CII National Awards for Excellence in Energy Management 2024

UNIT NAME : ACC LIMITED,MADUKKARAI CEMENT WORKS

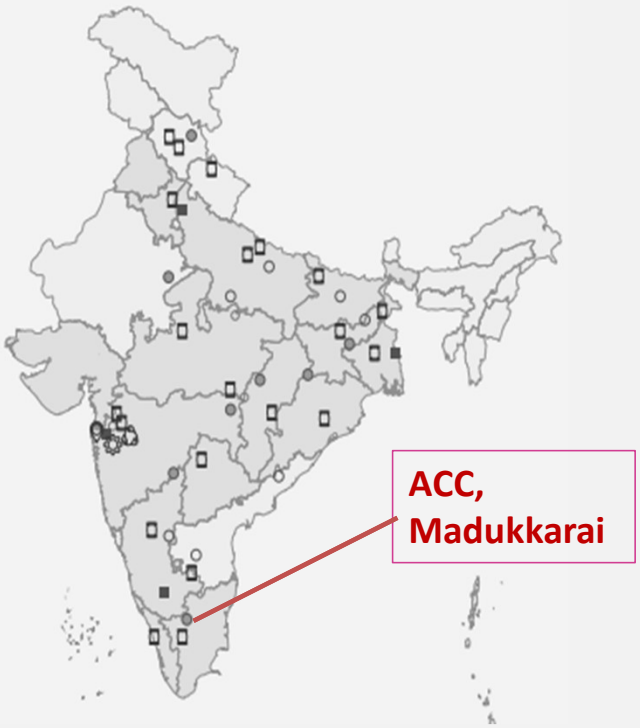
PRESENTED BY :

Mr. Anand Babu
Mr. Saravanan Duraiswamy

Company profile

ACC Limited, Madukkarai

Group capacity	: 73.6 MTPA
Total units in India (IP+GU)	: 30 units
ACC, Madukkarai capacity	: 1.0 MTPA
Plant commissioned	: 1934
Conversion from IU to GU	: 2020
Product mix	: 100% PPC

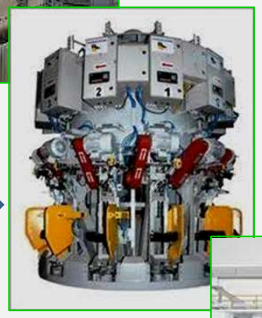


Process and Specification

Gantry for Raw material storage

VRPM Pregrinder

Ball mill Operation

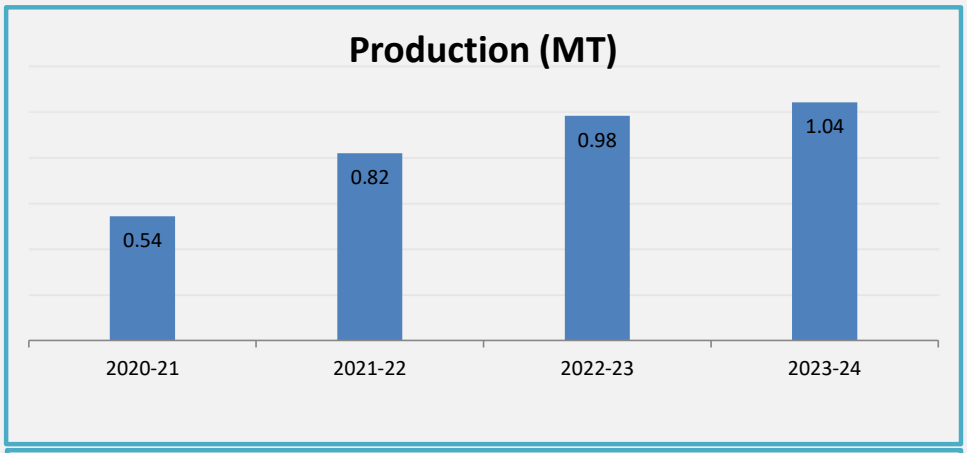


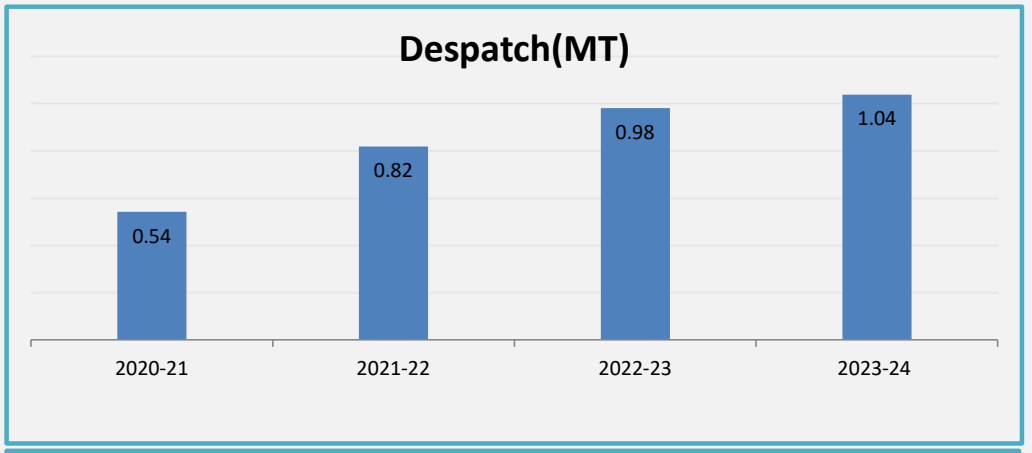
Packer Operation

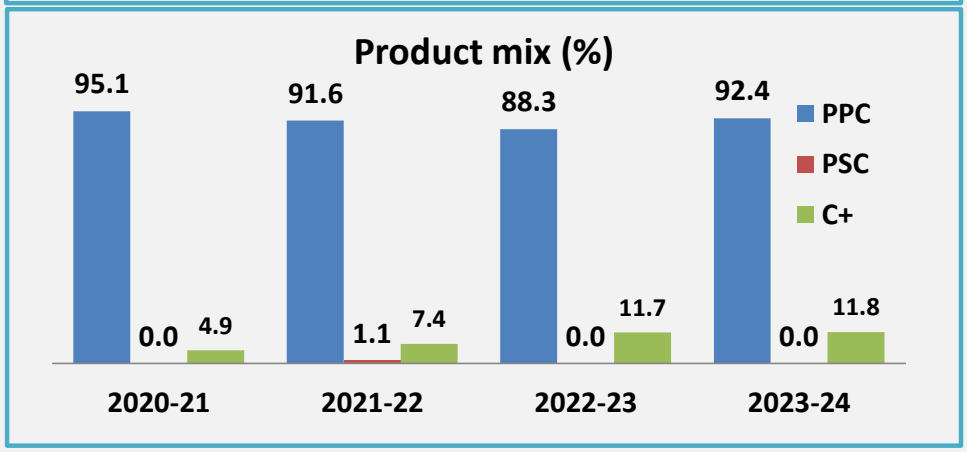
Truck Loading

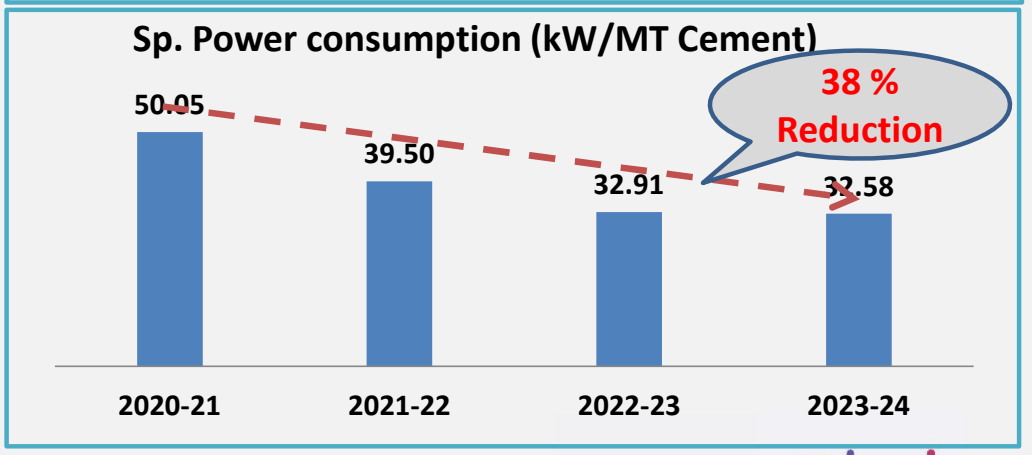
Equipment	Supplier	Capacity
Cement mill		
VRPM	AMCL	180
Ball mill	ABB	140 tph
Cement Silo		10000 MT
Packing & Loading		
Packer-1	ACC	40 TPH
Packer-2	EEL	60 TPH
Packer-3	Enexco	120 TPH

Product mix and Sp. Energy consumption





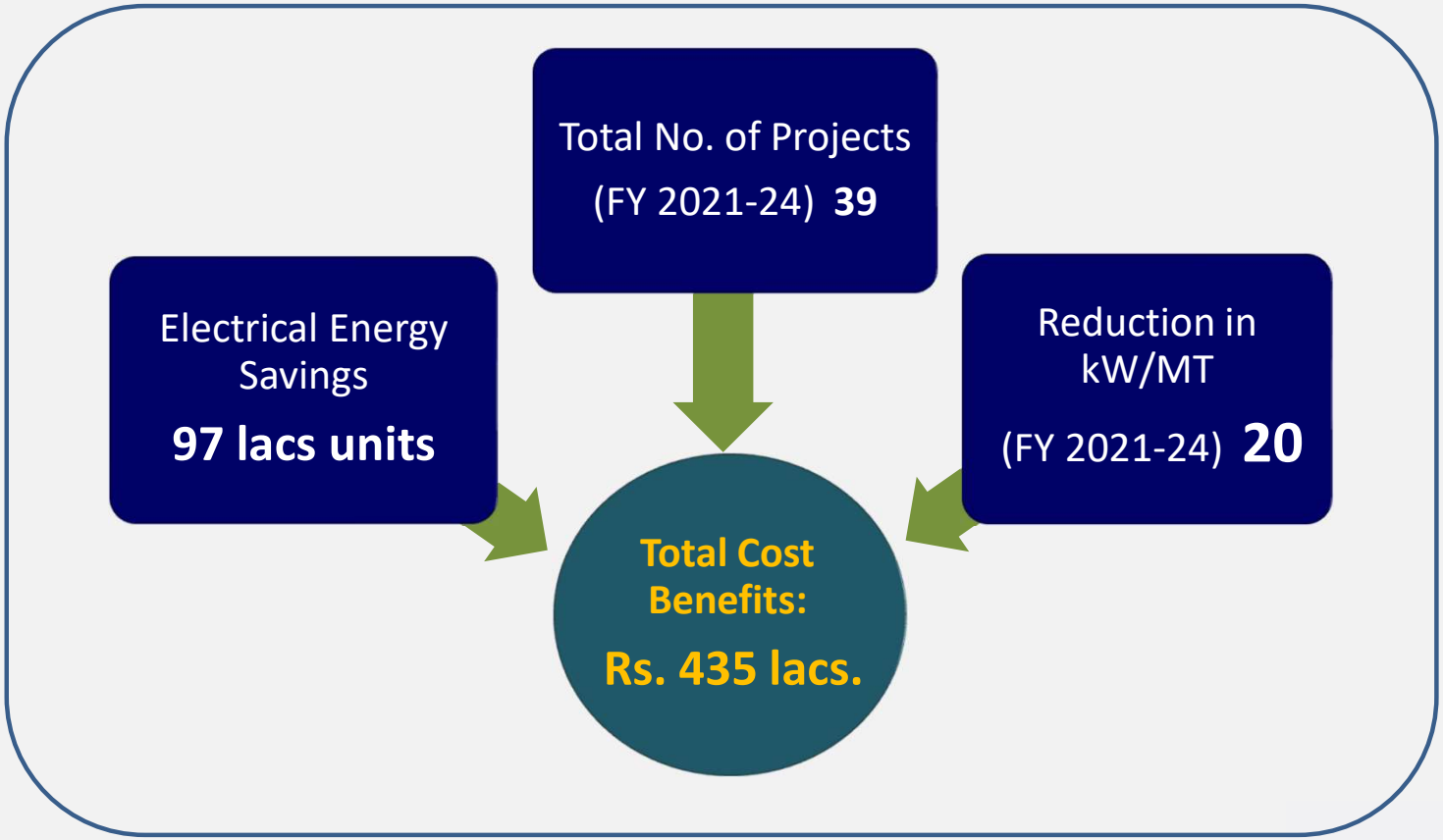




List of projects Planned in FY2024-25

S. No	Title of Project
1	Cement mill Separator up gradation
2	Converting DFA pneumatic conveying to Mechanical conveying
3	Replacement of reciprocating compressor to Screw compressor for DFA unloading
4	BCFC wagon for DFA receipt

Energy Saving projects in last three years



4. Energy Saving projects in last three years

Year	No of Energy Saving Projects	Investment (INR Million)	Electrical Savings (Lakhs kWh)	Savings (INR Million)	Impact on SEC (kWh/t)
2021-22	3	1	28.1	12.7	2.7
2022-23	25	15	38.8	17.1	9.3
2023-24	11	20	30.5	13.7	8.1

Energy Saving projects in last three years

S.No	Title of Project	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Investment Made (Rs million)	Impact on SEC (kWh/t)
1	VVF Drive Installation for RC Fan instead of GRR Saving	130000	0.58	4.5	0.13
2	250 KW Compressor Installation with VVF For D-Pump in Place of 2 X 165 KW Saving	680000	3.03	4	0.68
3	Reduction of Transformer losses	237037	1.1	0	0.24
4	Confined space / Tunnel lighting to be separated from plant lighting	29630	0.1	0	0.03
5	Switch of the kiln CEMS & CPP CEMS	96296	0.4	0	0.1
6	6.3 MVA transformer to be taken in line instead of 8 MVA transformer	37037	0.2	0	0.04
7	Plant and Colony Transformer voltage optimization	74074	0.3	0	0.07

Energy Saving projects in last three years

S.No	Title of Project	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Investment Made (Rs million)	Impact on SEC (kWh/t)
8	Mill Bucket Elevator Capacity enhancement from 500 TPH to 550 TPH	231481	1	6	0.23
9	Replacement of reciprocating compressor with Screw compressor for flyash bulker unloading	231481	1	2.5	0.23
10	Process water pump replacement from 55 kw to 37 kw	88889	0.4	0.5	0.09
11	Installation of VFD for Flyash Aeration PD Blower	22222	0.1	0.2	0.02
12	Installation of VFD for FK Pump Drive	51852	0.2	0.2	0.05
13	Mill Bucket Elevator VFD drive installation	59259	0.3	0.2	0.06
14	Installation of VFD for 110 KW Flyash unloading Compressor	148148	0.7	0.2	0.15

Energy Saving projects in last three years

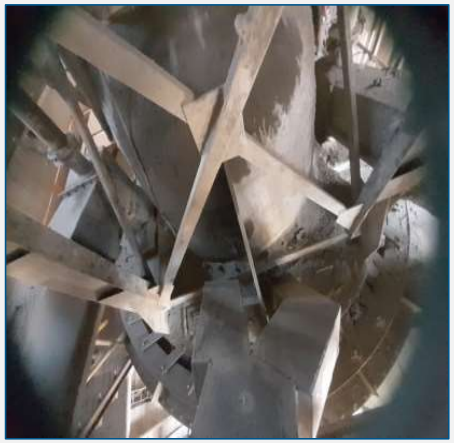
S.No	Title of Project	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Investment Made (Rs million)	Impact on SEC (kWh/t)
15	Installation of VFD for 132 KW Instrument air Compressor	111111	0.5	0.5	0.11
16	Replacement of all old water Pump with high Energy efficiency Pump.	100000	0.4	0.2	0.1
17	CFA metal hopper Weigh feeder chute modification to reduce the running hours of CFA Feeding circuit	14583	0.1	0	0.01
18	Cement mill elevator feeding hopper airslide blower to be use only during plant start up	23333	0.1	0	0.02
19	Changing of Cement product conveying from pneumatic conveying in to Mechanical conveyor	1500000	6.7	20	1.5
20	HES felt packing replacement, Static vane rotor optimisation	10000	0.4	0	0.1
21	HES Seal gap reduction	100000	0.4	0	0.1

Energy Saving projects in last three years

Mechanical Conveying for Silo 6 & 7

- Mechanical conveying system installed for PPC (85% of product portfolio) for filling in silos 6& 7.
- New air slide, Belt conveyor and Bucket elevator installed
- Increase in output by 10tph
- Reduction in Power consumption by 1.5kw/MT cement

Separator and Ball mill optimization



- Material feeding to Separator modified from 2 to 4 point
- Strict maintenance of separator inner & Outer seal gap
- Grinding media pattern optimized
- Product residue achieved <9 % on R45µ from 12%
- Mill output increased by 5tph.

Energy Saving projects in last three years

VRPM Circuit Modification

- V-Separator gas inlet duct modified
- VRPM Feed chute modified
- Roller static gap maintained within recommended range.
- VRPM dam ring height optimized
- Mill output increased by 5 tph

Separator and Ball mill optimization

- Process & D Pump Compressor in DCS operation.
- Feeding higher Blaine fly ash at mill outlet.
- Installation of VFD for Fly ash PD blower
- Optimized air slide blower operation.
- CFA metal hopper Weigh feeder chute modification.

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Innovative Projects

Ball mill Bucket Elevator Modification

Major Issues

- Mill elevator frequent tripping with boot level.
- During power failure/unexpected stoppage, downtime increased due to BE boot level
- Mill feed frequently reduced on bucket elevator power high.

Improvements executed

- Mill bucket elevator capacity enhanced by increasing the bucket width from 440mm to 490mm.
- Chain links, head and tail sprocket changed as per bucket width.
- Motor capacity remains unchanged.

Results

- Increase in Mill output by 9tph
- Power saving due to out put increase – 2.0 kWh/t

Innovative Projects

D Pump Optimization

Major Issues

- Mill tripping with D-Pump high level
- Pneumatic conveying Limitation for increasing the feed(130tph)
- Operating additional compressor to avoid D pump high level.

Improvements executed

- Level sensor in the filling bin raised by 500mm
- Cycle Time Changed to – Filling 31sec conveying 78 Sec Gap 3 Sec Total 112 Sec
- Chain links, head and tail sprocket changed as per bucket width.
- Motor capacity remains unchanged.

Results

- Increase in Mill output by 7tph
- Power saving due to out put increase – 1.05 kWh/t

Innovative Projects

Install Recirculation duct for V-Separator

Major Issues

- Less CFA consumption
- Frequent V-Separator , Baghouse bottom airslide, VRPM discharge jam
- Low material temperature. (< 40 deg)

Improvements executed

- Recirculation dust provided from BH Chimney to V-Separator.
- Additional Electrical heaters installed in Recirculation duct and Baghouse hoppers

Results

- Material jam issues eliminated.
- CFA Consumption improved by 2%

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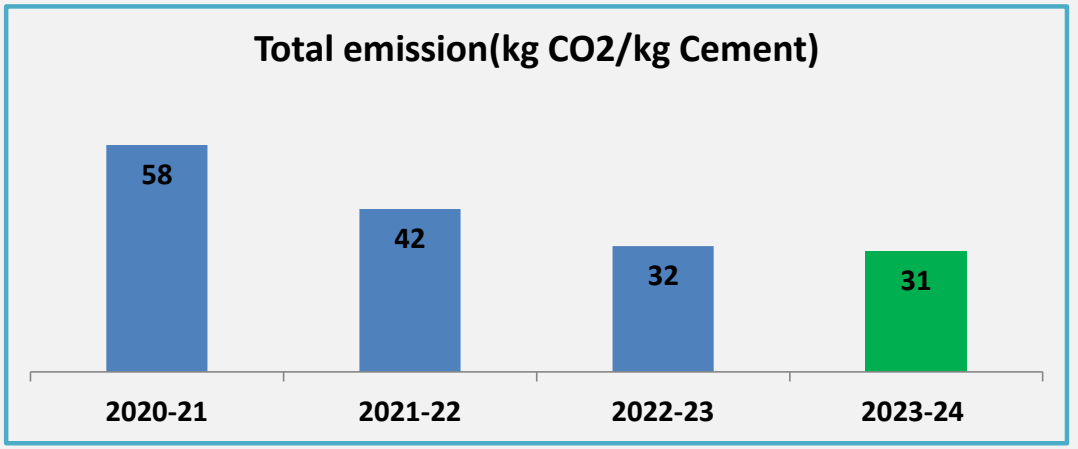
Utilisation of Renewable Energy sources

Offsite Generation

Year	Technology	Installed capacity (MW)	Consumption (million kWh)	% of Overall Electrical energy
2021-22	Wind	9	13.9	40
2022-23	Wind	9	16.1	44
2023-24	Wind	9	17.7	48

- **M/s ACC Limited having 9MW capacity of wind turbines in southern part of Tamilnadu**
- **Planned to install additional 6MW windmill in Tamilnadu.**

GHG Inventorisation

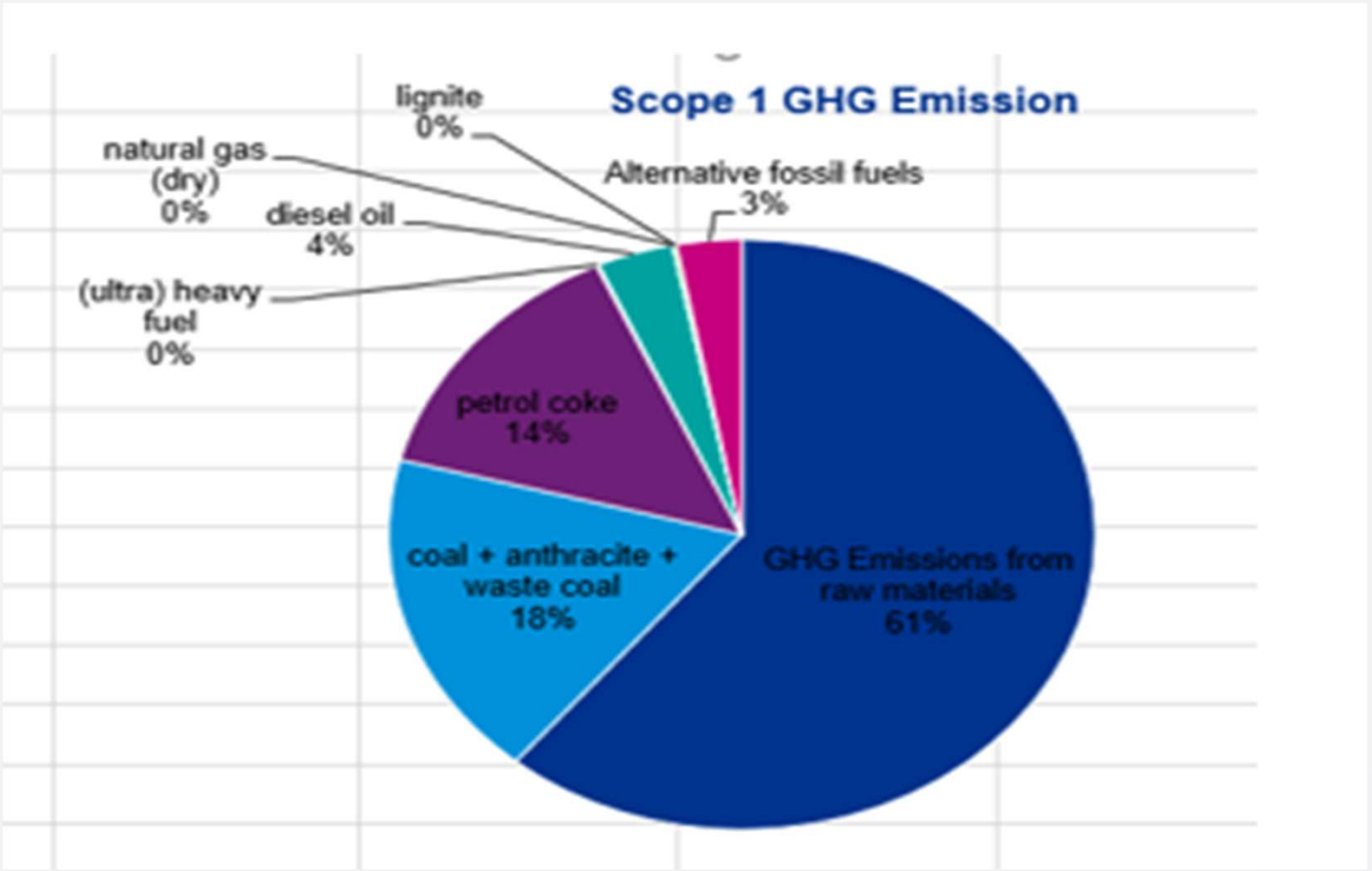


Actions Planned in 2023-24

Actions taken for Carbon capture and reduction in FY 2023 - 2024

- **Increase the Plantation in the Plant premises**
- **Implementation of Udaaan initiatives**
- **Reduce Electrical energy consumption**
- **Improve and sustain Flyash addition and reduce Clinker factor**

GHG Inventorisation- Overall ACC Level



EMS and other requirements

ACC, Madukkarai Cement Works

Daily Power Consumption Report

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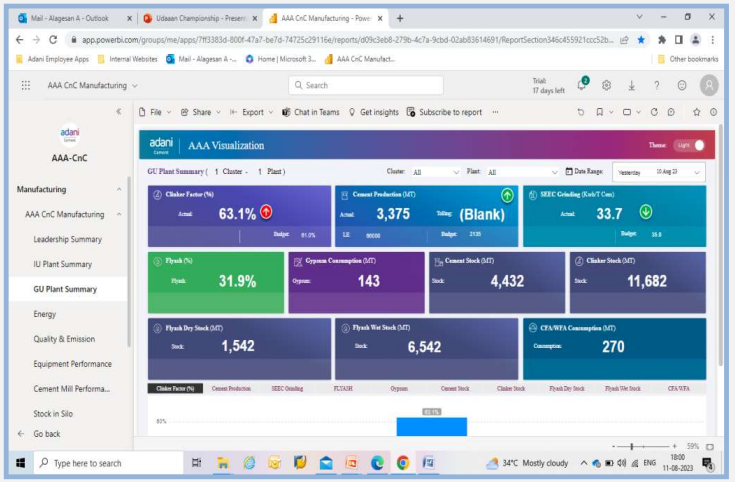
Date: 29-Jul-23

Production & Despatch	Unit		On date		MTD		YTD	
Run Hours	hrs		18.00		415.00		2162.25	
Production	MT		2615		61101		325518	
Rate of production	TPH		145		147		151	
Cement despatch	MT		2137		61484		321949	
Power Input	kWH		97188		2225509		11282755	
Gen & Admin office Power consumption	kWH		540		15660		64800	
Power Input to Plant	kWH		96648		2209849		11217955	
Section/Equipment	**Target kW/MT**	**Deviation**	**Energy Consumption kWh**	**Kwh/t Cement**	**Energy Consumption kWh**	**Kwh/t Cement**	**Energy Consumption kWh**	**Kwh/t Cement**
Ballmill Section	**20.00**	**-1.78**	**56943**	**21.78**	**1265538**	**20.71**	**6587878**	**20.24**
Cement Mill Main drive-1	7.50	-1.21	22772	8.71	506105	8.28	2591286	7.96
Cement Mill Main drive-2	7.50	-0.70	21446	8.20	473719	7.75	2461026	7.56
Mill Bucket elevator	0.50	0.09	1064	0.41	24550	0.40	132391	0.41
RC Fan	2.00	-0.13	5561	2.13	120908	1.98	667651	2.05
HES	0.10	-0.09	488	0.19	11241	0.18	65210	0.20
Mill vent fan	0.20	0.08	305	0.12	6850	0.11	34212	0.11
Sep vent fan	0.20	-0.03	601	0.23	14492	0.24	66911	0.21
CM Aux	2.00	0.20	4706	1.80	107673	1.76	569191	1.75
VRPM Section	**10.00**	**-1.22**	**29352**	**11.22**	**652026**	**10.67**	**3263369**	**10.03**
VRPM Main Drive	5.80	-0.55	16616	6.35	360485	5.90	1814312	5.57
VRPM Bag house fan Power	0.60	0.06	1414	0.54	32562	0.53	176947	0.54
VRPM Bucket elevator	0.60	0.59	28	0.01	564	0.01	4961	0.02
VRPM Aux	3.00	-1.32	11294	4.32	258415	4.23	1267149	3.89
Cement grinding	**30.00**	**-3.00**	**86295**	**33.00**	**1917564**	**31.38**	**9851247**	**30.26**
Packing Plant	**1.50**	**-0.34**	**3937**	**1.84**	**109586**	**1.78**	**506979**	**1.57**
OLD PACKING HOUSE			269	0.13	11879	0.19	51351	0.16
NEW PACKING HOUSE			502	0.23	16947	0.28	79417	0.25
SILO 7MCC			159	0.07	4596	0.07	18622	0.06
PACKING & LOADING(NPH2)			3007	1.41	76164	1.24	357589	1.11
Services	**1.90**		**6416**	**2.45**	**182698**	**2.99**	**860131**	**2.64**
Walayar Lighting	0.05		0	0.00	6800	0.11	27311	0.08
Colony Lighting	0.30		941	0.36	28538	0.47	125871	0.39
Plant Lighting	0.20		456	0.17	14393	0.24	74331	0.23
Mgt. Quarters	0.70		2196	0.84	66588	1.09	296052	0.91
Distribution Losses	0.65		2823	1.08	66379	1.09	336566	1.03
Section Power including Non Process								
PPC	31.50		71360	34.06	1764427	33.30	9233724	31.99
concrete +	35.00		20389	39.21	308431	37.98	1348293	36.55
Cement- Grinding	**32.00**		**91749**	**35.09**	**2072858**	**33.93**	**10582017**	**32.51**
Cement Packing	**1.90**		**4899**	**2.29**	**136991**	**2.23**	**635938**	**1.98**
Total Cement up to packing	**33.80**		**96648**	**37.38**	**2209849**	**36.15**	**11217955**	**34.48**



- Daily report will be circulated to all team members
- Energy Management Cell is formed to analyze & brainstorming for the reduction of the SEC.
- Regular study of area-wise equipment on deviation and their analysis
- RCFA of all critical breakdowns
- Dash board implementation for easy review of the plant performance

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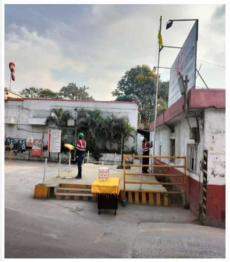
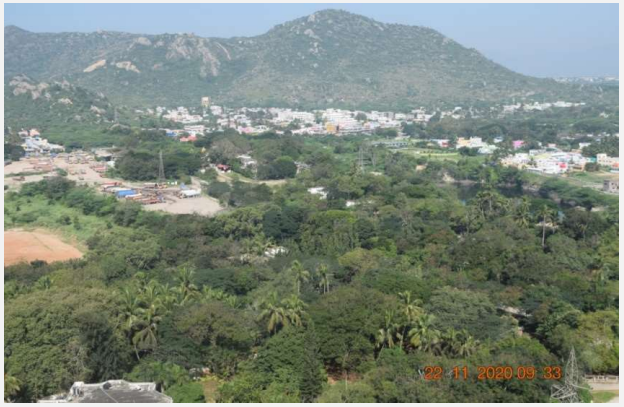
Learning's from other plant

- Energy Conservation activities became a habit of each and every one at our plant
- Implementation of innovative projects/Ideas which may be applicable to us by observing the other Units presentations
- Installed belt conveyor for cement transport to Silo storage

Green belt at Plant premises





Major achievements : QCFI sustainability award for Excellent H&S and efficient Energy unit in January 2024.

QCFI HEALTH & SAFETY EXCELLENT AWARD 2024

QCFI ENERGY EFFICIENT AWARD 2024

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Major achievements : Zero Harm Award, Safety excellence & best performance awards for year 2023-2024.

Safety Awards/ Recognition received by the organisation in the last 3 years

S. No.	Awards received 2023-24	Remarks
1	Zero Harm Award 2023-24	Awarded to Madukkarai Unit for achieving Zero harm 2023-24
2	Safety Excellence Award	Award given in Safety Conclave 2024 conducted by CPC under guidance of Department of Factories & Boilers
3	Best Performance Award	Award given during First International Cement Conclave-2024 conducted by QCFI
4	Health & Safety Excellence Award	Award given during 3rd National Sustainability awards on Cement & RMC-2024
5	Best Safety Practices	Awarded by CPC under guidance of DISH, Govt. of TN
6	Safety Milestone Award	• Achieving 1035 LTI free man days • Achieving 98% HSEIP score
7	Excellence in Execution	Proactive Contribution & passion towards H&S execution.

Awards & Accolades

Zero Harm awarded to Madukkarai Unit during the Year 2023-24

Safety Excellence Award given to ACC Ltd., Madukkarai during Safety Conclave 2024 conducted by CPC under guidance of Department of Factories & Boilers

Best Performance Award given to M/s ACC Ltd., Madukkarai during First International Cement Conclave-2024 conducted by QCFI

Major achievements : Adani workplace Management Award-Gold category for successful 5-S implementation in Pan India level cement plants.

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Thank you

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