Ambuja Cements Ltd
Unit Bhatapara

Team Members

1. Mahaveer Singh Bolia (Chief Operation Manager)
2. Anil Kumar (Associate General Manager- Production)
3. Dhiraj Kumar Gupta (Associate Manager-Technical)

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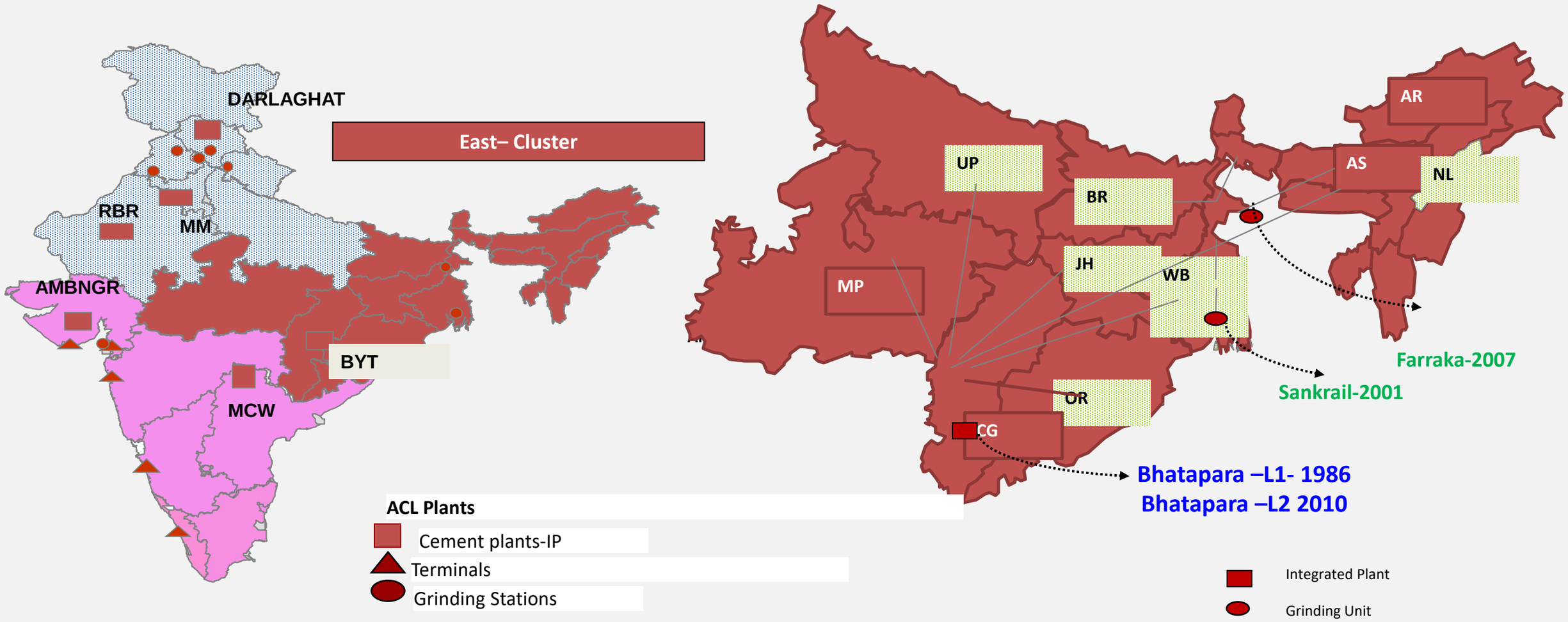
Geographical view



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Introduction

Ambuja Cements Limited (ACL,Bhatapara) is a leading manufacturer of various types of cements in India.Bhatapara has always been in the forefront to undertake environmental safeguards & improvement initiatives.

Bhatapara, ACL are certified to Environment Management System (ISO-14001), Quality Management system (ISO-9001), Occupational Health & Safety (ISO-45001), Energy Management System (EnMS)(ISO-50001).

To further add value to its customers, the company has launched innovative products like **Ambuja Roof Special, AmbujaKawach and Ambuja Cement Compocem**. The new products not only fulfil important customer needs but also help in significantly reducing carbon footprint.Ambuja Cements Limited, Bhatapara is the industry leader in responsible use of resources, both natural and man-made. Bhatapara stands way ahead of its peers for its management of natural resources, energy management, carbon emissions reduction, conservation of water resources and biodiversity, and management of waste.

Bhatapara Unit has been **certified 7.38 times water positive,** a feat achieved through conservation efforts and increasing water efficiency in its plants. Eco-friendly operations & mining practices, **100% restoration of mined area, recycling of sewage**, **zero discharge of waste water**, **emissions below prescribed norms are only a few of these measures.**

Ambuja Cements Limited (Unit: Bhatapara) has its existing Integrated Cement Plant for Cement Production Capacity **(3.5Million TPA),** Clinker Production Capacity **(4.8 Million TPA Line 1- 1.7 MTPA Line 2- 3.1 MTPA),** Captive Power Plant (63 MW) **with WHRS (18 .0 MW).**at village “Rawan”, Taluka Balodabazar, District- Balodabazar (Chhattisgarh) .

M/s. Ambuja Cements Limited (Unit: Bhatapara) is proposing an Expansion of Integrated Cement Plant - **Clinker (4.8 to 8.1 MTPA), and WHRS (25 MW) by Installation of New Line – III at Village: Rawan, Taluka: BalodabazarDistrict:Balodabazar - (Chhattisgarh).**

Electricity generation from WHRS:

Bhatapara Unit having**18 MW WHRS** for electricity generation by using waste heat from the existing Cement plant. This initiative helps in saving of natural resources – Coal and also help in CO2 emission reduction.

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Plant Bhatapara-1
Quarry to Lorry

Clinkering Capacity : 1.7 MTPA,
Cement Capacity - 3.5 MTPA

Quarry

- Rawan Mines
- Maldi Mines

Crusher

- Limestone Crusher 600 TPH .
- O & K Make
- Motor- 950 KW

Raw Mill

- 1 VRM -270 TPH Krupp Make
- 3.5 % residue on 212 micron

Blending Silo

- 1 X 16500 MT Krupp Make

Kiln

- 1 Dry Process Kiln 4 stage Double String Preheater 3300 TPD Krupp Make
- 4.4 m Dia x 65 m Length
- Cooler - Krupp

Clinker Silo

- 1 Silo- 100000 MT
- 1 Silo – 25000 MT
- Clinker stock Pile- 100000 MT

Coal Mill

- 30 TPH Ball Mill
- Krupp Make

Cement Mill 1 ,2 & 3

- Existing: 3 Mills X 125 TPH Krupp Make.
- VRPM in CM-2 , Make krupp polysius.

Cement Silo

- 5 Cement Silos
- 2 FA Silos
- 4 CM Silos of Capacity 5000 MT,
- One silo of Capacity- 7000 MT.

Packing House

- 7 Packers Machine
- 4 X 120 TPH
  2 X180 TPH
  1 X 240 TPH
  Make- EEL

Dispatch

- 16 Wagon Loader
  8 X 120 TPH
  8 X 100 TPH.

- 5 Truck Loader
- 120 TPH X3
- 90 TPH X 2
- Bulk Loading 100 TPH

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Plant Bhatapara-2

Clinkering Capacity : 3.1 MTPA

Crusher

- Limestone Crusher 1200 TPH.
- L&T Make

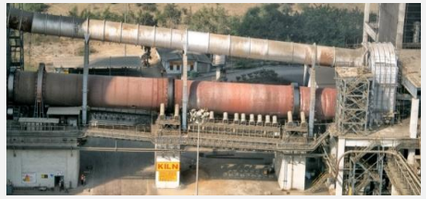
Raw Mill

- 1 VRM - 565 TPH Loesche Make
- 1.8% residue on 212 micron

Blending Silo

- 1 X 21800 MT TKIL Make

Kiln



- 1 Dry Process kiln 6 stage Double String Preheater.
- 7000 TPD Thysen Make
- 5.4 m Dia x 82 m Long, RPM - 6 (Max)
- Cooler: IKN

Coal Mill

- 93 TPH VRM.
- Loesche Make
- 1220 Kw

CPP

Cap: *63* MW = 2*15+1*33MW

WHRS – 18 MW under commissioning.

Solar- Group captive- 11 MW(Offsite Model)

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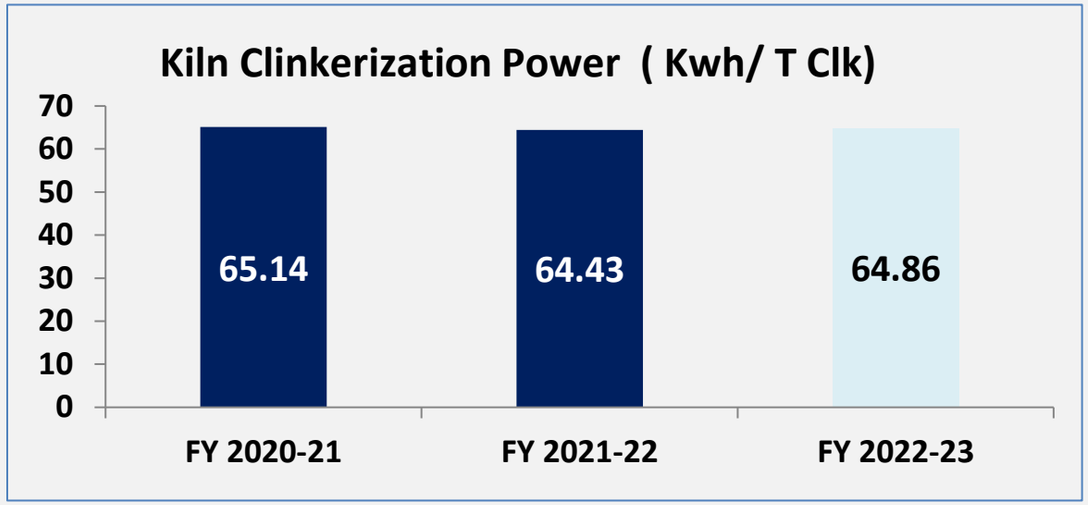
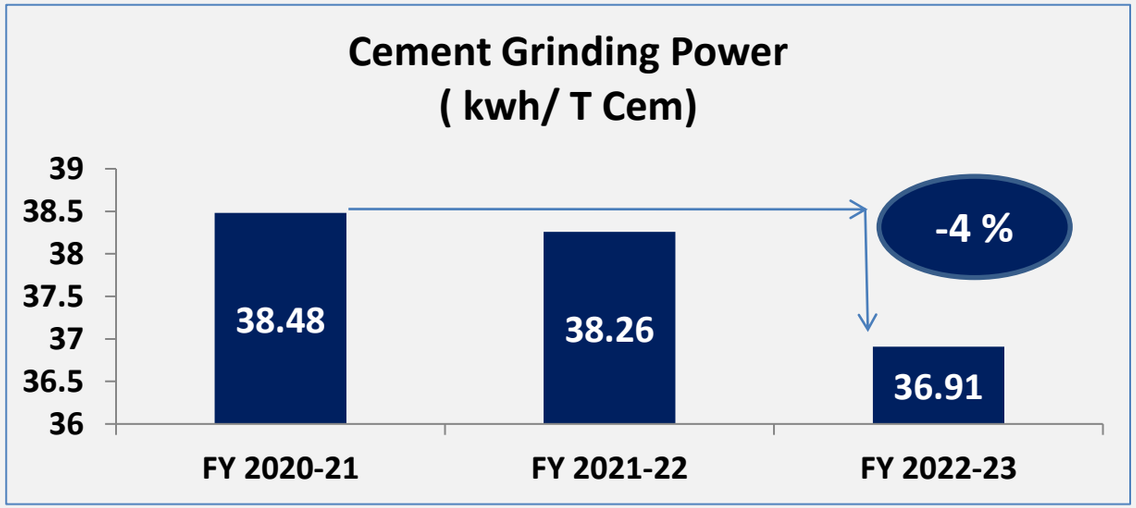
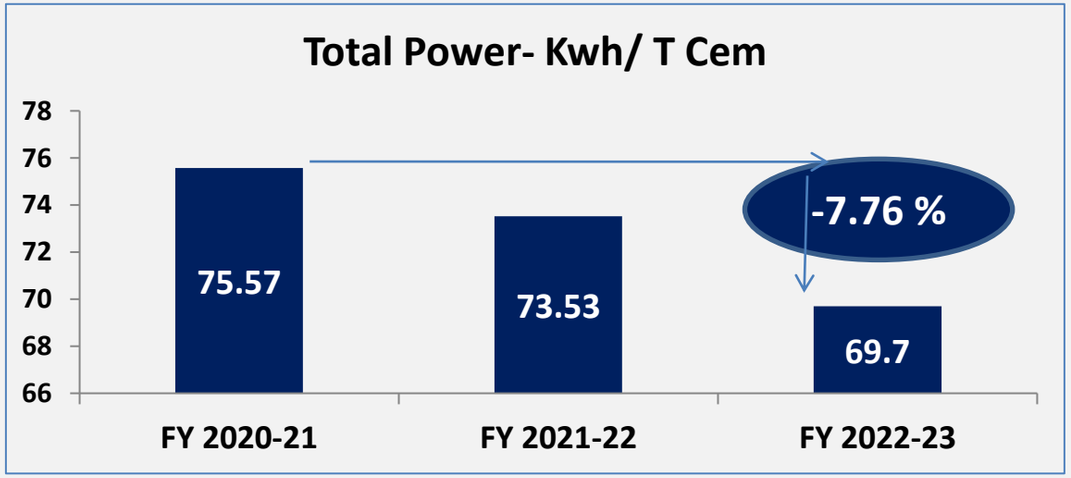
Electrical Energy Consumption Details- Last 3 years







Cement Grinding improvement Initiatives
1.Installation of new design Energy Efficient liners in CM-3 and grinding media loading optimization.
2.CM2 grinding media optimization done based on chamber sampling and process study, reduced 150 kw/ hour of maid drive load.
3.CM1, CM2 and CM3 vent fan flow optimized by PID with mill inlet draught, saving 14 kw/hour.
4. CM3 mill outlet airside blower stopped and removed from logic, saving of 22 kw/hour
5.CM3 VFD installation in osepa fan and removed fan inlet damper, saving of 0.75 Kw/T-cement

Note:- Kiln-2 Clk Power increased in FY-23 due to commissioning of Maldi crusher in Dec'22 to transport Limestone away from 2.5 Kms from Plant- Impact in SEEC-1.5 Unit/ T Clk

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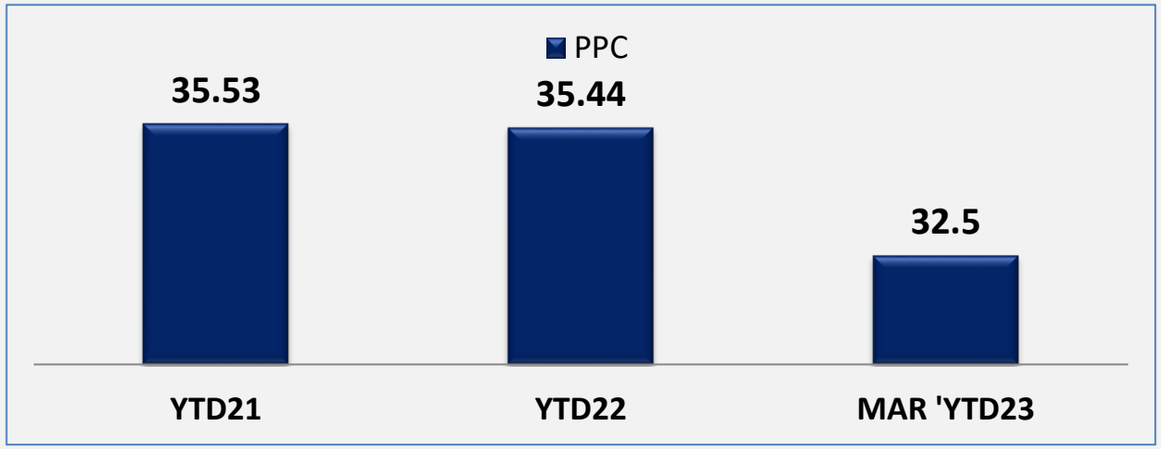
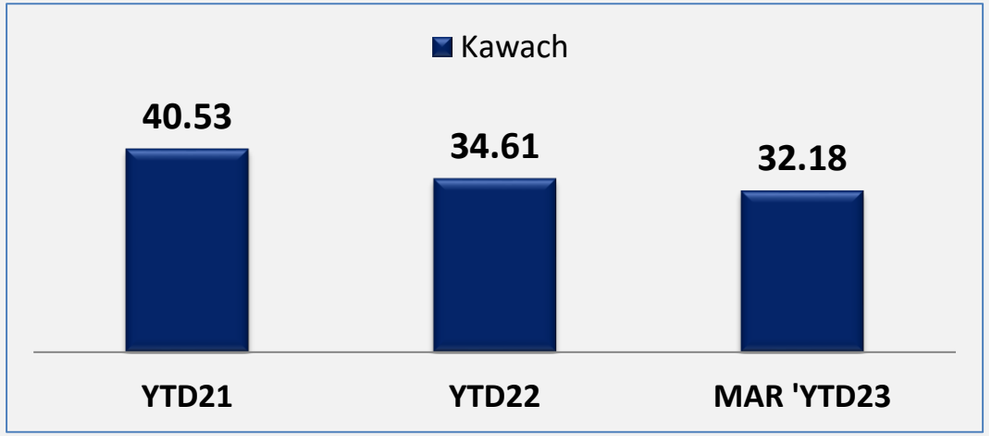
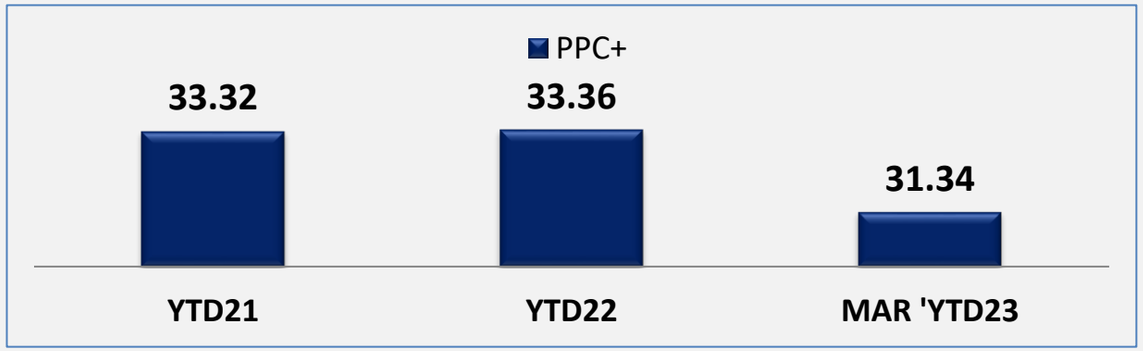
Electrical Energy Consumption Details- Last 3 years



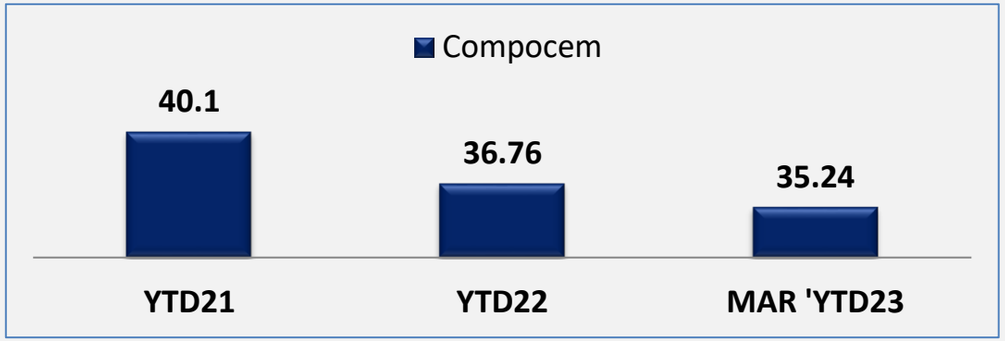
SEEC reduction in PPC



SEEC reduction in Kawach

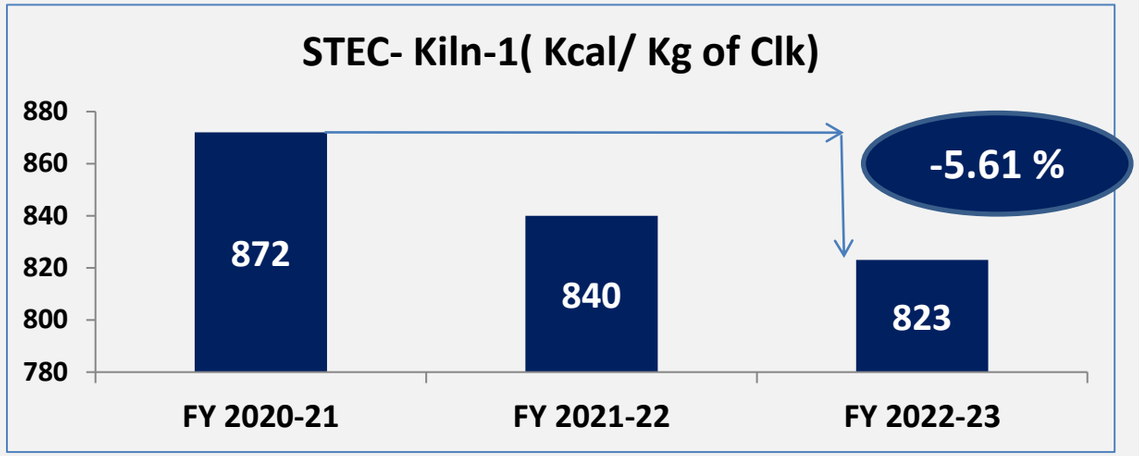


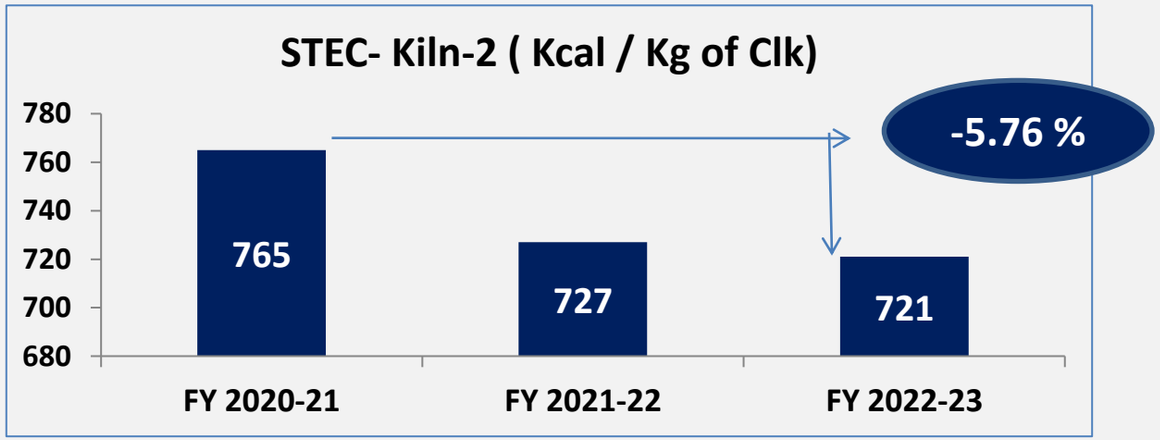
SEEC reduction in PPC+



SEEC reduction in Compocem

Thermal Energy Consumption Details- Last 3 years





Sr No.	KPI	Improvement Initiatives	Impact of WHRS
1	STEC -Kiln-1	1. Cyclone Stage 2, 3 & 4 Meal Flap made operational to reduce Gas bypass and Heat loss. 2. Replacement of Higher primary Air with lower primary Air Burner of Kiln-1. 3. Reduction of excess air by reduction of Preheater fan speed to reduce preheater exhaust gas volume. (Avoiding of material accumulation in Pyroclone by installing Air blasters and Continuous air lancing in P.H inlet and feed pipes) 4. Optimized the Cooler Bed Height to improve Cooler Reccupuration efficiency 5. Inter compartment Sealing to improve heat transfer. 6. Cooler Plate to plate gap minimized.	4 Kcal/ kg of Clk
2	STEC -Kiln-2	1.Cyclone Stage 2, 3, 4, 5 &6 Meal Flap made operational to reduce Gas bypass and Heat loss. 2. Up gradation of Cooler Kiln-2 with IKN cooler. 3. Reduction of excess air by reduction of Preheater fan speed to reduce preheater exhaust gas volume. 4. Optimization of Cooler Bed Height to improve Cooler Recuperation efficiency. 5. Cooler Plate to plate gap minimized. 6. Replacement of kiln Inlet and out seal of Kiln-2.	10 Kcal/kg of clk

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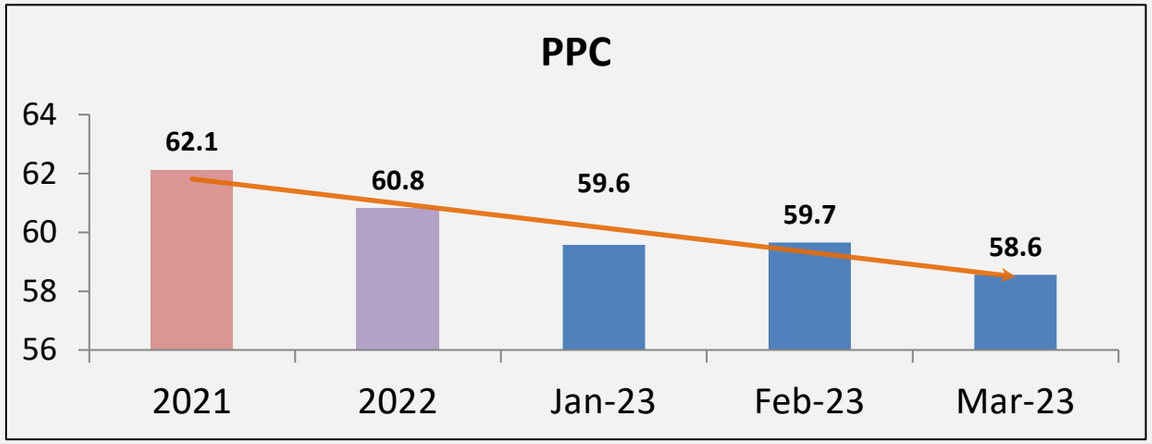
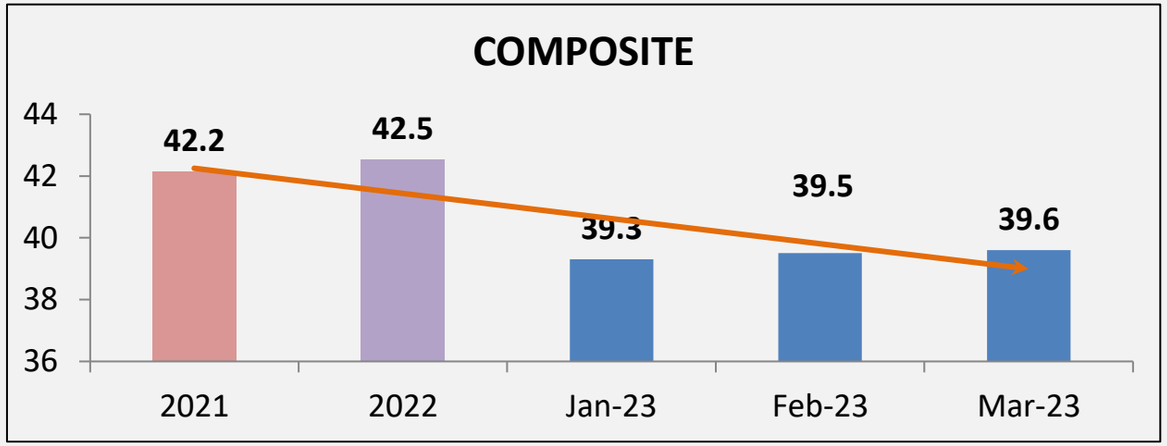
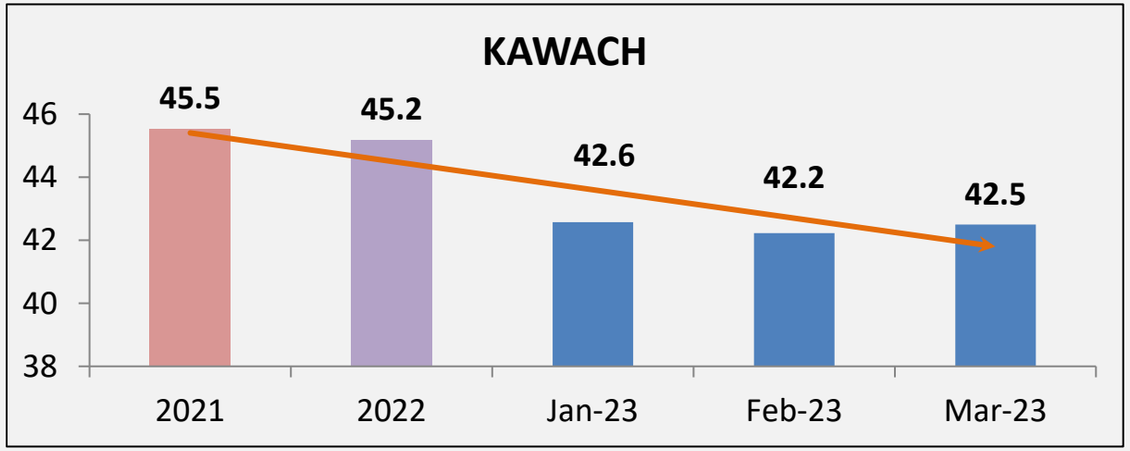
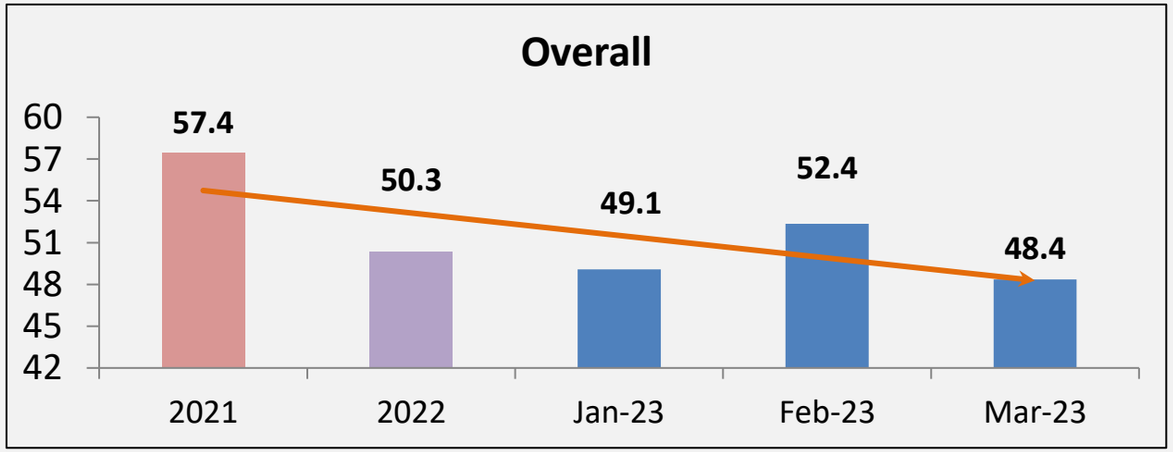
Product Wise Clinker Factor Reduction:









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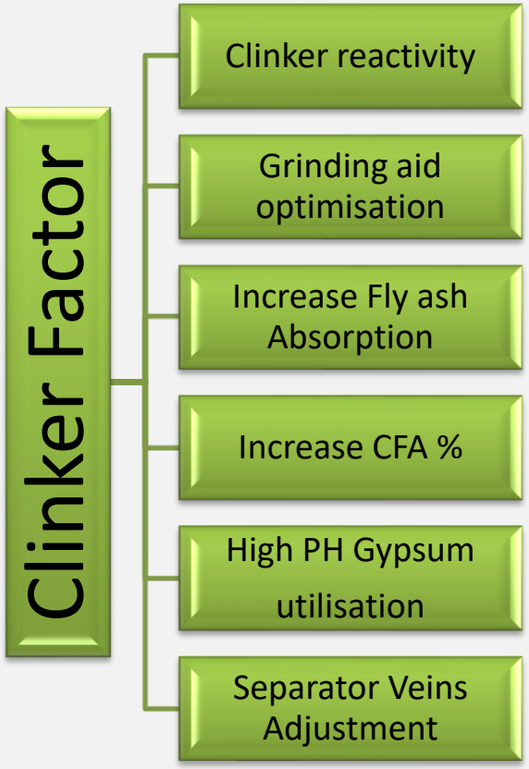
Key levers identified -



Design of solution(s) -

- Improve clinker C3S
- Increase sourcing & receipt of High PH gypsum to reduce setting time
- Grinding aid formulation change discussion with supplier without change in cost
- Fly ash bin cloth replacement to improve flow ability and increase addition of FA
- Self cleaning equipment installation viz;air blaster vibrator, Teflon liner and manual hot gas furnace for increasing CFA% in place of DFA
- Based on lab trials results ,increase addition of activated gypsum
- Separator veins adjustment to reduce bypass and improve R45 residue

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National Benchmarking-

Company	UoM	Adani	Indian Benchmarking
Parameters		ACL Bhatapara	Numbers
SEEC Clinkerization	kWh/MT Clk	K1 : 69.2 K2 : 62.7	42.6
STEC	Kcal/Kg Clk	K1 : 822 K2 : 724	675
SEEC Cement Grinding	kWh/MT Cem	36.08	VRM (PPC Grinding) - 18.8 VRM (OPC Grinding) - 23.0 VRM (PSC Grinding) - 31.9 Ball Mill + HPRG (PPC) - 18.6 Ball Mill (PPC Grinding) - 27.0
SEEC upto cement grinding	kWh/MT Cem	69.7	56.1
TSR	%	8	30
WHRS	MW	15	-

Long Term Capex to meet Benchmarking-

- Up gradation of Kiln-1 – feasibility study is going on by TKIL.
- Line 2 up gradation (600 TPD) - Cooler, Raw mill up gradations.
- Chlorine Bypass + Installation of Feeding system - L1 AFR- upto-30 %
- Chlorine Bypass + Installation of Feeding system - L2 AFR- upto-35%

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Energy Saving projects Implemented in last 3 years

Saving – 6.2 Mio Units

S.No.	Measure	Annual Savings		Investment
		Lac Kwh	Rs Lac	Rs. Lac
1	Bag house - Bags Change for both Line-1 & Line-2	8.71	52.27	280
2	Use Sonic Soot Blower for Flue gas existing temp control for Boiler No-4		136.38	25
3	Ejector Vacuum Pump for CPP	19.31	115.86	70
4	High Efficiency Cooling Water Pumps for CPP Cooling Water Pumps	4.59	27.56	25
5	Replacement of Conventional lights with LED lights	6.36	38.17	59.35
6	Reciprocating Vs Screw Compressors	6.65	39.92	120.00
7	Cyclone modification -for Line-2 Raw Mill fans (362-FN1/2)	7.92	47.52	40.00
8	Cyclone and duct modification for Cement Mill-02	1.98	11.88	20.00
9	MVVFD installation -Cement Mill-3 OSepa fan	2.77	16.62	50.00
10	VFD installation for Cooling Water Pumps	3.96	23.76	100.00
11	Waste Heat Recovery System		5987.52	16600.00
Total		**62.26**	**6497.46**	**17389.35**

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Proposal - Energy Saving projects Fy-23-24

	(B) Under Implementation	Proposed Projects & Estimated Energy Saving for FY 2023-24					
S.No.	Description of Energy Efficiency Improvement Measures		Investment (Lac Rs.)	Verified Savings (Lac Rs.)	Verified Annual Energy Savings	Unit	Fuel
1	Screw Compressor with VFD to be installed inplace of Reciprocating compressor for Bulker unloading	Process	35.85	14.26	237600	kWh	Electricity
2	Screw Compressor with VFD to be installed inplace of Reciprocating compressor for Dense Phase	Process	35.89	14.26	237600	kWh	Electricity
3	Cement Mill-1 osepa fan (563 FN3)HT motor starter to be changed from GRR mode to LT Motor with VFD	Process	57.00	14.256	237600	kWh	Electricity
4	Replacement of conventional lights with LED lights (20W-9W,28W-18W, 36 W-18W, 40W-18W,HPSV 70W-40W,80W-40W,150W-40W,250W-90W,400W-200W)	Illumination	29.35	31.90	531732	kWh	Electricity
	Total		**158.09**	**74.67**	**1244532**		

Long term Proposal - Energy Saving projects Fy-24-25 to meet Benchmarking

Plant	Head	Area	Initiatives	Impact Lever	KPI Movement	Total Capex Cr
Bhatapara	Major Capex	AFR	Chlorine Bypass + Installation of Feeding system - L1	TSR	0.3% -> 30%	76
Bhatapara	Major Capex	AFR	Chlorine Bypass + Installation of Feeding system - L2	TSR	7.8% -> 35.0%	59
Bhatapara	Minor Capex	Specific Heat	Line 2 up gradation (600 TPD) - Cooler, Raw mill up gradations	Sp. Heat	15 Units	60
Bhatapara	Major Capex	WHRS	WHRS upgrade	MW	28.50	170
Bhatapara	Major Capex	Renewables	Solar	MW	10.00	100
Bhatapara	Minor Capex	Raw Material & Mining	Automation of Material Handling system.	Material Handling		25

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Installation of Reactive Power Management System at CPP

Investment : 16.5 Lac Rs.

Savings Achieved :
64 Lac Rs in 2 Months (Dec- Jan)

Saving Estimated in 2023 :
Approx. Rs 2 Crore plus by reduction in Grid Bill at grid cost of Rs 6.33 per unit , Duty and cess.

- Reduction in KVAH Billing due to improvement in power factor.
- Automatic pf control system by controlling the STG excitation system.
- Savings of approx. 30 Lacs per month achieved .
- Project Cost 16.5 Lacs only.
- Useful to install where we have CPP run parallel with grid and billing is done in KVAH or pf incentive is there.
- Ordered in Nov-22 and Commissioned in Dec-22

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Installation of Reactive Power Management

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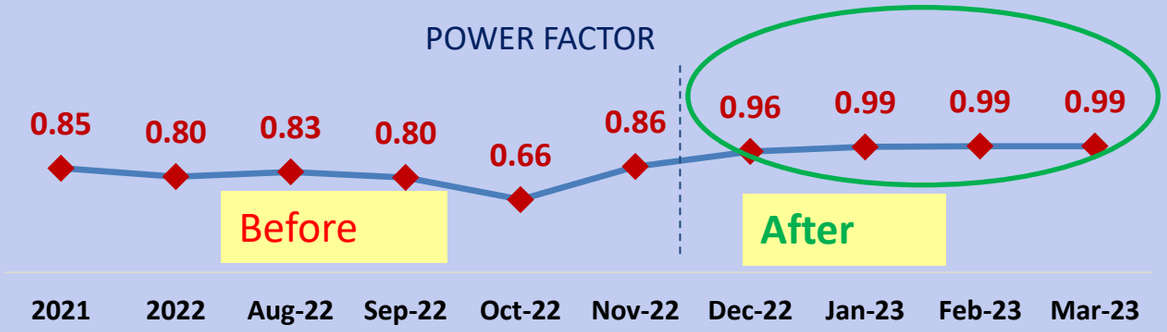
Results - KPI Improvement (Before & After Trend)



Benefits (Quantitative/ Qualitative)

- Rs 9 / t cement considering 2.7 Mio T Vol.
- Rs 2.5 Cr/ annum

Actual/ Projected Savings

- Capex – 16.5 Lac INR
- Payback – 2 Months

Why improvements will stay (Control Plan)

- Automatic controller and logic to control the grid power factor.
- Online and continuous motoring .
- Shift wise and daily report generation for variance analysis .
- SOP for the power factor control.
- 24 Hrs Monitoring by shift staff at CPP CCR .

Applicability to other plants

- It can be installed at all plants having CPP with grid parallel operation and the states where invoicing is done on KVAH in place of the KWH incentive / Penalty clause for pf are applicable.

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Utilization of Renewable Energy Source Solar -11.5 MW (Offsite Model)

Onsite Generation				
Year	Technology (Solar/wind/Biomass etc)	Installed Capcity (MWp)	Consumption (million kWh)	% of overall electrical energy consumption
FY 2020-21	**Solar**	**0.3**	**0.13**	**0.04**
FY 2021-22	**Solar**	**0.3**	**0.10**	**0.03**
FY 2022-23	**Solar**	**0.3**	**0.11**	**0.04**
Offsite Generation				
Year	**Technology (Solar/wind/Biomass etc)**	**Installed Capacity (MWp)**	**Consumption (million kWh)**	**% of overall electrical energy consumption**
FY 2020-21	**Solar**	**11.5**	**0**	**0.0**
FY 2021-22	**Solar**	**11.5**	**4.97**	**1.4**
FY 2022-23	**Solar**	**11.5**	**15.67**	**4.9**

Waste utilized as fuel at TPP				
Year	**Waste as Fuel**	**Qty (T)**	**GCV (Kcal/kg)**	**Waste % of Tota l Fuel**
FY 2020-21	**AFR**	**10488**	**2420**	**2.66**
FY 2021-22	**AFR**	**19225**	**2452**	**2.8**
FY 2022-23	**AFR**	**14621**	**2820**	**3.41**

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9	Waste Utilization
10	GHG Inventorisation
11	EMS system
12	Net Zero Commitment

Waste Utilization- Last 3 Years

Year FY	Waste of fuel	Qty(Mt)	NCV (Kcal/Kg)	Waste as Percentage of Total fuel
2020-21	AF	49711	2072	**8**
2021-22	AF	80172	2206	**12**
2022-23	AF	85902	1921	**15**

Conversion of Screw of Multiplex to Belt conveyor

Title: Installation of New Belt conveyor in place of Multiflex Screw

Function: AFR Co-processing Location: Bhatapara L-2

- For the last 3 years as AF consumption has increased the multiflex dosing system had several breakdowns i.e. failure of GB,Shaft,Screw wear, Casing wear, these breakdowns badly impacted our consumption as well as the %TSR.
- We were not getting required support from OEM

How was the Challenge resolved?

- After brainstorming session, it was decided to replace the multiflex Screw & Casing with a normal conveyor belt (called Sacrificial Belt).
- Later normal belt converted into weighing circuit (Weigh Feeder).
- HIRA , MOC and FRA.
- Fire detection and suppression system installation

- Insights:- Development of drawing, fabrication & erection of structure, finding out the motor and GB, Arrangement of small but important machine i.e.rollers,idlers etc.
- Time line – job finished within 7days
- Savings - %TSR improved from 3% to 10% ~, GAV - ~ 2.0 Lacs/day

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GHG REDUCTION ACTION PLAN SHORT TERMS/LONG TERM

Ambuja has taken CO2 emission intensity reduction measures such as

- Clinker factor reduction
- Improving Thermal Substitution Rate (TSR)
- Installing Waste Heat Recovery System (WHRS)
- Reducing Thermal & Electrical Energy intensities
- Increasing renewable energy consumption
- Adoption of new technologies.

- For raw material transportation decrease in lead distance.
- 100 % fly ash utilization of own captive power plant .
- Reduction in clinker content 2 % in cement production .
- Increase in TSR 10 % to 25 %.
- WHRS 18 mw fully utilization
- New proposed line 3 WHRB 25 MW installation before end of 2024.
- Using solar power 10 mw.

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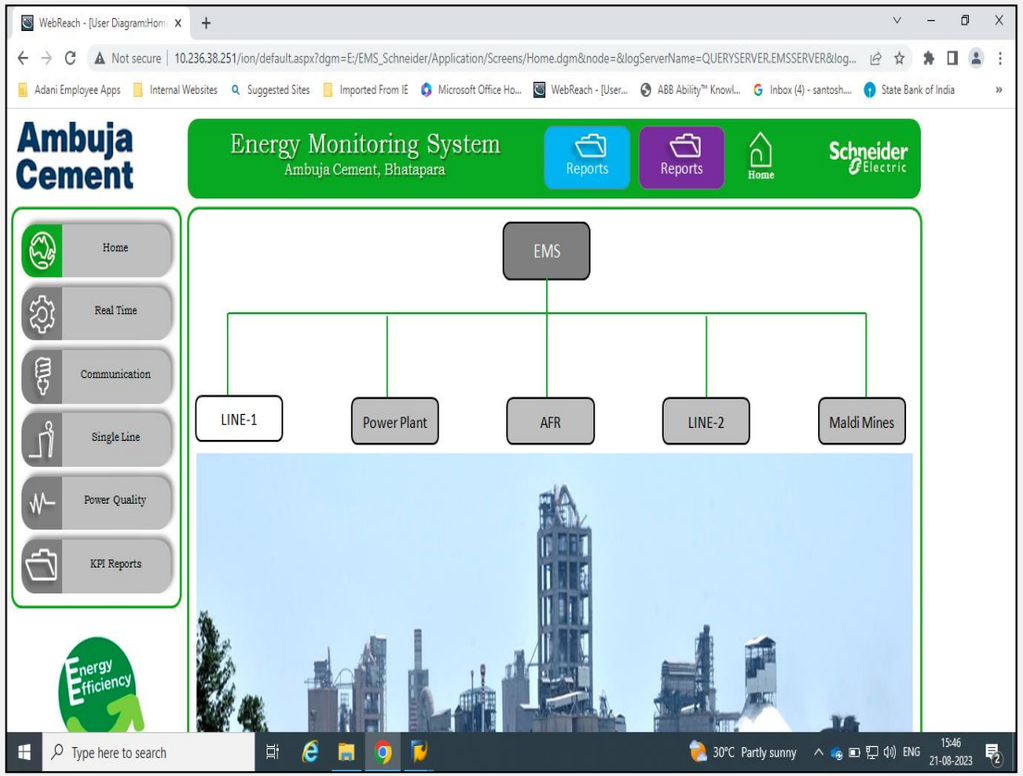
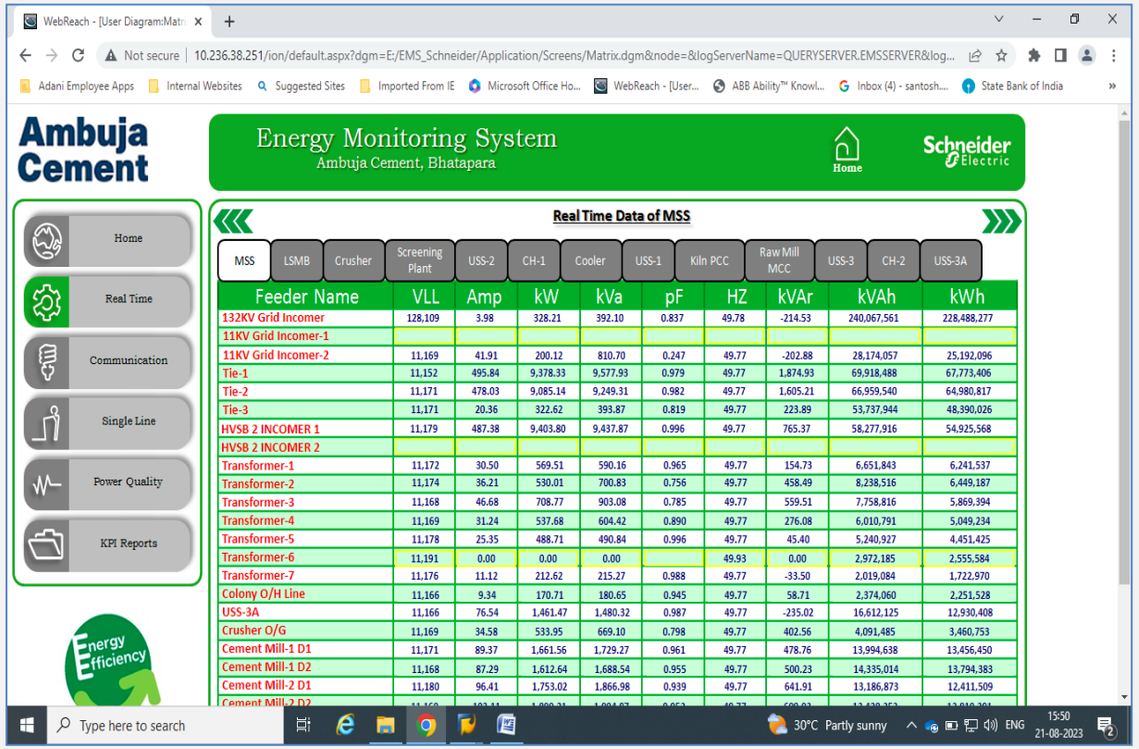
Energy Management System - Bhatapara





Feeder Name	VLL	Amp	kW	kVa	pF	HZ	kVAr	kVAh	kWh
132KV Grid Incomer	128,109	3.98	328.21	392.10	0.837	49.78	-214.53	240,067,561	228,488,277
11KV Grid Incomer-1									
11KV Grid Incomer-2	11,169	41.91	200.12	810.70	0.247	49.77	-202.88	28,174,057	25,192,096
Tie-1	11,152	495.84	9,378.33	9,577.93	0.979	49.77	1,874.93	69,918,488	67,773,406
Tie-2	11,171	478.03	9,085.14	9,249.31	0.982	49.77	1,605.21	66,959,540	64,980,817
Tie-3	11,171	20.36	322.62	393.87	0.819	49.77	223.89	53,737,944	48,390,026
HVSB 2 INCOMER 1	11,179	487.38	9,403.80	9,437.87	0.996	49.77	765.37	58,277,916	54,925,568
HVSB 2 INCOMER 2									
Transformer-1	11,172	30.50	569.51	590.16	0.965	49.77	154.73	6,651,843	6,241,537
Transformer-2	11,174	36.21	530.01	700.83	0.756	49.77	458.49	8,238,516	6,449,187
Transformer-3	11,168	46.68	708.77	903.08	0.785	49.77	559.51	7,758,816	5,869,394
Transformer-4	11,169	31.24	537.68	604.42	0.890	49.77	276.08	6,010,791	5,049,234
Transformer-5	11,178	25.35	488.71	490.84	0.996	49.77	45.40	5,240,927	4,451,425
Transformer-6	11,191	0.00	0.00	0.00		49.93	0.00	2,972,185	2,555,584
Transformer-7	11,176	11.12	212.62	215.27	0.988	49.77	-33.50	2,019,084	1,722,970
Colony O/H Line	11,166	9.34	170.71	180.65	0.945	49.77	58.71	2,374,060	2,251,528
USS-3A	11,166	76.54	1,461.47	1,480.32	0.987	49.77	-235.02	16,612,125	12,930,408
Crusher O/G	11,169	34.58	533.95	669.10	0.798	49.77	402.56	4,091,485	3,460,753
Cement Mill-1 D1	11,171	89.37	1,661.56	1,729.27	0.961	49.77	478.76	13,994,638	13,456,450
Cement Mill-1 D2	11,168	87.29	1,612.64	1,688.54	0.955	49.77	500.23	14,335,014	13,794,383
Cement Mill-2 D1	11,180	96.41	1,753.02	1,866.98	0.939	49.77	641.91	13,186,873	12,411,509
Cement Mill-2 D2									

Monitoring of Energy Parameters through Energy Management System on daily Basis.

Content

ACL's Net Zero Pledge and Science Based Target Initiative (SBTi)

During September, 2021, Ambuja became the second company (after our subsidiary ACC being the first) in the Indian construction sector to sign the Net Zero pledge and join the "Business Ambition for 1.5°C" where we commit to set a long term science based target to reach Net Zero value chain greenhouse gas (GHG) emissions by no later than 2050 and to set interim Science Based Targets (SBTs) in line with the criteria and recommendations of the Science Based Target Initiative (SBTi).

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

info@sciencebasedtargets.org
www.sciencebasedtargets.org

Approved science-based target

The Science Based Targets initiative has validated that the corporate greenhouse gas emissions reduction target(s) submitted by

Ambuja Cements Limited

have been deemed to be in conformance with the SBTi Criteria and Recommendations (version 4.2). The SBTi's Target Validation Team has classified your company's scope 1 and 2 target ambition and has determined that it is in line with a well-below 2°C trajectory.

The official target wording is:

Ambuja Cements Limited commits to reduce Scope 1 and Scope 2 GHG emissions by 21% per ton of cementitious materials by 2030 from a 2020 base year. With this target Ambuja commits to reduce scope 1 GHG emissions by 20% per ton of cementitious material and scope 2 GHG emissions by 43% per ton of cementitious materials in this timeframe.

** The target boundary includes biogenic emissions and removals from bioenergy feedstocks.*

Date of issue: Sep, 2021

Certificate Number: AMBU-IND-001-OFF

An initiative by CDP WORLD RESOURCES INSTITUTE WWF

As per the validated SBT, Ambuja Cements Limited commits to reduce Scope 1 and Scope 2 GHG emissions by 21% per ton of cementitious materials by 2030 from a 2020 base year. With this target Ambuja commits to reduce scope 1 GHG emissions by 20% per ton of cementitious material and scope 2 GHG emissions by 43% per ton of cementitious materials in this timeframe.
These targets cover greenhouse gas emissions from company operations (scopes 1 and 2) and are consistent with reductions required to keep the global warming to well-below 2°C. The same can be viewed in the SBTi Website in the link given below:

GHG TARGETS & NET ZERO

Target summary

Near term: Well-below 2°C by 2030

Net zero: We are committed for "Net-Zero" emission ambition by 2050.

Target

Ambuja Cements Limited commits to reduce scope 1 and scope 2 GHG emissions by 21% per ton of cementitious materials by 2030 from a 2020 base year. With this target Ambuja commits to reduce scope 1 GHG emissions by 20% per ton of cementitious material and scope 2 GHG emissions by 43% per ton of cementitious materials in this timeframe.

adani

Growth with Goodness

Thank You

adani