Dalmia
Bharat Group

Unit Name:

Dalmia Cement Bharat Limited, Belgaum

Members:

Mentor: Mr. Prabhat Kumar Singh (Unit Head)

Mr. Manish Kumar Maheshwari (Technical Head)

Presenting team:

1. Mr. Samir Tayal (Senior Manager)
2. Mr. Ajeet Singh Rai (Assistant General Manager)
3. Mr. Bestavemula Amrutesh (Manager)

Dalmia Cement Profile

- Founded in 1939 By Shri Jaidayal Dalmia
- 15 Cement Plants spread across 11 States
- Cement Capacity of 45.6 Million Tons
- 4th Largest Cement Manufacturer in India
- ISO Certified Company

- 1st Indian company to join both RE100 as well as EP100
- Target for Carbon Negative by year 2040
- Sustainable Solution for MSW
- Swatch Bharat Abhiyan
- Highest AFR (TSR%) and further targeting for 50% in FY26

Dalmia, BELGAUM Profile

- **Plant Commissioned on : March 2015**
- **Installed Capacity (Clinker) : 2.6 MTPA**
- **Installed Capacity (Cement) : 4.0 MTPA**
- **Captive Power Plant (CPP) : 27 MW**
- **WHRS : 9 MW**
- **Solar : 8 MW**
- **Cement Products : OPC, PPC & DSP**
- **AFR TSR% : 37%**
- **Green Power : 73%**

M/s Dalmia Cement Bharat Limited, Yadwad Village, Mudalagi
Taluk, Belagavi District, Karnataka – 591136

MAJOR PROCESS/EQUIPMENT SPECIFICATION

Mining & Crushing

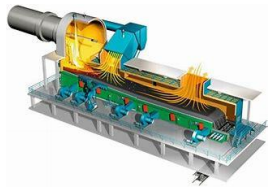
Mines
Yadwad Kunnal Mines
Crusher
Make- L&T
Cap- 900 TPH
Lime stone stacker/Reclaimer
Make-Takraf

Raw Mill & Coal Mill

Raw Mill
Make- KHD
RP-390TPH
Coal Mill
Make-FLS
Atox-45TPH @15 % residue on 90 Micron
Coal Stacker and Reclaimer
Make-Takraf

Green Fuel

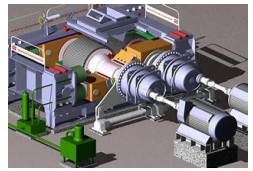
Solid AFR Shredder
Make-SIDSA
Cap-25 TPH
Liquid AFR
Make- All flow
Extractor
Make- ATS
Cap-25 tph



Kiln & Cooler

Kiln
KHD-4500TPD

Cooler-
CEMPROTECH cooler



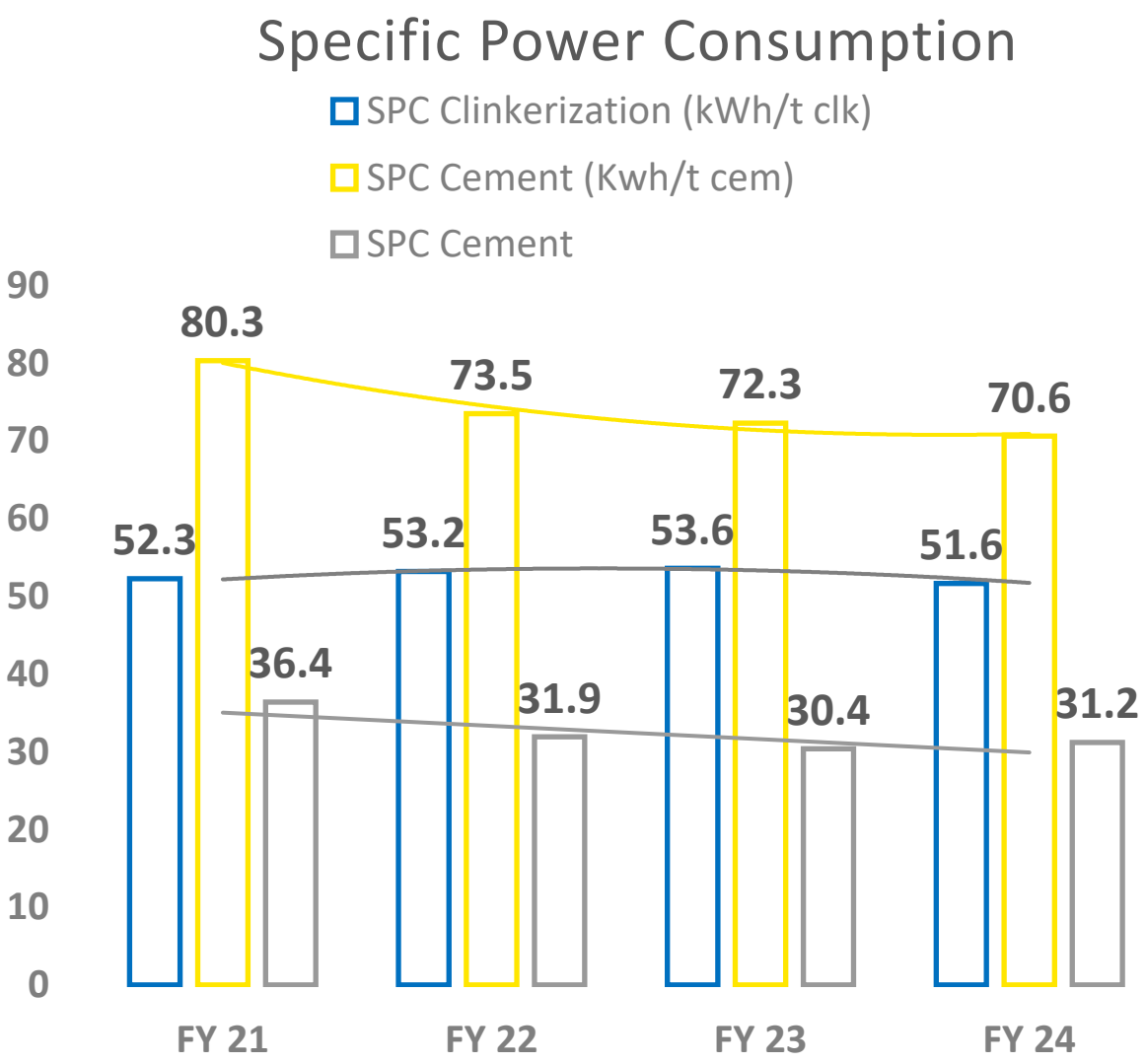
Cement Mill

Cement Mill
Roller press
RP-1&2
Make-KHD
Cap-250 TPH
Ball Mill 1- KHD 6000 TPD
Ball Mill 2- KHD 5000 TPD

Packing Plant

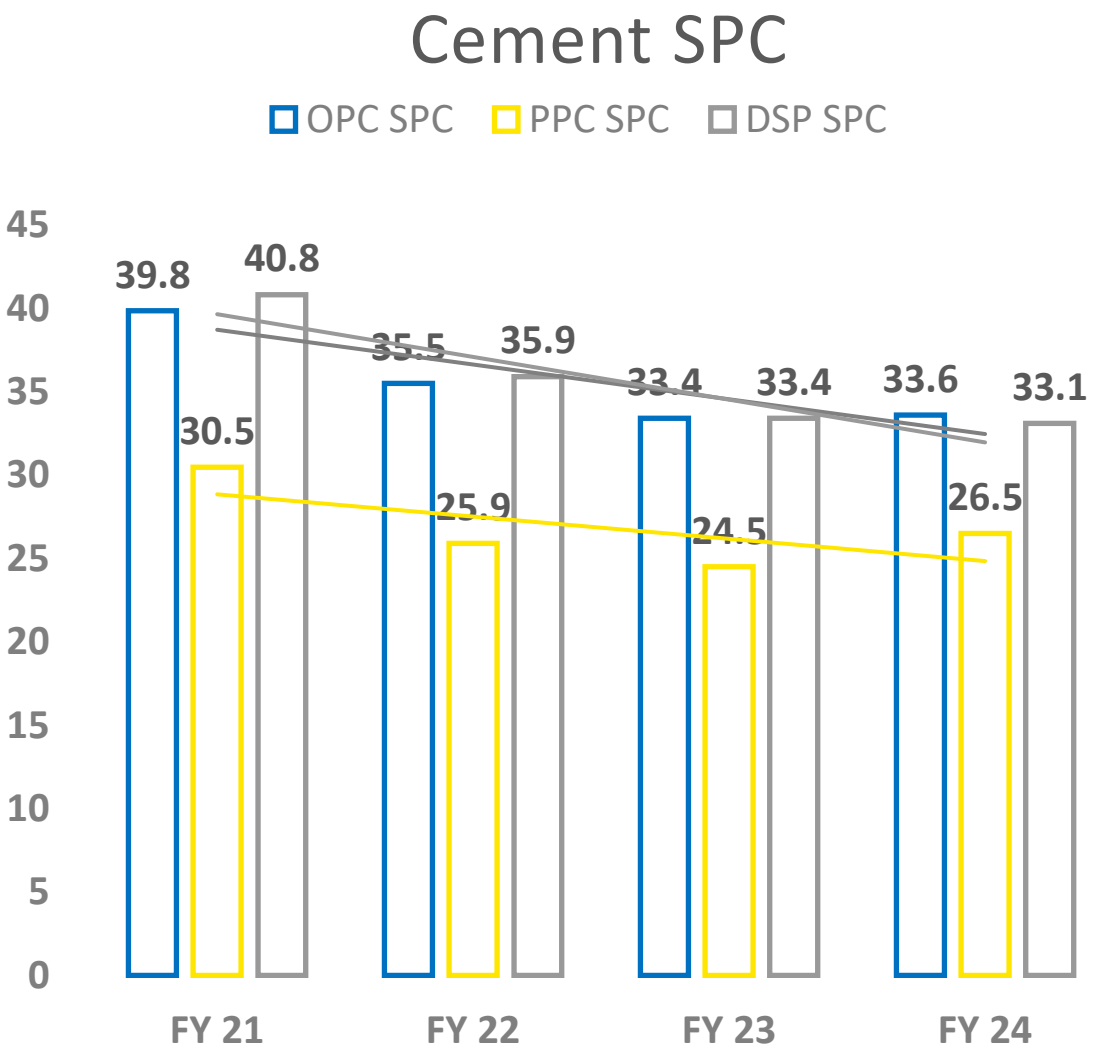
Packing Plant
Make- Enexco
Spout-12(Double discharge)
4 Packers
BEUMER
Cap-780 TPH

Specific Electrical Energy Consumption from FY21 to FY24



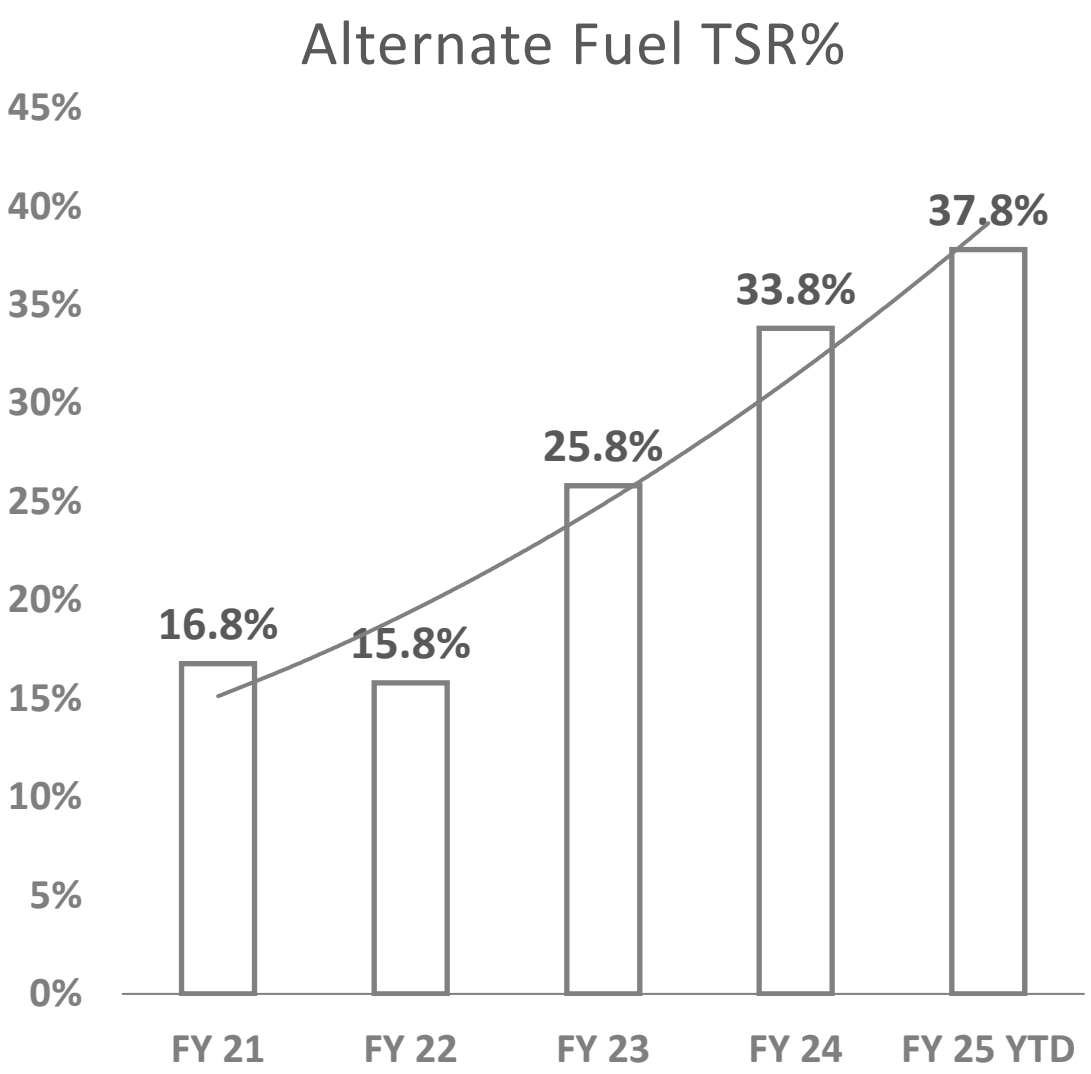
- ✓ Continuous improvement is visible in Cement SPC, Clinkerisation SPC and hence overall Cement SPC
- ✓ New PH fans installed of high efficiency @82%+ in FY24
- ✓ Preheater modification (Cy. 2,3,4) done to reduce pressure drop in FY24, investment 29 Cr.
- ✓ Compressor power reduction by 3000 kwh by reducing pressure and implementing Air leakage tracker system
- ✓ RA Fan optimization (RA Fan run hrs <5 hrs)
- ✓ Improvement in CM Reliability
- ✓ Raw Mill Operation Optimization (LS size reduction, hydraulic pressure reduced, fan speed reduced)

Specific Electrical Energy Consumption from FY21- FY24



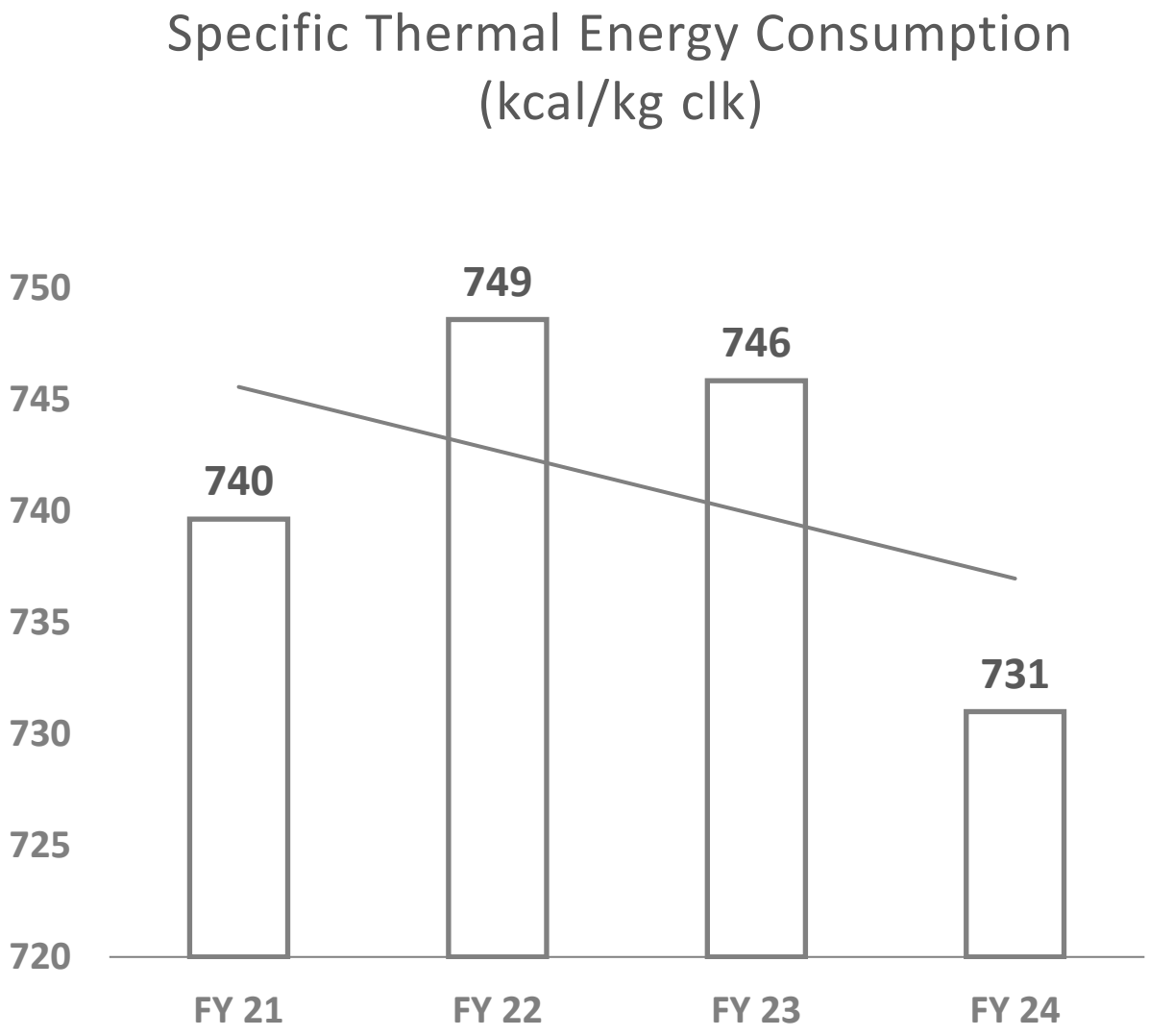
- ✓ Installation of 23 nos. of VFD in auxiliary bagfilter
- ✓ Improvement in Reliability and MTBF
- ✓ FY24 – addition of New Ball Mill to increase cement capacity
- ✓ Optimized operation of Aux BFs
- ✓ Usage of LP compressor in Fly Ash unloading
- ✓ Usage of Fly ash up to 35%

Alternate Fuel TSR (%)



- ✓ Installation of Solid AFR **feeding system** of 25 tph capacity
- ✓ Installation of **Shredder (25 tph + 15 tph)** for size reduction of Solid AFR for complete combustion
- ✓ Installation of **Chlorine Bypass System**
- ✓ Modification of **Preheater**, increase **Calciner Height**
- ✓ Upgraded **PH fan** Capacity
- ✓ Installation of **Trommel**
- ✓ **Raw mix** modified at 35% AFR TSR
- ✓ Solid feeding @ 750-800 tpd and Liquid @ 50-60 KL per day
- ✓ **Targeting for 50% AFR TSR%** by FY25 closing

Specific Thermal Energy Consumption



- ✓ Modification of **Preheater**, increase **Calciner Height**
- ✓ Modification of TAD and Kiln inlet riser
- ✓ Modification of Stage 2,3,4 cyclone. Height increased by 300mm (15 kcal/kg clinker)
- ✓ Cooler Modification (30 kcal/kg clk
- ✓ Optimized **PH fan** Operation to maintain O2 <2.5% at PH Outlet
- ✓ **Raw mix** modified at 35% AFR TSR

Long term/Short term targets taken in FY25

Sl. No.	KPI	UoM	FY24 Achieved	FY25 Target	Improvement w.r.t FY24	% Reduction	Project description
1	Clinker Volume	KMT	1659	2083	424	26%	
2	Clinker TPD	TPD	5698	6200	502	9%	
2	AFR TSR	%	33.8	41	7	21%	
3	Clinker SPC	Kwh/t clk	51.6	50	1.6	3%	
4	Clinker SHC	Kcal/kg clk	731	720	11	2%	
5	RE Power	%	73	80	8	9%	
6	Cement Volume	KMT	2232	2983	751	49%	
7	Cement SPC	Kwh/t cem	31.2	30.5	0.7	2%	
8	GHG Emission	Kg CO2/t cem	421	330	90	21%	

Roadmap – ENCON Projects planned in FY25

Sl. No.	Project Title	Investment (millions)	Annual Electrical Saving (million Kwh)	Annual Thermal Saving (million Kcal)	Total Annual Savings (Rs million)	Impact on SEC/ SHC	Project description
1	High Efficiency Blowers	10	0.47	0	3.9	0.24	To reduce Clinker SPC Replacement of existing Lube blowers with Energy efficient screw blowers
2	Raw Mill Fan Inlet Duct modification	2	0.51	0	4.2	0.26	To Reduce Clinker SPC Modification Fan Inlet duct to reduce pressure drop and hence reduce the power consumption
3	RABH Fan Inlet Duct modification	2	0.63	0	5.1	0.32	
4	PH Fan 1 & 2 inlet box modification	4	1.1	0	9.0	0.56	
5	CM1 BH Pr. drop reduction by conducting CFD Study	2	0.32	0	2.6	0.16	Reduce cement SPC
6	Reduction of Pr. Drop in DC Duct by conducting CFD	10	0.72	0	5.9	0.37	Reduce Clinker SPC
7	Solar power Plant (2MW)	100	3.27	0	24.3	-	On Ground On site Solar Power plant of 2MW in addition of 8MW
8	PH Boiler upgradation to increase 2 MW generation	133	15.84	0	112.8	-	Boiler Pressure parts modification to reduce PH boiler outlet temp to 190 Deg C to increase WHRS Generation
9	AFR Phase 3,4,5	990	0	219000	448.5	-	Installation of additional 40 tph shredder and 60 tph feeding capacity along with Trommels and ballistic separator to reduce moisture and Ash
10	Chlorine Bypass Boiler	200	3.16	0	22.6	-	Installation of Boiler in chlorine bypass to encash the heat loss happening through Chlorine bypass

ROAD MAP TO ACHEIVE BENCHMARK

Dalmia BHARAT CEMENT

ENCON PROJECTS

- Solar power plant
- AFR shredding and feeding capacity
- High efficiency blowers
- PH Boiler upgradation
- Major Process fans inlet duct modification

KAIZEN

- Idle running to be reduce in transport system and etc.
- Kaizens on energy conservation
- Implementing 5s
- Reducing compressed air leakages
- Material leakages
- Oil leakages

DIGITALIAZATION

- Online reports monitoring
- Monitor installed in sitting office area for continuous monitoring of SPC/SHE

BRAINSTORMING

- UTKARSH, full day event organized for generating ideas on energy reduction
- Development of ideas
- Monthly Energy review and action plant for reduction of SPC/SHC

UPGRADATION

- Adoption of new techlogies to reduce energy like
- CFD study, to reduce pressure drop
- Major fans inlet duct modification to reduce pressure drop
- Srew blowers inplace of Lube Blowers
- Low cost technical solutions

ENERGY AUDIT

- CII Energy Audit Conducted
- Internal audit
- Comparing our values with National and Global bench marks
- CFD Studies
- Reitz Study for increasing fan efficiency

INNOVATIVE PROJECTS

Name of the Project	Brief description	Trigger for implementing the project	Project category (A/B/C/D)	Replicability	Total Annual Savings (Rs. lakhs)	Investment (Rs. Lakhs)
Trommel screen modification	Recycled waste TSR performance continuously coming 36-38% with increasing the clinker production > 6100 MT. For achieve the target, we are feeding the solid wet qty > 730 tpd on consistence basis but shredded material unavailability in the market and higher rate challenges of shredded material.	We have changed the trommel screen to 80 mm size from 40 mm size for screening of the shredded material from un-shredded material & it is giving the shredded material 125 mt/day. Trommel over size material is going in the shredder & it is giving the shredded material > 65 mt/day. Its handling managing with internal resources. This has increased the shredded material 190 MT/day, after that we have reduced the purchased market shredded material. Recycled waste Monthly saving is 72 Rs. L.	B	Yes	861	**170**
Pyro Performance Enhancement	1. TAD modification 2. Cy. 2,3,4 height increased 3. Kiln inlet riser widened 4. Cooler plates replaced 5. PH Fan upgraded 6. PH Boiler tapping revised 7. Pyroclone height increased	1. Constraint in increasing the kiln feed, AFR feeding, high CO generation in system, high PH pressure drop 2. Loss of WHRS generation due to PH boiler tapping from PH Fan Outlet 3. Low cooler recuperation efficiency	D	Yes	Improvement TPD – 1000 TSR – 6% SHC – 40 Kcal SPC – 1 kwh/t clk	**8200**

ENCON PROJECTS SUMMARY

Sl no	Years	No of Projects	Investment (Rs million)	Annual Electrical Saving (million Kwh)	Annual Thermal Saving (million Kcal)	Total Annual Savings (Rs million)	Impact on SEC/ SHC (Electrical kWh /MT cement or Kcal/Kg cement)
1	FY 2021-22	2	6	0.87	0	6.3	**0.5 kwh/t clk**
2	FY 2022-23	5	2	4.0	0	34.3	**2.1 kwh/t clk**
3	FY 2023-24	4	2900	5.1	66000	177	**2.1 kwh/t clk 40 kcal/kg clk *Cem Mill Mod. (addition of New Ball Mill) for Capacity Enhancement**
4	AFR / RE projects in last 3 years	5	2297	81.3	326250	1197	**AFR – 5% to 37% WHRS – 9MW Solar – 8MW**

ENCON PROJECTS (2021 – 2022)

Sl no	Project Title	Investment (millions)	Annual Electrical Saving (million Kwh)	Annual Thermal Saving (million Kcal)	Total Annual Savings (Rs million)	Impact on SEC/ SHC	Project description
1	VFD installation in Aux BFs (23 nos.)	6	0.51	0	3.7	0.3	**VFDs installed in aux BFs to reduce aux BF fan speed and hence power saving**
2	RA Fan Optimization to reduce SPC of RABH Fan	0	0.36	0	2.6	0.2	**Inhouse optimization of RA fan is been done. Put in automation to reduce the RA fan run hours and consequently SPC of RA Fan and RABH Fan**

ENCON PROJECTS (2022– 2023)

Sl no	Project Title	Investment (Rs million)	Annual Electrical Saving (million Kwh)	Annual Thermal Saving (million Kcal)	Total Annual Savings (Rs million)	Impact on SEC/ SHC	Project description
1	VFD installation in Compressors	2	0.28	0	2.4	0.17	**VFD installed in 1 compressors of cement mill section and 1 compressor of pyro section and put it in Auto mode with main receiver pressure. This is done to reduce the unloading time of compressor**
2	Coal mill Baghouse Purging optimization to reduce Compressor power	0	0.28	0	2.4	0.17	**Pause time increased from 4 sec to 12 sec without hampering the Baghouse DP**
3	Raw Mill Optimization to reduce SPC	0	1.27	0	10.9	0.5	**TPH and SPC are varying significantly from LS pile to Pile. Detailed analysis done of many LS piles and Breakeven point identified to operate at particular range of TPH to minimize the SPC**
4	Dense Phase Compressor optimization to reduce SPC	0	1.16	0	10.0	0.7	**1. Pressure reduce to minimum for dense phase conveying 2. Put in Auto with Bin level to stop compressors as soon bin is emptied.**
5	Compressed air Optimization	0	0.997	0	8.6	0.6	**Pressure reduced to 5.2 at receiver, Installation of Air receiver, shifting of Small Compressor in LS Crusher, Leakage Arresting system developed via SAP**

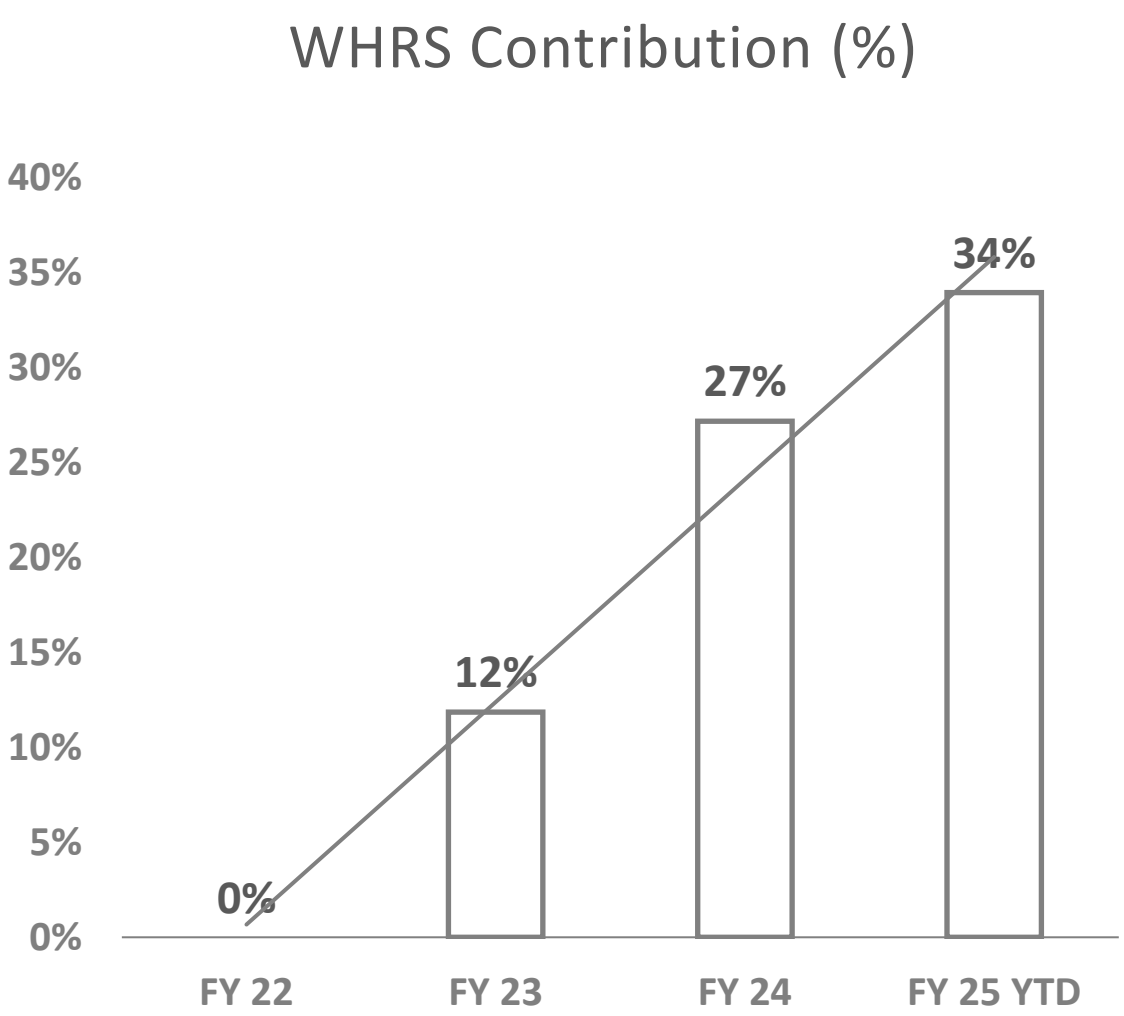
ENCON PROJECTS (2023– 2024)

Sl no	Project Title	Investment (Rs million)	Annual Electrical Saving (million Kwh)	Annual Thermal Saving (million Kcal)	Total Annual Savings (Rs million)	Impact on SEC/ SHC	Project description
1	PH Modification (Reduce Pressure drop in PH) to reduce SPC, SHC and increase productivity	290	1.33	24750	61.5	15	**It is a 6 stage cyclone and Stage 2,3,4 modified, along with TAD and its feeding point modification**
2	Cooler Upgradation	280	0	41250	84.5	25	**For improving the recuperation efficiency of cooler from 60% to 70%, all cooler plates replaced with latest technology (conda nozzle effect)**
3	Cement Mill Capacity Enhancement	2240	1.1	0	8.9	0.5	**In Existing set up of 2 RP and 1 BM, 1more ball mill added and 2 separate circuits created (R.P+BM). THis is benefited in increase the Capacity from 8000TPD to 11000 TPD and reduction in SPC by 0.5 kwh/t cem**
5	New PH Fan (for capacity enhancement and High Impeller Efficiency)	90	2.66	0	21.7	1.6	**New PH Fans (2 nos. double string PH) installed of higher capacity and high impeller efficiency to increase clinker production and reduce PH fan SPC**

ENCON PROJECTS (AFR/RE)

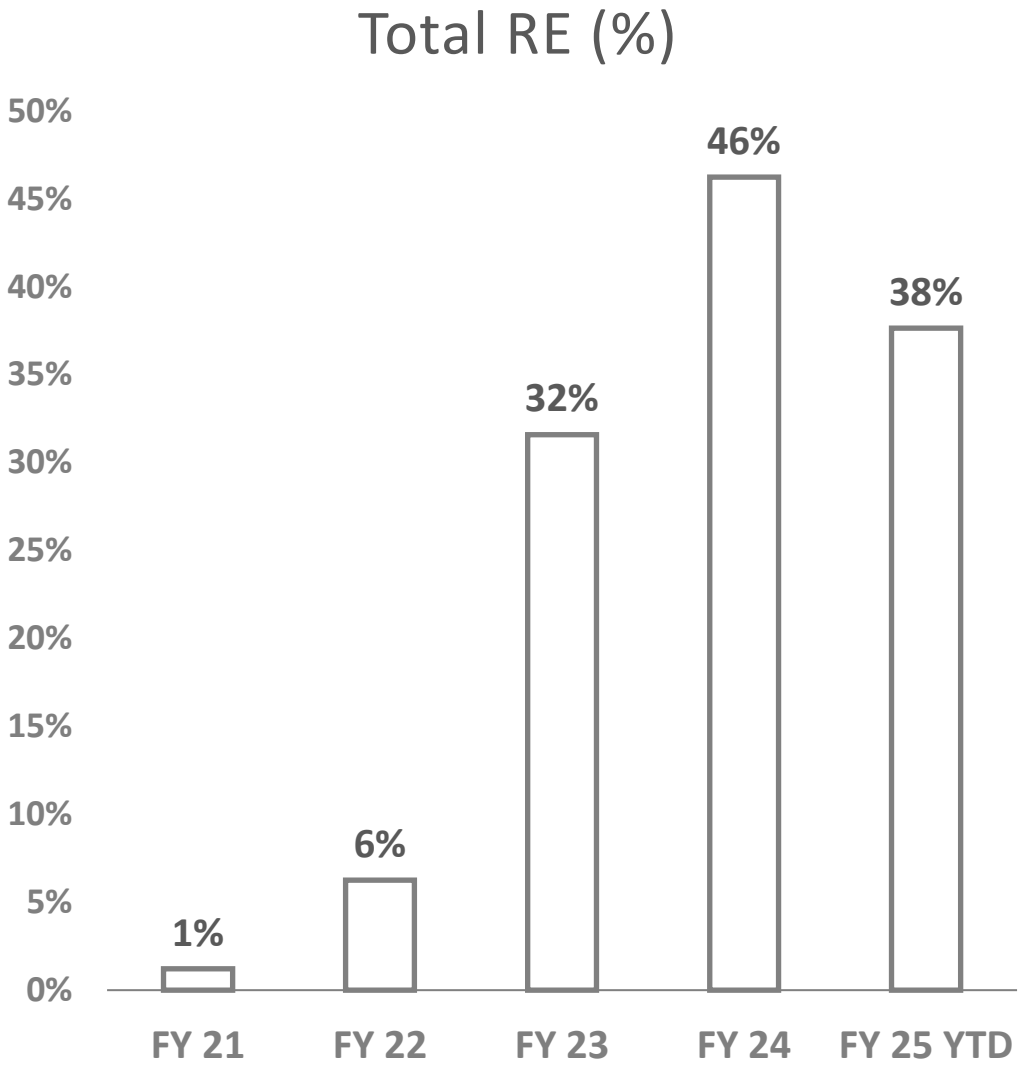
Sl no	Project Title	Investment (millions)	Annual Electrical Saving (million Kwh)	Annual Thermal Saving (million Kcal)	Total Annual Savings (Rs million)	Impact on SEC/ SHC	Project description
1	Installation of Chlorine Bypass System to increase TSR%	250	0	163125	293.5	0	**Achieved TSR % from 20% to 35%, Chlorine bypass system is installed to reduce the chlorine % in the clinker (<0.1%) and to remove the volatiles (alkali, sulphur, chlorine) from the system to avoid coating, ring formation at kiln inlet and riser also.**
2	AFR Phase 2 (Adding Capacity of Shredding and feeding of Solid AFR and Liquid AFR)	220	0	163125	293.5	0	**Achieved TSR% from 05% to 20%, Installation of shredder (25 tph) and extractor with feeding capacity up to 25 tph.**
3	Installation & Commissioning of WHRS (9MW)	1207	60.19	0	455.7	0	**WHRS installed of 9MW in PH side and Cooler Side along with HAR system in Cooler**
4	Solar Power Plant (8MW DC, 6.8MW AC)	500	13.20	0	97.9	0	**On Site Solar Power plant installed**
5	PH Boiler Tapping Revised from PH Fan Outlet to Inlet	120	7.92	0	56.4	0	**During Phase 1 WHRS project, PH boiler tapping was considered from PH Fan outlet which is later on shifted to before PH Fan (Downcomer duct at 5th floor)**

Green Energy – WHRS



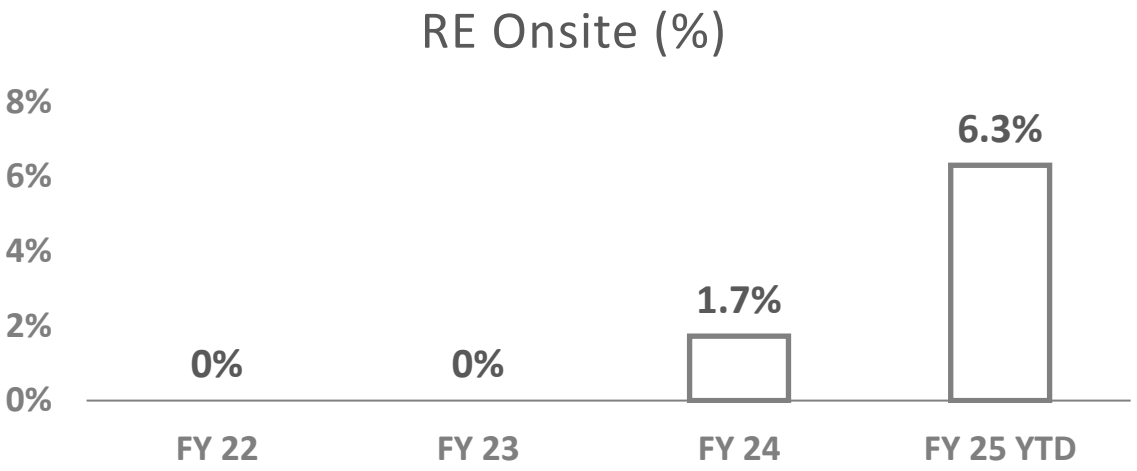
- ✓ Installed Capacity : **9.0MW**
- ✓ Commissioned on 13.09.2022
- ✓ FY25YTD - contribution increased to **34%**
- ✓ FY25 - Targeting for **40%** in FY25 closing
- ✓ Increase **2MW** by PH Boiler pressure parts modification
- ✓ FY23 – 180 Lakh Unit Net generation
- ✓ FY24 – achieved 432 Lakh Unit Net generation
- ✓ FY25 – Targeting for 625 Lakh Unit

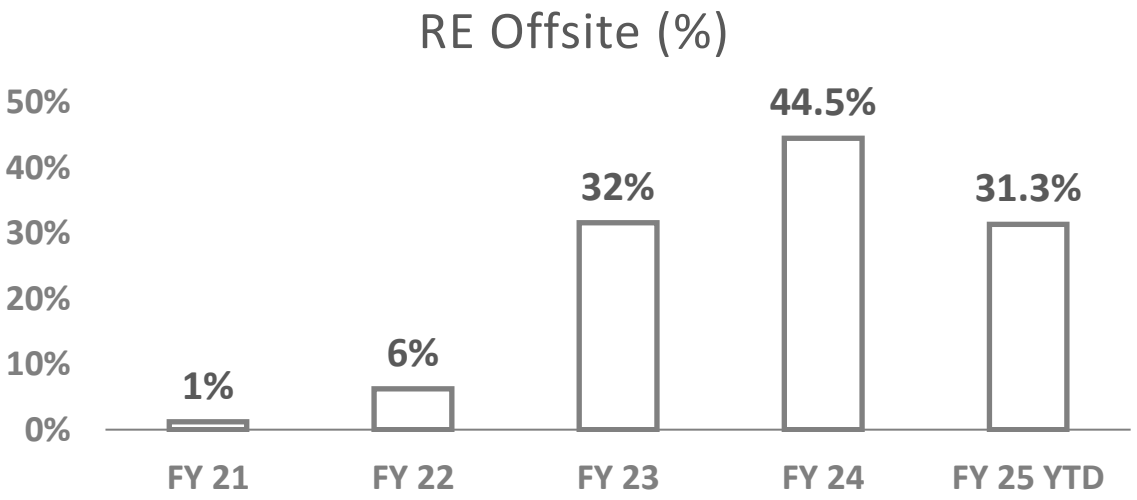
Total RE (%)



- ✓ Onsite Solar plant of **8MW**
- ✓ FY25 - Group Captive of 11 MW (2.2*5-Wind) for 1 year, **3.2 Cr. Units** started from May 2024.
- ✓ **FY25 - RE power will go up to 50%**
- ✓ **FY26 – RE power will go up to 60%**
- ✓ FY26 - Long term contracts (Solar) in the group captive scheme for 25 years, ~**5 Cr. Units per year**
- ✓ FY26 – Initiated to have Group captive of (Solar/Wind/Hydro) for 1 year @ **4 Cr. Units**
- ✓ Third party RE for Solar and Wind

RE - Onsite and Offsite

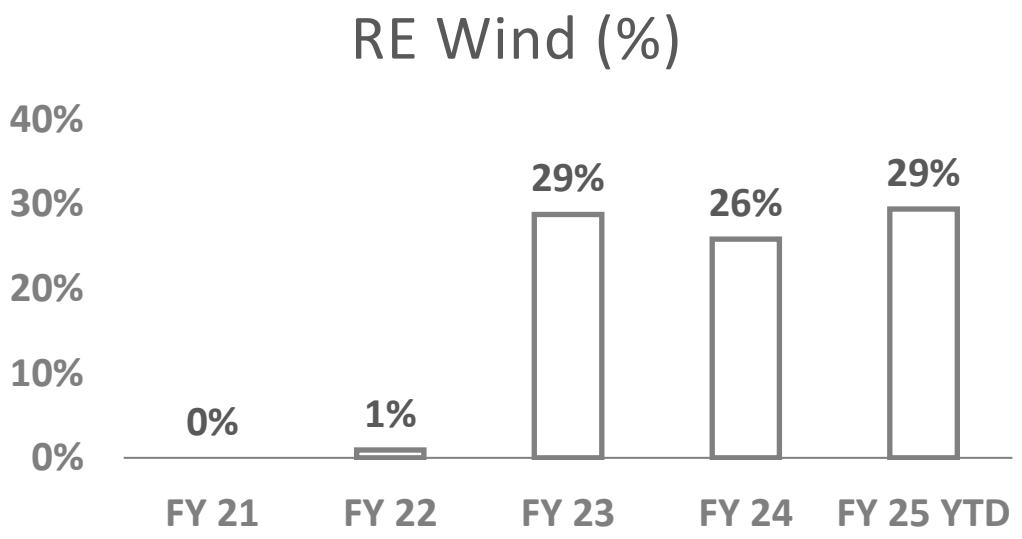


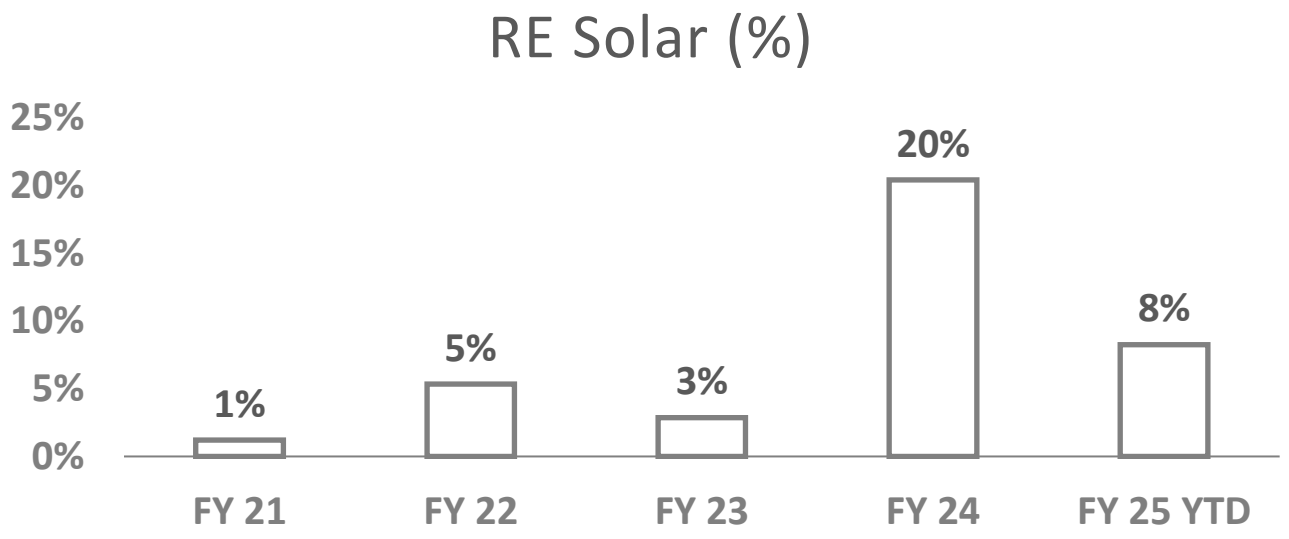


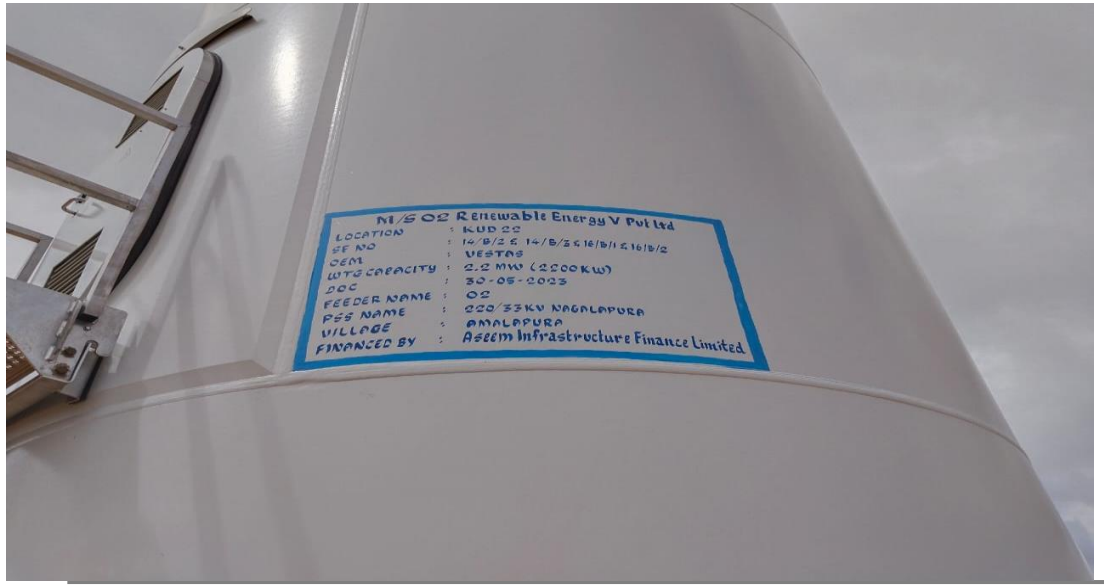
- ✓ Installed Capacity of Solar Plant: 8.0MW
- ✓ Commissioned in Jan 2024
- ✓ **FY25 – RE Onsite will go to 7%**

- ✓ Third party RE for Solar and Wind
- ✓ Group Captive of 11 MW (2.2*5 MW - Wind) for 1 year, **3.2 Cr. Units** started from May 2024
- ✓ FY26 - Long term contracts (Solar) in the group captive scheme for 25 years **43.5 MW**, **~5 Cr. Units** per year
- ✓ FY26 - Initiated to have Group captive of (Solar/Wind/Hydro) for 1 year @ **4 Cr. Units**
- ✓ **FY25 – RE offsite will go up to 43%**
- ✓ **FY26 – RE Offsite will go up to 53%**

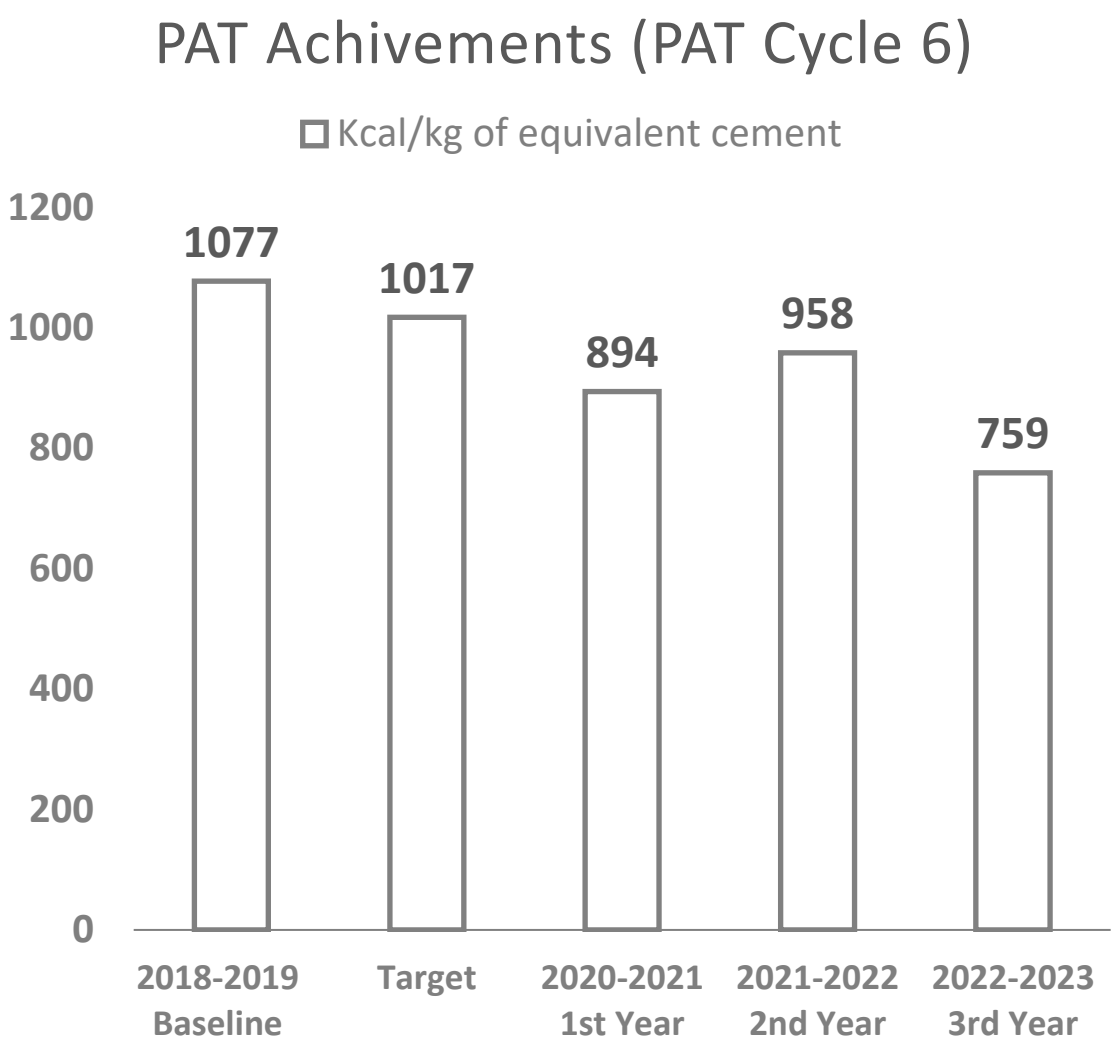
RE – Solar and Wind







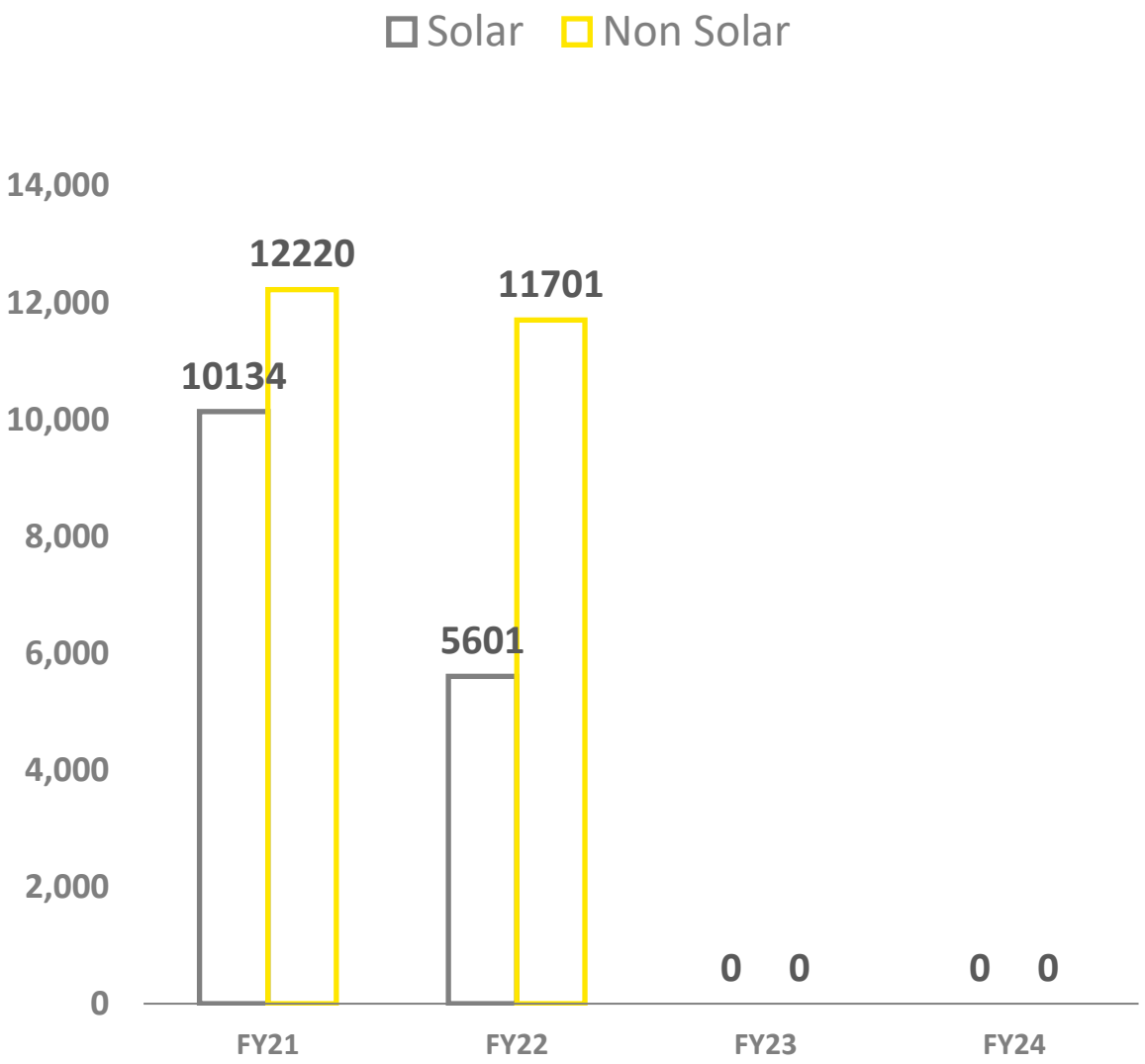
PAT Achievements – PAT Cycle 6



- ✓ Baseline - **1077** kcal/kg of equivalent cement
- ✓ Target – **1017** kcal/kg of equivalent cement)
- ✓ Target Reduction of **5.6%** (i.e. **60** kcal/kg of eq. cement
- ✓ Achieved **29.5%** reduction i.e. **318** Kcal/kg of eq. cement
- ✓ 35000 Ecerts
- ✓ Major Actions taken are

a. WHRS of 9MW,
b. Preheater & TAD modification for heat reduction
c. AFR TSR% increased to ~35%
d. Cooler modification for heat reduction by 25 Kcal/kg clk
e. 100% Petcoke utilization

RE Certificates Purchased



- ✓ REC purchased till FY22
- ✓ From FY23, RPPO compliance is achieved by consuming Solar and Wind (Onsite and offsite)

UTKARSH – “Brainstorming Session on Energy Reduction”

OUTCOMES/ACTION PLAN

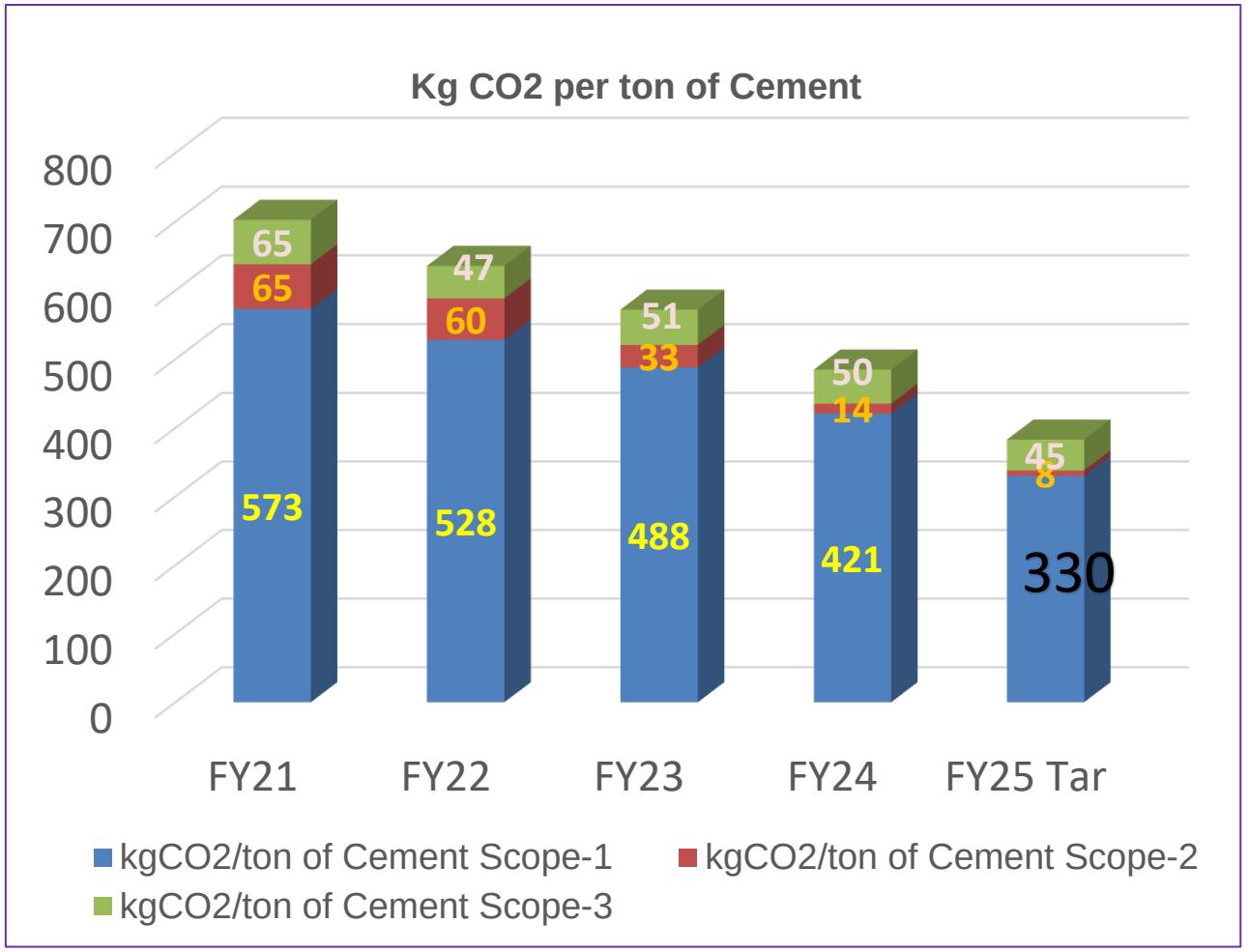
- AFR TSR - Roadmap of 50 % by FY25
- SPC Clinkerisation – Reduction by 1.5 kwh/t clk
- SHC – Reduction plan of 5-6 Kcal/kg clk
- SPC Cement – 1.5 kwh/t cem
- RE Power – Increase up to 80% (including WHRS) in FY25 and 100% by FY27

Brainstorming Session / Huddle activity for Energy Saving Ideas

- ✓ All talents were divided into 7 teams with cross functional team members for energy and brainstorming done for 1 hour
- ✓ Subsequently the outcomes were collected, polished, checked feasibilities and delegated to all Hods for implementation

GHG Inventorisation

Scopes



Emission of Kg CO_2 per tonne of cement get decreased continuously due to the following efforts done by the Unit:

1. Maximize the uses of Alternative Fuel Resources (both Hazardous and Non-hazardous) from **TSR 17% to 38 %** to reduce the CO_2 emission in Scope-1 from **573 to 421** Kg CO_2/tone of Cement.
2. DCBL, Belagavi has stop the power generation from CPP and install **WHRS (09 MW)**, **Solar Power Plant-08 MW** and **third party RE power** contracts to meet the power demand. Therefore, CO_2 emission in Scope-2 was decreased from **60 to 14 Kg CO2/ton of Cement**.
3. As transportation of Alternative fuel increase which bulk density is less than the density of conventional fuel but, still we are working to reduce its impact.

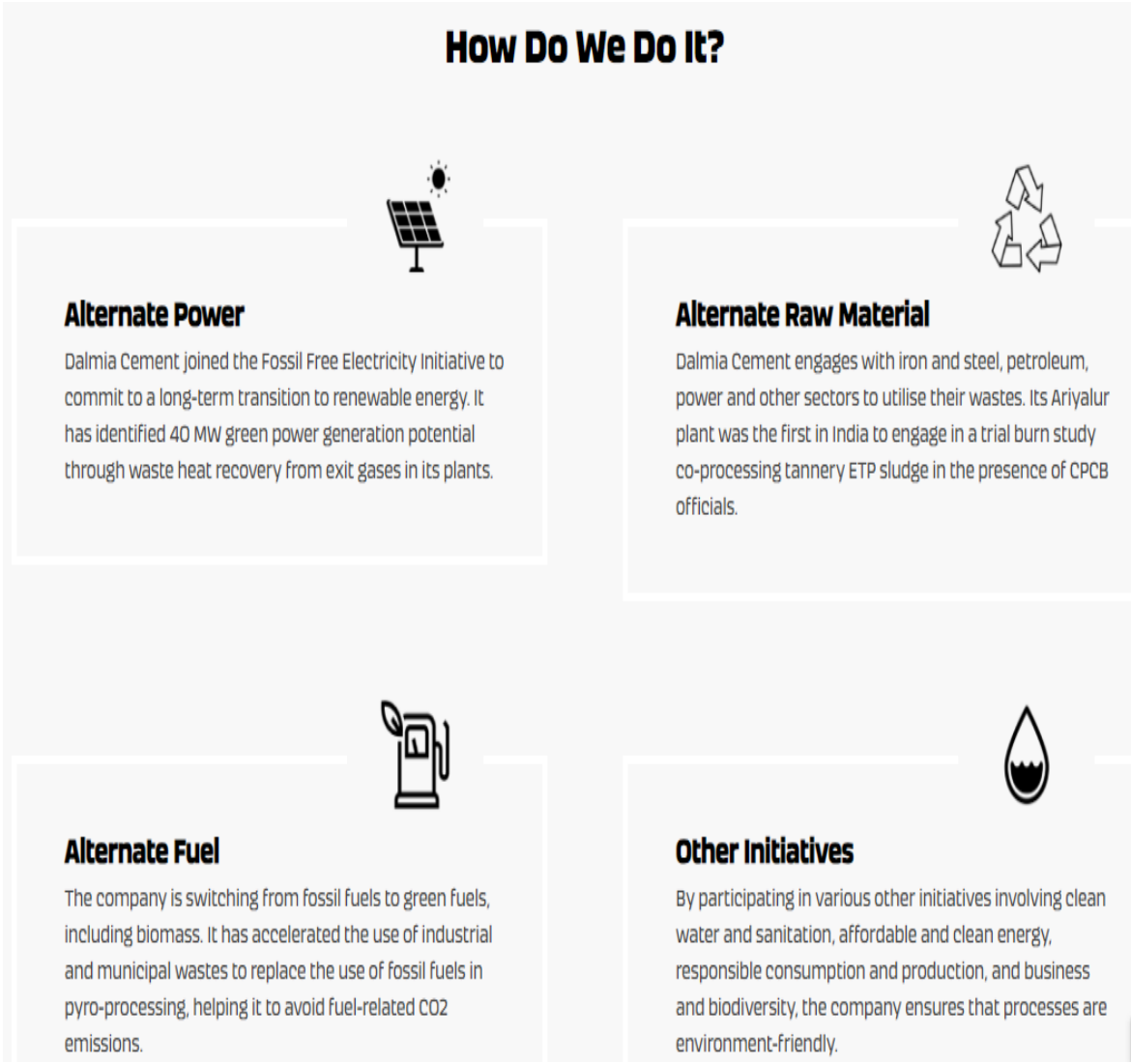
Future Target, Information on GHG Inventorisation and public disclosure:

Commitments on Global Level

1. Carbon Negative by 2040
2. The company became the first organization globally, to commit to both **Fossil Free Electricity Initiative (RE 100)** and **Energy Productivity (EP 100)** campaigns and **Water Positivity**.
3. DCBL has moderated its emissions in line with the **International Energy Agency's (IEA) 2° scenario mandated for 2030**

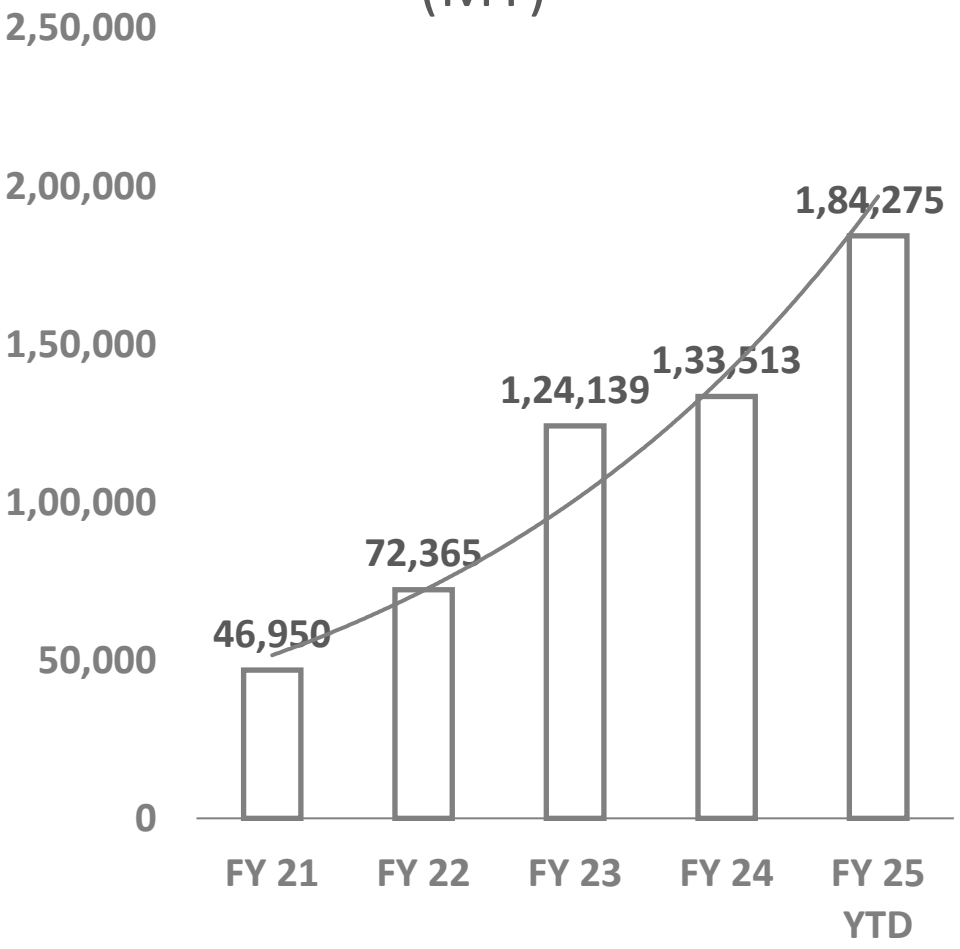
Major actions under pipeline for carbon Negative

1. Introduction of **Composite Cement** by Dec'24
2. Increase **AFR from 33.8% to 50%** by Jan'25
3. Increase **WHRS gen from 9MW to 11 MW** in Dec'24
4. Modifications planned to reduce **SPC by 1.5kwh/t** in FY25
5. Water Positivity – Harvesting More Water Than We Consume

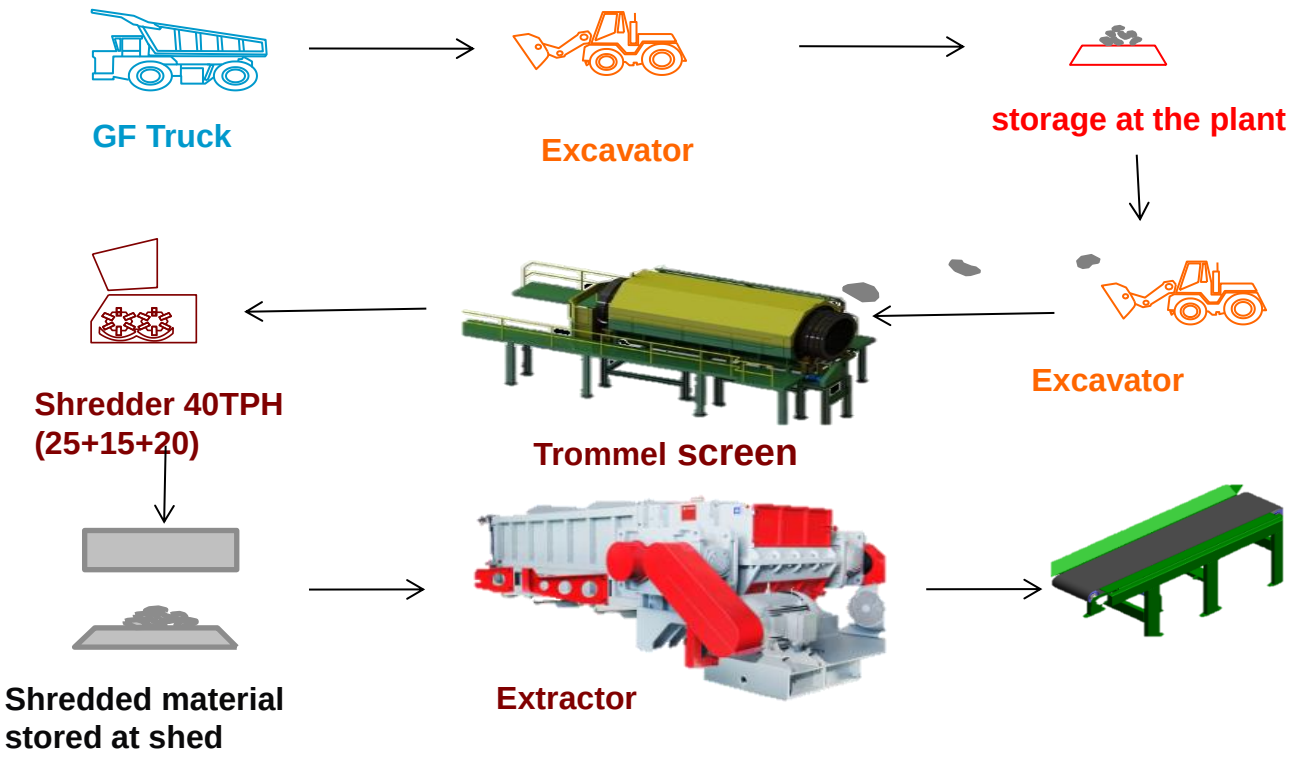


Total Waste Consumption as Alternate Fuel

Total Waste Consumption (MT)



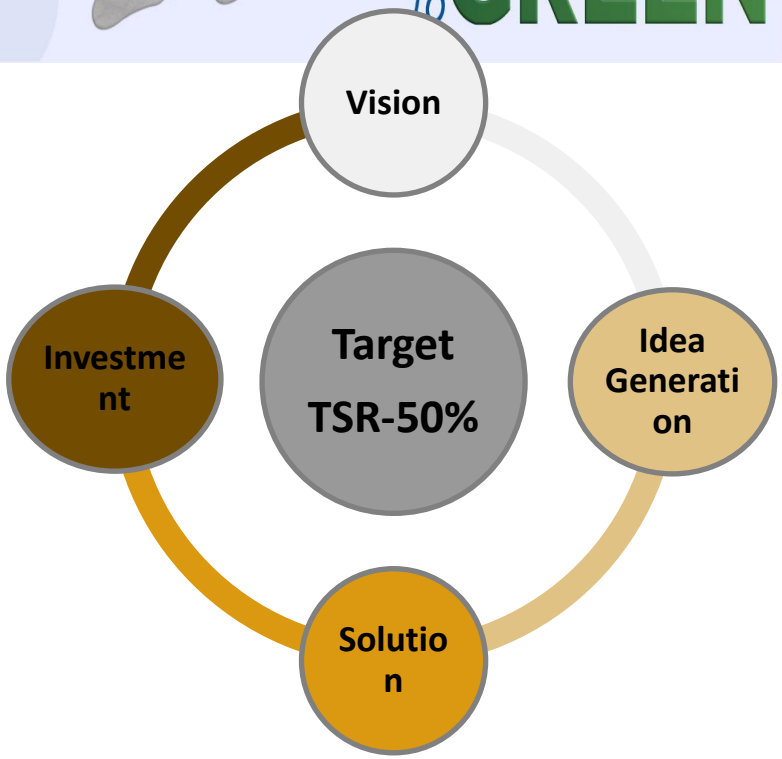
Infrastructure for feeding of Solid and Liquid



Present Capacity	
Solid	750-800 TPD
Liquid	200 TPD
Dolachar	100 TPD

Capacity Building	
Solid	1200 TPD
Liquid	200 TPD
Dolachar	100 TPD

Journey towards Carbon Negative – 50% TSR



Vision

TO become Carbon Negative by 2040 % and hence to increase AFR TSR% to 50%+

Idea generation

UTKARSH – 1 day brainstorming session on how to achieve 50% TSR from AFR

Mainly two bottle neck were observed

1. High moisture in Solid Waste leading to less NCV

2. High Ash content/dust/clay content in solid waste which are received from market, affects kiln process and clinker quality, not allowing to use high AFR.

Solution – Strengthen the Pre processing

1. **To separate out the clay/dust from the solid AFR which leads to kiln process disturbance, 2 nos. of TROMMEL machine is being introduced with different screen sizes to remove the moisture and clay from solid waste**
2. **Further Ballistic separator is also ordered and will be installed in next 5 months to reduce ash and moisture**
3. **Additional shredder of (40 tph + 25 tph) also will be installed in FY25 to increased the feeding of shredded material and reduce the size of solid waste, which will ease out the combustion**

Investment-

CAPEX of 100 Cr. Is been approved BY DCBL management, an aggressive move to become 1st cement plant to achieve ambitious figure of 50% TSR in country

Green Supply Chain

INPUT

Utilization of waste

GCP Dust- waste of Iron industry

Utilization of Petcoke 100%

Using Solid and Liquid Waste as Fuel

Unloading of material through tippler

Using Low LSF Mines Mat.

TRANSPORT

Efficientt Process/Technology

Latest Pyro Processing Equipment

Advance Grinding Mill

Optimized Process

Energy Monitoring & Utilization

GRINDING

Utilization of waste

Pond Ash

Fly Ash

Slag

Slit Dust

PACKING AND LOGISTIC

Product Logistic

Given preference of green supply trucks for ce back loading

Bulk & Trade Dispatch Improvement

Utilization of Vehicle Master & Tracking

Material Management & Planning

Energy Policy and ISO Certification

DNV

MANAGEMENT SYSTEM CERTIFICATE

Certificate no.: 10000425914-MSC-RvA-IND | Initial certification date: 07 December 2017 | Valid: 07 December 2023 – 06 December 2026

This is to certify that the management system of
Dalmia Cement (Bharat) Limited
Village & PO – Yadwad, District Belagavi - 591136, Karnataka, India

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

This certificate is valid for the following scope:
Mining of Limestone Manufacturing of Cement

Place and date: Barendrecht, 30 November 2023

For the issuing office: DNV - Business Assurance, Zwolseweg 1, 2994 LB Barendrecht, Netherlands

Erik Nonk
Management Representative

- ✓ Energy Management System Standard ISO 50001:2018
- ✓ Certificate no. - 10000425914-MSC-RvA-IND
- ✓ Validity – 07 December 2023 – 06 December 2026

Awards

QCFI 3rd National Sustainability Awards on Cement & RMC

CII Excellent Energy efficient plant award 2022

Excellence in In-House Water Management Award by CII 2018-19

Sustainable Waste Management and Circular Economy and IPLA Global Form 2023

Thank You !!

Samir Tayal
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