HEARTY WELCOME

1. Brief introduction on Company / Unit- *Leading the way for over 8 decades*

Team : P.Balaji, Energy Manager, P.Naveenkumar, Energy Manager , and R.Rajamohan, Head-Sustainability,PH&Systems

M/s DALMIA CEMENT (BHARAT) LTD, DALMIAPURAM

Our Uniqueness

- Only Plant in the World , Making 16 Varieties and Operating 8 Management systems
- A Pre-independent, first born Indian Cement Plant, has won 52 National Awards in the recent 4 years , including the CII EHS 5 Star / CII National Energy leadership Awards.
- Our Dalmiapuram Green Fuel TSR Annual (21-22) Avg.19.7% in Line2 & overall 15.6 % as against, Indian Avg., of @ 5%. Consumed 61KMT of Alternate Fuel in FY22. In Jun'21, 26.6% .
- Green fuel/AFR enhancement to replace Fossile is not only part of our National Agenda but also a Global main lever as well towards Carbon Nertrality & to combat climate change challenges.
- Specific Power KWH/MT of Clinker is 46.6 Units/MT, Cement 57.2 units/MT of PPC. 84 Kaizens in FY22.
- Water Positivity – Our DPM Plant is 4.8 times
- Carbon Neutral Ambition - Carbon Negative Cement Group 2040.
- DPM is the First Green Pro Certification in the Country for PPC

Our Uniqueness

- **First Rank in the country in the CDP League Table .Ranked no.1 cement group globally on business readiness for low carbon transition (Source : CDP Global Cement Sector Report, April 2018)**

- **RE 100 - first cement company in the country to join RE100 (Third amongst all after Tata Motors and Infosys . (RE 100 is** a global collaborative initiative of the world's most influential companies committed to 100 per cent renewable power.**)**

- **100% renewable power under fossil free electricity initiative – 2030 . (**Being one of the greenest cement companies in the world, Dalmia Cement has set an ambitious interim target to increase four-fold its percentage of renewable energy consumption by 2030)

- **Double energy productivity - 2030 (EP 100)**

- **EV 100 – Significant Electrical Vehicles Transition by 2030**

- **Renewable biomass and waste to replace fossil fuel use - 2035**

- **Third Indian Cement Company to sign the CSI Charter**

- **Wash Pledge adopting**

Presentation Coverage

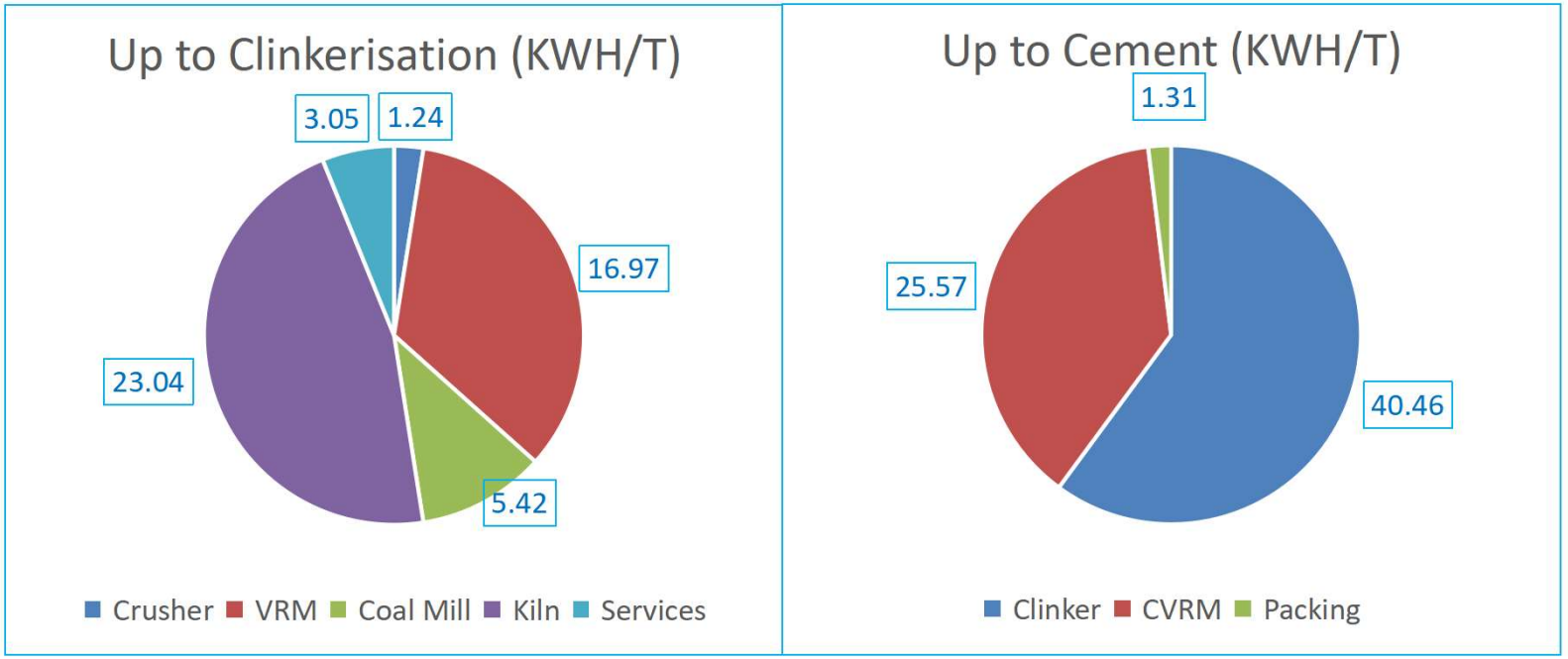
Dalmia cement FUTURE TODAY

1. Brief introduction on Company / Unit
2. Energy Consumption Overview
3. Specific Energy Consumption in last 3 years
4. Information on Competitors, National & Global Benchmark
5. Energy Saving Projects implemented for last 3 years
6. Innovative Projects implemented
7. Utilization of Renewable Energy Sources
8. Utilization of Waste material as fuel
9. Learning from CII Energy Award 2021 or any other award program
10. GHG Inventorization
11. Green Supply Chain Management
12. Team work, Employee Involvement & Monitoring
13. Implementation of ISO 50001/Green Co/IGBC rating
14. Other information

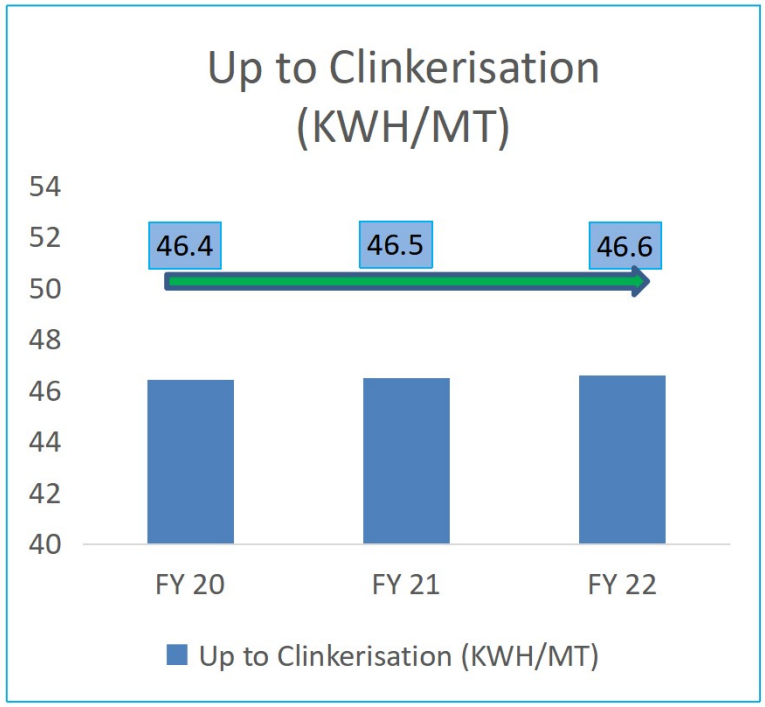
Specifications of major sections

Equipment Name	Make	Rated Capacity
LINE 1		
Raw Mill	Loesche LM 30.31	190 TPH
Coal (Ball) Mill	KHD	22 TPH
KILN	KHD (3.8 M D * 56 M L)	3250 TPD
Cement Vertical Roller Mill	Loesche LM 46.2 + 2	160 TPH
LINE 2		
Raw Mill	Loesche LM 30.31	320 TPH
Coal Mill	Loesche LM 46.4	33 TPH
KILN	FLS (3.95 M D * 62.1 M L)	3800 TPD
Cement Vertical Roller Mill	Loesche LM 56.3 + 3	305 TPH

2. Energy Consumption Overview - FY 21-22

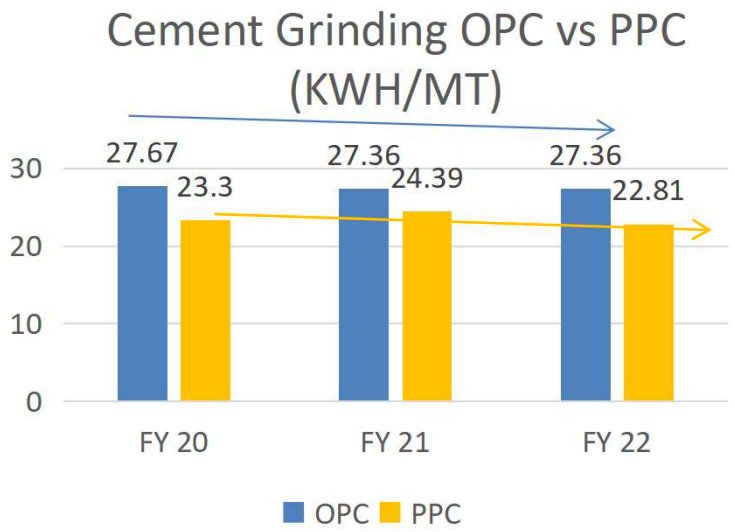


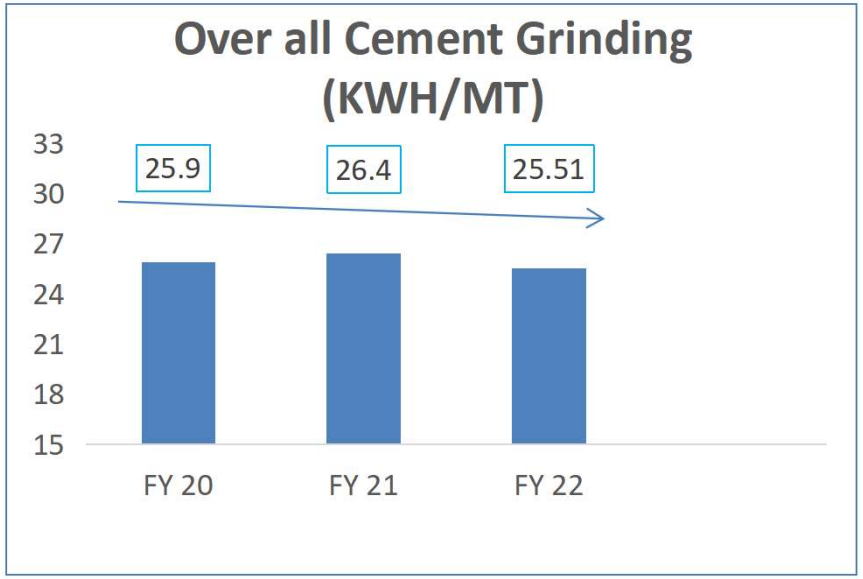
3. Specific Energy Consumption in last 3 years (Upto Clinkerisation)



Section	UOM	FY 20	FY 21	FY 22
Crusher	KWH/MT Matl	0.84	0.84	0.85
Raw Mill	KWH/MT Matl	11.8	11.2	11.16
Coal Mill	KWH/MT Matl	53.5	55.5	58.20
Kiln	KWH/MT Clinker	22.4	23.1	23.04
Clinker	KWH/MT Clinker	46.4	46.5	46.6
Services	KWH/MT Clinker	3.1	3.0	3.05
Total Clinker	KWH/MT Clinker	49.4	49.5	49.72

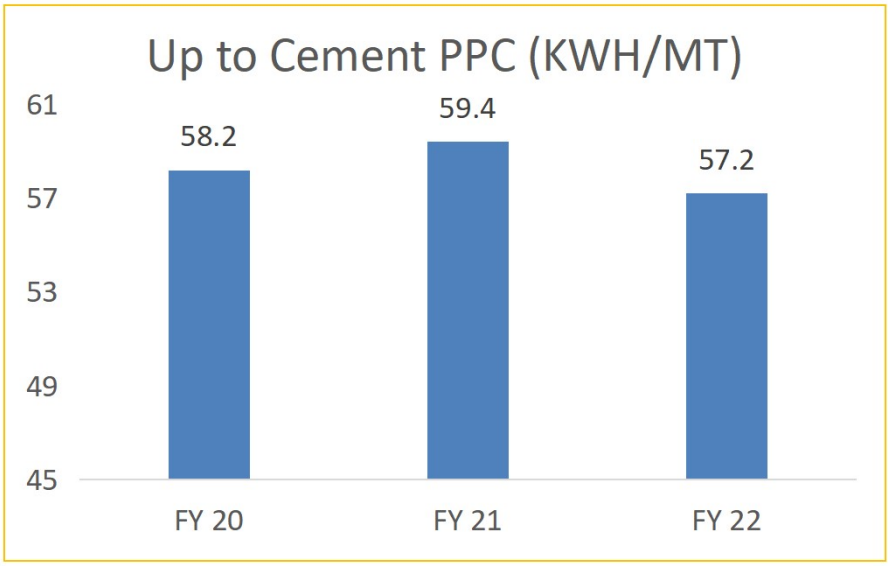
3.Specific Energy Consumption in last 3 years (Cement Grinding)

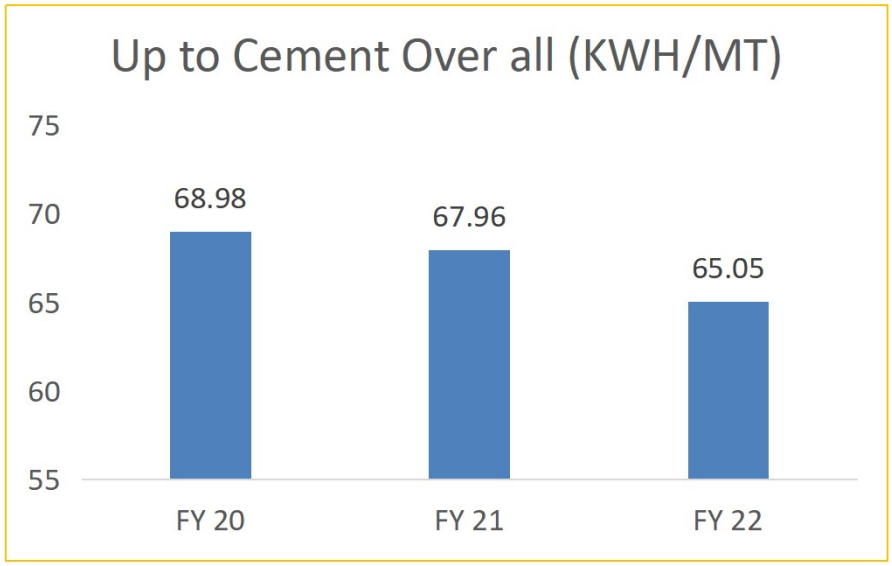




1. Periodic Hardfacing of Roller & Table Liner
2. Consistent Usage of Dryflyash
3. Maintaining Classifier Seal Gap

Upto Cement - PPC & Overall





3. Specific Energy consumption in PPC

Section	UOM	FY 19	FY 20	FY 21	FY 22
Crusher	KWH/MT Matl	0.83	0.84	0.84	0.85
Raw Mill	KWH/MT Matl	11.8	11.8	11.2	11.2
Coal Mill	KWH/MT Matl	56.4	53.5	55.5	58.2
Kiln	KWH/MT Clinker	21.7	22.4	23.1	23.0
Clinker	KWH/MT Clinker	46.5	46.4	46.5	46.6
Services	KWH/MT Clinker	2.9	3.1	3.0	3.1
Total Clinker	KWH/MT Clinker	49.4	49.4	49.5	49.7
Cement Mill	KWH/MT Cement	23.1	23.3	24.4	22.8
Packing	KWH/MT Cement	1.36	1.31	1.3	1.3
Total Cement	KWH/MT Cement	58.5	58.2	59.4	57.2

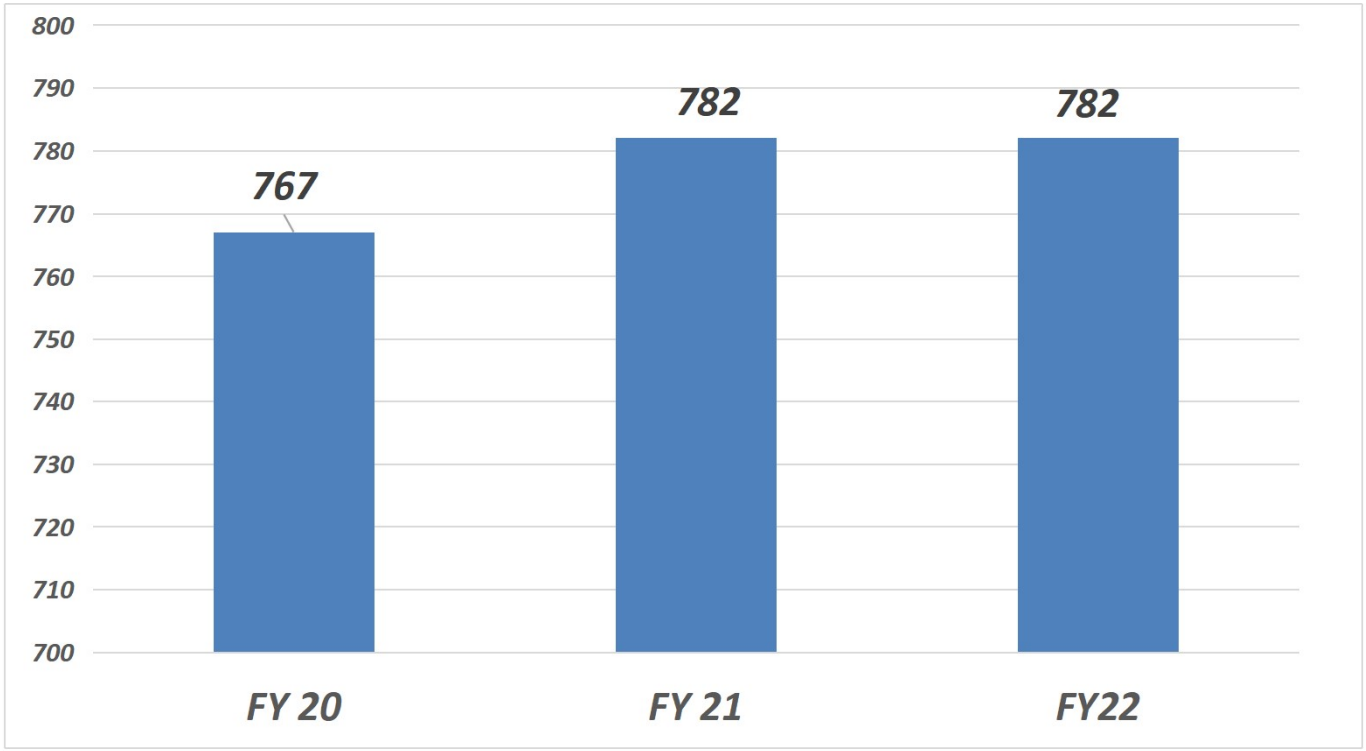
Specific Energy consumption in OPC

Section	UOM	FY 19	FY 20	FY 21	FY 22
Crusher	KWH/MT Material	0.83	0.84	0.84	0.85
Raw Mill	KWH/MT Material	11.8	11.8	11.2	11.2
Coal Mill	KWH/MT Material	56.4	53.5	55.5	58.2
Kiln	KWH/MT Material	21.7	22.4	23.1	23.0
Clinker	KWH/MT Clinker	46.5	46.4	46.5	46.6
Services	KWH/MT Clinker	2.9	3.1	3.0	3.1
Total Clinker	KWH/MT Clinker	49.4	49.4	49.5	49.7
Cement Mill	KWH/MT Cement	26.1	27.7	27.4	27.4
Packing	KWH/MT Cement	1.36	1.31	1.29	1.31
Total Cement	KWH/MT Cement	74.5	76.0	74.7	75.1

SHC

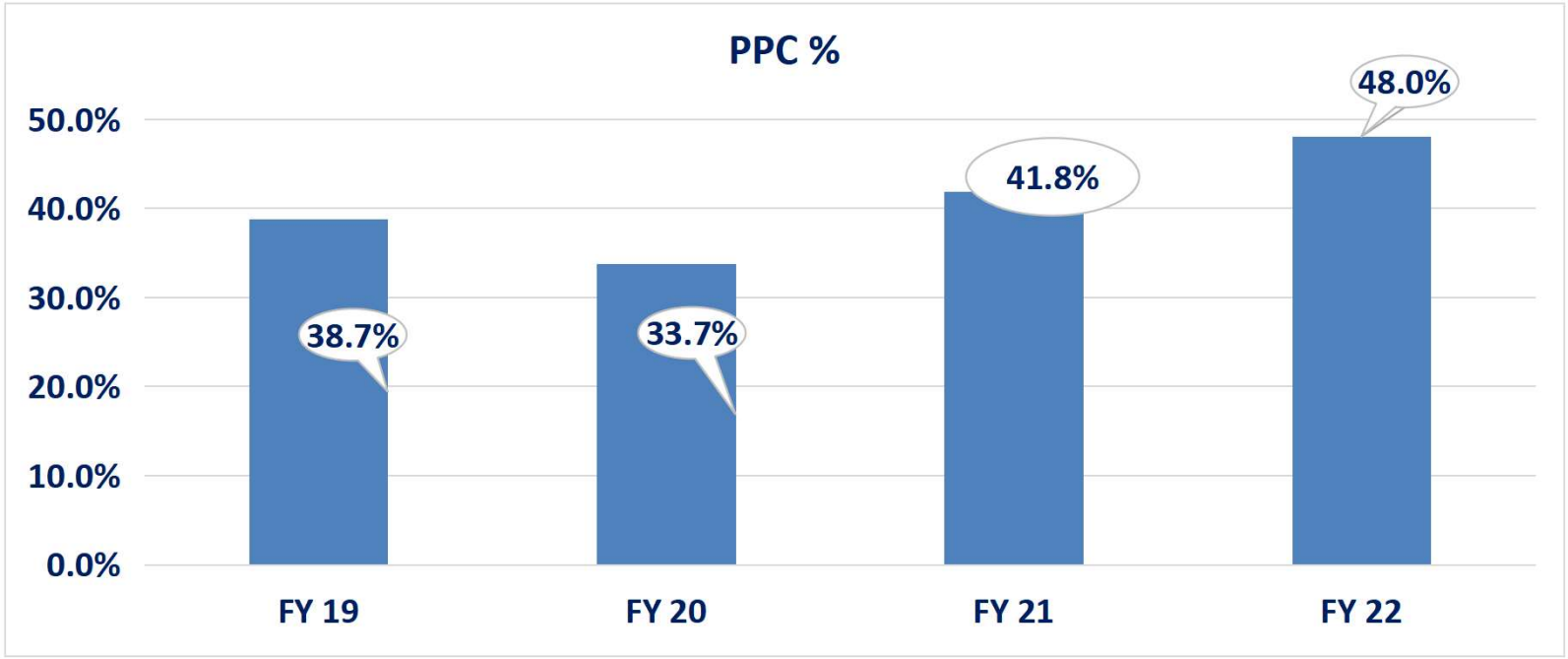
Dalmia cement
FUTURE TODAY

SHC & TSR %



1. AFR TSR increased in last 3 years
2. Burning zone coating formation

Blended Cement - PPC %



4. Information on Competitors, National & Global Benchmark

Energy Bench Marking		
Sl. No.	**Section**	
A	**Electrical Power Consumption**	
1	LS CRUSHER (Kwh/MT of Limestone)	0.58
2	RAW MILL (Kwh/MT of Rawmeal)	10.80
3	COALMILL (Kwh/MT of Coal)	15.63
4	KILN (Kwh/MT of Clinker)	19.04
5	SPC Upto Clinkerisation (Kwh/MT of Clinker) with Shutdown Power	42.5
6	PACKING PLANT (Kwh/MT of Cement)	0.65
B	**Fuel Consumption (Kcal/Kg of Clinker)**	676

Energy Bench Marking		
Parameters (21-22)	**Electrical SEC (kWh / T of Cement)**	**Thermal SEC (kcal / kg of Clinker)**
Comparison of specific energy consumption (SEC)		
SEC : Dalmia Dalmiapuram	57.2	782
SEC Values for Competitor - 1	56.14	676
SEC Values for Competitor - 2	61.40	682
SEC Values for Competitor - 3	61.65	682
National Benchmark for SEC :	56.14	676
International Benchmark for SEC :	62.0	660

Road Map for FY 22 & 23

Project Lined up for Increasing TSR , SPC & SHC reduction

1. Line-1 Cooler upgradation - Jan'23
2. Line-1 Top stage cyclone modification – Jan'23
3. Line-1 Precalciner height increase – Jan'23
4. Line-2 Calciner height increase for achieving residence time 12 Sec – Oct'22
5. Chlorine bypass system in Line 2 - Enhancing Green Fuel Beyond 35% - Feb'23
6. Upgradation of Line-2, RABH Fan efficiency improvement. – Oct'23
7. Upgradation of high efficiency Mill fan & latest generation classifier – Nov'22
8. 7 MW WHRS in Cooler Line-1 & 2 – Feb'23

4. List of Major Encon project planned in FY 2022-2023

LIST OF ENCON PROJECTS PLANNED IN 2022 - 2023								
No	Title of Project	Year	Saving Kwh/T of Clinker	Annual Electrical Saving (kWh)	Annual Electrical Saving (Million kWh)	Investment (Rs. In Lacs)	Investment (Rs. In Million)	Annual Thermal Saving (Million KCal)
1	Upgradation of high efficiency Mill fan & latest generation classifier	22-23	-	2017575	2.02	580	58.0	
2	Upgradation of Line-2, RABH Fan efficiency improvement.	22-23	0.7	1039500	1.04	150	15.0	
3	Increase in calciner height in Line 2	22-23	0.4	646800	0.65	2000	200.0	8085
4	Line-1 cooler upgradation	22-23	0.2	250800	-	2695	269.5	50160
5	Line-1 Top stage cyclone modification	22-23	0.3	376200	-	1200	120.0	6270
6	Line-1 Precalciner height increase	22-23	0.5	627000	0.63	4000	400.0	6270
7	Solar power system (1st phase)	22-23	2.8	7920000	7.92	2200	220.0	
8	WHRS in Line-1 & 2 Kiln (AQC boiler)	22-23	17	47520000	47.52	11000	1100.0	
					59.77		2383	70785

5. Energy Saving Projects implemented for last 3 years

Year	No.of Proposals	Investments Rs.Million	Savings Rs.Million	Pay Back Months
2019-20	29	107.87	107.72	12
2020-21	8	420.70	151.18	30
2021-22	7	28.91	85.46	4
Total	44	557	344	19

6. Innovative Projects implemented

Innovation 1 – Increasing AFR from 20 % to 25 % in Line2

Existing System :-

1. AFR Belt conveying system Capacity 20 TPH
2. Extractor Design 25 TPH , Operating 19 Max
3. Frequent damage / wear of castable at feeding / Calciner joining point and chute due to higher moisture / ash / chemicals
4. Heavy wear of Shredder blade and shaft 12 - 15 mm / 2000 MT (RDF , PP waste, Resin)
5. No provision of Extractor weighment calibration

Upgraded System :-

1. Belt Speed increased by replacing head pulley dia from 400 mm to 600 mm increased capacity upto 24 TPH
2. **Calibrator portion height increased by 200 mm over OEM** to increase the capacity to 24 TPH
3. Castable replaced with wear / alkali resistance SiC refractory bricks
4. Acro plate utilized for buildup instead of hardfacing , wear rate reduced to 3 to 5 mm/2000 MT
5. Motorized Divertor installed at chute for calibration

AFR Pre-Processing unit – Nov'20

Dalmia cement
FUTURE TODAY

1.Receipt material Storage

3. Eco star screen

2.Imported shredder

4. <60mm size collected in tipper

AFR Co-Processing unit – Nov'20

Dalmia cement
FUTURE TODAY

1. Shredded material Storage Shed

3. Conveying Belts 315 m

2. ATS extractor cum weigh

4. ATS Double flap

Extractor gap increased – Nov'21

Dalmia cement FUTURE TODAY

Challenges:

- ATS extractor design capacity is 25 TPH but we were unable to increase above 19 TPH due to usage of low bulk density material [< 0.1 T/M3]

Action Taken:

- Calibrator portion height increased by 200 mm
- **As per design, gap between extractor to Calibrator was 250 mm.**

  After modification, **gap increased up to 450 mm.**

Results:

- 24 TPH - actual flow rate achieved by keeping the calibrator position @ 350mm

Belt conveyor speed increased 1 to 1.5 M/Sec – Jun'21

Challenges:

- Transportation belt conveyor capacity constraint [20 TPH]

Action Taken:

- Belt conveyor BC-2, 3 & 4 – Head pulley diameter increased from 400 mm to 600 mm [linear speed increased from 1 m/s to 1.5 m/sec]

Results:

- System capacity enhanced and operated up to 24 TPH

Castable bricks replaced with SiC bricks – Nov'21

Dalmia cement
FUTURE TODAY

Challenges:

- Feed pipe jamming issue due to castable / Refractory failure - usage of high silica RDF material.

Action Taken:

- Existing **bend portion replaced with - Wear & temperature resistant Arco plate without refractories**.

Results:

- Jamming issue eliminated.

ARCO Plate for shredder blade instead of buildup – May'21

Challenges:

- M/s SIDSA shredder blade worn out is high in short period of operation, reducing the life of blades and output of shredder

Action Taken:

- **Arco plate welded over the shredder blade instead of hard facing**

Results:

- Wear rate is less than 3 to 5mm against the earlier worn-out of 10 to 15mm (within 10 days period)

Avoiding spillage from Green fuel feeding conveyor

Dalmia cement FUTURE TODAY

Challenge:

- Material is flying and continuous spillage across the full length of Green fuel transport circuit.

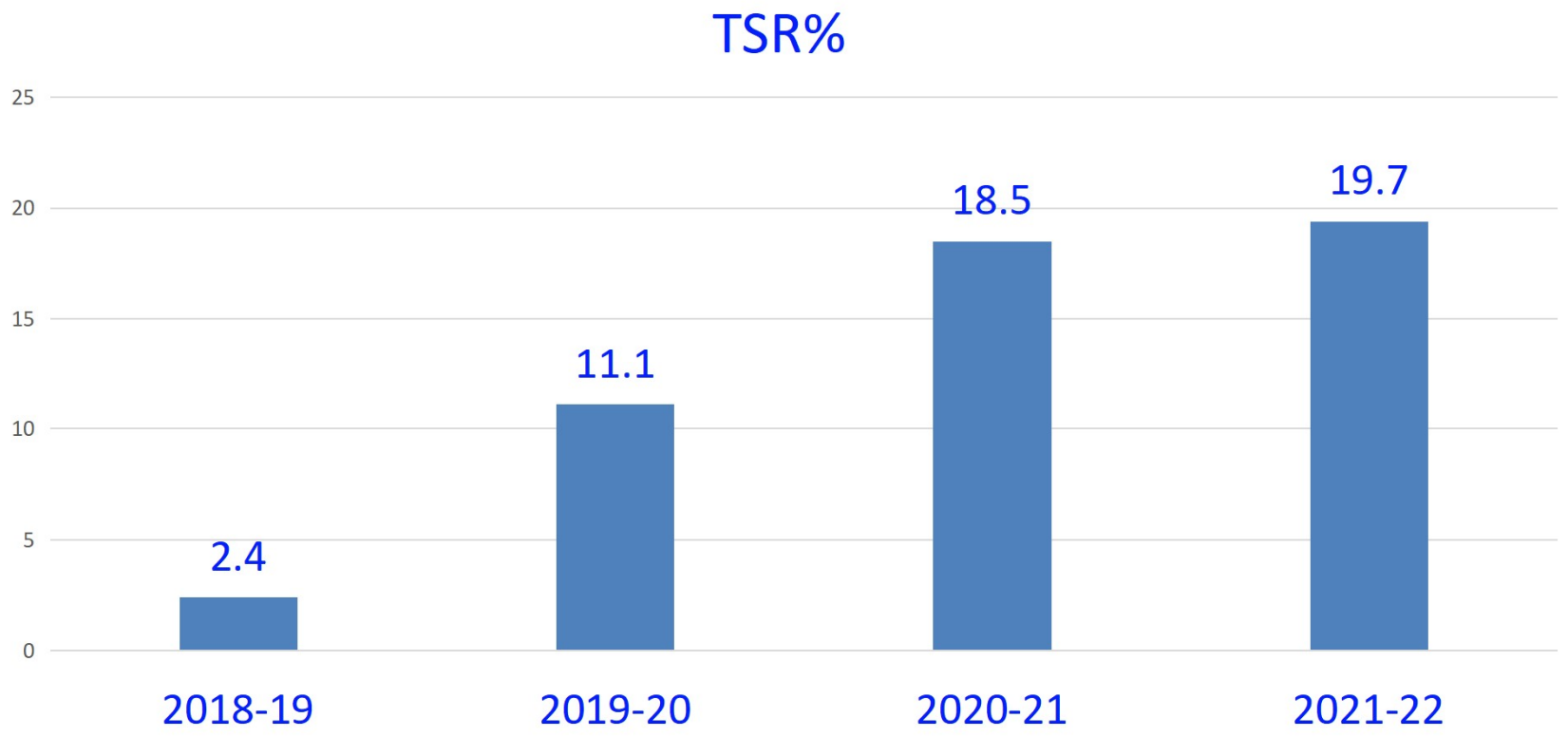
Action Taken:

- Skirting [500 mm height] provided on both sides of transportation conveyor across the length [310 M]
- Old ESP sheets used as deck plate throughout the transportation belt conveyor to avoid material accumulation

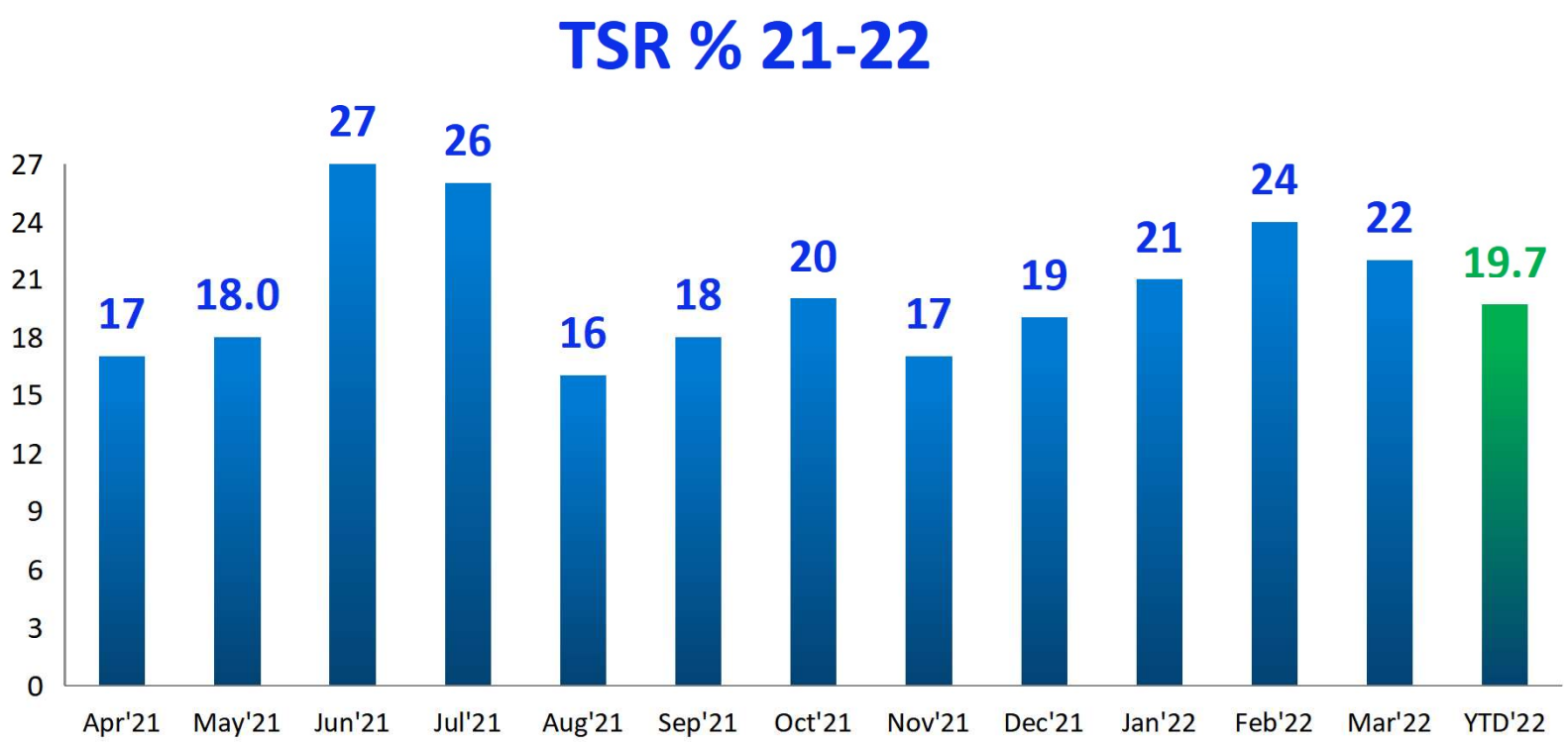
Results:

- Material spillage & accumulation eliminated

Innovation 1 – TSR Trend



Innovation 1 – TSR Trend FY - 22



Innovation 2 – No Coal Clinker (NCC)

Existing System : Usage of traditional fuel (High Grade coal , Petcoke , Indonesian coal, Carbon black) along with Alternate Fuel

Challenges:

- Fluctuation in fuel Cost in international market
- Low Calorific value of low grade fuel and AFR to maintain stable kiln operation

Action Taken :

- Replacing traditional fuel with Low cost Lignite 70 to 65 % and AFR 30 to 35 %
- Increased the raw meal LSF from 0.97 to 1.0
- **Kiln productivity reduced from 4200 TPD to 4000 TPD as per Fine Coal availability**

Innovation 2 – No Coal Clinker (KPI's)

Dalmia cement FUTURE TODAY

Date	16-Jun-2021	17-Jun-2021	18-Jun-2021	19-Jun-2021	20-Jun-2021
Kiln Production (TPD)	**3933**	**4039**	**4094**	**4134**	**4084**
TSR (%)	**27.9**	**30.0**	**32.1**	**32.1**	**33.2**
SHC(KCal/kg cli)	**842**	**821**	**799**	**808**	**811**
GF (wet Qnty)					
FW(Tons)	0	0		20	
RDF(Tons)	205	250	220	230	230
PPW(Tons)	150	123	135	90	145
Resin (tons)	5	0		10	
MLP (tons)	15	30	30	10	20
Tyre Chips (tons)				21	
Oil soaked cotton (tons)			25		30
Total(Tons)	**375**	**403**	**410**	**381**	**425**
GF (Dry Qnty)					
FW(Tons)	0	0		19	
RDF(Tons)	151	183	166	172	178
PPW(Tons)	71	51	54	42	67
Resin (tons)	5	0		10	
MLP (tons)	15	28	29	10	19
Tyre Chips (tons)				19	
Oil soaked cotton (tons)			22		26
Total(Tons)	**242**	**262**	**271**	**272**	**290**
Limestone pile no	30	31		32	33
Kiln (kwh/ton)	22.81	22.28	22.07	21.75	22.1
Upto clinkeraization power(k	50.98	49.62	49.09	48.87	48.51
Clinker 1 day strength(MPA)	21	20.4	21.8	22.2	23.1
GF Day avg(% Ash)	29.02	29.57			

Innovation 2 – No Coal Clinker (NCC)

Details / Date	16-Jun-21	17-Jun-21	18-Jun-21	19-Jun-21	20-Jun-21	21-Jun-21	22-Jun-21
Kiln production (TPD)	3923	4039	4094	4134	4084	4099	3928
AFR - TSR %	27.9	30.0	32.1	32.1	33.2	32.6	30.1
Lignite %	**72.1**	**70**	**67.9**	**67.9**	**66.8**	**67.4**	**69.9**

Results :

- Kiln operated stabily without any disturbance in Quality
- Fuel cost reduced by Rs 400 /Mkcal
- **Such operation strategy can be followed during low demand period**

Innovation 3 - DPM Line 1 Clinker Cooler water and energy consumption optimisation by replacement of Cooler vent duct

Project Need:

- The need to take up the project was established due to deterioration of the existing Cooler vent duct thickness & higher false air entry
- The increased air volume also had an impact on higher Energy & cooling water demand or gas conditioning. Due to this, the water pump remained in continuous operation for 24 hours.
- The continuous operation of water pump also increased its tripping incidents

  Brainstorming for ideas & Internal Innovative Actions.
- **Diameter of the Cooler vent duct re-designed to 3,000 mm** as compared to 2,500 mm in the pre-project scenario & Duct replacement done for a full length from the Cooler take-off upo the ESP inlet with expansion joints.

The total cost incurred in this modification was Rs.3.5 million INR.

Innovation 3 - DPM Line 1 Clinker Cooler water and energy consumption optimisation by replacement of Cooler vent duct

Specific outcomes & Benefits :

- The cooler water pump, which was earlier being operated for 24 hours, was only used for 8 hrs./day after the intervention.
- Water consumption reduced from 180 Ltr/minute to 70 Ltr/minute – a saving nearly 61%.
- Total water-saving, considering 330 days of plant operation is 52,272 m3/year & Rs.4.05 Lacs/annum.
- Total power saving of approximately 237,000 KWH/year considering 330 days plant operation. & 21 Lakhs/Annum
- Considering a conservative value of CO2 emission factor for power (captive + grid) as 1 kgCO2/kWh, **237,000 kg CO2 emissions would be saved annually.**
- By applying 11 USD/ton CO2 as social cost of carbon in India, the natural capital value added by the project would be Rs. 208,560/annum in addition to power saving benefit. and dust emissions also came down below 15mg/Nm3 and eliminated spillage cleaning costs under the conveyor with a saving of 3.96 lakhs /Annum.

The integrated value created by project is nearly 2.9 million INR/annum @ 330 days plant operation with an ROI of 1.2 Years.

Innovation 4 - Switching to Alternate Fuel

Dalmia cement FUTURE TODAY

USAGE of BIOFUEL AS ALTERNATIVE FUEL IN MINES MACHINERY

A

HSD

Pure HSD no sedimentation

B

Bio-Diesel

Bio fuel sedimentation found at bottom

Filter

Clogged filters collected from the machine after Biodiesel usage

New Filter | **Clogged Filter**

In House Design for Biodiesel Filtration

Dalmia cement FUTURE TODAY

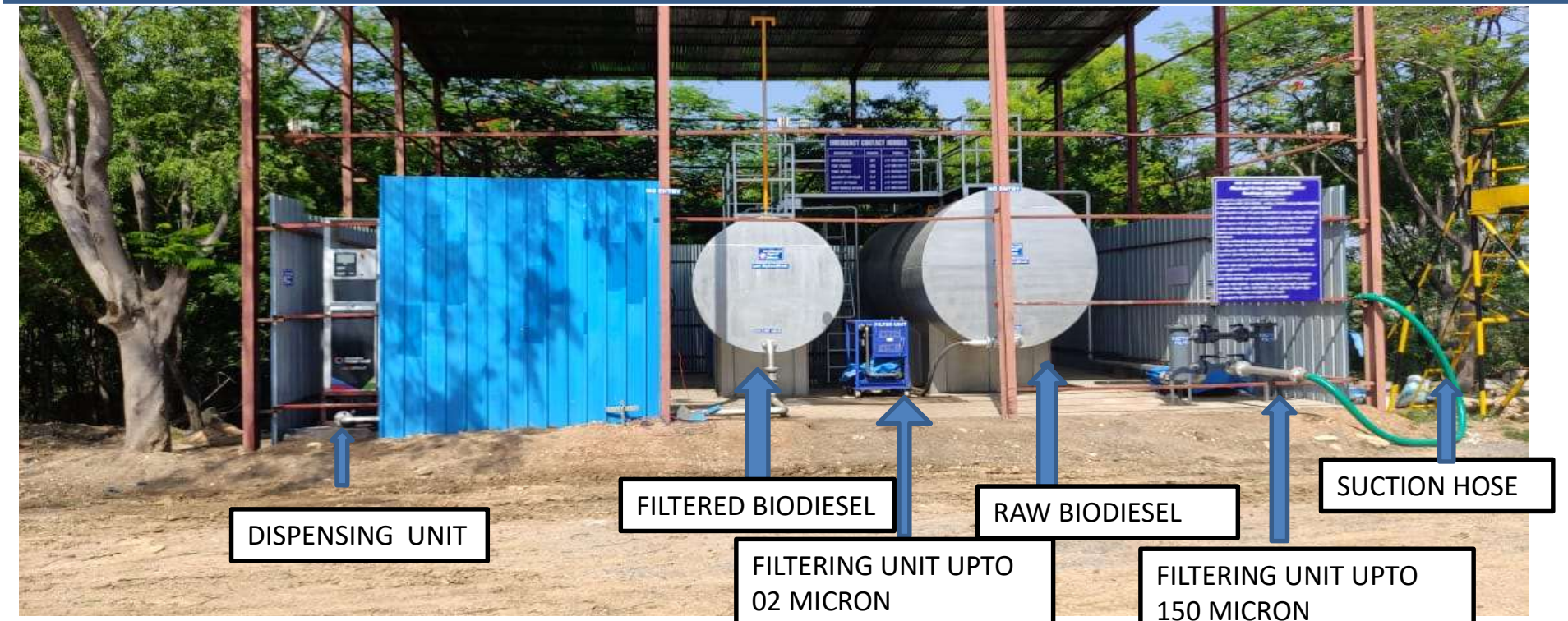
Biodiesel filtration Arrangements

Bio-diesel Filtration unit with Single filter

Bio-diesel Filtration unit with double filter

BIOFUEL BUNK AT KLK MINE

Biodiesel storage and handling facilities



Major Improvements in Productivity

Usage of Bio diesel in Mines Machinery

75% usage in FY 22 – Cost Savings 1.2 Crores

Bio diesel Storage and filtration Unit

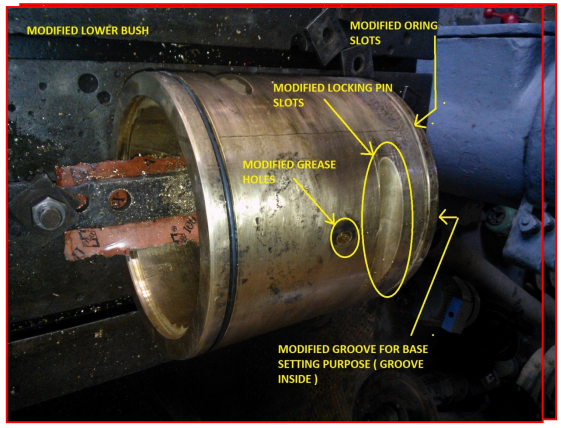
Innovation 5 - Rock Breaker Lower Wear Bush Modification

Dalmia cement FUTURE TODAY

MACHINING PROCESS

MACHINING PROCESS

AFTER MODIFICATION



MODIFIED BUSH CLEARENCE

Lower Bush, which holds the Rock breaker chisel had to be replaced due to wear after every 700 Hrs. Innovative idea was to rotate by 180 degrees and reuse as the other side, which was having no wear. Implemented with suitable Machining for re-fiting and Life & Productivity doubled. Replicated in all our Machines.

MODIFIED BUSH FITTED

Description	UOM	
Life of the lower wear bush (Before Modification)	Hours	700
Life of the Wear Bush (After Modification)	Hours	1400
Cost of one Wear Bush	Rs. Lakhs	2.25
Annual Saving per year due to Bush Modification	**Rs. Lakhs**	**31.5**

Project – Switching OFF Pressurization system during Mill P.M

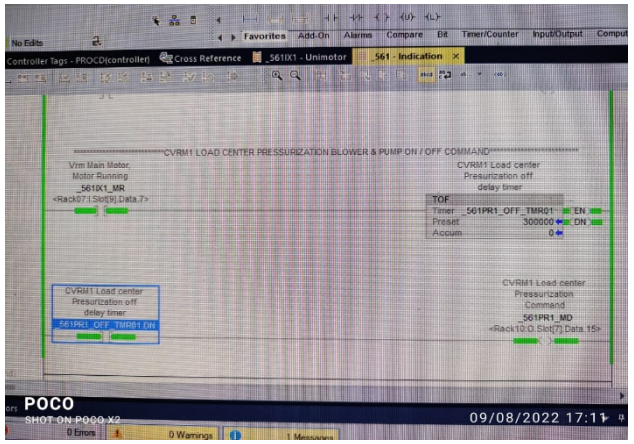
Existing : CVRM 1 Loadcenter pressurization blowers were running round the clock even during Mill PM.

Challenges :

* Ensuring power saving by interlocking pressurization blowers & water pump with Mill main drive with out affecting the purpose.

Action Taken:

Interlock provided in PLC – If main drive stop – pressurization blowers & pump will switch OFF with 5 Min time delay and switch ON if Mill main drive is switched ON.



PLC interlock

Result:

Description	
Installed Load of Pressurization Blowers & pumps (18.5*2 & 1.5 *2)	40 KW
Actual / Running Load of Pressurization Blowers & pumps (12*2 & 1.5 *2)	26 KW
Stoppage of CVRM 1 Mill for PM & Silo full per days in a month	4 days
Stoppage of CVRM 1 Per year in Hrs (12*4*24)	1152
Energy saved per year (Rs. in lakhs)	2.9

Project Automation of Hopper level sensor with feed belt conveyors

Existing :Hopper levels are maintained manually by person at hopper building.

Challenges :

* Tripping of Mill due to hopper empty & over flowing of material due to hopper full.

Action Taken:

Implemented hopper level sensors in all hoppers and automation done so that once high level is reached – feeding conveyors will get stopped.

Result:

Avoided tripping of mill due to hopper empty – avoided Mill auxiliaries idle power (15 to 20 Minutes)

7. Utilization of Renewable Energy Sources

Renewable energy -

- Wind Mill
- We had installed windmill Farm - First in Cement Plant in the Tamil Nadu. Location and Capacities are as mentioned as below:
- Site-I : In Muppandal,Kanyakumari District

Capacity : 11.5 MW

- Site-II : In KarungulamVillage at Thirunelveli District

Capacity : 5.025 MW

7.Utilization of Renewable Energy Sources

Replacement of Electrical Energy with Renewable Energy	Annual Energy Generated in 2019-20 (million kWh)	% Share	Annual Energy Generated in 2020-21 (million kWh)	% Share	Annual Energy Generated in 2021-22 (million kWh)	% Share
Wind Energy	**23.3**	**15.9**	**21.9**	**14.9**	**21.49**	**11.96**
Replacement of Thermal Energy with Renewable Energy	**Equivalent Annual Fuel Savings in 2017-18 (million kcal/year)**	**% Share**	**Equivalent Annual Fuel Savings in 2018-19 (million kcal/year)**	**% Share**		

RE 100 - first cement company in the country to join RE100 (100% renewable Power by 2030).

Including WHRS (7MW under Installation, Solar 5 MW under Installation out of 10 MW Approved.

SHARING BETWEEN DPM & ALR Plant

GREEN POWER

Solar Power Plant-5 MW Capacity with a Cost of Rs. 42.5 Crores

- Per day 20500 units are generated from Solar Power Plant.

7 MW-WHRS PROJECT UNDER PROGRESS.

8. Utilization of Waste material as fuel

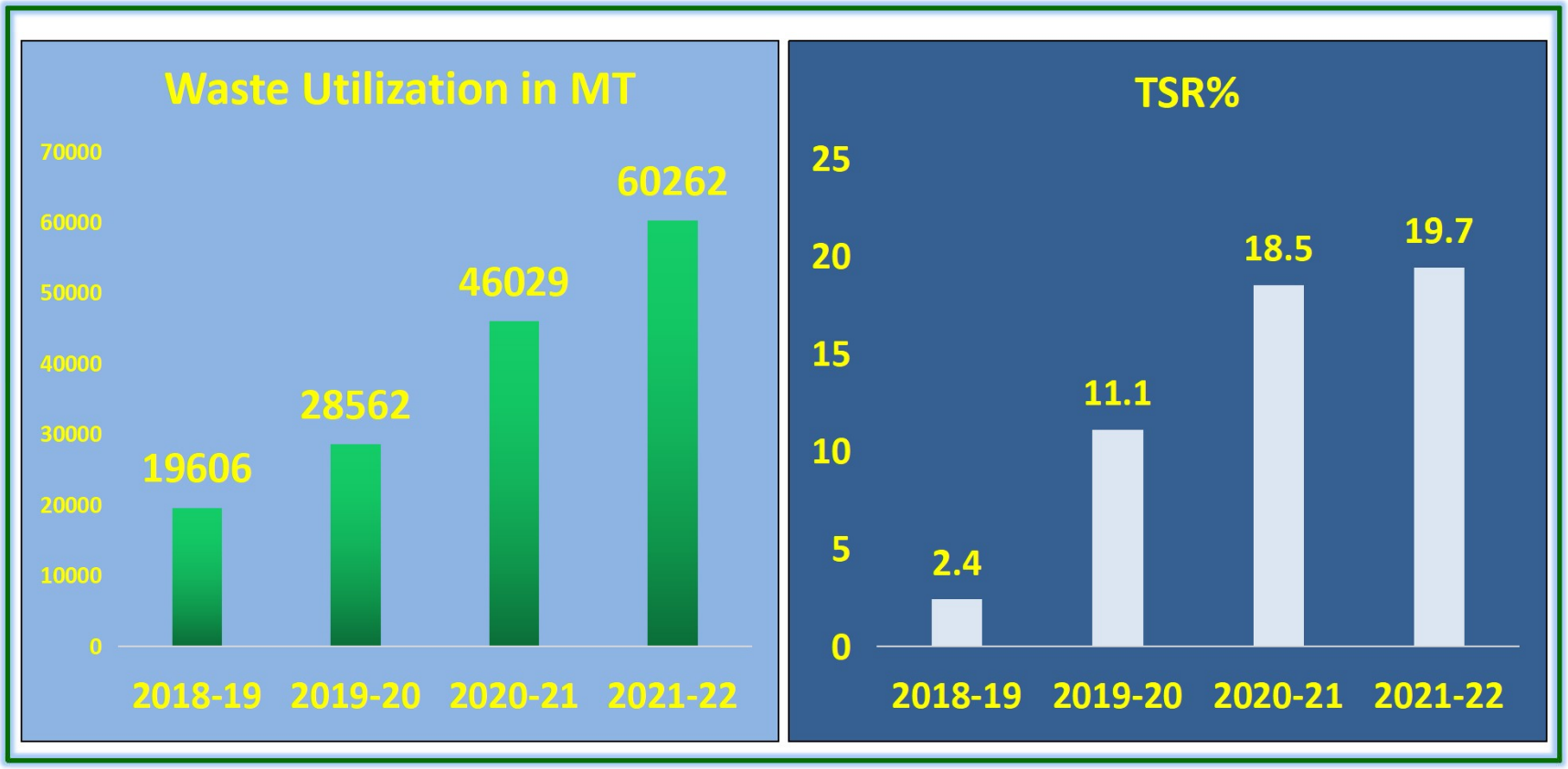
	FY19	FY20	FY21	FY22
Biomass	-	3,907	-	-
Carbon Black	5237	1,357	-	1801
Chocolate Wrapper	109	33	-	-
Emery Paper Waste	34	23	-	-
Cpp ash	1549	-	-	194
Foot Wear Waste	3574	3,347	4,057	4827
FRP Waste	285	361	203	12
High Ash Waste Mix Solid	57.3	1,977	887	92
Julie Flora	-	140	-	-
MSW	48	-	-	-
Oil Soaked Cotton Waste	-	573	740	2102
Plastic Waste MLP	-	240	4145	8072
PP Waste	1261	7,131	10,706	11758
Pyrolysis Oil Emulsion	27	-	-	-
RDF	-	7,648	22,446	27062

AF quantity (In addition we have done 20437 MT of Lime sludge in FY 20,21&22)

	FY19	FY20	FY21	FY22
Resin Waste	-	-	530	422
Rubber & Elastic Waste	-	59	160	261
Rubber & Foam Waste	-	-	293	53
Shredded Biomass Waste	-	227	-	-
Spent Wash	2959	1,136	448	323
Tyre Chips	-	-	191	61
Used PP Bag	-	15	54	61
Waste. Mix. Liq	40	439	367	295
Waste. Mix. Sol		160	-	-
GEPIL	3811	-	-	-
Palm Bunch / Rice Husk	130	-	-	105
Organic liquid	-	-	133	35
ULB plastics	-	-	266	299
SCF	-	-	81	1253
ETP sludge	-	-	7	-
Paint Sludge			21	25
Grinding sludge	-	-	18	111
Shredded RDF	-	-	194	1010
Liquid Waste			650	28
Total Qty			**46,599**	**60262**

WASTE UTILIZATION & TSR% YEAR-WISE

AF quantity (In addition we have done 20437 MT of Lime sludge in FY 20,21&22)



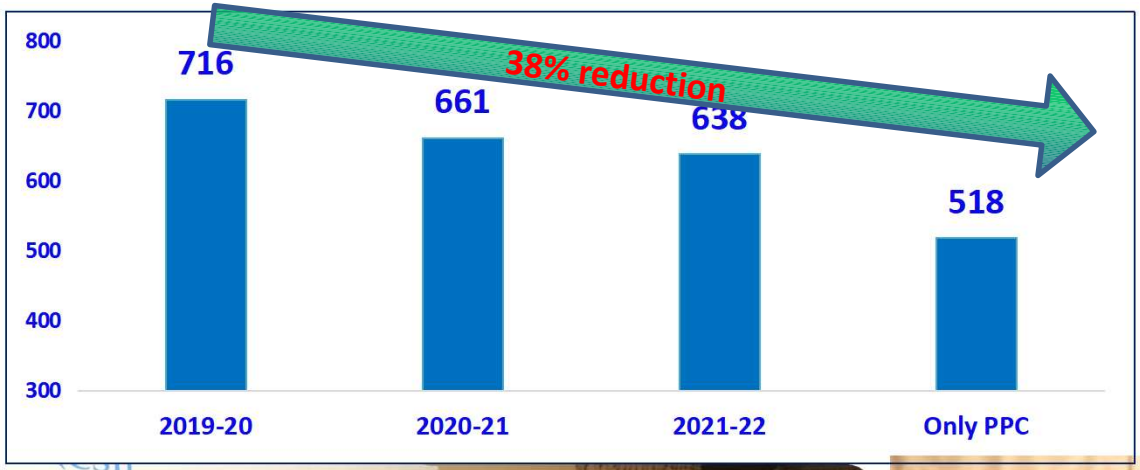
9. Learnings from other Companies from Past Energy Award Events

1.Complete upgradation of conventional lights with LED lighting in plant.
2.Automation of AC and lighting system control through cloud-based technology
3.High energy efficiency IE3 Motors in place old low efficiency motors
4.High efficiency - 3 / 5 star rated Air conditioner.
5.High energy efficiency impeller for main process fan.
6.Usage of high chlorine content alternate fuel – Based on chlorine balance.
7.Installation of Pre-processing system for making Uniform quality of AFR
8.Handling / Addition of lime sludge in crusher
9.Installation of ATS make double flap, cycle time reduction from 14 S to 6 S
10.Installation of ATS extractor cum weigh feeder, for uniform feeding to reduced PC temperature fluctuation
11.Full-fledged laboratory for AFR analysis
12. CFD Analysis

10. GHG Inventorization

GHG Emission - Low Carbon Technology Road Map

Total kg CO2 / Ton of Final Product



Road Map for Carbon Neutrality:

Immediate:

- ✓ Increase the AFR Utilization from 15.6% to 35%.
- ✓ Increase the PPC Product ratio from 48% to 75%
- ✓ Increase the Fly Ash usage from 32% to 35%

Future:

- ✓ 100% AFR utilization in PC
- ✓ Negative Carbon Foot Print on 2040
- ✓ Carbon Capturing & Utilization
- ✓ By introducing Composite Cement

MD Signing the new Charter at Seoul , Oct 2012

Dalmia participates in the Green Strategic Partnership of India and Denmark & Dalmia Cement & IFC Disclosure to Public thro' Dalmia Sustainability Report

Dalmia Cement and FLSmidth of Denmark sign a MoU for cooperation in next generation cement technology towards building a sustainable future in presence of Danish Prime Minister and Indian Prime Minister in Copenhagen

Partnership with IFC and CII

Our Group CEO (Cement) Shri.Mahendra Singhi represented india at the Highlevel signing ceremony of Paris Agreement on Climate Change.

11. Green Supply Chain Management

Sl. No.	Projects Implemented	Investment Made (Rs In Million)	Benefits Achieved	Description
1	Electronic Proof of Delivery (E- POD) An electronic proof of delivery (E-POD) is a digital format (usually PDF) of a traditional paper Delivery Order or Delivery Note. An E-POD is the electronic form of such a paper document, and it is a fast-growing trend and our DCBL Dalmiapuram Plant implemented the E-POD System	1.15	E-PODs saves time, prevents disputes, and reduce the company's carbon footprints.	A delivery order or delivery note is required to facilitate a delivery and upon a successful delivery which consists of handing over of goods from the driver to the end recipient, a signature or some endorsement is collected on the paper document as a delivery. This proof of delivery is essential for subsequent billing of the customer and serves as an important acknowledgment to mark the delivery as completed.An E-POD is the electronic form of such a paper document, and it is a fast-growing.

Green Supply Chain Management

Sl. No.	Projects Implemented	Investment Made (Rs In Million)	Benefits Achieved	Description
1	Radio Frequency Identification (RFID) implemented in yard IN / OUT ,Cement gate IN / OUT, Line1 & Line 2 packing House IN / OUT .	4.7	1.Capture vehilce time at various stages in the plant, uniformly and consistently. 2. Identify areas leading to increase in Plant OET & vehicle TAT. 3. Faster customer service result in increase in P2D 4	It gives better clarity and position / location of truck from yard in to yard out. Ø This gives visibility of trucks available at parking yard with order placed / want of order truck details. Ø Through RFID security guards save time to create yard slip by auto generating trip register. Ø DPM plant & cement business highly adopted with digitization and helped business lot in speed / accuracy.

Green Supply Chain – Cement Bulker %

FY19-20		FY20-21		FY-21-22	
DispatchQuantity	Avg. Distance	DispatchQuantity	Avg. Distance	DispatchQuantity	Avg. Distance
555909	321	482793	308	1930173	268
1503508	314	1586447	314	615097	332
2059417	316	2069240	316	2545271	280

Bulker Quantity - 615097 MT

Fuel Savings - 424384 Ltrs. x Rs.94 / Ltrs. of Diesel

Cost Saving - 398 Lakhs

Green Supply Chain – Back Hauling %

Results:

- ✓ **Backhaul Quantity = 145000 MT**
- ✓ **Fuel Savings = 193399 Ltrs. x Rs.94 / Ltrs. of Diesel**
- ✓ **Cost Saving = 181 Lakhs/annum**

Green Supply Chain / Replication of Best Practices

Dalmia cement FUTURE TODAY

Reverse logic system for Limestone & Gypsum trucks

- Round Trip - Rs.131/Ton Straight Trip - Rs.209/Ton
- Savings - Rs.78/Ton Average Receipt/Day - 1960 Tons
- Installation of GPS tracking system, Monitoring of Supplier Rating Green Policy followed in our Purchase Order
- Green Purchasing: Polyethylene sheet used in packaging shall be more than 20 microns. Packing of material should be in good condition & it should be of bio- degradable material wherever possible
- Reverse logistics meticulous implementation, thus not only saving cost but also on CO2 emission reduction
- Maximising cement transport thro' Bulkers, thus improving on Specific Supply Chain efficiency, thus saving on Fuel as well as CO2.
- Dalmia Cement encourages to re-use, re-cycle material
- PLMS (Plant Logistics Management System) Implementation
- RFID (Radio Frequency Identification) Reader installation. at our Dalmipauram Plant Premises at 6 locations, in addition to logistics locations
- FT (Freight Tiger)Tracking Consent & FT IVR (Freight Tiger Interactive Voice Response) / E-POD
- Efficiency Improvement Programs/projects implemented for Suppliers
- Supplier Evaluation/audit

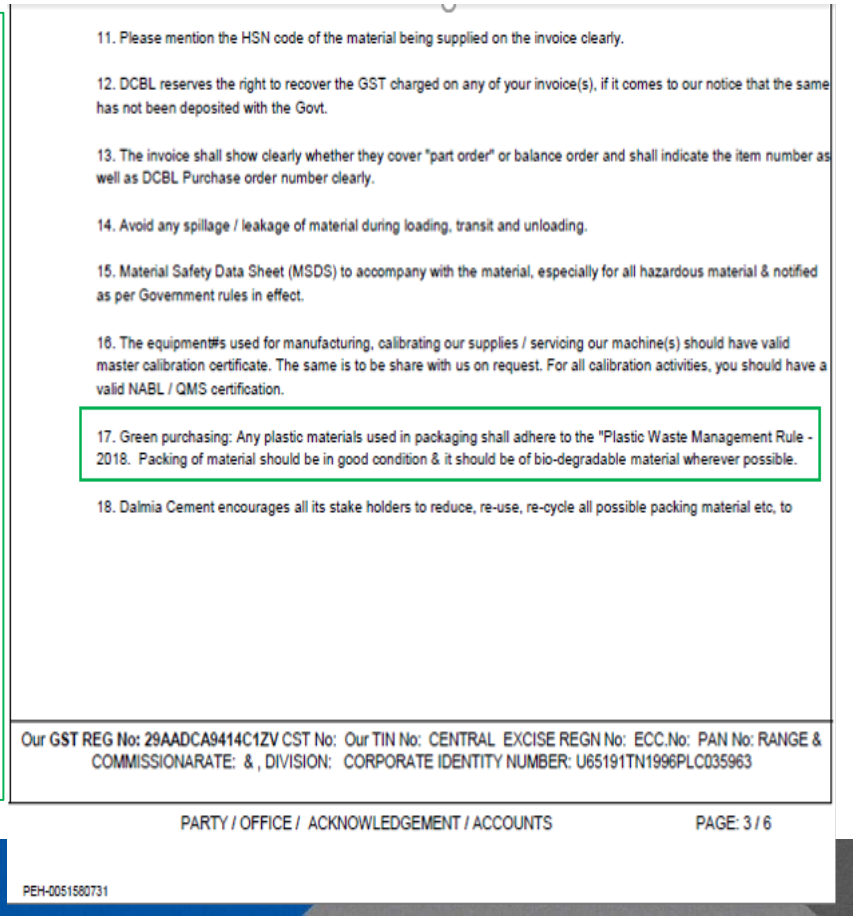
Green Purchasing Policy & in Purchase order

Dalmia Cement (Bharat) Limited, Dalmiapuram

Green Purchase Policy

1. Aim at making our value chain environmental friendly and responsible.
2. Committed to comply with the requirements of local laws and regulations related to environment in which it operates and from where it sources any material, product or services.
3. Realize that the scope and nature of operations of our suppliers vary and hence emphasis on these principles may vary accordingly.

The following shall be followed at DCBL, Dalmiapuram shall:
Energy:
a. All new purchases of electronic items & energy-using appliances shall be energy efficient equipment's.
b. All copiers and printers purchased or leased shall be capable of double-sided copying/printing.
c. Complete phase out of incandescent, fluorescent light sources & CFL bulbs into LED.
d. Insisting suppliers strive towards enhancing the efficiency and performance of the equipment and processes by continual improvement, monitoring and assessment of technology.
e. Identifying the scope of replacing conventional sources of energy with sustainable and renewable sources in their operations thereby fighting for climatic change.



11. Please mention the HSN code of the material being supplied on the invoice clearly.

12. DCBL reserves the right to recover the GST charged on any of your invoice(s), if it comes to our notice that the same has not been deposited with the Govt.

13. The invoice shall show clearly whether they cover "part order" or balance order and shall indicate the item number as well as DCBL Purchase order number clearly.

14. Avoid any spillage / leakage of material during loading, transit and unloading.

15. Material Safety Data Sheet (MSDS) to accompany with the material, especially for all hazardous material & notified as per Government rules in effect.

16. The equipment#s used for manufacturing, calibrating our supplies / servicing our machine(s) should have valid master calibration certificate. The same is to be share with us on request. For all calibration activities, you should have a valid NABL / QMS certification.

17. Green purchasing: Any plastic materials used in packaging shall adhere to the "Plastic Waste Management Rule - 2018. Packing of material should be in good condition & it should be of bio-degradable material wherever possible.

18. Dalmia Cement encourages all its stake holders to reduce, re-use, re-cycle all possible packing material etc, to

Our GST REG No: 29AADCA9414C1ZV CST No: Our TIN No: CENTRAL EXCISE REGN No: ECC.No: PAN No: RANGE & COMMISSIONARATE: & , DIVISION: CORPORATE IDENTITY NUMBER: U65191TN1996PLC035963

PARTY / OFFICE / ACKNOWLEDGEMENT / ACCOUNTS PAGE: 3 / 6

PEH-0051580731

12. Team work, Employee Involvement & Monitoring

Team Work in Encon / Monitoring & Reporting / Employee Involvement in Encon

Dalmia cement FUTURE TODAY

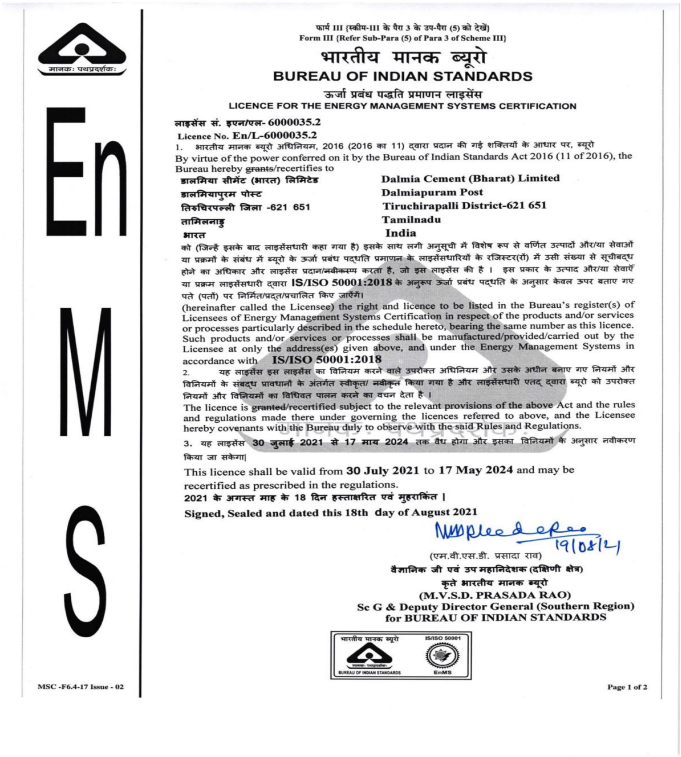
SPECIFIC POWER LINE 2 PLANT						
Description	31.05.2022					
	MTD					
	KWH	Run Hrs	PROD	TPH	KWH/HR	KWH/T
LS Crusher						
LS Crusher Main Drive	131833	508.80	338631	666	259	0.39
MCC - 31(LS Transport & RM handling)	136183	508.80	338631	666	268	0.40
Circular Stacker	4470	508.80	338631	666	9	0.01
Crusher Total (Both Line-1 +Line 2 Plant)	**272485**	**508.80**	**338631**	**666**	**536**	**0.80**
LINE-1 Transfer Power	111323	208.60	142880	685	534	0.78
LINE-2 Circular Stacker	142617	265.00	180569	681	538	0.79
LINE-2 Linear Stacker	18546	35.20	15182	431	527	1.22
LINE-2 TOTAL	161163	300.20	195751	652	537	0.82
LS Crusher & Transport (Total)	**161163**	**300.20**	**195751**	**652**	**537**	**0.82**
Section Stoppage Power	**0**					
LS Crusher & Transport with Stoppage Power	**161163**	**300.20**	**195751**	**652**	**537**	**0.82**

Team Work Involvement of employees

- E8K Mission
- Suggestion Scheme
- Good Work Award
- Long Service Award
- Employee of the Month
- EOM Training and Dinner
- Workers Education Class
- Nomination for Tamilaga Arasin Uyarntha Ulaipalar Virudhu
- Safety Quizzes in Gate Meeting
- Safety Messages Sharing in Gate Meeting
- Productivity week/ Environmental Day Celebrations Various Contests
- National Safety Day Celebrations Various Contests
- Health & Safety Committee Meeting Members Participation
- Various External Awards Participation
- Birthday Fiesta/Long service Mass Tree Plantation
- Trained for New Safety Approaches

13.Implementation of ISO 50001/Green Co/IGBC rating

IS/ISO 50001:2018, Green Pro Certification



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
ऊर्जा प्रबंध पद्धति प्रमाणन लाइसेंस
LICENCE FOR THE ENERGY MANAGEMENT SYSTEMS CERTIFICATION

लाइसेंस सं. इएनएम- 6000035.2
Licence No. En/L-6000035.2

Dalmia Cement (Bharat) Limited
Dalmiapuram Post
Tiruchirapalli District-621 651
Tamilnadu
India

IS/ISO 50001:2018

30 July 2021 to 17 May 2024

Signed, Sealed and dated this 18th day of August 2021

(एम.वी.एस.डी. प्रसादा राव)
वैज्ञानिक जी एवं उप महानिदेशक (दक्षिणी क्षेत्र)
कृते भारतीय मानक ब्यूरो
(M.V.S.D. PRASADA RAO)
Sc G & Deputy Director General (Southern Region)
for BUREAU OF INDIAN STANDARDS

MSC -F6.4-17 Issue - 02

Page 1 of 2

Energy Management SystemCertifiion
IS/ISO 50001:2018

Confederation of Indian Industry

CII-Green Products and Services Council

hereby certifies that

Dalmia PPC/Vajram Cement

(GPDC10001)

manufactured by Dalmia Cement (Bharat) Limited meets the requirements of GreenPro Certification and qualifies as a Green Product.

This certification is valid till ***December 2022***

Jamshyd N Godrej
Chairman, CII-Godrej GBC

ParasuRaman R
Chairman, CII-Green Products & Services Council

K S Venkatagiri
Executive Director, CII-Godrej GBC

Supporting Council and programmes

Dalmia PPC - Green Pro Certified by CII

Implementation of ISO 50001/Green Co/IGBC rating

Keys to Success By Implementation of ISO 50001:2018

- *Well defined energy policy to become excellent energy efficient plant*
- *Gap analysis for the targets and corrective actions for acheiving the targets.*
- *Energy task force team consisting of people at different levels.*
- *Systematic approach to improve the energy performance*
- *Periodical review by top management.*
- *Availability of advanced tools like Expert optimizer & online reporting , etc.*
- *Inter-departmental cross-functional energy audits.*
- *Active participation in national level energy management programs, workshops.*
- *Young enthusiastic work force always quick to learn and eager to innovate and implement out-of-the-box ideas.*
- *Reduction of GHG Emission & Carbon footprint*

14. Other Information

- **Only Plant in the World Making 16 Cement Varieties** & Operating 8 Management Systems.
- **AFR is given complete focus**, in line with national agenda for Climate mitigation.
- **Achieved TSR % 19.7 % Annual Avg in Line2 in Assessment Year FY 21-22**, 18.5% TSR in 20-21 & Target to 35 % by 2024 with **ongoing Chlorine By pass System**
- Specific Electrical Energy Consumption Kwh/T of **Upto Cement - PPC: 57.2 . Upto Clinker 46.5 Units and Cement Grinding 22.8 Units/MT of PPC.**
- Thermal energy from Fossil Fuel is 662 Kcal/Kg clinker only out of 785. Rest from AFR, which enhances Sustainability/climate mitigation.
- **Line 1 Cooler Upgradation to reduce SHC investment of 26 Crs** – Target – Mar2023
- RE 100 - first cement company in the country to join RE100 (100% renewable Power by 2030)
- **46 CAPEX Projects ongoing for energy optimization/Productivity/de-bottlenecking**
- Lowest Carbon footprint in the World as a Group
- First Rank in the country in the CDP (Carbon disclosure Plan) League Table
- Double energy productivity - 2030 (EP 100)

14. Other Information

- Renewable biomass and waste to replace fossil fuel use – 2035
- Water Positivity target – As Group 5 times Water Positive
- Carbon Neutral Ambition - Carbon Negative Cement Group 2040
- Through Energy Management System & Energy Conservation Team, implementation of improvement projects internally identified & suggested by CII during the MEA.
- Daily Co-ordination meeting is another forum in which, details of every parameters are captured, presented, discussion for analysing the Gaps and effect actions.
- Structured Kaizen Scheme is in place (**84 Kaizens in FY22**)
- Various Energy Efficiency Training Programs are conducted through a Technical Staff Club & CII Seminars to gain knowledge on latest energy efficient technologies.

Gold Award - Apex India Green Leaf Award 2021 for Energy Efficiency

Dalmia Wind Farm - Muppandal Site - Best Performing Wind Farm Award 2021-22
Zone : 1 Above 2 MW

Platinum Award - Apex India Green Leaf Award 2021 for Environment Excellence

Grow Care India "GOLD AWARD" for Sustainability Award 2021.

" PLATINUM AWARD " for the Grow Care India Environment Excellence Award 2021

"GOLD AWARD" EXCEED" Environment Sustainability Award 2022"

"Winner Award" GREENTECH ENVIRONMENT AWARD - 2022

Dalmia cement FUTURE TODAY

Ref.: Env2022/AwdDecl/E - 130

11th August 2022

Shri K. VINAYAGAMURTHI
PLANT HEAD
Dalmia Cement (Bharat) Limited
Dalmiapuram
Tamil Nadu

CONGRATS!

"DECLARED WINNER of "22nd Greentech Environment Award 2022"

Dear Shri K. VINAYAGAMURTHI,

With immense pleasure we intimate that our Jury Members have recommended **M/s. Dalmia Cement (Bharat) Limited Dalmiapuram** as **WINNER** for outstanding achievements in **"Environment Protection"** category.

It is our proud privilege that the following dignitaries have consented to grace the occasion as Chief Guests to inaugurate and present the most prestigious "9th Annual Greentech CSR Awards 2022" awards on 24th August 2022 at 18.30 hrs at Vivanta by Taj, Guwahati:

- Shri Bimal Borah, Minister of Industries & Commerce & Public Enterprises , Govt. of Assam
- Shri Parimal Baidyasukla, Minister of Transport & Excise, Govt. of Assam
- Dr. Arup Kumar Misra, Chairman, Assam State Pollution Control Board.

Some more dignitaries are likely to confirm to grace the event.

One person as 'Award Receiver' can attend the Summit as well as Awards presentation program on 24th August 2022 on behalf of your company on complimentary basis (non-residential). The Award Presentations will be done at 18.30 hrs followed by dinner.

We also request you to nominate some participants to attend the Summit and Awards Presentation program on 23 - 24 August 2022 by registering Online (www.greentechevents.com) as Delegates on payment of the participation fee, payable prior to the event.

We look forward to welcome you in Guwahati
Sincerely,

K. Sharan
Chairman & CEO

Greentech® Foundation
Partners in your Pride & Prestige
603, DDA Tower 2, District Center,
Janakpuri, New Delhi - 110058 (India)
Phone : +91. 11 .25543371, 25543373, 25543376
Mob : +91 (0) 9650960482
Email : info@greentechevents.com
Website : www.greentechevents.com

Greentech Foundation Charitable Trust *Regn. No. DEL - GR 22467*

“Occupational Health, Safety and Environment Awards 2020” & State Level Safety Competitions-2020
Awarded by National Safety Council – Tamilnadu Chapter ,Chennai

"GMF PINNACLE ENVIRONMENT INITIATIVE AWARDS - 2022 in "DIAMOND CATEGORY"

Mines Environment & Mineral Conservation Week (MEMC) - 2022

Non conventional category

Mineral Conservation - KVK 3rd prize

Sustainable and development - KLK 1st prize

Publicity & propaganda - KVK 3rd prize

Conventional category

Afforestation - PTK- 2 nd prize

Mineral conservation- PNR -2nd Prize

Reclamation & Rehabilitation- PTK - 3rd prize

Environment Monitoring- PNR -1st prize

Sustainable development- PNR 2 prize

Publicity &propaganda- PNR -1 prize

Overall performance- PNR - 2 prize

Dalmia
Bharat Group

CII-SR Industrial Waste Management Competition 2021 – 1st Edition

Solid Waste Management Company

CII
Confederation of Indian Industry

Dalmia Cement (Bharat) Ltd
Dalmiapuram

K Vinayagamurthi
Plant Head
Dalmia Cement (Bharat) Limited
Dalmiapuram

FIMI Award 20-21 - Kovandakurichi - KVK Limestone Mine of Dalmia Cement (Bharat) Ltd. for Tata Steel Award for Sustainable Mining for its efforts towards biodiversity conservation and sustainable mining.

CII National Award for Environmental Management 2021

Confederation of Indian Industry

8th CII National Award for Environmental Best Practices 2021

This is to certify that

Dalmia Cement (Bharat) Limited, Dalmiapuram

Project Title: **Water conservation projects linked with the goal of Water Neutrality**

is a "Innovative Environmental Project"

This is being given on completion of the National Competition for CII National Award for Environmental Best Practices held on 28 - 30 July 2021 over Virtual Platform.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Pradeep Bhargava
Chairman
GreenCo & Environmental Council
CII - Godrej GBC

L S Ganapati
Chairman
CII Environmental Best Practices Award
CII - Godrej GBC

CII National Award for Excellence in Energy Management 2021 & Energy Leader Award 2021

CII National Award for Excellence in Energy Management 2021 & National Energy Leader Award

CII
Confederation of Indian Industry

22nd National Award for Excellence in Energy Management 2021

This is to certify that

Dalmia Cement (Bharat) Limited, Dalmiapuram

has been recognized as

"National Energy Leader"

for their consistent and progressive performance in energy management.
This acknowledgment is based on the evaluation by panel of judges at the "National Award for Excellence in Energy Management" held during 24 - 27 August 2021.

K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

CII National Award for Excellence in Energy Management 2021 & Excellent Energy Efficient Unit Award

CII

Confederation of Indian Industry

22nd National Award for Excellence in Energy Management 2021

This is to certify that

Dalmia Cement (Bharat) Limited, Dalmiapuram

has been recognized as

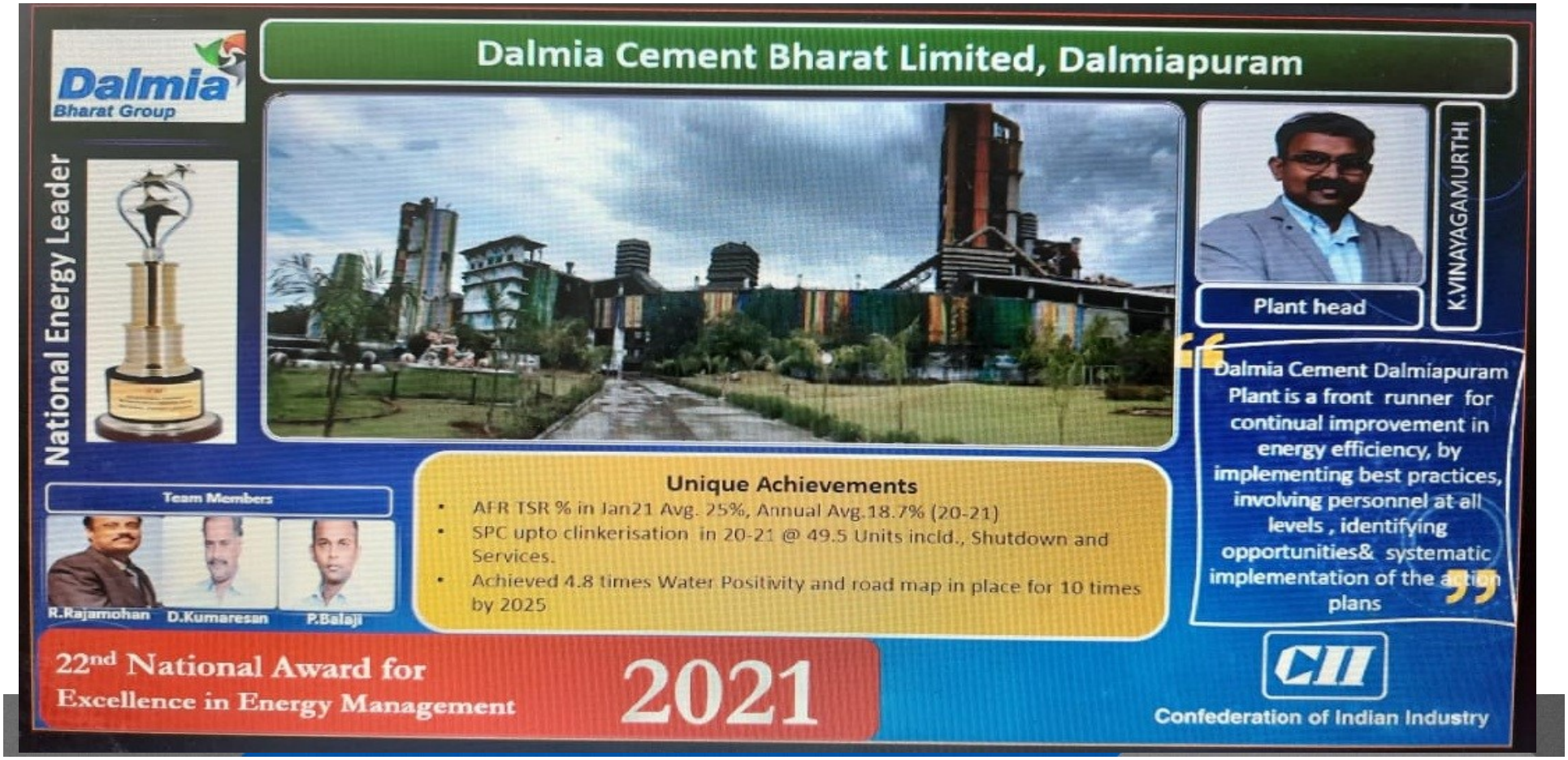
"Excellent Energy Efficient Unit"

This acknowledgement is based on the evaluation by panel of judges at the "National Award for Excellence in Energy Management" held during 24 - 27 August 2021.

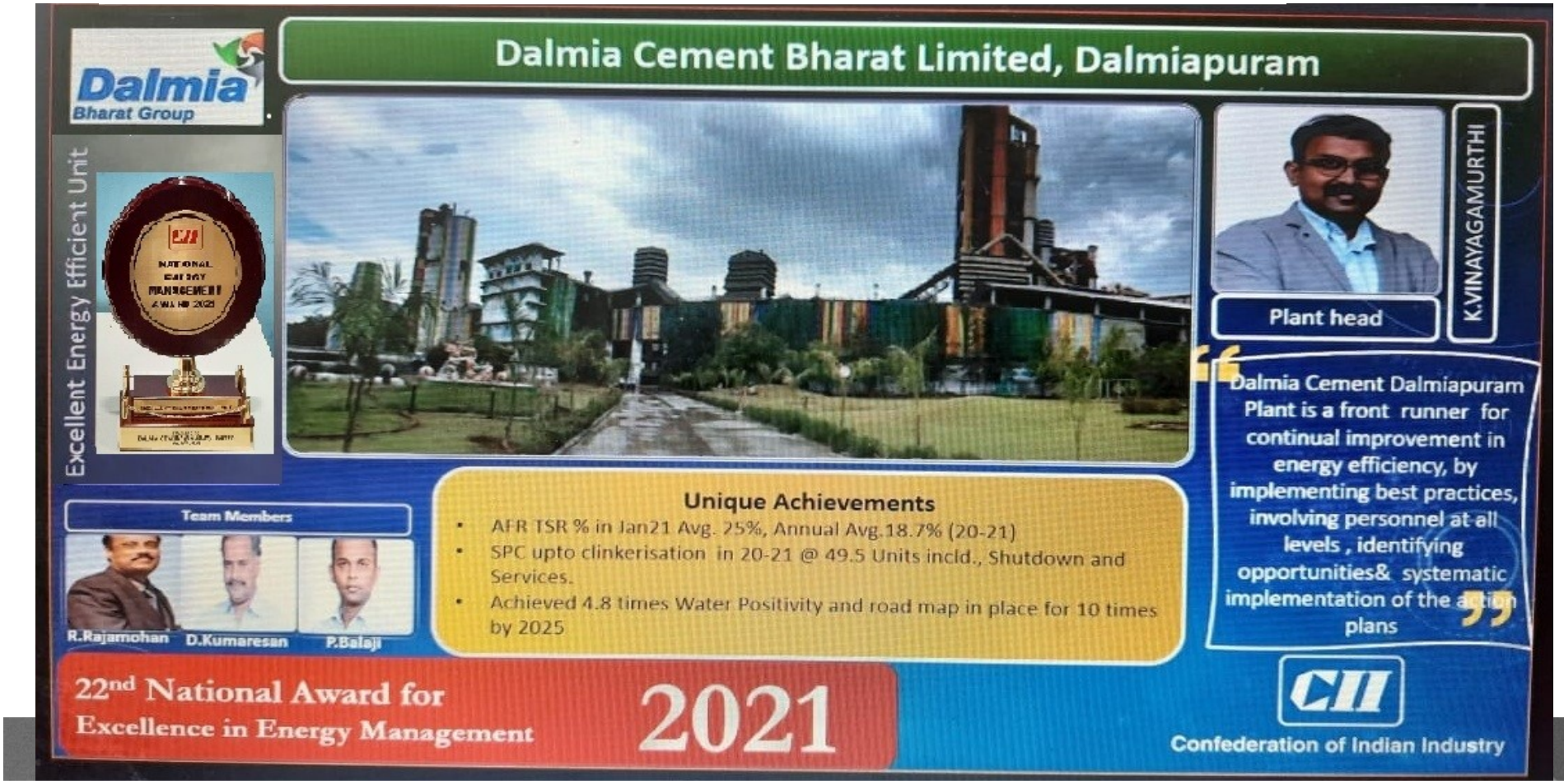
K S Venkatagiri
Executive Director
CII - Godrej GBC

Ravichandran Purushothaman
Chairman, Energy Efficiency Council
CII - Godrej GBC

CII National Award for Excellence in Energy Management 2021 &
National Energy Leader Award



CII National Award for Excellence in Energy Management 2021 &
Excellent Energy Efficient Unit Award



Organised by The Directorate General, Factory Advice and Labour Institutes (DGFASLI), Ministry of Labour & Employment, Government of India & Regional Labour Institute (RLI), Faridabad, Government of India.

Mr. S. Suresh, Emp. No: 272, Fitter - VRM2 Mechanical has received Vishwakarma Rashtriya Puraskar (VRP) Award &Certificate

CII-SR EHS Excellence Award - 2021

- Our Unit Bagged Bronze Award from CII-SR EHS Excellence Award - 2021

Dalmia cement
FUTURE TODAY

Confederation of Indian Industry

World Environment Day 2021

Competition for recognition of **Ecosystem Restoration** by companies

CII Sohrabji Godrej Green Business Centre

here by recognizes that

Rain Water Harvesting thro' Water Body restoration -De-silting of 450 Acre Manodai Lake

initiative by

Dalmia Cements, Dalmiapuram

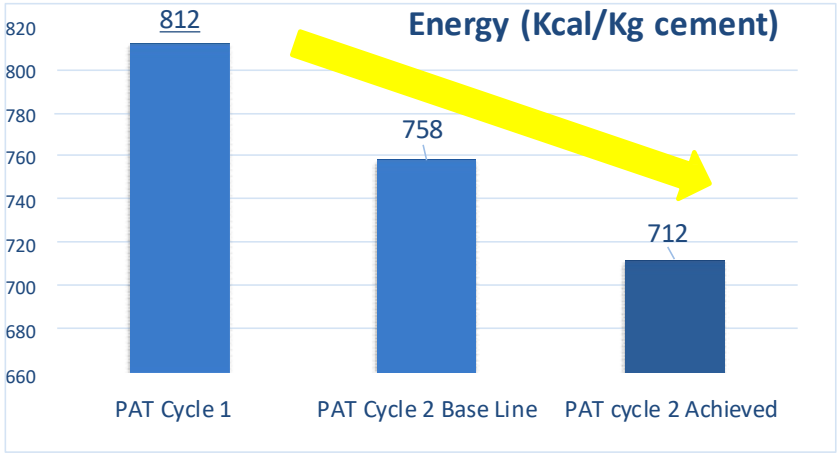
as an **Excellent** effort towards "**Ecosystem Restoration**"

Pradeep Bhargava
Chairman
CII GreenCo Council

K S Venkatagiri
Executive Director
CII Green Business Centre

Conclusion

1. Won 52 National Awards in the recent 5 years from- CII , NCCBM , CMA and Apex India..,
2. 10 Times Won CII Energy Excellence awards and twice won the BEE energy Award from the President of India. Won CII Energy Leadership Award 4 times and Won CII EHS 5StarAward.
3. PAT Cycle 2 achieved is 712 Kcal/Kg Cement against 812 Kcal/Kg Base line, which is 14 % redcution.



Our Manthra

We have never said "Yes to No"

(Made the impossible, Possible)