Aditya Cement Works

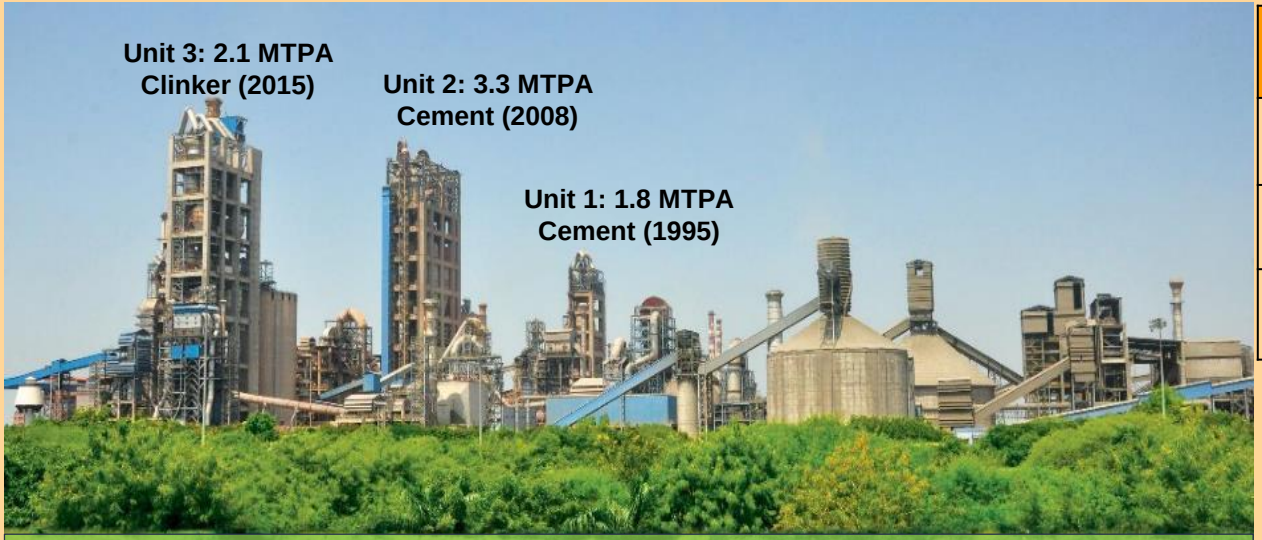
(A unit of UltraTech Cement Limited)

Team Member :

- Vishvesh Saxena
  (HOD Process)
- Sudhir Sharma
  (HOD Quality Control)
- Mukesh Sharma
  (HOD Technical Cell)
- Anil Bijoliya
  (SH Technical Cell)

23rd National Award for Excellence in Energy Management 2022

Company Profile

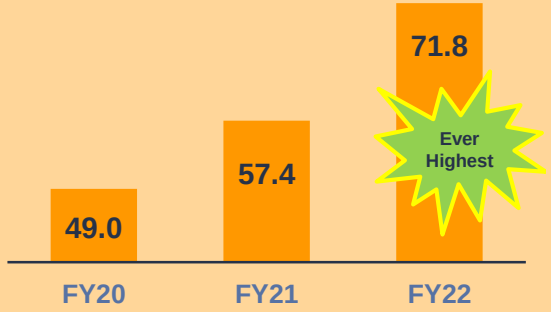


- Aditya Cement Works is located approximately 15 KM from Chittorgarh and 90 KM from Udaipur airport.
- Cater Clinker requirement for 7 GUs in north zone.
- Our Products : PPC / OPC / IRST 40 (53S)
- Two times recipient of Chairman's WCM Gold Awards in 2013 & 2017.
- First plant to receive JIPM Excellence Award for TPM in 2001.

(In MTPA)	UTCL	Aditya
Installed Capacity	119.95	7.18
Cement Production FY22	86.98	4.5
Clinker Production FY22	64.80	7.18*

*** 100% Capacity Utilisation**

Clinker Production (LMT)



Major Equipment Details

LS Crusher

- **Line-1**
  - Make : L&T
  - TPH : 850
- **Line-2**
  - Make :L&T
  - TPH : 1800
- **Line-3**
  - Make : L&T
  - TPH : 1800

Raw Mill

- **Line-1**
  - Make : Krupp
  - Polysius
  - TPH : 300
- **Line-2**
  - Make :LOESCHE
  - TPH : 550
- **Line-3**
  - Make :LOESCHE
  - TPH : 550

Coal Mill

- **Line-1**
  - Make :Polysius
  - TPH : 40
- **Line-2**
  - Make :LOESCHE
  - TPH : 80
- **Line-3**
  - Make :FLS
  - TPH : 62

Kiln

- **Line-1**
  - Make : Polysius
  - TPH : 3300
- **Line-2**
  - Make : KHD
  - TPH : 8000
- **Line-3**
  - Make :THYSSEN KRUP Polysius
  - TPH : 6000

Cement Mill

- **Line-1**
  - Make :Polysius
  - TPH : 250
- **Line-2**
  - Make: LOESCHE
  - TPH : 210
- **Line-3**
  - Make :LOESCHE
  - TPH :205

Packing Plant

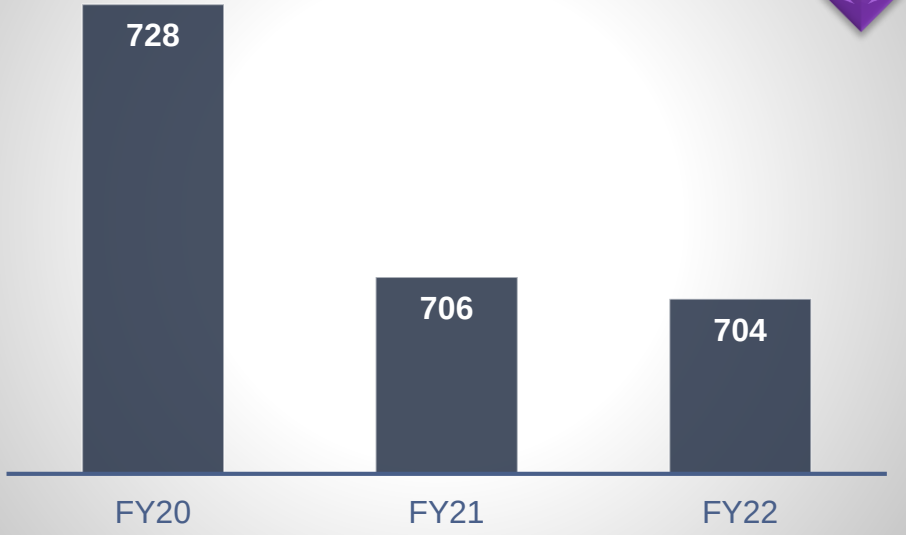
- **Line-1**
  - Make : EEL
  - Nos : 2 nos
  - TPH : 180, 12 Spout Double Discharge
- **Line-2**
  - Make : EEL
  - Nos: 8 nos
  - TPH : 120, 8 Spout ,Single Discharge

Other Plant Facilities :

- **WHRS : 16.05 MW**
- **TPP : 73 MW (23MW + 25MW + 25MW)**
- **Solar : 8.1 MWp**
- **AFR : 3 no's Shredders *20 TPH each**

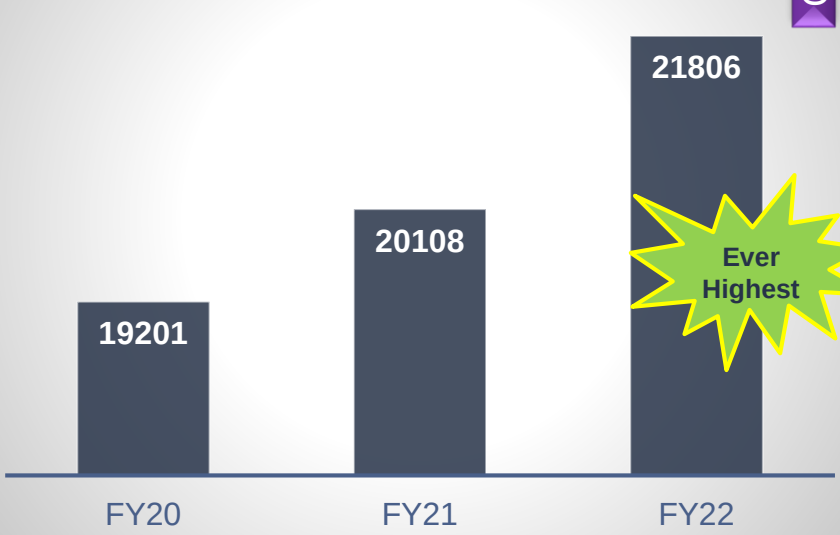
Specific Thermal Energy Consumption (Clinker SHC)

Combined Clinker SHC (kcal/kg Clk)



3.29% Improvement over FY20

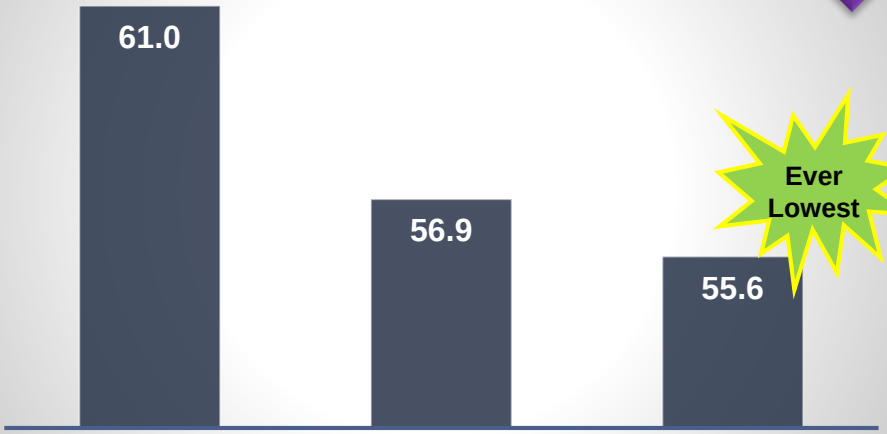
Clinker TPD



13.56 % Improvement over FY20

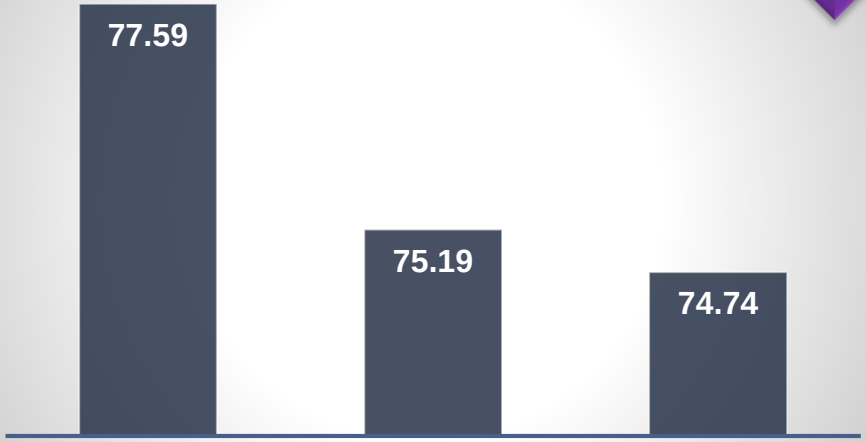
Specific Electrical Energy Consumption

Combined Clinker SPC (kWh/MT Clk)



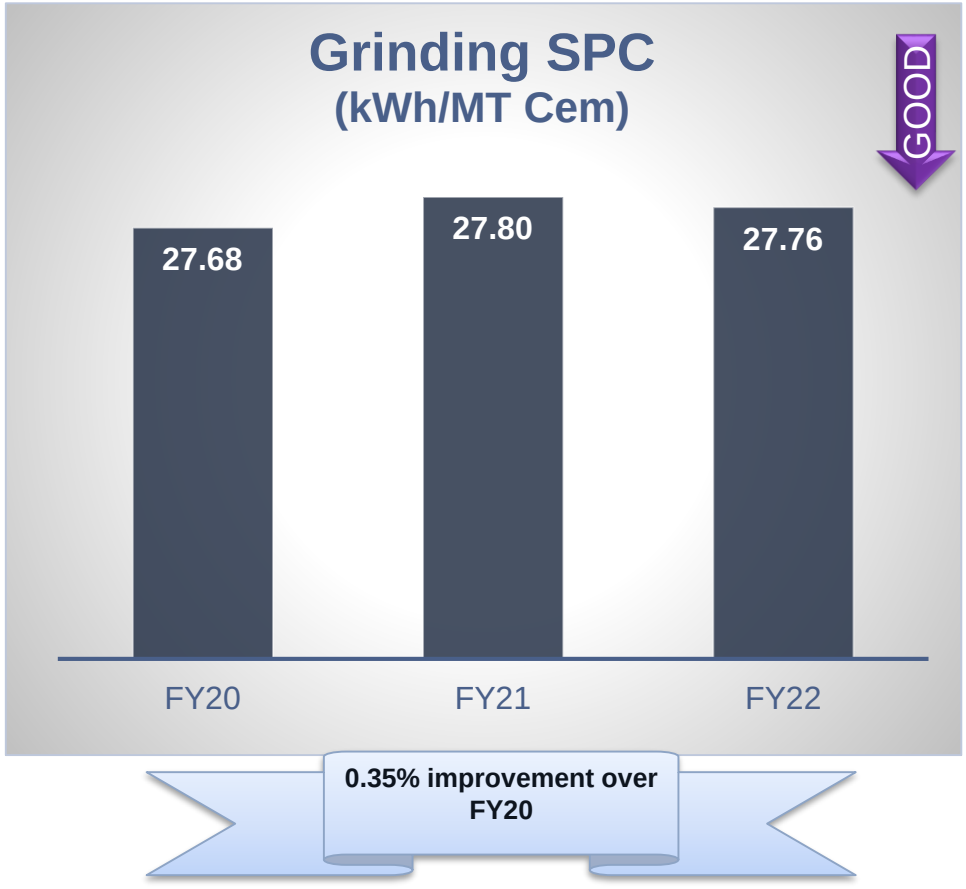
8.85% Improvement over FY20

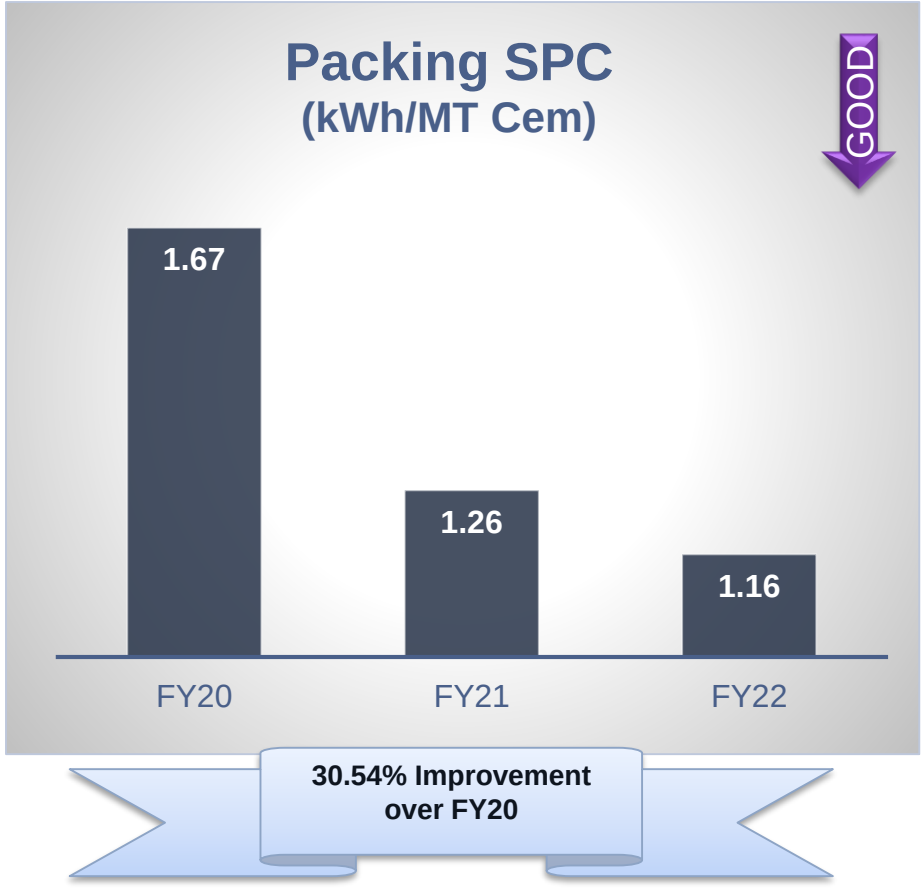
Combined Cement SPC (kWh/MT Cmt)



3.81% Improvement over FY20

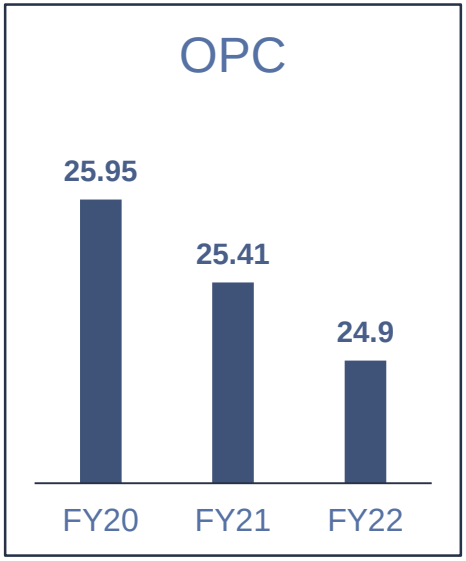
Specific Electrical Energy Consumption (Post-Clinkerisation)

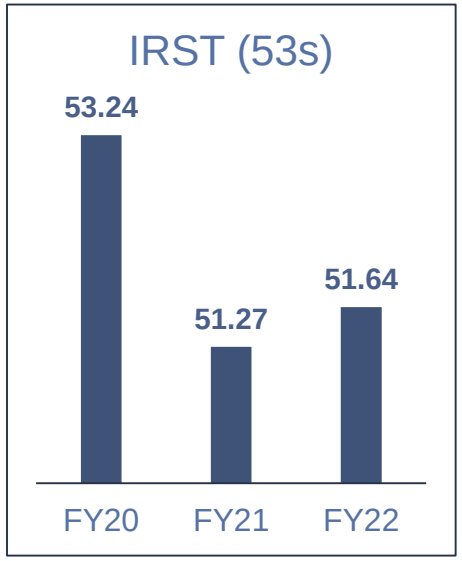


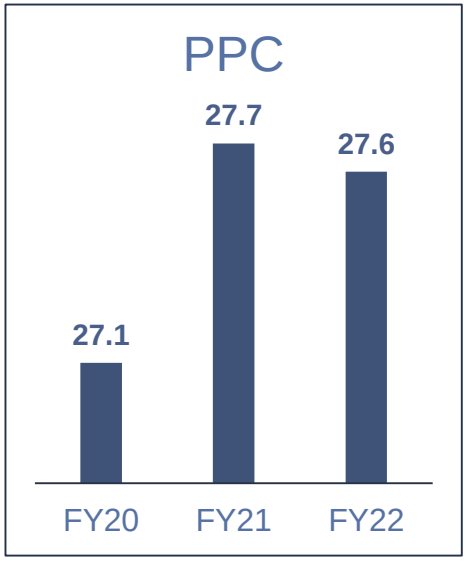


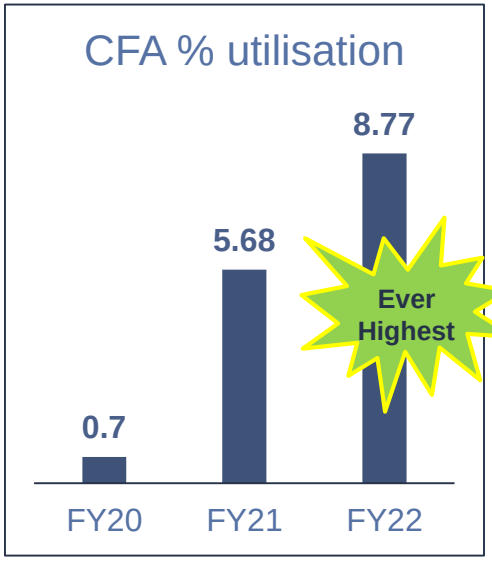
Maintained same SPC despite higher Wet flyash usage and higher IRST grade production

Specific Electrical Energy Consumption (Product Wise)









4.2% Improvement over FY20 in OPC

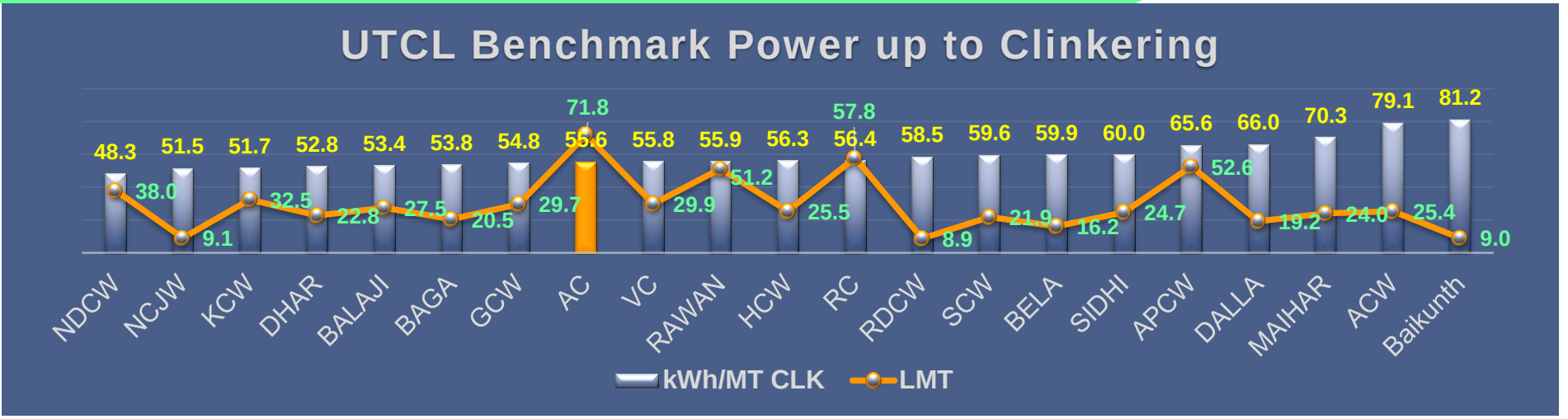
3.09% Improvement over FY20 in IRST

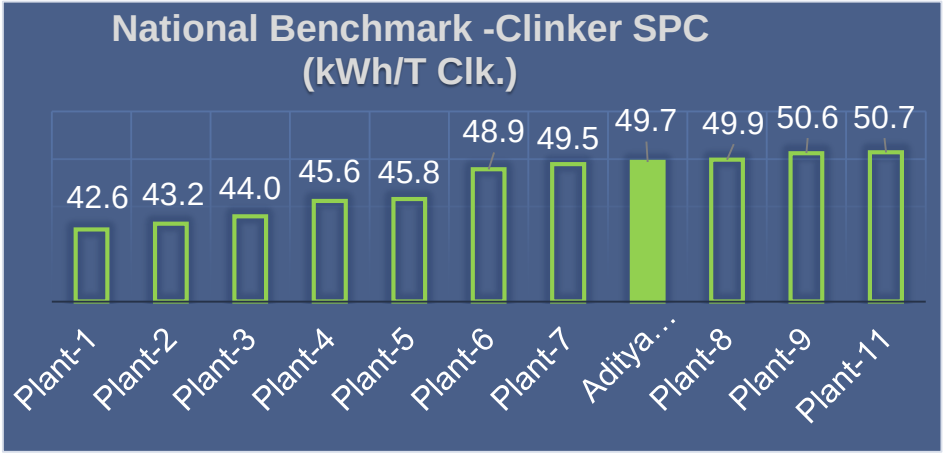
As per customer requirement product fineness increased from 380 to 390 m2/kg Blaine

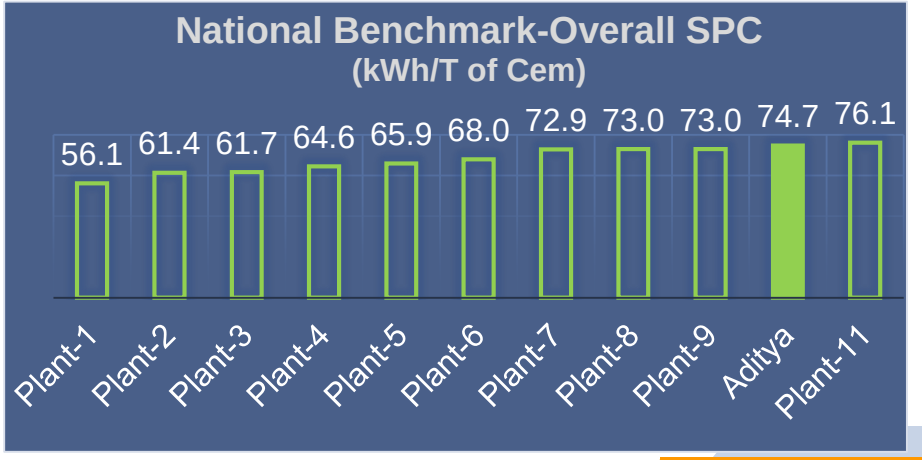
0.28% Improvement over FY21 in IRST

Marginal change in PPC SPC due to utilisation of Wet Ash(Low Blaine) up to 8.8%.

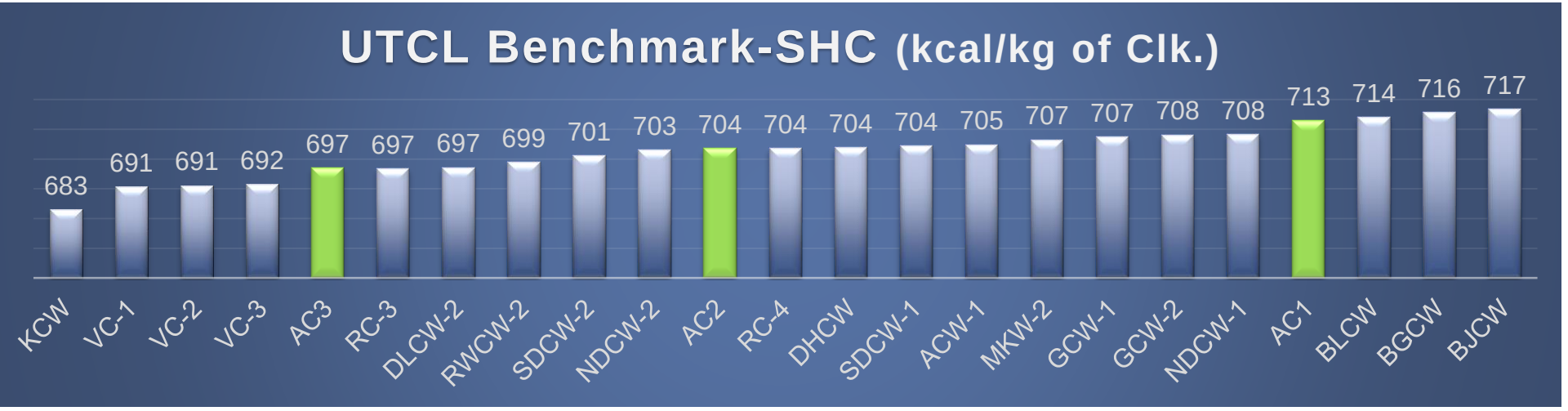
Benchmarking SPC

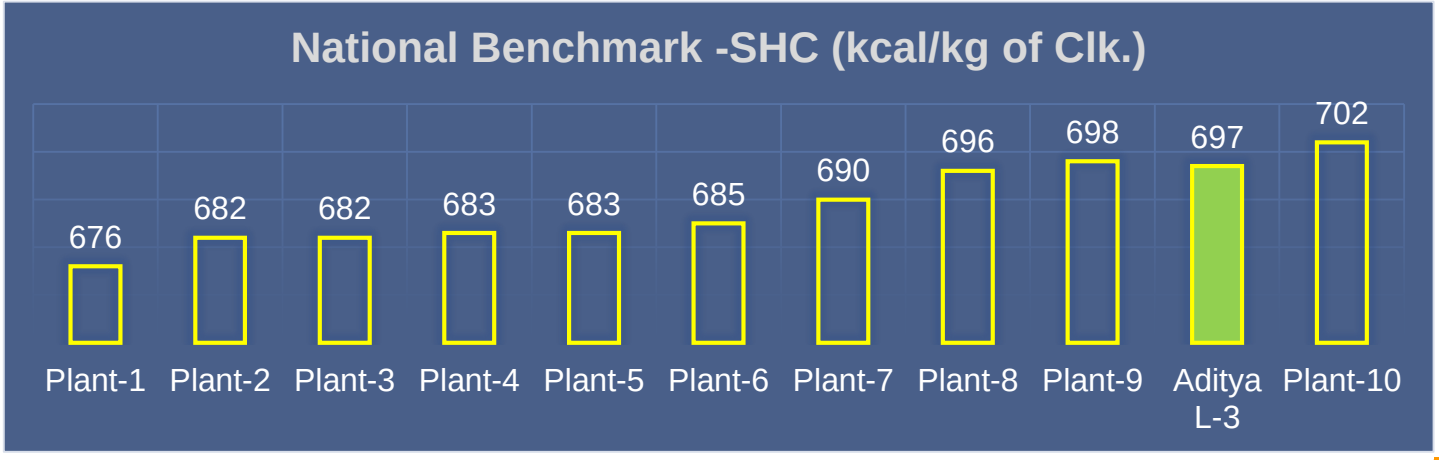






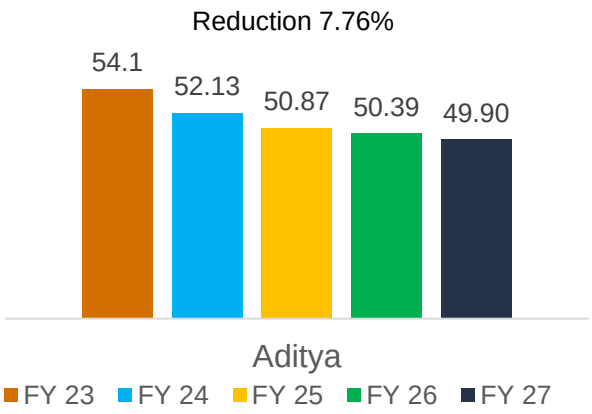
Benchmarking SHC



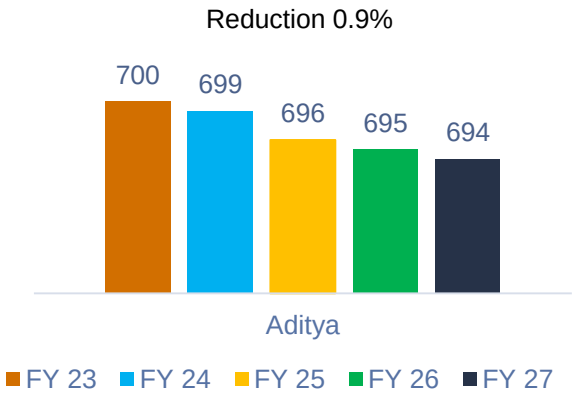


Internal Targets Setting & Action Plan

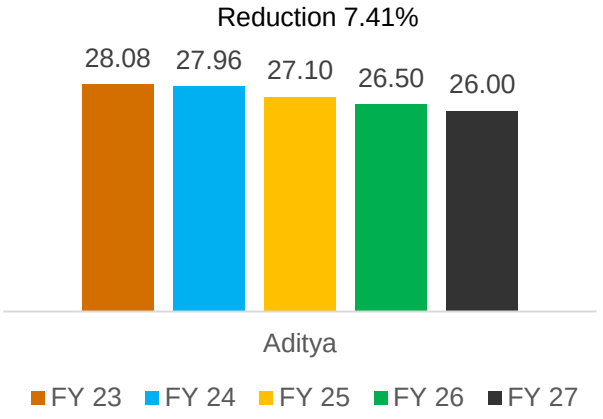
Clinker SPC kWh/T Clk



Kiln SHC kcal/kg Clk



Cement Grinding SPC kWh/TCem



Future Actions -

Clinker SPC

- L-1 PH Fan, RM-2&3 ID fans Retrofit
- L2 Cooler upgrade
- VAM from L3 Cooler
- Low air volume air blasters
- L2 PH Fans (after WHRS)
- RM1 Upgradation
- L2 & L1 Top Cyclone modification

Cement Grinding SPC

- CM-1 Separator drive upgradation from DC to VFD
- CM-2 Roller segment & Table liner replacement
- CM-2 & 3 separator modification

Clinker SHC

- L2 Bottom Cyclone ceramic Dip-tube
- L-2 Cooler upgradation
- L-1 & 2 Kiln Inlet Graphite Seals
- L-1 Cooler upgradation
- L-1 Calciner retention time enhancement through CFD modelling

List of Major Encon Project - FY 2022-23

Sl. No.	Section	Description of energy efficiency improvement measures	Investment (Lakh Rupees Estimated)	energy savings estimated	Units	Type of Energy
1	Kiln	Line-2 Cooler upgradation/ Retrofitting to reduce thermal energy consumption by 20kcal/Kg Clinker.	3000	66000	Mkcal	Coal/ PC/ AFR
2	Kiln	Installation of high efficiency impeller for L-1 Preheater ID Fan	76	831.6	MWh	Electrical
3	Raw Mill	Installation of high efficiency impeller in Raw mill-2 ID Fans	56	2640	MWh	Electrical
4	Raw Mill	Installation of high efficiency impeller in Raw mill-3 ID Fans	56	2640	MWh	Electrical
5	WHRS	WHRS Power generation capacity enhancement up-to 29.4 MW/hr from present capacity of 16.05 MW/hr	15600	310432	Mkcal	Coal/ AFR

Other Strategic Improvement Projects - FY 2022-23

S.No.	Action Point	Benefit in Rs./Bag & Rs. Crs	Target Date
1	Improving utilization of CFA/WFA up to 20% with installation of New Pond Ash feeding system.	Rs 0.98/Bag and Rs. 7.2 Cr p.a.	31.12.2022
2	Shredder Capacity & Feeding Circuit Capacity by following- • New Extractor (45TPH) with weigh feeder and Flap gates • Additional 30 TPH capacity (4th Shredder) in FY23	1st Phase by FY23, 14.2% TSR	FY23

Major Encon projects implemented in Last 3 years

Year	No. of Encon Project	Investment (Lac INR)	Electrical Saving (MWh)	Thermal Saving (M Kcal)	Savings (Lac INR)	Impact on SEC/ SHC (wrt FY20)
FY 2019-20	19	675.28	6887.66	13328	450.23	
FY 2020-21	07	81.81	3924.13	-	167.94	SPC-3.1% and SHC-3.12%
FY 2021-22	10	225.42	4304.29	40846.58	962.85	SPC-3.81% and SHC-3.29%

% investment of energy saving project on total company turnover in FY21-22 : 0.93%

Encon projects implemented in FY 2019-20

Sr. No	Description of energy efficiency improvement measures	Investment (Rs Lakh)	savings (Rs Lakh)	Energy saving	Units
1	Installation of MV drive in Line-1 cooler fan FN312.	31.93	0.9	18.7	MWh
2	Replacement of fan impeller of process fan for enhancing fan efficiency /(2FN357)/2FN310/(3FN323)/2FN309impeller.	175	65.77	1487.7	MWh
3	Upgradation of SPRS panel of RAW mill-2 & 3 fans.	25.62	6.4	145.2	MWh
4	Installation of Expert optimizer in line-02 & line-03 Raw mill.	295	104.35	2455.23	MWh
5	Installation of Expert optimizer in line-02 & line-03 Cement mill.		32.45	763.45	MWh
6	Installation of Expert optimizer in line-02 & line-03 Coal mill.		8.69	204.48	MWh
7	Installation of Expert optimizer in line-02 & line-03 Kiln.		151.54	13328	MKcal
8	Installation of IGBT based SPRS in Cement mill sepol fan FN501.	26.13	6.62	149.7	MWh
9	Replacement of ACC blades of ACC Fan TPP-2, TPP-3 & WHRS	87	46.32	1048.1	MWh
10	MV Drive for BFP of TPP1	34.6	20.51	463.9	MWh
11	Reduction in discharge pressure (from 3.5 Kg/cm2 to 1.1 Kg/cm2) of Auxiliary cooling water pump in WHRS	Nil	6.68	151.2	MWh

Major Encon projects implemented in Last 3 years

Encon projects implemented in FY 2020-21

Sr. No	Description of energy efficiency improvement measures	Investment (Rs Lakh)	Savings (Rs Lakh)	Energy saving	Units
1	Water Spray in PH Top Cyclone for power saving	15.93	16.11	379.91	MWh
2	VFD installation in two Coal Firing Blowers	0.28	7.38	174.05	MWh
3	Reversal of NOx modification in line-01 kiln	59.6	29.92	705.70	MWh
4	Power reduction in Raw Mill - 2	Nil	59.74	1408.93	MWh
5	Classifier Seal Gap Reduction in Cement Mill	1	27.93	631.85	MWh
6	Improvement of packer productivity	Nil	1.67	39.28	MWh
7	Stable & Increased WHRS Generation	5	25.19	584.41	MWh

Major Encon projects implemented in Last 3 years

Encon projects implemented in FY 2021-22

Sr. No	Description of energy efficiency improvement measures	Investment (Rs Lakh)	Savings (Rs Lakh)	Energy saving	Units
1	Raw Mills section SPC reduction & Production optimisation	Nil	81.57	1480.386	MWh
2	Installation of high efficiency new impeller for CM-2 Bag house fan	48	51.31	931.2	MWh
3	Installation of high efficiency new impeller for CM-3 Bag house fan	48	30.41	551.824	MWh
4	Packing plant SPC reduction drive through various in-house interventions	Nil	22.93	416.153	MWh
5	Replacement of existing lamps with energy efficient LED lamps across unit and colony	54.74	16.52	299.75	MWh
6	Reduce False air across RM-2 from 13.8% to 10%	Nil	22.5	408.387	MWh
7	Reduce False air across RM-3 from 12.6% to 10%	Nil	10.78	195.575	MWh
8	Reducing preheater fan power consumption by arresting false air across Line -1 WHRS boiler and by reducing the existing pressure drop across Line -1 PH 01 boiler from 161 mmWG to 100 mmWG.	Nil	1.16	21.017	MWh
9	Reduction in TPP requirement by 96.93% through WHRS Sp. Generation from 16.4 KW/ T Clinker in FY21 to 17.75 in FY22	15.08	545.77	30203	MKcal
10	SHC reduction by 6.43 kcal/kg clk in Kiln-1 through tongue plate modification and process optimization	59.6	179.9	10643.58	MKcal

Innovative Projects implemented

Theme

- **Digitalization** in Process Optimization for Mills, Kiln Operation and WHRS operation optimization through AKXA Tech

Analysis

- Manual Intervention for Mill & Kiln Optimization
- Dependency on Interpretation of Shift operators
- Variation in process variables due to AFR, raw mix and fuel.
- Less Utilization of cooler heat

Solution

- Digitalization of Process Optimization through EO
- Increase in WHRS inlet temp & flow through cooler operation optimization.
- Integration of 2 digital platform EO & AKXA Tech.

Benefit

- Increase in Production from 1.5 to 2.2%
- Reduction in Specific Power Consumption 1.5 to 2%
- Reduction in Heat Rate, 1.3 to 1.5%
- WHRS Generation improved by 1.11 MWh

Replication

- Project is 100% replicable and already under implementation phase at UTCL units

Innovative Projects implemented

Theme

- AFR enhancement up-to 10% in Kiln 3 using CFD modelling

Analysis

- Unable to increase L-3 TSR beyond 3% due to intermittent CO peaks leading to process disturbances

Solution

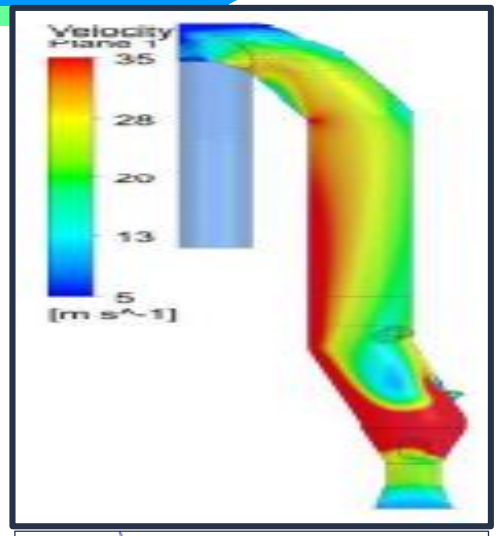
- CFD modelling carried out to establish AFR feed chute inclination (70° from 60°) for uniform material flow
- Modification carried out in Oct'21 shutdown
- On site troubleshooting for installation of air blasters to avoid build ups
- AKXA controller installed to maintain consistent Calciner temperature with minimum CO considering inputs of Fuel & AFR NCV.

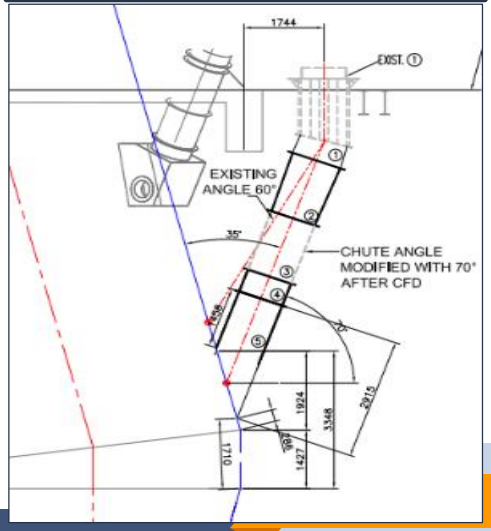
Benefit

- TSR % increased from 2.71% (YTD Oct'21) to 7.18% (Nov21 – Mar22)
- Process disturbance minimized
- Achieved benefits of Rs. 684.36 Lacs by Line-3 AFR feed chute modification through CFD modelling

Replication

- 100% replication potential in Cement Sector with AFR utilization facility. Horizontal replication is already done at UltraTech sister units.





Innovative Project implemented

Theme

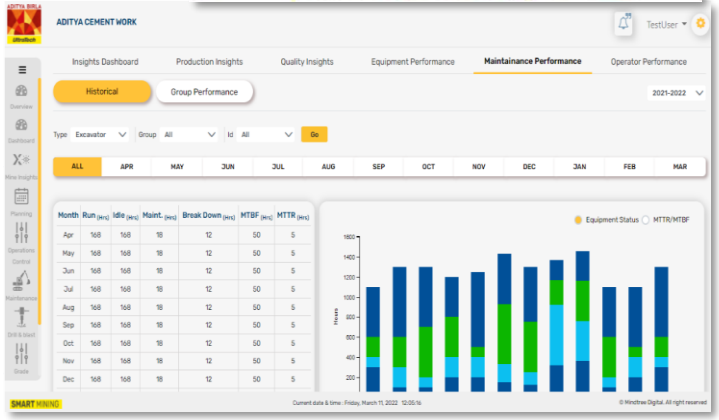
- **Digitalization** of Mines Planning & Operations through (Mindtree- L&T NXT platform for reduction in mining cost.

Analysis

- Mines HEMM fleet operations carried out in conventional fashion
- No tracking mechanism for location & effective utilization of dumper fleet
- No system for monitoring of Idle running of machines
- No common platform for blend plan & quality analysis

Solution

- Integration of Mine Planning & Operations in single digital platform starting from mines configuration till the final KPI report generation for analysis.



Benefit

- Optimized utilization of Mines Reserve & Plant Resources
- Mines productivity will be improved by 2 to 5%
- LS Raising cost reduction by 304 lacs per annum

Replication

- Project is 100% replicable. This is a pilot project at Aditya Cement Works.

Innovative Projects implemented

Theme

- TPP Boilers reliability enhancement through AI based alerts/ alarms.
- Historical data, alarms & events mapping in collaboration with Digitization partner M/s Exact Space to generate accurate alerts

Analysis

- Non availability of predictive and real time alerts on TPP performance & reliability, for preventive maintenance.

Solution

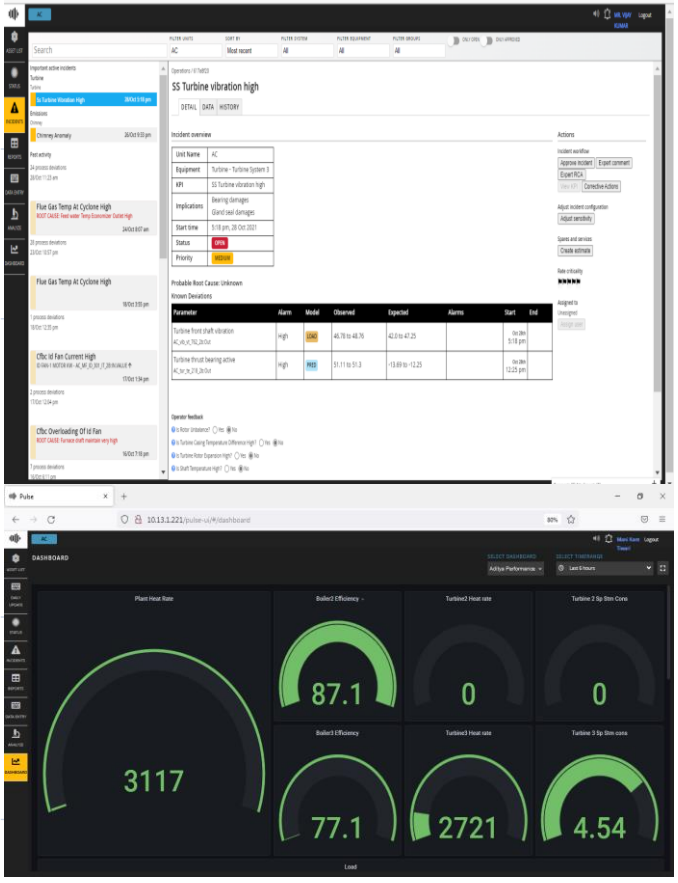
- Data template generation & Historical data/ events collection
- Performance benchmarking of unit data
- Data integration with OPC server & clouds server
- Performance assessment & centralized monitoring
- Fault tree configuration and generation of real time alerts

Benefit

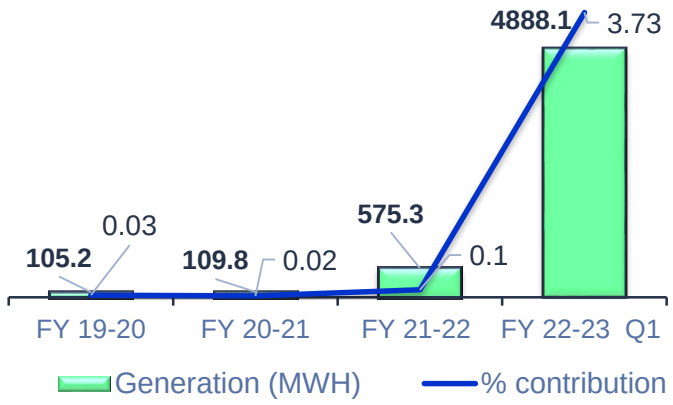
- Reliability Improvement
- Knowledge Management
- Performance Improvement

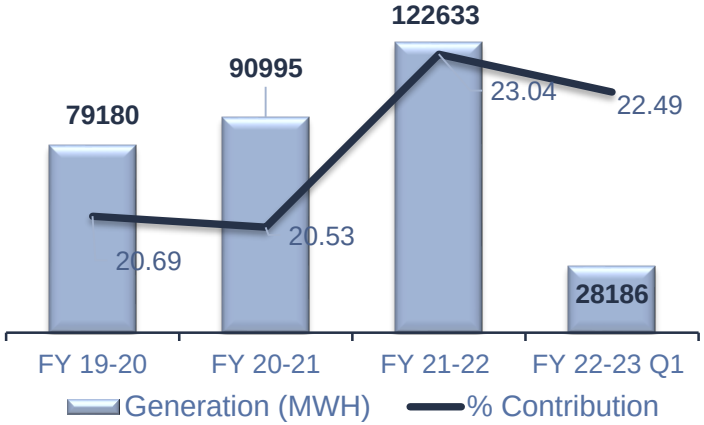
Replication

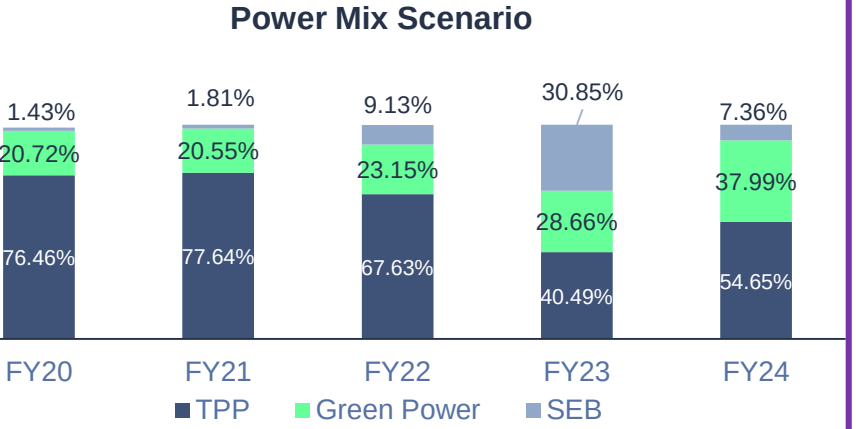
- 100% replication potential and replicated in other UTCL units



Utilisation on Renewable Energy Sources







Financial resource allocation			
S.No	Project Description	Budget (Cr)	Target
01	Expansion of WHRS project- 13.35 MW	156.54	Feb'23
02	Installation of additional 5.0 MW Solar Plant near to the Meera Colony	28.12	Oct'22
03	Installation of solar roof top panel 1.8 MW	6.5	Nov'22

Offsetting of Electrical Renewable Energy Sources

Utilisation of Solar Power

Year	Technology	Onsite/Off site	Installed Capacity (MW)	Generation (Million kWh)	% of share
FY 2019-20	Solar Power Plant	Onsite	0.1	0.105	0.03
FY 2020-21	Solar Power Plant	Onsite	0.1	0.11	0.02
FY 2021-22	Solar Power Plant	Onsite	8.1 (*)	0.57	0.11

(*) 8MW solar plant installed in March'22

Utilisation of WHRS

Year	Technology	Onsite/Off site	Installed Capacity (MW)	Generation (Million kWh)	% of share
FY 2019-20	WHRS	Onsite	16.05	79.18	20.69
FY 2020-21	WHRS	Onsite	16.05	90.99	20.53
FY 2021-22	WHRS	Onsite	16.05	122.63	23.04

We meet the REC compliance by using waste heat & Solar generation

Waste Utilisation and Management (AFR & ARM)

Utilisation of AFR as fuel (Including RDF/ Carbon black and other MSW waste)

Year	Waste as Fuel	Quantity	GCV	TSR %	Saving (Crs)	Remarks
FY 2019-20	AFR	26926.50	3,752.43	2.62	9.9	
FY 2020-21	AFR	71800.26	3,239.69	5.08	14.7	
FY 2021-22	AFR	83331.27	4514.63	6.32	50.34	**Highest AFR consumer in UTCL**

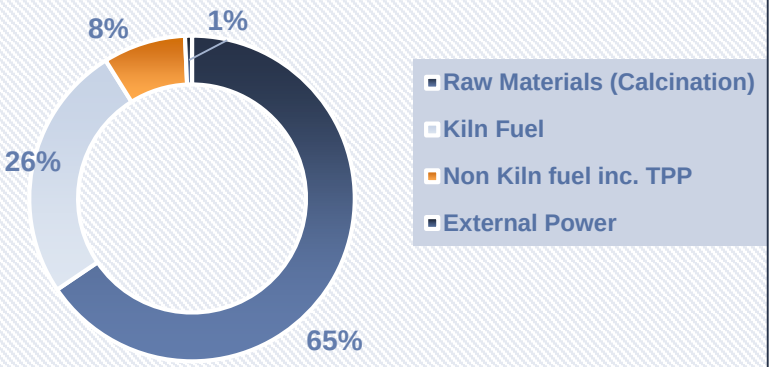
Utilisation of ARM (Additives used in cement such as slag, fly ash and gypsum for PPC, PSC and special cement)

2019-2020			2020-2021			2021-2022		
Alternative raw material	**Replaced Material**	**Quantity used (MT/ Year)**	**Alternative raw material**	**Replaced Material**	**Quantity used (MT/ Year)**	**Alternative raw material**	**Replaced Material**	**Quantity used (MT/ Year)**
Iron sludge	laterite	118	Iron sludge	Laterite	159	Claywollastonite	Redochre / laterite	544
Slag fresh	Red ochre / laterite	1683	Slag fresh	Red ochre / laterite	11131	Redmud	Bauxite / Laterite	49716
Alumina	Bauxite	134	Alumina	Bauxite	130	marble slurry	Limestone	50968
Aretpsludge	Redochre / laterite	8362	Aretpsludge	Red ochre / laterite	1167			
Redmud	Bauxite / Laterite	2789	Redmud	Bauxite / Laterite	66270			
			Phosphate sludge	Redochre / laterite	189			

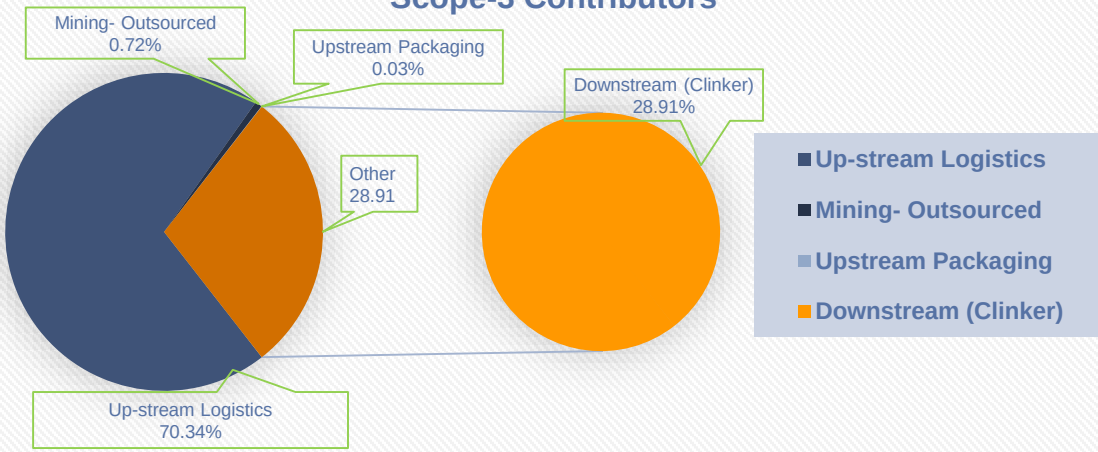
Start the use of High Grade red ochre with replace of Bauxite .
Reduce the distance for 550 KM to 15 KM

GHG Inventorisation

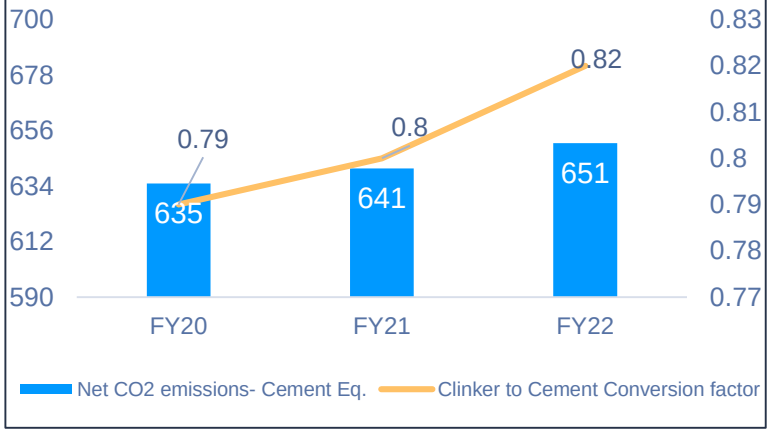
Processes Contributing to Scope-1 & 2



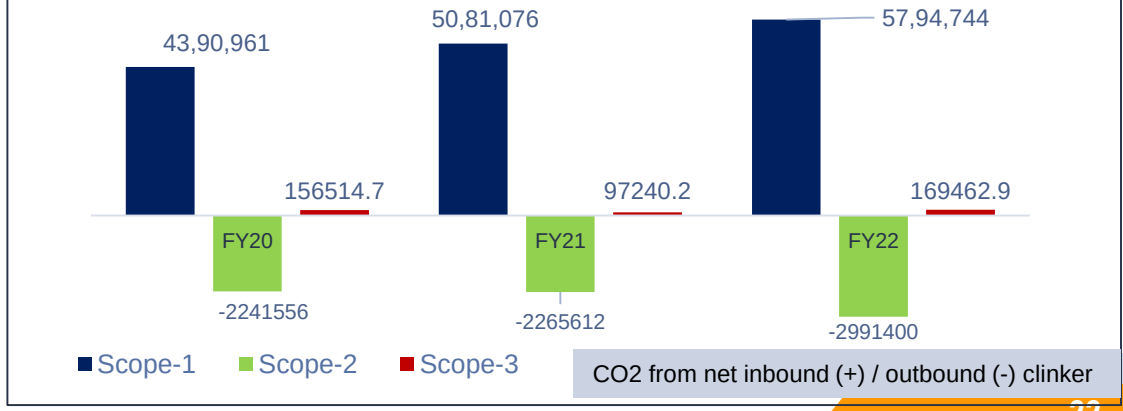
Scope-3 Contributors



Scope-1 & 2 Emissions

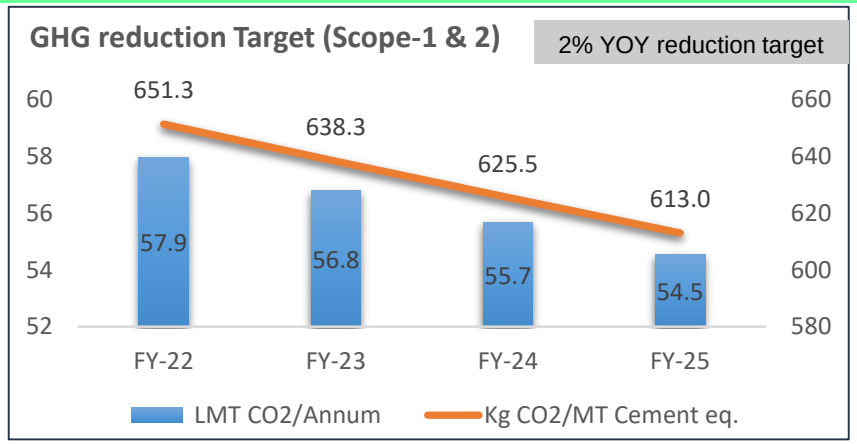


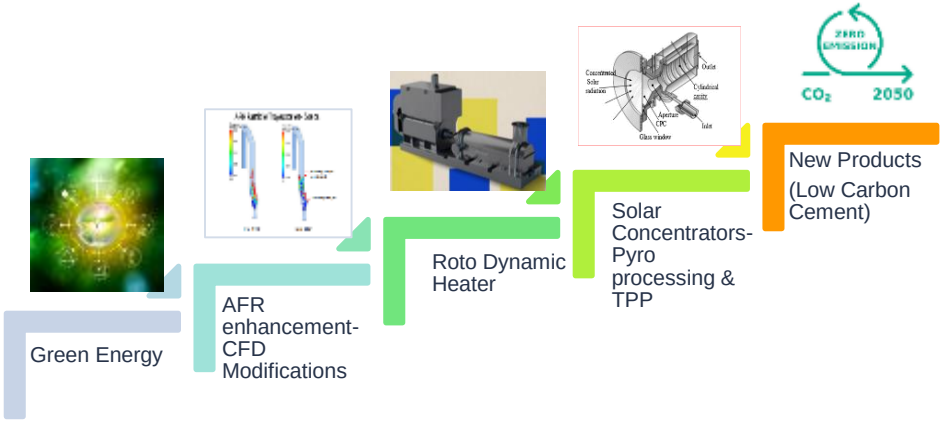
Carbon Emission [t CO2/yr.]



Scope 1&2 net CO2/T of Cem. Eq. (Excluding outbound Clinker)

GHG Emission Reduction Target & Action Plan





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)- 35% TSR
- 8MW Solar Power panel-Onsite BOT model
- Enhance Fly ash consumption Up-to 34% by using GA
- High Efficiency ID fans installation

2,25,853 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

96,492 T CO2 Reduction

Long Term (>5yrs)

Harness Thermal Energy from Electrical RE- Roto Dynamic Heater

Solar Concentrators for Captive Power Generation

New Blended cement Products for reducing Clinker to Cement factor

Carbon sequestration for capture

- **CarbonOro:** Unique bi-phasic amine carbon capture technology
- **Coomtech:** Kinetic energy based low energy, low cost drying technology
- **Fortera:** Combining capture CO2 emissions with Calcium oxide to make reactive calcium carbonate

Future Strategy for Net Zero by 2050

Green Supply Chain Management

ADITYA BIRLA
UltraTech

Green Supply Chain Policy

We at **UltraTech Cement Limited (Unit: Aditya Cement Works)** are committed to green procurement through a selection of products & services that minimize environmental impact. We will develop and conduct programs for the suppliers with a focus on the green supply chain.

We are also committed to:

- Use of waste generated by other process industries for the co-processing and working towards zero discharge to landfill.
- Incorporate the use of renewable sources.
- Encourage suppliers, transporters, and Contractors/Service providers, to offer environmentally preferable products and services at a competitive price.
- Encourage suppliers, transporters, and Contractors / Service providers to continuously improve their performance with respect to safety, Health, and Environment through sustainable development.
- Purchasing preference will be given to the suppliers who-
  - Minimize the generation of waste and disposal.
  - Offer eco-friendly products.
- Life Cycle of the product during procurement.
- Sustain appropriate development programs for our employees and suppliers.
- Comply with all environmental legislative and regulatory requirements in procurements in the procurement of the product.
- Make this policy available to all our employees and business partners

April 2022

Bhanu Prakash Singh
Unit Head

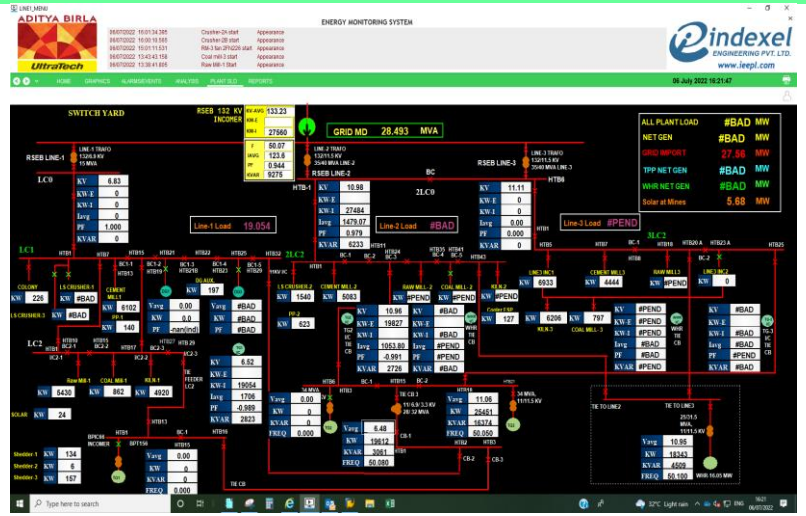
Focus Area

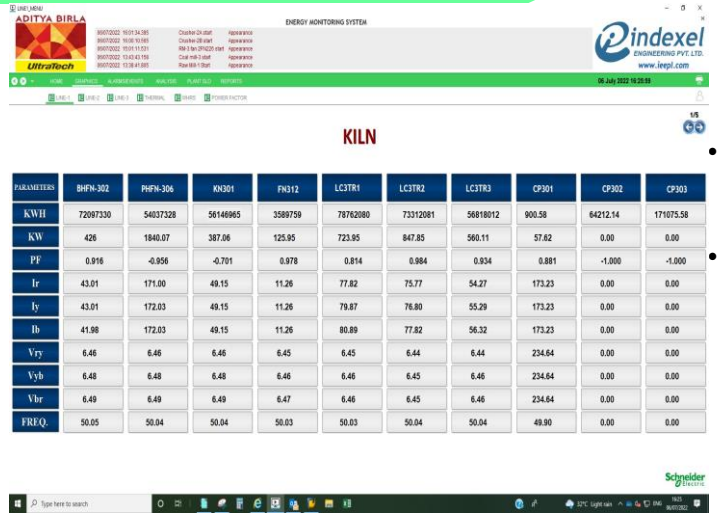
- Implementation of green procurement guidelines.
- Logistics & % reduction of the GHG emissions from transportation.
- Purchase of green certified products or materials.
- Targets, action plan and resource allocation
- Awareness creation and Training program for suppliers, vendors, associates, etc.

Green Supply Chain Projects

Projects Implemented	Investment Made (Rs In Million)	Benefits Achieved	Description
Uses of aluminum industry waste (Hindalco) REDMUD	Investment of Hindalco on account of freight subsidy 7.8 Crs (Annual Investment)	Rs. 14.65 Rs/ Clinker by optimizing additive usage, Savings - Rs 9.62 Cr/yr	Utilizing industrial waste of Hindalco & conserving mineral (Bauxite)
Reduction in cement transportation cost considering reverse logistic of fly-ash transportation cost.	NIL	60 Lacs / Annum	Bulkers used in cement transportation for Kota area are considering reverse logistic freight (Reduced freight). On return bulker bring to Aditya plant fly-ash from KSTPS (Kota Super Thermal Power Plant).
Developed alternate source of Bauxite (Low Silica & high alumina red ochre) in local area (under 15 KMs)	NIL	80 Lacs in 03 Months & GHG reduction	Raw material sourcing distance reduced from 350 km to under 15 kM. Now sourced high alumina-low silica red ocher near by area. Resulted in reduction of Carbon Emission & Procurement saving benefits of the unit.
Mines life enhanced by using marble industrial waste	NIL	Mine Life increase by 7.3 Years. Screen Reject Reduction by 2%	At present, 40 Million Ton Greenish Grey Limestone is blend-able. Overall deposit increased by 73.36 Million Tons. 3.53 Lac Ton Greenish Grey Limestone is consumed with Sweetener and Marble Slurry in FY22.
GreenPro Certificated (PPC Product)	NIL	GreenPro empowers end users with product sustainability information and steer them towards purchasing of sustainable products.	A product which bears GreenPro Ecolabel has lower environment impact and contributes significantly for enhancing the performance of Green Buildings and Green Companies.

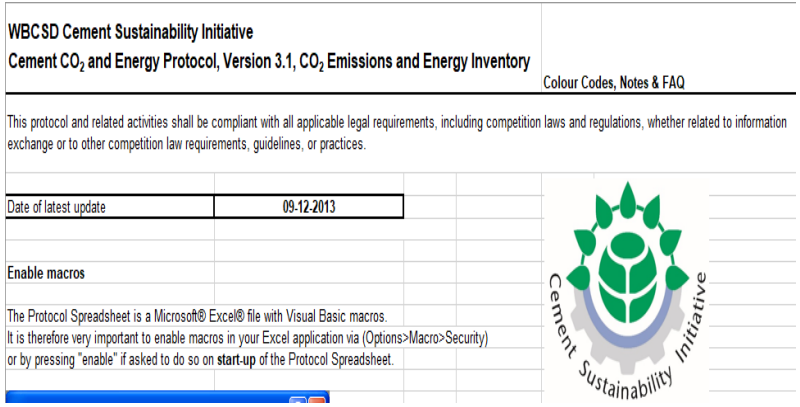
Monitoring Systems





PARAMETERS	BHFN-302	PHFN-306	KN301	FN312	LC3TR1	LC3TR2	LC3TR3	CP301	CP302	CP303
KWH	72097330	54037328	56146965	3589759	78762080	73312081	56818012	900.58	64212.14	171075.58
KW	426	1840.07	387.06	125.95	723.95	847.85	560.11	57.62	0.00	0.00
PF	0.916	-0.956	-0.701	0.978	0.814	0.984	0.934	0.881	-1.000	-1.000
Ir	43.01	171.00	49.15	11.26	77.82	75.77	54.27	173.23	0.00	0.00
Iy	43.01	172.03	49.15	11.26	79.87	76.80	55.29	173.23	0.00	0.00
Ib	41.98	172.03	49.15	11.26	80.89	77.82	56.32	173.23	0.00	0.00
Vry	6.46	6.46	6.46	6.45	6.45	6.44	6.44	234.64	0.00	0.00
Vyb	6.48	6.48	6.48	6.46	6.46	6.45	6.46	234.64	0.00	0.00
Vbr	6.49	6.49	6.49	6.47	6.46	6.45	6.46	234.64	0.00	0.00
FREQ.	50.05	50.04	50.04	50.03	50.03	50.04	50.04	49.90	0.00	0.00

- Dedicated Energy monitoring system designed by indexel.
- Energy Score Card system for shift wise monitoring of KPIs like SPC/SHC etc.



WBCSD Cement Sustainability Initiative

Cement CO_2 and Energy Protocol, Version 3.1, CO_2 Emissions and Energy Inventory

Colour Codes, Notes & FAQ

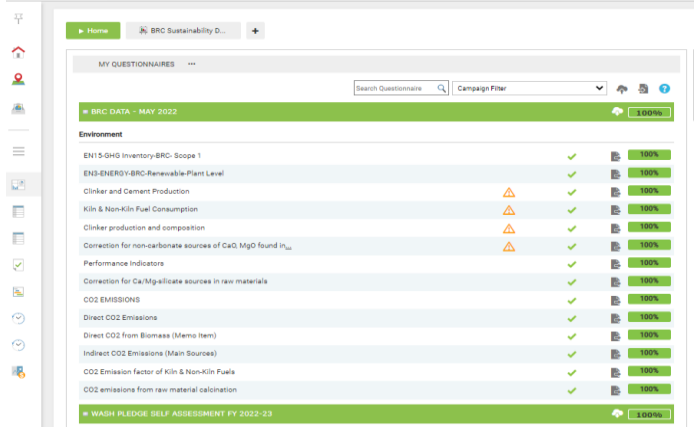
This protocol and related activities shall be compliant with all applicable legal requirements, including competition laws and regulations, whether related to information exchange or to other competition law requirements, guidelines, or practices.

Date of latest update	09-12-2013

Enable macros

The Protocol Spreadsheet is a Microsoft® Excel® file with Visual Basic macros.
It is therefore very important to enable macros in your Excel application via (Options>Macro>Security)
or by pressing "enable" if asked to do so on **start-up** of the Protocol Spreadsheet.

Cement Sustainability Initiative



- CSI CO2 protocol sheet for calculation of GHG emissions
- CSI-CO2 data sheet (Scope-1 & 2) is shared with HO-Sustainability team on monthly

Review Mechanism

Top 5 KPI deviations wrt Budget with Action Plan - Aditya

Unit	KPI Deviation	Action Plan	Target Date	Responsibility
1	High Heat Consumption (705.29 A v/s 699.39 B)	SHC increased due to start-ups and stabilization after stoppages. L-1 (higher SHC-719.44) operated at lower output to manage high shell radiation at 0-5 mtr zone as > 15 months refractory life already achieved. Further, we have planned following actions for SHC reduction- • Increase carbon black use in L-3 and sourcing dry AFR's like saw dust, Agro waste, Tyre fiber waste • Reducing recirculation phenomenon in kiln by optimizing usage of Red mud • L-2 Cooler retrofit for SHC reduction by ~20 kcal/kg. Capex Received. Offers received and Technical Comparison shared with P&B Cell and TPMC for review. • L-1 Kiln production ramp-up and SHC optimization post June'22 annual S/D	• Continuous • Continuous • FY23-FY24 • June'22	• DH-AFR • DH-QC • DH-Projects • DH Process
2	Combined Clinkerisation power (55.55A v/s 54.21 B)	Combined Clinkerisation SPC 55.55 kWh/MT due to Shutdown power contribution of 0.67 SPC units because of L-1 Annual shutdown. Further SPC reduction planned through following actions • L-1 Kiln production enhancement back to 5200 TPD post June'22 annual S/D • False air arresting across L-1 PH & WHRS circuit during S/D • L-1 Cooler fan flow optimization after grate plate repairs in S/D	• June'22 • June'22	• DH-Process • DH-Mech • DH-TPP/WHRS
3	High TPP combined GHR (3139.52 A v/s 3037.34 B)	Operated TPP3 at combined PLF of 82.13% as low cost Grid power imported 192.66 Lac Unit (40.72.% of Total power mix) and solar power purchased 17.54 Lac Unit (3.71% of total Power Mix) Further actions are planned as below • Up-gradation of ACC Ejector for reduction in steam consumption. (Material Received & work in progress) • ACC Duct interconnection of TG-2&3. Interconnection completed on 2nd Jun 22. • Installation and commissioning of Fan less cooling Tower in TG-2&3 • Replacement of ACC Multi Row Tube Bundle with SRC Tube Bundle in TG-2. (Capex Proposed)	• Work In progress • Completed • Completed • Oct-22	• DH-TPP • DH Project • DH-TPP • DH-TPP

Heat Balance data (Aditya L2)

		Plants	AC-2	AC-2
	Date		07.05.22	07.06.22
	Capacity	TPD	9919	10025
Heat Output	Clinker	Kcal/Kg CL	32.36	35.64
	Heat of reaction	Kcal/Kg CL	406.40	406.46
	Kiln feed return dust	Kcal/Kg CL	4.75	4.78
	Heat loss due to Coal and KF Moist.	Kcal/Kg CL	6.49	5.17
	AFR Moisture evaporation	Kcal/Kg CL		
	Cooler exhaust air	Kcal/Kg CL	27.60	21.09
	Preheater flue exhaust gas	Kcal/Kg CL	127.82	133.28
	Heat loss through DA Fan	Kcal/Kg CL	-	-
	Cooler water spray evaporation	Kcal/Kg CL	4.48	5.00
	Sensible heat of Coal mill mid air	Kcal/Kg CL	-	-
	Cooler WHRS	Kcal/Kg CL	85.62	86.44
	PH water spray evaporation	Kcal/Kg CL	0.72	1.63
	Radiation & Convection losses			
	Kiln	Kcal/Kg CL	19.63	19.84
	Preheater	Kcal/Kg CL	27.38	27.94
	TAD	Kcal/Kg CL	9.44	9.29
	Cooler	Kcal/Kg CL		
	Total R&C Losses	Kcal/Kg CL	56.45	57.06
	Total	Kcal/Kg CL	752.70	756.57

		Plants	AC-2	AC-2
Heat Input	Cooler air	Kcal/Kg CL	21.54	20.44
	Kiln feed sensible heat	Kcal/Kg CL	25.98	25.981
	Fine coal sensible heat	Kcal/Kg CL	2.04	1.979
	Coal conveying air	Kcal/Kg CL	0.54	0.516
	Primary air sensible heat	Kcal/Kg CL	0.41	0.398
	Cooler water spray	Kcal/Kg CL	0.31	0.35
	Sensible heat of moisture in fuel	Kcal/Kg CL		
	Heat by in filtered air	Kcal/Kg CL		
	PH water spray	Kcal/Kg CL	0.05	0.10
	Sensible Heat in False Air	Kcal/Kg CL		
	Sensible Heat input from AFR	Kcal/Kg CL		
	Heat input from moisture in kiln feed	Kcal/Kg CL	0.243	0.243
	Additional entry			
	Total	Kcal/Kg CL	51.12	50.01

Remarks: PH Fan flow increased to maintain Oxidising conditions & to maximize output rate and for sustaining AFR consumption rate

Net Heat consumption	Kcal/Kg CL	701.58	706.56
Cooler specific air	Nm3/Kg cl	1.67	1.62
Preheater specific air	Nm3/Kg cl	1.33	1.37
Recuperated Heat	%	62.15	62.51

- Monthly Energy consumption performance is reviewed at Unit management & Top management (COO, CMO & MD) level.
- MPR is reviewed at unit level & Cluster Head level. MD & CFO review is conducted separately followed by Process Operations review by CMO every month
- Short & Mid term action plans for progress on Energy KPI's improvement is tracked & reviewed by Top management

Employee Involvement Strategy – Synergy for Energy

GRT Level Involvement

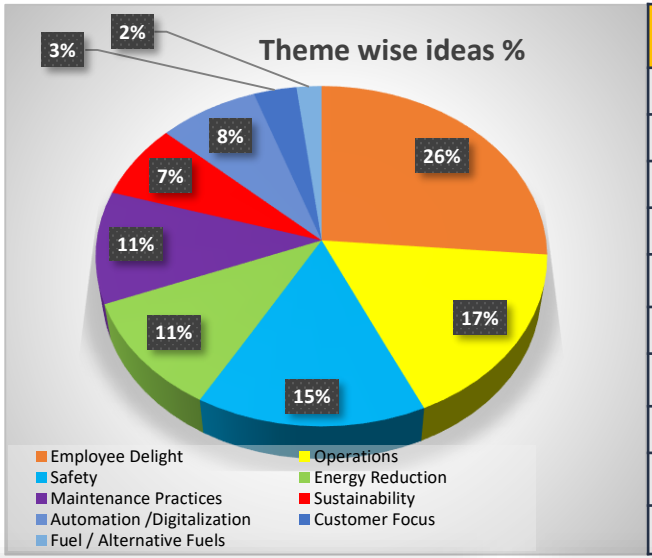
- Tool box talk
- KPI display at GRT Boards
- Kaizen submission & reward schemes

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



Theme	Ideas Numbers
Employee Delight	1957
Operations	1253
Safety	1122
Energy Reduction	803
Maintenance Practices	790
Sustainability	530
Automation /Digitalization	584
Customer Focus	250
Fuel / Alternative Fuels	146
Grand Total	**7435**

Implementation of ISO 50001 /GreenCo Rating System

DNV

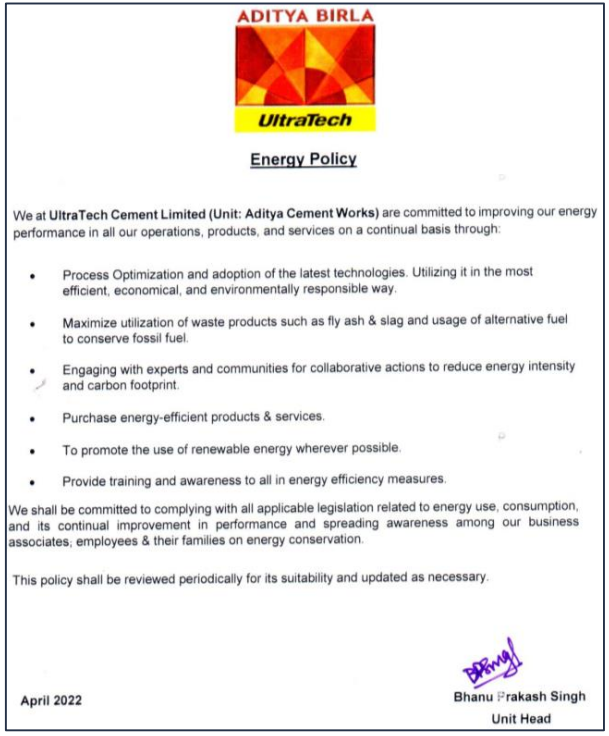
MANAGEMENT SYSTEM CERTIFICATE

This is to certify that the management system of
UltraTech Cement Limited (Unit : Aditya Cement Works)
Post Adityapuram, Sawa - Shambhupura,Dist. Chittorgarh - 312622, Rajasthan, India

has been found to conform to the Energy Management System standard:
ISO 50001:2018

This certificate is valid for the following scope:
Manufacture & Dispatch of Cement.

- Aditya Cement Works was the first unit among UTCL to get certified for ISO 50001 (EnMS) in year 2012.
- Other than ISO 50001 unit is also certified for ISO 9001/ 14001/45001 & SA 8000 latest version.



ADITYA BIRLA
UltraTech

Energy Policy

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- Process Optimization and adoption of the latest technologies. Utilizing it in the most efficient, economical, and environmentally responsible way.
- Maximize utilization of waste products such as fly ash & slag and usage of alternative fuel to conserve fossil fuel.
- Engaging with experts and communities for collaborative actions to reduce energy intensity and carbon footprint.
- Purchase energy-efficient products & services.
- To promote the use of renewable energy wherever possible.
- Provide training and awareness to all in energy efficiency measures.

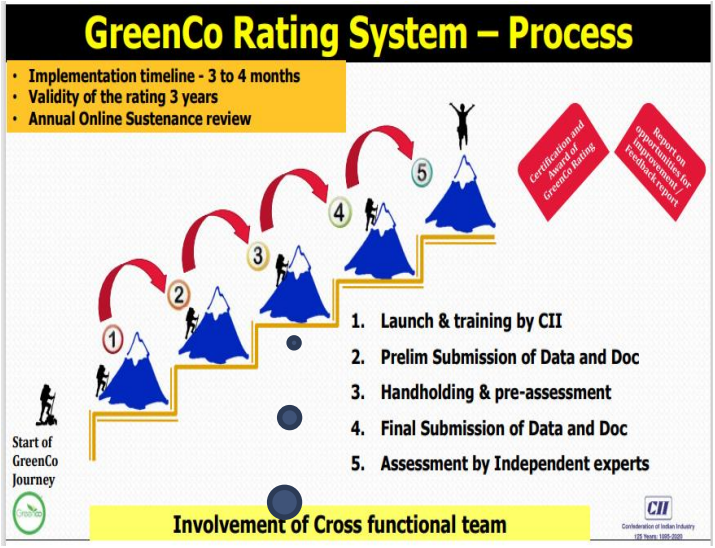
We shall be committed to complying with all applicable legislation related to energy use, consumption, and its continual improvement in performance and spreading awareness among our business associates, employees & their families on energy conservation.

This policy shall be reviewed periodically for its suitability and updated as necessary.

April 2022

Bhanu Prakash Singh
Unit Head

- UTCL & Aditya unit follow unified Energy & Carbon policy
- Energy Policy states unit's commitment towards continual energy performance improvement.
- Energy policy is communicated at all levels.
- Energy policy is regularly reviewed and last renewed in Apr'2022



Pre-Assessment done on 2nd & 3rd Aug'22

Learning from CII Energy Award and other Award programs

- Various events and training programs conducted by CII are extended learning and knowledge sharing platforms where we can unearth the best practices, latest technologies and future roadmaps to achieve Excellence in energy efficiency.
- We get inspiration to view overall data of different industry at common platform.
- Analytical level increased to understand the data and how to conserve energy in industry level.
- Learn about innovation best practices by taking part in various stages of the award process.
- The most conventional and effective way to implement energy efficiency projects is through direct implementation by project beneficiaries.
- As a responsible corporate, Aditya Cement Works owns its responsibility towards the Energy Conservation and efficiency and moving step towards sustainable product development . In the journey of Excellence we found CII as most enduring companion. Various Energy saving projects implemented in our plant are replicated from Knowledge sharing programs and events by CII.

Awards & Accolades

For Business Excellence

Winning "Platinum award" in Business Excellence at Apex India Award September 2019

For Quality Excellence

.Winning-"Platinum Award" in Apex India Quality Excellence Award 2020

For Excellence in Sustainability

Apex India Green Leaf Sustainability Award – Platinum Award April 2022

For Excellence in Sustainability

CII-ITC Sustainability Awards-2018" by Shri Amitabh Kant - CEO, NITI Ayog, Govt. of India on 12th December 2018 at New Delhi.

For Excellence in Energy Conservation

"1st Prize in 9th RECA Award-2018 " on 14th December 2018 at Jaipur.

For Excellence in Sustainability

Frost & Sullivan and TERI Sustainability 4.0 Awards 2021: 'Leaders Award - Mega Large Business, Process Sector.
*Site Assessment Done at Aditya Cement Works

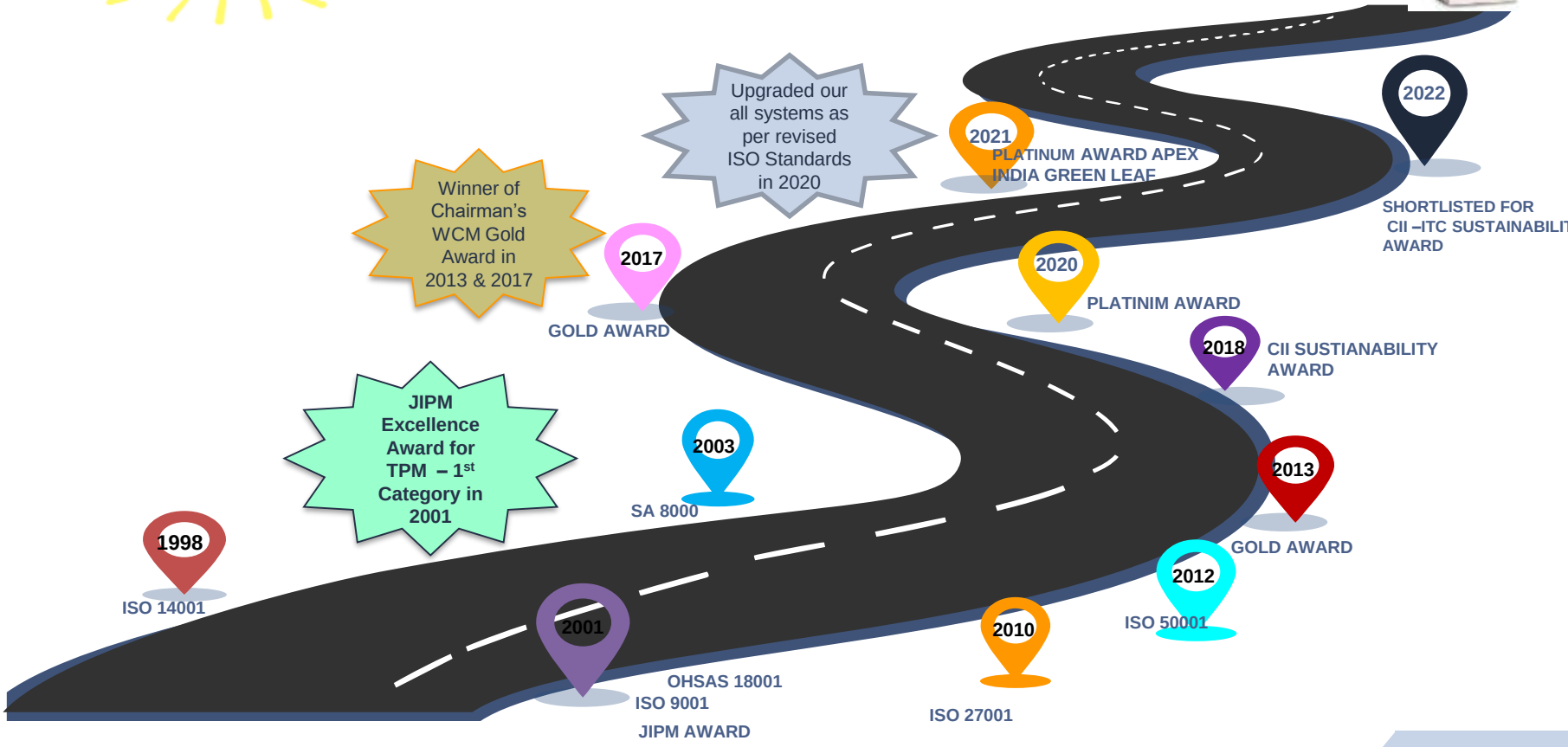
Thank You!

Build beautiful

Mukesh.rsharma@adityabirla.com / +91-9887482020

Additional Info.

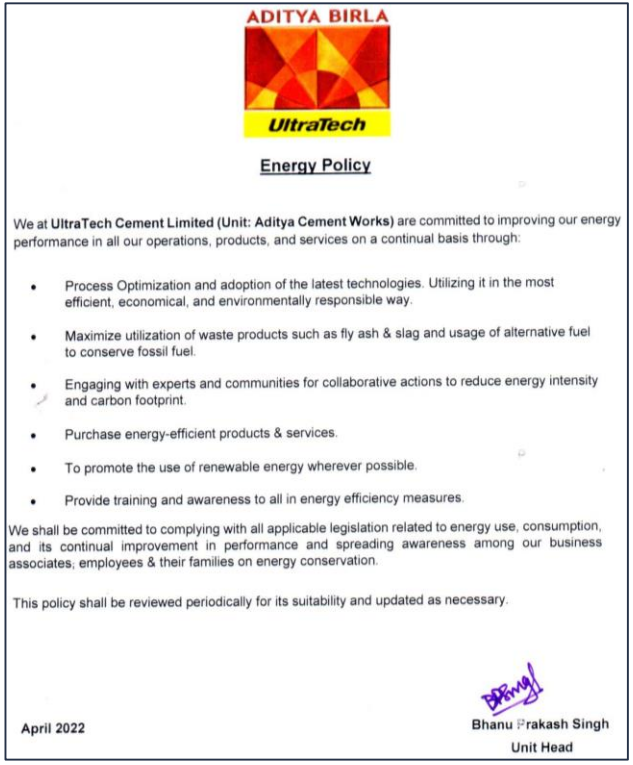
Our Good to Great journey



Capacity Building

S No	Year	Start Date	Date Date	Month21-22	Category	Course Name	Type	Faculty Name	ELM SID	Target	Duration	Target No	Actual No	Target MHrs	Actual MHrs
1	21-22	08/04/2021	08/04/2021	April'21	Functional	Online session on AFR WCSCT - Manual 2	INE	HO	113563	O&S	3	3	3	9	9
2	21-22	18/05/2021	18/05/2021	May'21	Functional	LT VFD Best Practices and Troubleshooting	INE	HO	113987	O&S	4	7	2	28	8
3	21-22	30.06.2021	30.06.2021	June'21	Functional	AFR Grab Crane Training	INE	Mahesh Rajput		O&S	3	8	8	24	24
4	21-22	22/06/2021	22/06/2021	June'21	Functional	Cyclone performance assessment	INE	TPMC and M/s SRSMES.	113959	O&S	3	10	4	30	12
5	21-22	21/06/2021	21/06/2021	June'21	Functional	AC drives-mvds- soft starters-harmonic filters-power controllers-plc and automation	INE	Vivekanand Betageri		O&S	3	3	3	9	9
6	21-22	22/09/2021	22/09/2021	September'21	Functional	Pyro (Preheater, Kiln & Cooler) - Operation & maintenance	INE	HO		O&S	4	11	11	44	44
7	21-22	28/01/2022	28/01/2022	January'22	Functional	AFR - Alkali Sulphur Ratio Solver	INE	HO	125607	O&S	3	5	5	15	15
8	21-22	23/03/2022	23/03/2022	March'22	Functional	AFR SOP Manual 3 - implementing process into action	INE	HO	127939	O&S	3	4	4	12	12
9	21-22	12/05/2021	12/05/2021	May'21	Functional	Energy, Efficiency and Cost Of Production	INE	HO		O&S	3	1	1	3	3
10	21-22	23/03/2022	23/03/2022	March'22	Functional	Alternative Fuels and Raw Materials(AFR) Standard Operating Procedure Manual 3 - implementing process into action	INE	HO		O&S	3	2	2	6	6
11	21-22	29/07/2021	29/07/2021	July'21	Functional	Alternative Fuels and Raw Materials(AFR) Standard Operating Procedure Manual 3 - implementing process into action	INE	HO		O&S	2.5	2	2	5	5
12	21-22	24/02/2022	24/02/2022	February'22	Functional	Alternative Fuels and Raw Materials(AFR) Standard Operating Procedure Manual 3 - implementing process into action	INE	HO		O&S	3.5	4	4	14	14

Implementation of ISO 50001 /GreenCo Rating System



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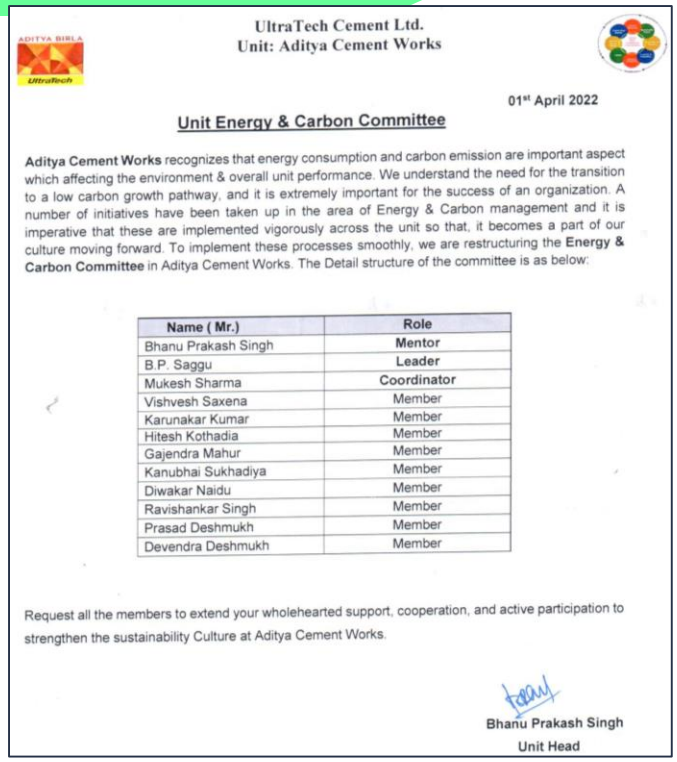
- Energy policy is communicated at all levels.
- Energy policy is regularly reviewed and last renewed in Apr'2022



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
Vishvesh Saxena	Member
Karunakar Kumar	Member
Hitesh Kothadia	Member
Gajendra Mahur	Member
Kanubhai Sukhadiya	Member
Diwakar Naidu	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 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 and Best practice implementation.

Green Supply Chain (Roadmap)

ADITYA BIRLA

UltraTech

Green Supply Chain Policy

We at **UltraTech Cement Limited (Unit: Aditya Cement Works)** are committed to green procurement through a selection of products & services that minimize environmental impact. We will develop and conduct programs for the suppliers with a focus on the green supply chain.

We are also committed to:

- Use of waste generated by other process industries for the co-processing and working towards zero discharge to landfill.
- Incorporate the use of renewable sources.
- Encourage suppliers, transporters, and Contractors/Service providers, to offer environmentally preferable products and services at a competitive price.
- Encourage suppliers, transporters, and Contractors / Service providers to continuously improve their performance with respect to safety, Health, and Environment through sustainable development.
- Purchasing preference will be given to the suppliers who-
  - Minimize the generation of waste and disposal.
  - Offer eco-friendly products.
- Life Cycle of the product during procurement.
- Sustain appropriate development programs for our employees and suppliers.
- Comply with all environmental legislative and regulatory requirements in procurements in the procurement of the product.
- Make this policy available to all our employees and business partners

April 2022

Bhanu Prakash Singh
Unit Head

Focus Area

- Implementation of green procurement guidelines.
- Logistics & % reduction of the GHG emissions from transportation.
- Purchase of green certified products or materials.
- Targets, action plan and resource allocation
- Awareness creation and Training program for suppliers, vendors, associates, etc.

Sl. No	Strategy	Initiatives & Action Plan	Short Term 2022 - 23	Medium & Long Term 2023-25
1	Reducing Environment Impact	Utilization of inward trucks for outbound movement through reverse logistics.	Increasing to 4.5% utilization of inward trucks.	Increasing to 10% utilization of inward trucks.
		Sourcing of Briquettes & Agro-waste at sustainable basis.	To procure 45000 MT Briquettes & 25000 MT Agro-waste per annum through multiple sources.	To procure 60000 MT Briquettes & 40000 MT per annum Agro-waste through multiple sources.
		Increase in percentage of rail movement for Cement dispatch as compared to road movement.	45% through rail movement and 55% through road movement.	55% through rail movement and 45% through road movement.
		Increasing of bulk cement dispatch percentage (For lesser consumption of packing bags).	15% of cement dispatch through Bulk loading (Loose Cement).	25% of cement dispatch through Bulk loading (Loose Cement).
2	Sourcing of energy efficient products	Energy efficient products (Star Rated) products to be procured	Already in practice replaced all vapor bulbs with LED lamps and Unrated refrigerators & AC with Star rated products.	100% LED lamps and Star rated refrigerators & AC.
3	Chalking out critical vendors	Critical vendors have been listed out based on green environment perspective.	To achieve green environment prospective by monitoring 5 critical suppliers on Energy, Water and Waste conservation parameters.	To achieve green environment prospective by monitoring remaining critical suppliers on Energy, Water and Waste conservation parameters.
4	Hiring of latest BS norms vehicles	Hiring of latest BS norms vehicles for lesser carbon emission.	60% of hired Tippers and gate pool vehicle with BS-VI norms.	90% of hired Tippers and gate pool vehicle with BS-VI norms.
5	Battery operated & CNG vehicle	Hiring of Battery operated & CNG vehicle	1 vehicle	3 vehicles
6	Vendor Collaboration	Vendor Connect	Conduct vendor meet by Dec-22	Feedback survey from vendors for customer satisfaction