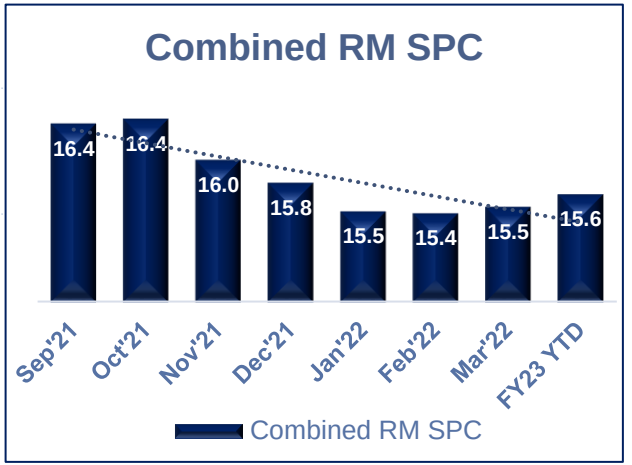
Rm-2 Gap reduction between support ring & roller (from 40 mm to 27 mm avg)

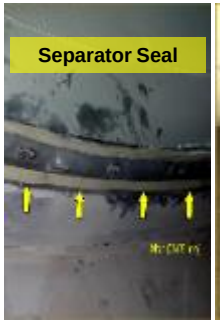
Raw Mill-2 Recirculation ID fans Cone gap & Overlap gap checking and correction/ repair jobs

Benefit

Mill SPC/MT Mat	Oct '21	Q4 FY22
RM-1	17.29	16.89
RM-2	16.05	15.17
RM-3	16.17	14.89
Combined	16.42	15.46

Achieved Savings of ~ Rs. 145.16 Lacs due to SPC reduction in FY22 Q4





Kiln-3 SPC reduction

Theme

To improve L-3 kiln productivity to achieve SPC & Reliability KPI's

Problem

Feed pipe jamming issues at higher output (>6700 TPD) & AFR usage >3%

Solution

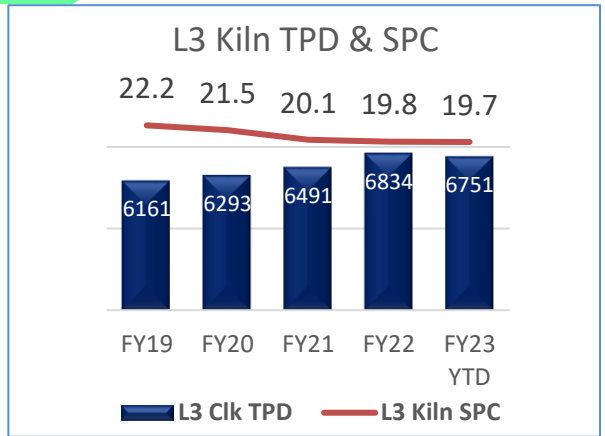
CFD study conducted to arrive at AFR feed chute modifications

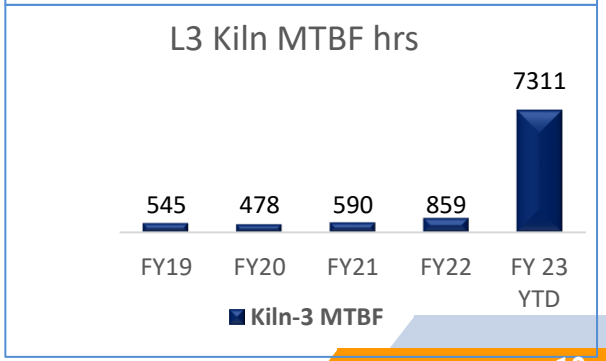
Bottom Cyclone feed pipe dia. Increased from 800 to 1030 mm to avoid cyclone jamming

Plotting Hot meal Volatiles concentration on visual template for easy comprehension of encrustation tendency

Benefit

- Kiln-3 MTBF improved from 590 to 7311hrs
- Achieved Continuous kiln run of 258 days in FY23
- SPC improved from 20.1 to 19.7 kWh/MT Clk
- Kiln-3 output rate improved from 6491 TPD in FY21 to 6834 in FY22
- Benefits of ~Rs. 36.38 Lacs on account of SPC reduction in FY22





WHRS generation enhancement through Digitalization

Theme

Increase in WHRS generation by improving AQC boiler I/L temperature

Problem

- Variation in AQC Inlet temperature resulting in low WHRS generation

Solution

- Cooler Mid-tap temperature vs Cooler fan flow PID controller created
- Cooler Mid-tap temperature increased from 420 to 460 °C
- Fed output of Expert Optimizer as set point to AkxaTech Control Loops, brought both optimizers on single platform

Benefit

- Improvement in AQC Inlet temperature
- Improvement in Sp. WHRS Generation from 16.4 kWh/MT Clk in FY21 to 17.75 in YTD FY22
- Reduced TPP requirement by 96.93 LkWh, leading to **Heat savings worth 30203 Mkcal**

Packing Plant SPC Optimization

Theme

Packing Plant SPC optimization

Problem

High Packing SPC leading to higher manufacturing costs

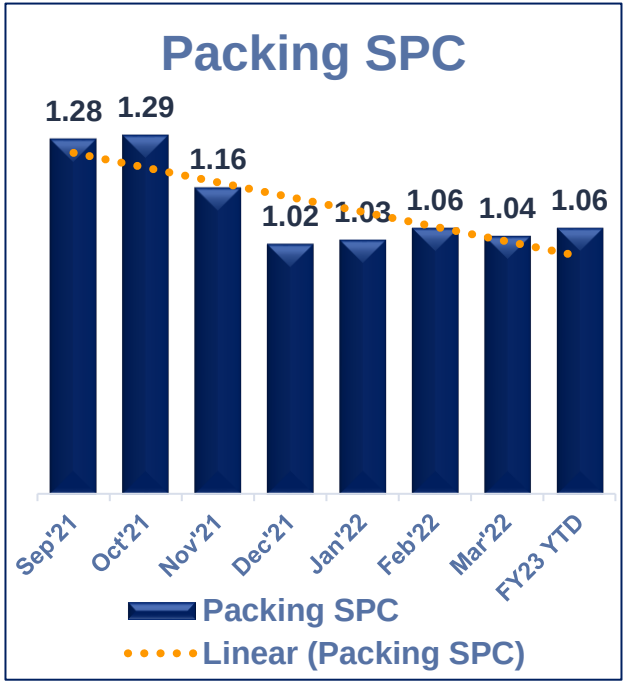
Solution

- 2BC810 & 860 belts removed by providing direct chute to 2TL 806BC & 856BC (7.5 kw)
- L-2 Packers Bag-filter fans RPM reduced from 900 to 800 RPM
- Packing bin aeration pressure reduced from 5.0 to 2.5 kg/cm2
- OPC cement feeding for 2PK803 & 2PK804 through 2BE804 & 2BE803, new air slide provided to stop 2BE804 for OPC43/53 (15 kw)

Benefit

Packing SPC reduced from 1.24 in FY22H1 to 1.04 in Dec'21 to Mar'22 period

- Benefit of ~ Rs. 18.55 Lacs in Dec'21 to Mar'22 period



Reduction in TPP APC

Theme

- Reduction in APC

Problem

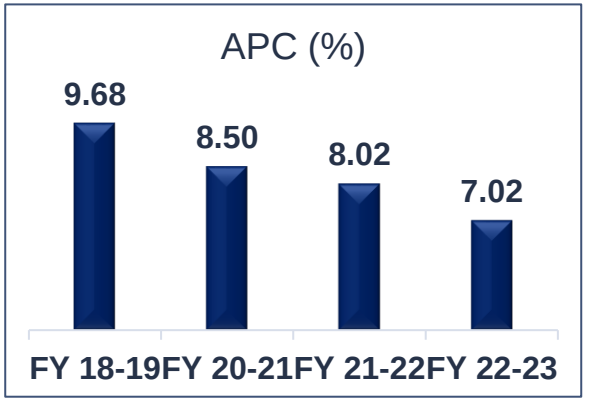
- APC was high as compared to other UTCL units.

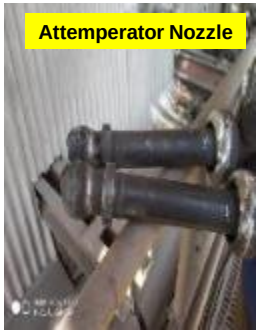
Solution

- Optimized ESP Power Consumption by Auto controlling of SPM Level in TPP-2 Stack.
- Cleaned the ACC fins by high pressure hydro jet
- Operation of BFP with DP based set point (7.0 Kg/cm^2)
- Optimization of furnace draft, maintaining bed height in furnace & running ash handling system in probe mode
- Replaced APH tube bundle
- Removed silencer from PA/SA fan inlet duct
- Modified Boiler 2& 3 attemperation nozzles to increase flow from 5 TPH to 7 TPH.

Benefit

- Reduced APC from 9.88% FY 19 to 8.09% in FY22





Reduction of APC by ACC duct interconnection- Part-1

Theme

Problem

ACC duct interconnection to increase heat transfer area resulting in reduced ACC fan power consumption.

Before Interconnection	After Interconnection
➢ Unavailability of dampers for isolation of running TG. ➢ Unavailability of expansion bellow. ➢ Fouling of flash tank with modified duct.	➢ Improper Steam distribution resulting in poor vacuum ➢ Condensate accumulation in exhaust duct & frequent chocking of pipe line ➢ Running of both units CEP

ACC exhaust duct connected to hot well pump suction

ACC interconnected duct

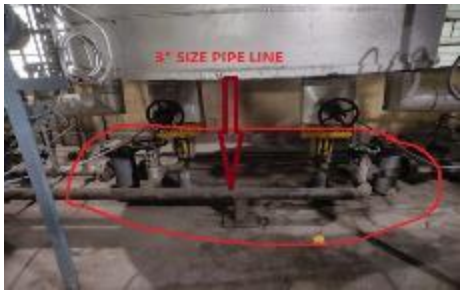
14

Reduction of APC by ACC duct interconnection- Part-2

Solution

As fuel price were hiked & CD was increased from 8 MVA to 40MVA ,our unit TG-2 was idle and got the opportunity to interconnect the ACC duct to increase the heat transfer area which will result in reduced fan power consumption & improved vacuum.

Before Interconnection	After Interconnection
➢ TPP -1 was idle due to obsolete technology so expansion bellow was removed from there and utilized to implement the idea. ➢ Flash tank relocated	➢ ACC exhaust duct drain which was connected to hot well, modified and connected to hot well pump suction. ➢ ACC duct drain pipe line size increased from 1" to 3". ➢ TG-2 and TG-3 ejector condensate line in-house interconnection done.



Benefit

Saved Rs 15 lacs by utilization of expansion bellow of TPP-1.

Saving of ~ 21.86 lacs units/annum & Rs ~ Rs 183.24 Lacs/annum due to improved vacuum and reduced power consumption.

After kaizen of ACC-2 duct drain pipe line connection at TG-3 hot well pump suction & enlarging pipe size from 1'' to 3", condensate line interconnection all the process parameter maintained and all equipment are running in an efficient manner.

Reduction of APC using Fan-less cooling tower

Theme

Technology Upgradation from fanned cooling tower to fan- less cooling Tower

Challenges

1. Line-02 Cooling tower isolation and plant operation with line-01 standby cooling tower.
2. RCC support structure showing aging effects which can lead to problem in lowering lifting of material.

Solution

Replaced conventional cooling tower with fan-less cooling tower

Benefit

- Achieved saving of 152935 Kwh /year
- Saving of ~ 12.81 Lacs Rs./annum
- ROI -1.19 years

Best Practices: WHRS AQC-1 HP line Low temp. steam utilization

Theme

AQC-1 boiler HP line Low temperature steam utilization in LP circuit.

Problem

Loss of steam at low temp (<300°C) during Kiln disturbance as HP line steam could not be utilized & had to be vented off.

Solution

Provided a interconnection with isolation valve to divert the steam from HP line to LP line for utilizing in LP circuit

Benefit

1. Low temp. HP steam utilized and power generation increased
2. Reduced steam venting.
3. Reduced DM water consumption.
4. Boiler connection to header time reduced.

Best Practices: Replacement of Package AC with VAM

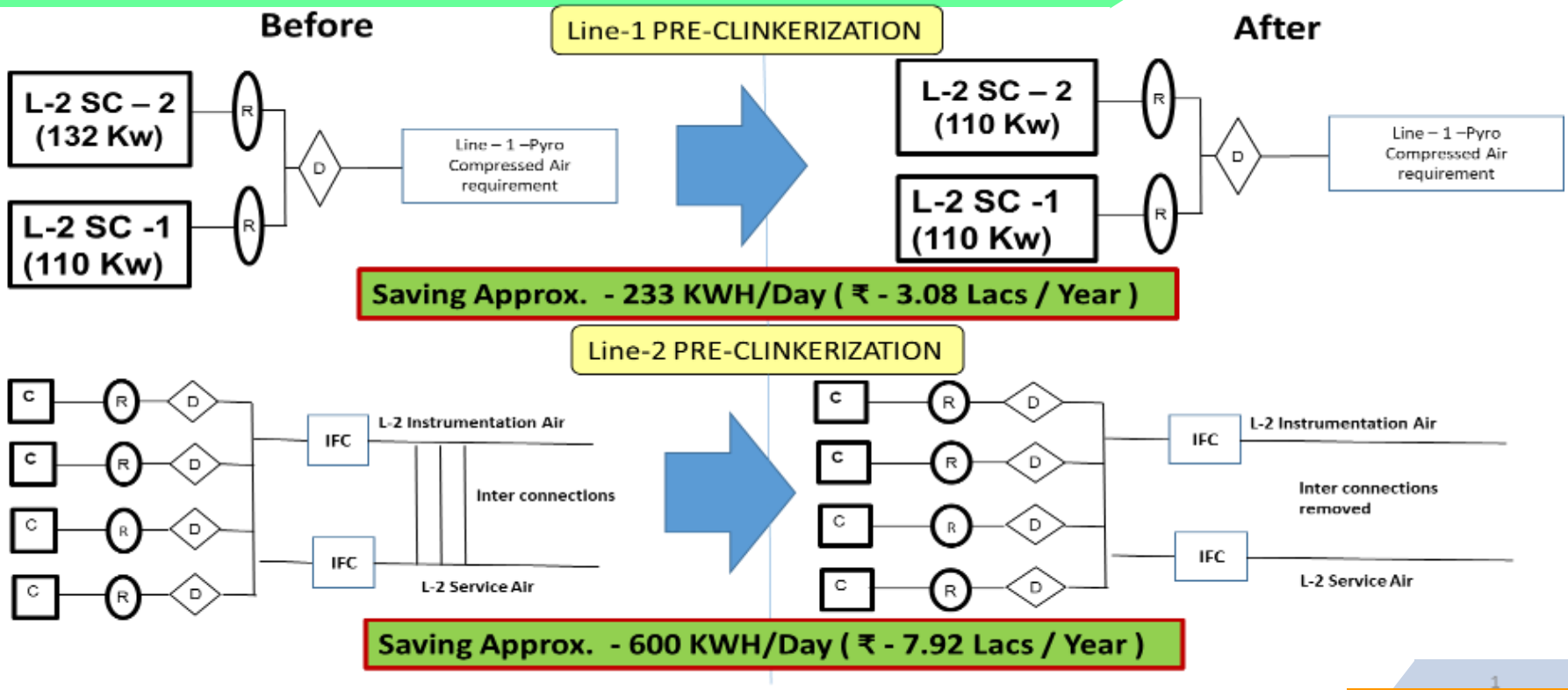
Theme	Replacement of Package AC with VAM (Vapour absorption machine)
Problem	High Power Consumption in Package AC
Solution	Replaced package AC with VAM
Benefit	• Existing AC power consumption : 1800 Kwh/day • Power consumption using VAM: 1144 Kwh / Day • Saving = 656 kwh/day • Annual cost saving ~ 20.0 lacs per annum

VAPOUR ABSORPTION MACHINE

Best Practices: Grid Power Factor improvement

Theme	Grid Power Factor improvement
Challenges	• Low Grid Power factor due to stopping of TPP • Non availability of HT capacitor in plant
Solution	• Installed New 2*2060 KVAR, 11kv Capacitor in LC2
Benefit	• PF improved from 0.96 to 0.98 • Additional loading margin of 1MW • 14 Lacs saving achieved within Two months

Compressed air audit & actions



Low Carbon Initiatives

Scope-1 GHG intensity Action Plan

GHG Credit 1.2

Short Term (1yrs)

- Line-1 WHRS Upgradation from 5.25 MW to 6.46 MW. Line-3 Upgradation from 6.05 MW to 10.92 MW
- Improving TSR % from 6.32% (FY22) to 16% 1st Phase by Oct'23.
- Using Briquettes in TPP boilers as AFR (Green Fuel)- 20% TSR
- 8MW Solar Power panel- Onsite BOT model
- Enhance Fly ash consumption Up-to 34% by using GA
- High Efficiency ID fans installation

2,88,259 T CO2 Reduction

Mid Term (3yrs)

- Improving TSR from 16% to 24%, 2nd phase will be taken in FY24 Capex
- Line-2 WHRS Upgradation from 4.75 MW to 12.02 MW- new PH Boilers
- L-2 Cooler upgrade for SHC reduction by 20kcal/kg Clk
- 5MW Solar Power panel- Onsite BOT model
- Improve Blended Cement share by 2% YOY

96,492 T CO2 Reduction

Long Term (>5yrs)

- Harness Thermal Energy from Electrical RE- Roto Dynamic Heater
- Solar Concentrators for Captive Power Generation
- Carbon sequestration for capture
- New Blended cement Products for reducing Clinker to Cement factor

Future Strategy for Net Zero by 2050

Carbon Offset: WHRS Generation Enhancement

GHG Credit 4.0

Theme

- Enhance WHRS power generation

Problem

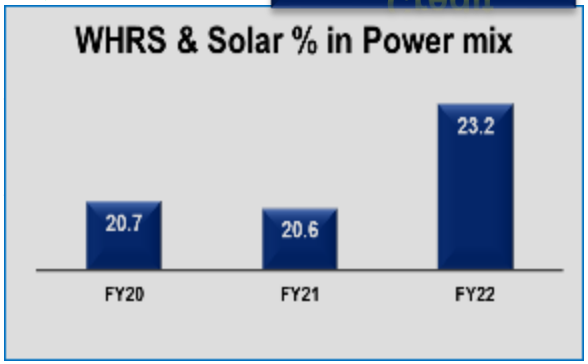
- Operation of AQC Boiler with low Draft.
- Unable to utilize high temperature of flue gas.

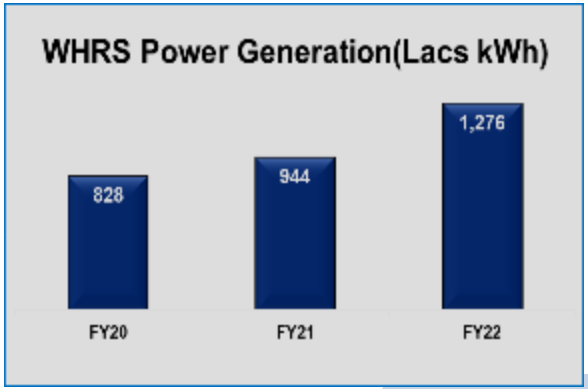
Solution

- Increased DP across the boiler from 80 to 120 mmwc by providing additional sacrificing tubes, erosion protection plate ,applied refractory in erosion prone area.
- In annual shutdown of Boiler, Tube inspection and 100% thickness mapping carried out of all pressure parts & Eroded tubes(Tube less than 80% of design thickness) replaced with higher thickness tube.
- AQC-1 ,2,3 De-super heater replacement with higher capacity from 2.0 TPH to 5.0 TPH
- Boiler inlet flue gas temperature set point increased from 400 ºC to 500 ºC

Benefit

- WHRS Generation increased from 16.05 (design) to 18 MW.
- Sp. Generation increased from 16.90 to 17.75 kWh/MT Clk
- Green Power Mix share increased up-to 23.2%
- Improved Availability of Turbine. Steam losses reduced.





Carbon Offset Achieved- 59295 TCO2 in FY22 compared to FY20

Carbon Offset: Fly Ash enhancement in PPC

GHG Credit 4.0

Theme

- Increase Fly ash Absorption in PPC from 31 to 35% keeping same Cement Strength at 1 day and 28 days.

Problem

- Less FA absorbsion in PPC to maintain overall product strength requirements

Solution

- Lab and Mill scale trails conducted with different formulations and dosages supplied by various vendors, to arrive at best possible results
- Grinding aid B-14 supplied by M/s Indochem proved to be best suited with desired results
- Separate GA preparation and dozing booth installed for Mill scale operations

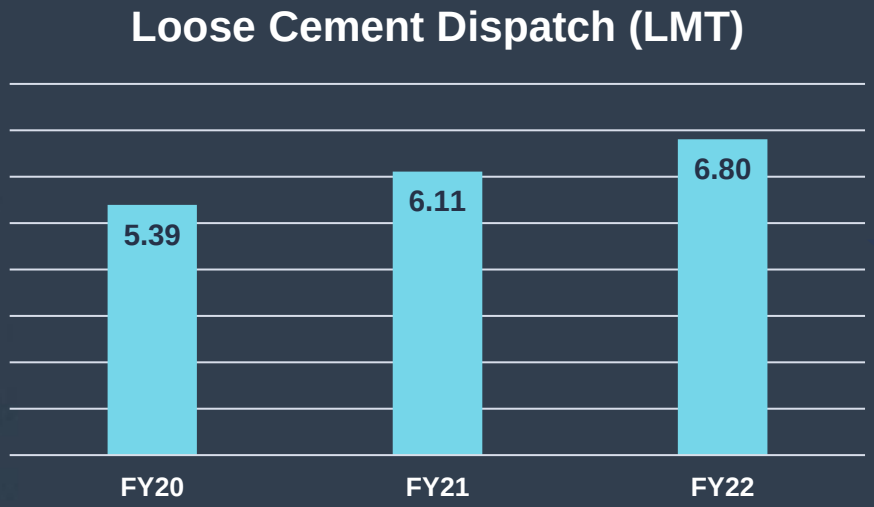
Benefit

- Fly-ash absorption in PPC from 30 to 34% in trials and has contributed to 35% Fly-ash absorption at present
- Effort will result in annualized CO2 emission reduction of ~64895 MT Fly-ash enhancement has resulted in **saving of ~ Rs. 37 /MT PPC**

Carbon Offset Achieved- 12568 TCO2 in FY22 compared to FY21

Scope-3 Emissions: Key Actions Taken

GHG Credit 6.2



Achieved Scope-3 Carbon Offset by **30.7 TCO2** in FY22 by Improving Loose Cement Dispatches

- Improved Bulk Naked cement dispatches YOY to reduce Scope-3 Emissions intensity on account of Up-stream packaging materials
- New and short haul road in Mines to cut down lead by 900 mtrs for fuel saving

Scope-3 Emissions: Key Actions Taken

GHG Credit 6.2

Green Supply Chain management

New Alternate Local Vendors developed for Sustainable sourcing of Rawmix additives like Bauxite & Red Ochre High grade.

- Upstream Logistics lead distance reduced from 365 Kms to 15 Kms
- Reduced Scope-3 emission intensity by 5414 T CO2 across FY20- FY21 in Up-stream logistics

Employees involvement & Capacity buiding

Employee Strategy - Synergy for Energy

GRT Level Involvement

- Tool box talk
- KPI display at GRT Boards
- Kaizen submission & reward schemes

Trainings & Capacity Building

- Training Needs Identification (TNI)
- Gyanodaya E-learning modules
- My Development Plan (MDP)

Awareness

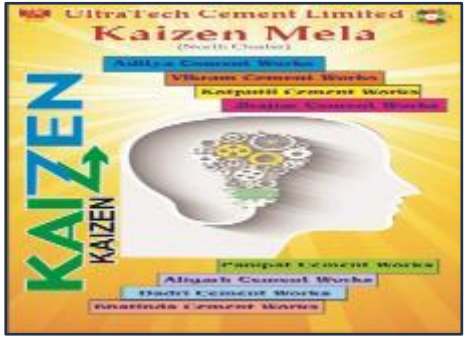
- Best Practices Implementation Sessions
- Peer Comparisons
- Shift wise performance Dashboard

Employee's involvement @GRT Level

GRT efforts recognised by top management at Confluence ideation event

GRT Team Board- Energy KPI's & Improvement Initiatives

Kaizen Mela to build Innovation at Cluster Level



Sr. No	Category	Position	Unit Name
1	SLOGAN COMPETITION Grinding Units	Third	Dadri Cement Works
		Second	Aligarh Cement Works
		First	Panipat Cement Works
2	SLOGAN COMPETITION Integrated Units	Third	Kotputali Cement Works
		Second	Aditya Cement Works
		First	Vikram Cement Works
3	POSTER COMPETITION Grinding Units	Third	Panipat Cement Works
		Second	Panipat Cement Works
		First	Panipat Cement Works
4	POSTER COMPETITION Integrated Units	Third	Kotputali Cement Works
		Second	Aditya Cement Works
		First	Vikram Cement Works
5	QUIZ COMPETITION Integrated Units	Commendation	Aligarh Cement Works
		Third	Aditya Cement Works
		Second	Panipat Cement Works
		First	Vikram Cement Works
6	KAIZEN EXHIBITION CATEGORY	Commendation	Aditya Cement Works
		Third	Panipat Cement Works
		Second	Jhajjar Cement Works
		First	Aditya Cement Works
7	KAIZEN PRESENTATION CATEGORY	Commendation	Bhatinda Cement Works
		Third	Kotputali Cement Works
		Second	Aditya Cement Works
		First	Vikram Cement Works

Organized Kaizen Mela at cluster level in every two years by systematic Improvement KFA

Promoting various completions & motivate employee by given Rewards & Recognition give at cluster level

Energy Score card & Employee Performance

EE Credit 2.3.1 & 2.3.2

- Energy Scorecard: Individual Performance Appraisal

- Energy Scorecard: Energy performance of major equipment & Shift wise Monitoring of Key KPIs

Awards & Recognitions

Awards & Accolades

CII-GreenCo Rating System –Gold Rating

NCCBM TOTAL QUALITY EXCELLENCE AWARD-2022

Combined Efforts Collective Excellence

Award & Accolades

National Award for Excellence in Energy Management Awards- Energy Efficient Unit

Mines Env. & Mineral conservation Week Celebration 2022

26th Bhamashah award by Govt of Rajasthan for Education support

Thank You!

Build beautiful

ADITYA BIRLA

UltraTech

UltraTech CEMENT

The Engineer's Choice

INDIA'S NO.1 CEMENT