22nd National Award for Excellence in Energy Management

Marelli Motherson Automotive lighting India Pvt. Ltd.,Pune

Presented By:-

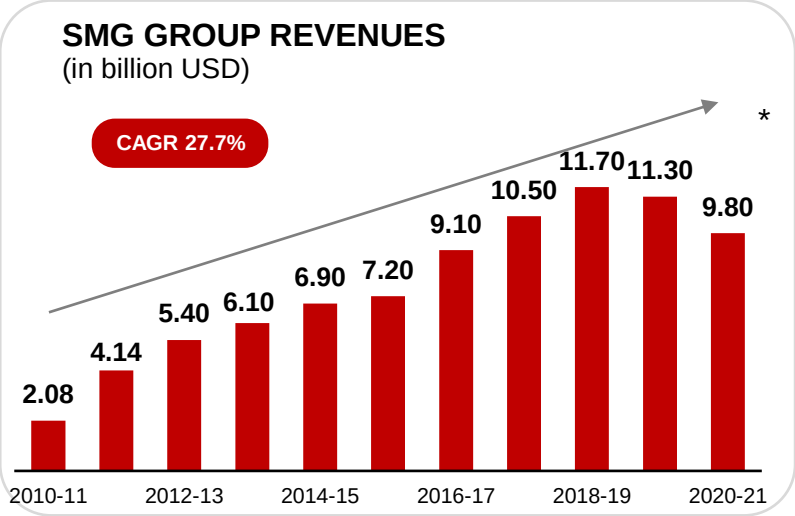
Sarvesh Raut (AVP–Operations)

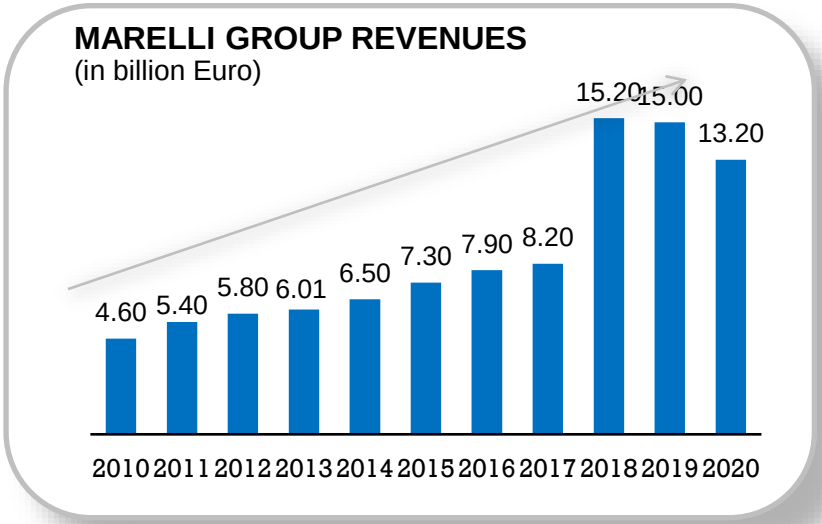
Shridhar Deshmukh (Unit Head-Operations)

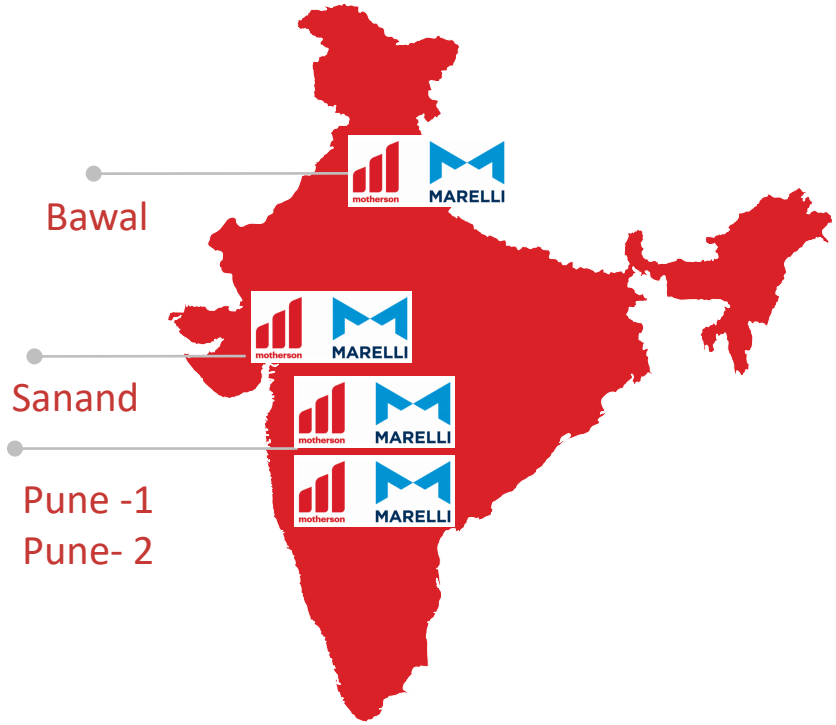
Sahebrao Bhosale (Sr. Manager –Maint. & Energy)

Marelli Motherson – Company Introduction

- **50 : 50** Joint Venture between Marelli (formerly known as Magneti Marelli) & Samvardhana Motherson (India) to cater the growing Indian Automotive Market.







Company Introduction – Products


















Company Introduction -Process Outline

Product	Head lamp	Rear Lamp	Air Intake manifold	PBA
Process	HL housing Moulding HL reflector Moulding → Base coating Hl bezel Moulding → Metalizing Hl lens Moulding → Hard coating → Assembly	RL housing Molding → Metalizing RL lens Molding → Assembly	Upper and Lower cover Molding → Assembly	→ Assembly

Impact of Covid 19

- Impact on Production :- Production reduced from 5% to 10% due to Nationwide lock down from 23rd March to 09th May. 2020

- SEC impact:- SEC improved by 2.95% with revised Planning and low production period taken to implement enecon projects on faster speed.

Overall 10% annual sales increased in MMLI Companies.

MMLI steps to avoid Covid 19 spread

Sanitization

Temp. scanning

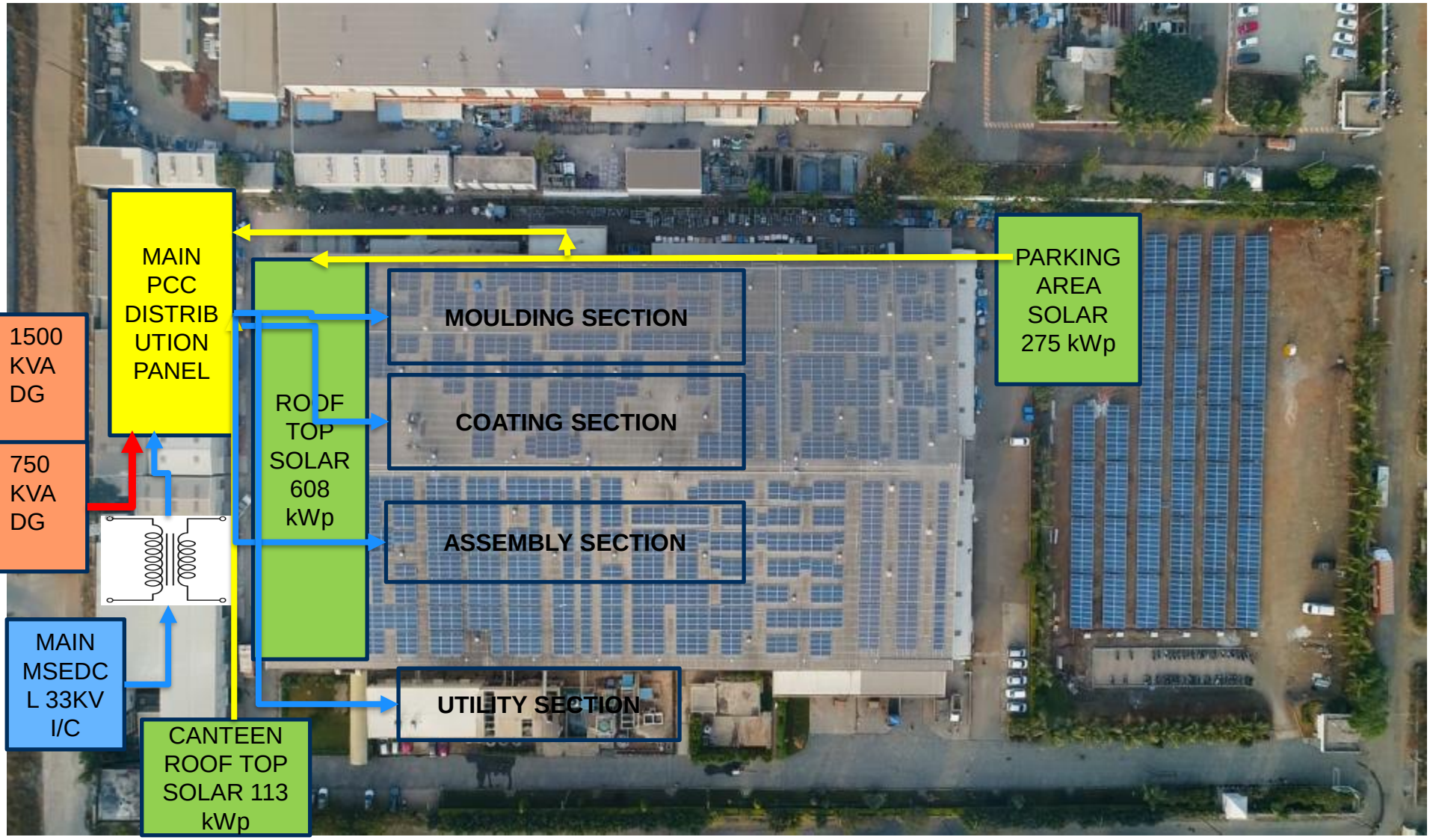
Sanitizer Dispensers

Awareness Training

Foot pedal for water coolers

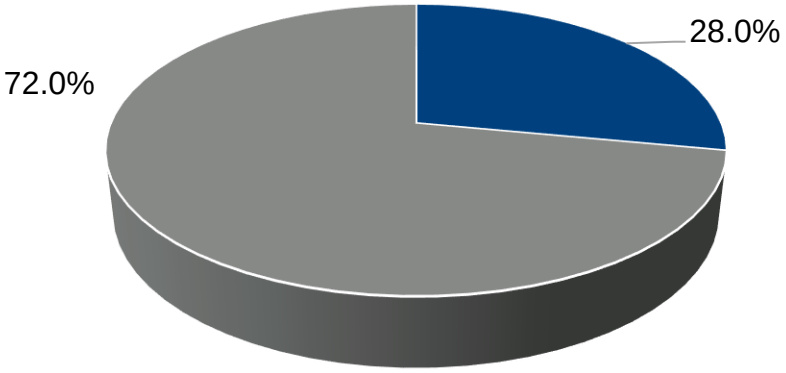
Employee Vaccination

Company Introduction-Energy Sources



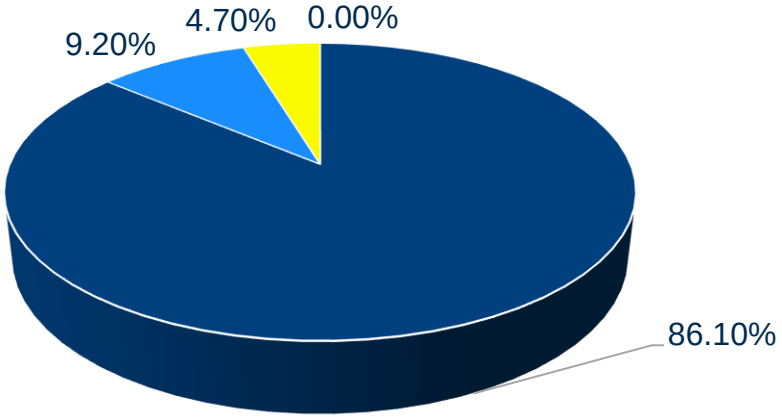
Energy Consumption Overview

Plant Transformation Cost 2020-21



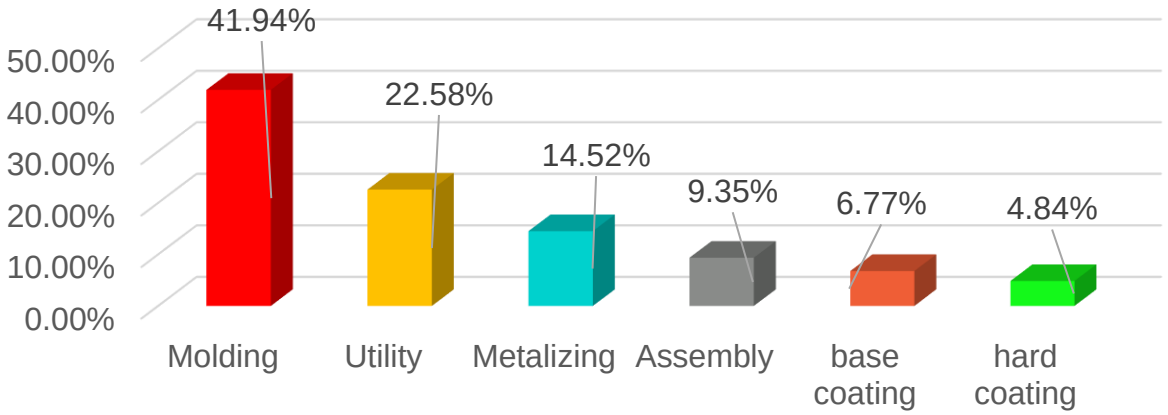
- Energy (63.61 Mil. INR)
- Labor+Mainte.+Scrap+Consumables+Packaging (227.00)

Electrical Sources stratification 20-21



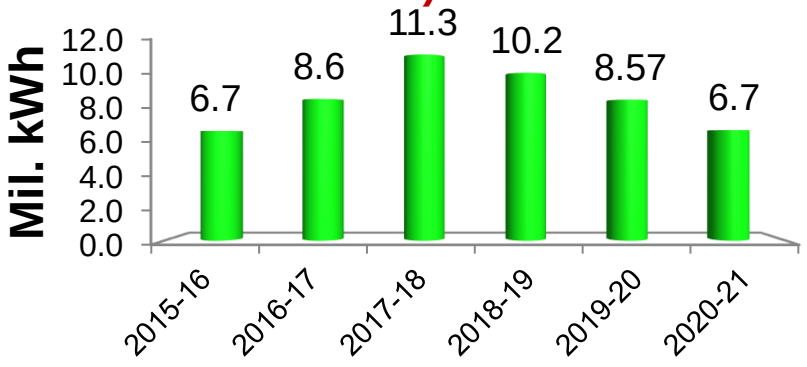
- MSEDCL
- Solar
- Fuel
- Thermal Energy

Section wise Consumption

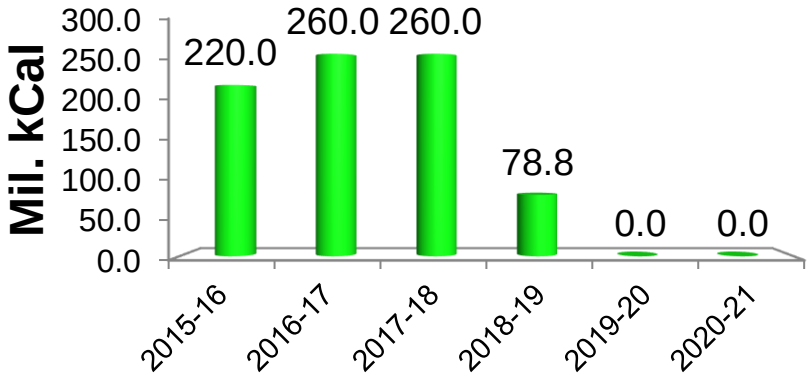


Energy Consumption Overview

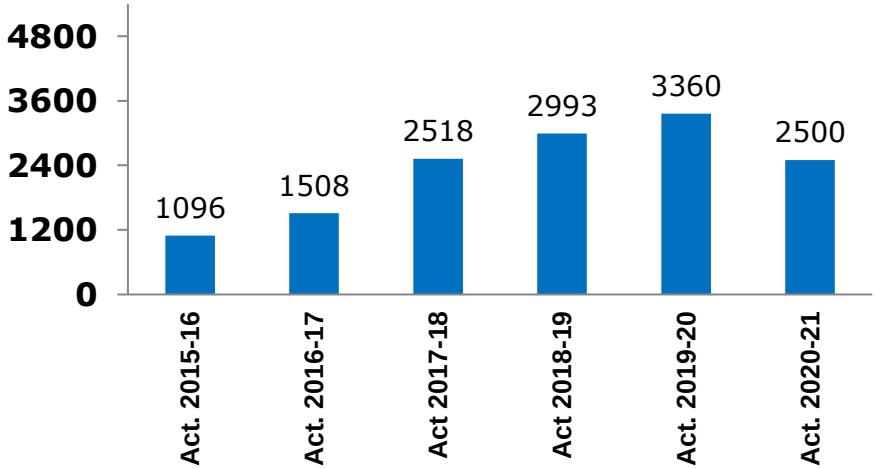
Total Electrical Energy Consumption (MSEDCL + Solar+ DG)



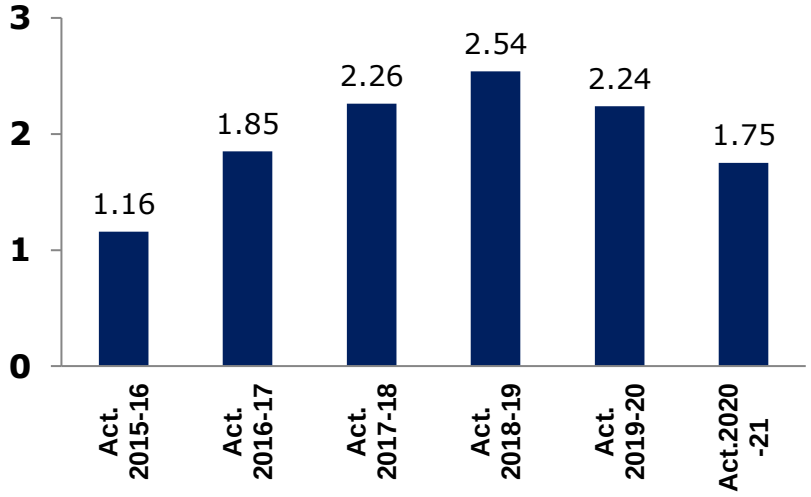
Total Thermal Energy Consumption



Sales Turnover in M. INR

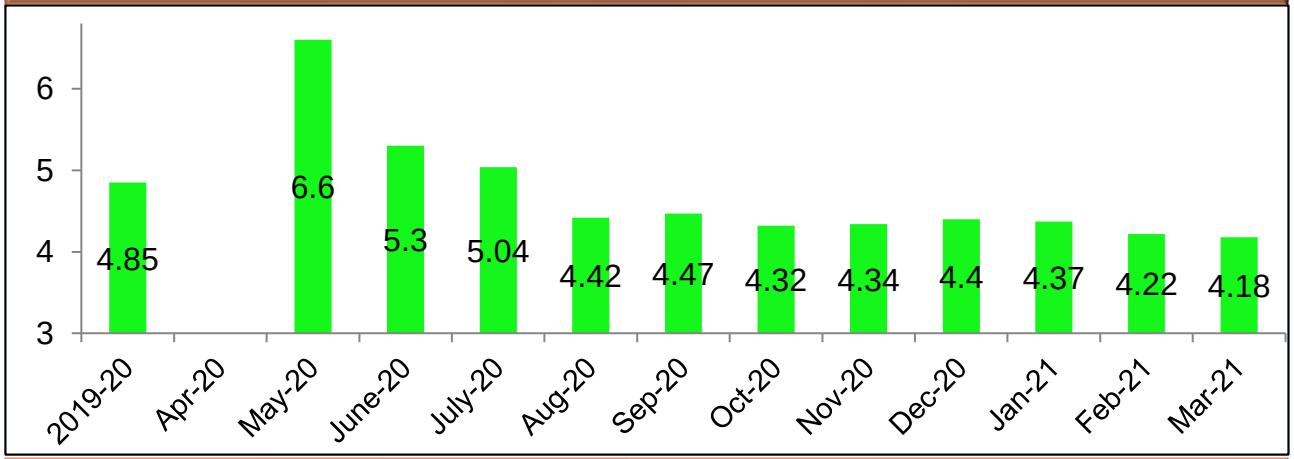


Volume in Million Nos.



Specific Energy Consumption – Last 6 years

Specific Energy consumption kWh/Kg plant level

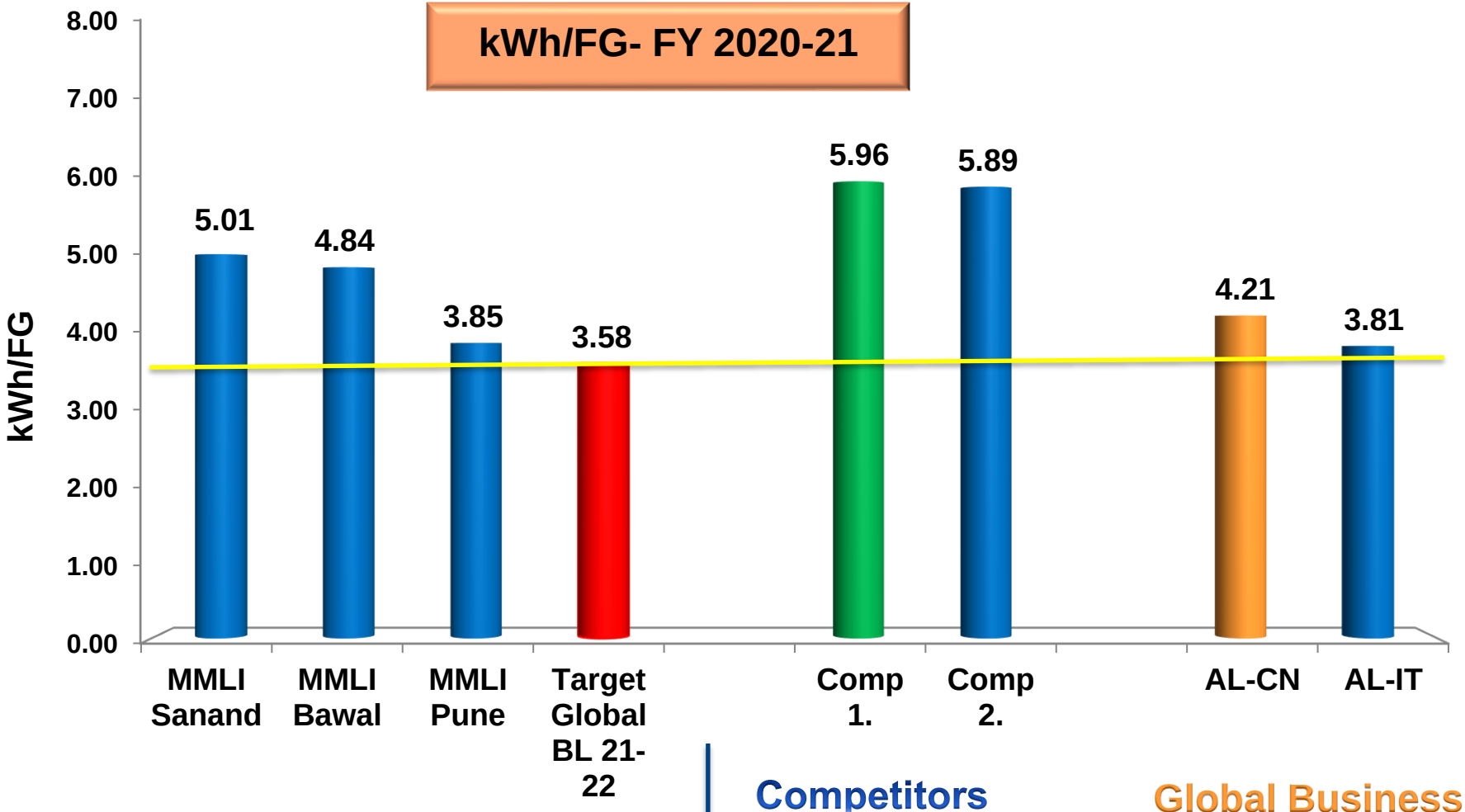


37% Reduction from 2014-15
Last one year 2.95% SEC reduction

Specific Energy consumption Thermal, Kg Lpg /Lamp

100% LPG and washing process eliminated with new technology machine

Competitors, National & Global Benchmark



Major Encon Projects Planned in 2021-22

Short Term Plans

- IE 1 motors replacement with IE 3 37 no's. (FY 21-22)
- Dehumidifier optimization with close loop circuit (FY 21-22)
- APFC panel upgradation for kVAh billing according to changed load (FY 21-22)

Mid Term Plans

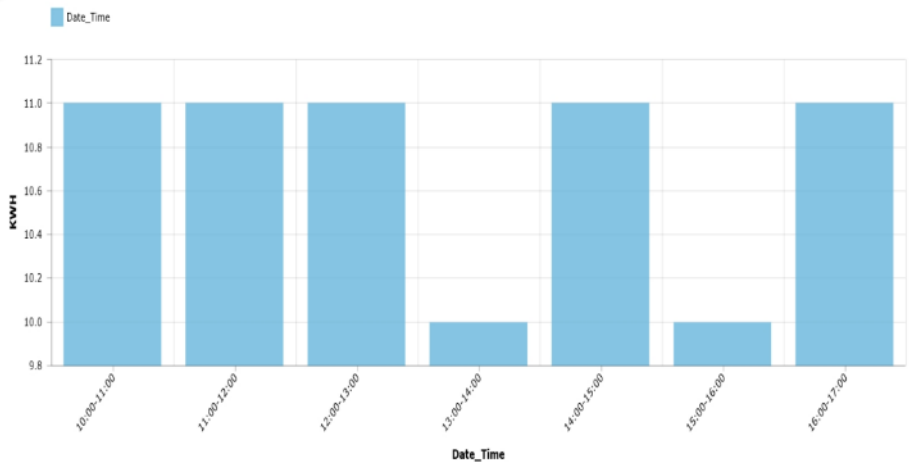
- IE 1 motors replacement with IE 3 37 no's.-ongoing (FY 21-22)
- EC fan motors for HCBC-ongoing (FY 21-22)
- WHRS-Compressor (FY 21-22)
- ISO 50001 certification (FY 21-22)
- Induction heating for IMM-ongoing (FY 21-22)

Long Term Plans

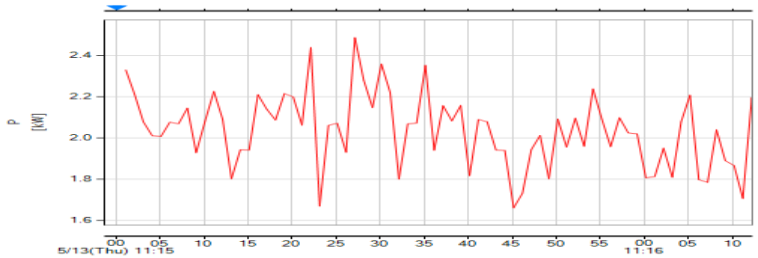
- Biogas to electricity generation (FY 22-23)
- Oil from waste plastic (FY 22-23)
- Drive for Negri bossi machines (FY 21-22)
- Old IMM servo conversion (FY 21-22)
- Wind Power procurement with captive Mode (FY 22-23)

Marked projects from Global Business line-Bench mark

Internal Benchmarking –Improvement In measurement



Before-Measurment with EMS, least count is min 3 minutes. So catpruing equipment wise loss but process wise loss with every second was not capturing with present system.



After- Now We Can be monitored energy consumption from 200 ms to 24 hrs with individual load on machine.

P D A C

Applicability :-

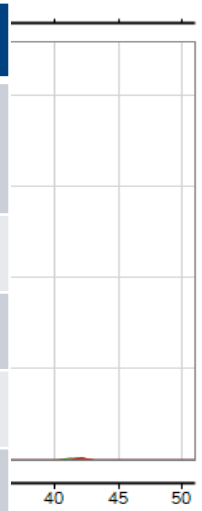
Measurement carried for all process equipment with individual loss and identified Projects more than 120 Nos.

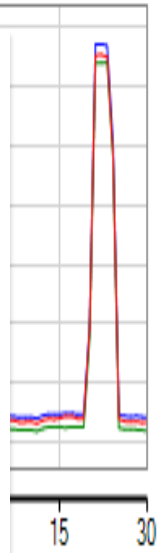
Benefits over EMS –

1) can measure type one ,two and three loss function wise loss
2)analysis of Harmonic in Voltage, Current and Frequency.
3) Electrical all parameter in graphics
4) Check balance and unbalance parameters.
5) can measure the Idle loss of machines and auxiliary Components.

Internal Benchmarking with technological advantage

Molding Machine consumption (kWh) range Procurement Year wise				
Machine Capacity	2010	2014	2018	% Change
1000T	44	26	18	59%
500T BMC	35	20	--	43%
450T Mono	32	19	13	59%
Dehumidifiers	3.88		1.89	51%
MTC	0.89		0.57	36%





- Drive to DFE pumps to avoid Idle loss during cycle
- Servo conversion to Old induction motor machines
- Dehumidifiers modification for close loop circuit
- MTC with higher motor and pump efficiency
- Idle equipment off during Non prod. Period
- Motors replacement which rewinded more than 4-5 times
- Vacuum pumps maintenance based on comparison with standard
- Drive for metalizing pumps to reduce speed during idle.
- IMM Heaters with reduced connected load

Long term Vision on EE

- **Vision:-**To create an energy-friendly plant, where each person takes responsibility for energy consumption and actively works to reduce it.

- **Objectives:-**Use new technologies and renewable sources to

• Reduce energy consumption,

• Reduce CO_2 emissions generated

- **Targets:-**

- Reduction in Energy Consumption by 7% for FY 2021-22
- Increase Renewable energy Share up to 50%

- **Major Projects in Progress**

1. Water Heat recovery for compressors
2. AHU motors & water pumps optimization
3. Servo conversion of Existing IMM

Planned Project :-2022-23Wind Power procurement through Captive Mechanism

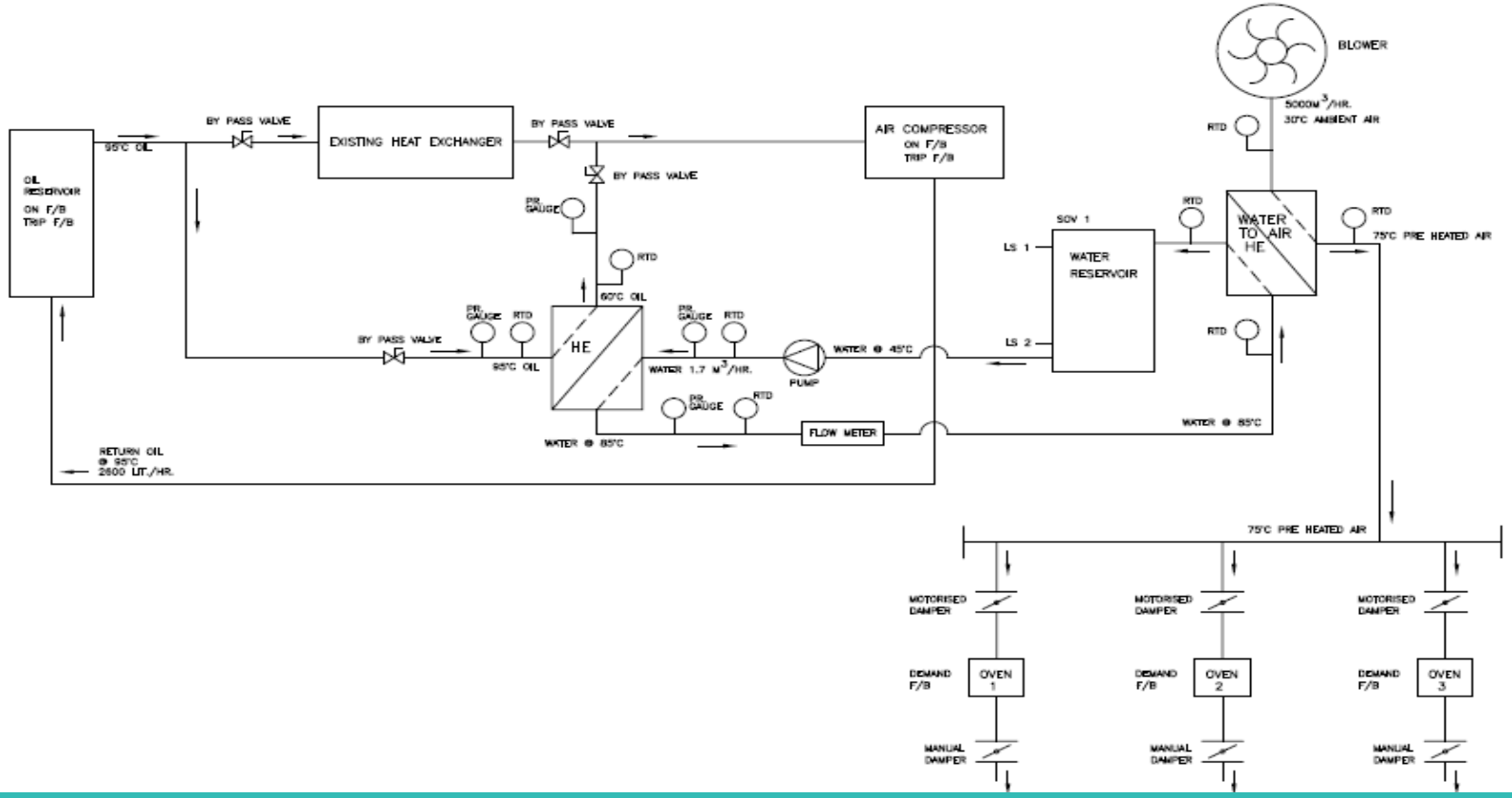
Wind Power procurement through captive Mod

Sr.	Description	2022-23
1	Generation Expected (kWh/Month)	202500
2	% renewable	100%
3	Investment (Lac INR)	150
4	Benefit (Lac INR)	114
5	CO2 Off set (Ton)	2107
Target Completion Date:-Jul.2022		
Status:-Installation in Progress.		
Difference :-4.60 INR/kWh		

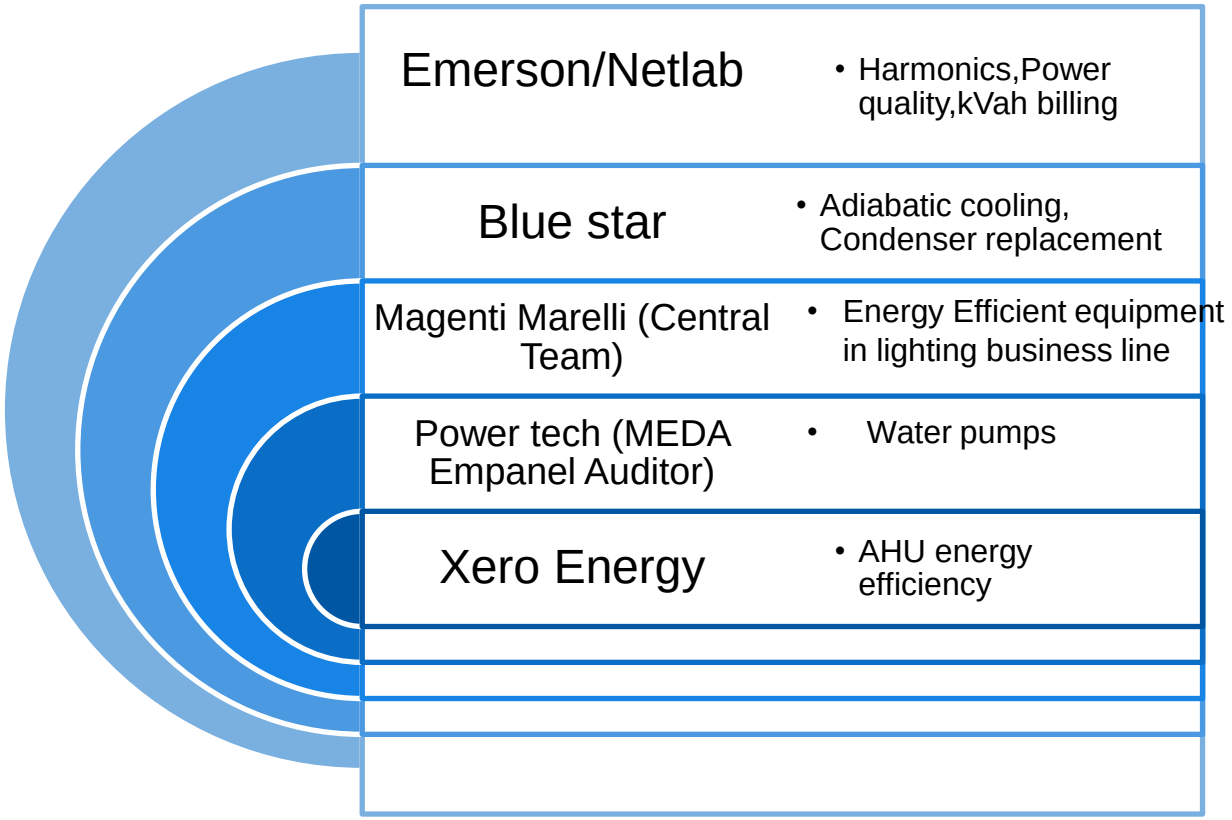
Injection Molding Surface Coating Assembly Utilities

Planned Project 2:-2021-22
Waste heat recovery Compressor

- Plan- Waste heat recovery from Compressor and hot air to use in annealing ovens
- Expected Savings -4 kWh/Hour
- Investment Proposed – 26,00,000 INR
- ROI Proposed- 11 Months
- Target Completion Date :-Feb.-22
- **Current status –Budgeted**



Energy Audits & Scope of Energy Savings, Outcomes



- Additional kVAr panel with 7% detuned reactors-In procurement
- Adiabatic cooling-02 Nos installed Condenser-02 Nos Replaced
- Waste heat recovery-Budgeted FY 21-22
- Water pump/Motor replacement with higher efficiency (P phase)
- EC++ motor for AHU

Energy saving projects 2018-19

Sr.	Type of Project	No of Projects	kWh Saving Annual	Cost Saved Annual Mil. INR	Investment Made Mil. INR	ROI Months
1	Advance technology reflector cleaning- Elimination of LPG & reduction of EE	01	295121	5.33	2.57	06
2	Installation of artic master on chillers	02	96574	1.24	1.37	13
3	IFC controller to air comp[illegible]ssor	[illegible]1	48384	0.35	0.34	12
4	Thermojacket installati[illegible]	[illegible]	21686	0.16	0.08	13
5	Advanced technology equipme[illegible] ie deionizers ,LED, etc	14	95876	0.78	1.51	23
6	Elimination of Type 1 loss on equipment's (Idle Consumption)	17	156644	1.28	1.96	18

Reduction in SEC over last year 10.1%

Total Projects	kWh Saved	Annual Savings Mil INR	Investment Mil INR
38	714285	9.14	7.83

Energy saving projects 2019-20

Sr.	Type of Project	No of Projects	kWh Saving Annual	Cost Saved Annual Mil. INR	Investment Made Mil. INR	ROI Months
1	Diffusion Pump Energy Saving Kit	05	180000	1.53	0.1	1
2	Heating idle off on annealing oven and hot plate welding machines	10	127810	1.08	0.32	4
3	VRF systems installation instead of Old Split and cassette AC	04	168898	1.44	5.1	3.5
4	Exhaust Fans and Cooling t wer fan clo loop control with temp.	14	21788	0.18	0.04	3
5	Adiabatic cooling and cond replacements on chillers		79266	0.70	1.0	17
6	MTC, Conveyors auto off & DH we kly t optimization in Molding area	82	21090	0.25	0.12	6
7	Heating optimization –Inductive heating on moldin	03	20898	0.18	0.12	8
8	Eco plu street li replace					12

Reduction in SEC 3.92% Over last year

Total Projects	kWh Saved	Annual Savings Mil INR	Investment Mil INR
138	640920	6.16	7.0

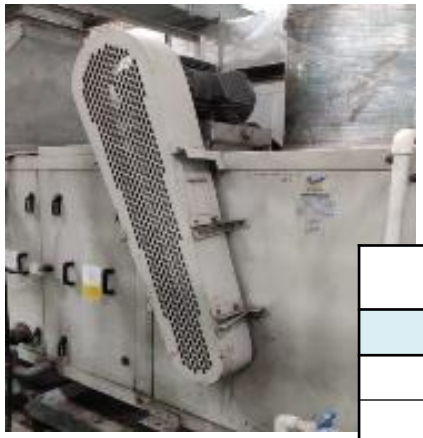
Energy saving projects 2020-21

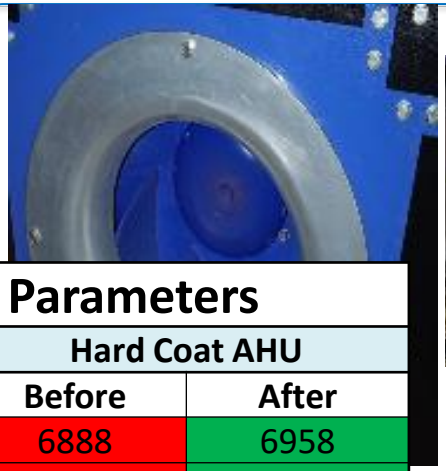
Sr.	Type of Project	No of Projects	kWh Saving Annual	Cost Saved Annual Mil. INR	Investment Made Mil. INR	ROI Months
1	Cooling tower pump motor replacement with higher efficiency pump and Motor	04	93928	0.83	1.0	16
2	AHU and HCBC blower replacement with EC & EC+ fan motors	04	37387	0.34	0.41	14
3	Compressed air free deionizing bars			0.24	0.6	30
4	Induction/Infrared heaters on IMM			0.15	0.16	13
5	Evaporative Cooling system to eliminate individual fans	07	67200	0.6	1.2	24
6	Cooling chamber for RL lens instead compressed air	01	14700	0.13	0.5	46
7	Idle of VMM Circulation pumps & IMM MTC	19	15500	0.14	0.05	4
8	Thyriste and oth					8

Reduction in SEC 2.95% Over last year

Total Projects	kWh Saved	Annual Savings Mil INR	Investment Mil INR
77	529355	4.71	5.86

Major Project 1:-2020-21
To reduce Loss due to Non optimization





Before- Traditional blow
was installed i

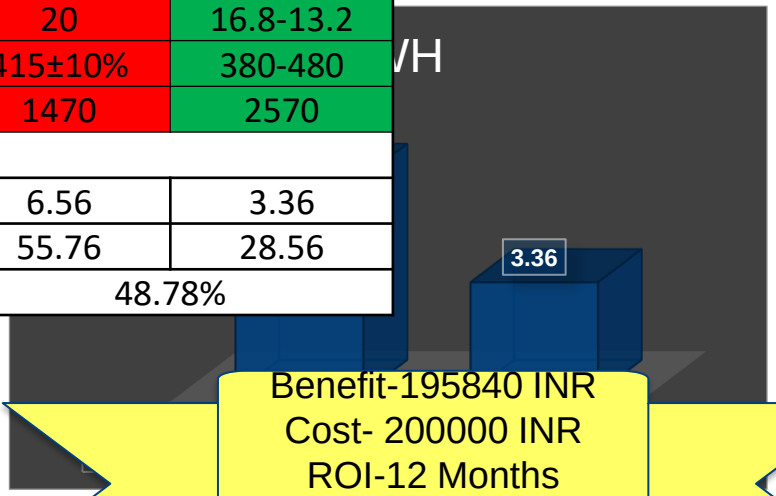
ncy Electronically
otor installed in AHU

Comparison of Parameters

AIR FLOW	Hard Coat AHU	
CFM COMPARISON	Before	After
Actual	6888	6958
Design	8034	8034
VFD Hz / MOD.	Manual	70%
kW	11	10.4
HP	15.0	14.0
Amp	20	16.8-13.2
Voltage	415±10%	380-480
RPM	1470	2570
kWh	6.56	3.36
Energy Cost/Hour-INR	55.76	28.56
Savings %	48.78%	

Benefits –
1) After installation of EC Fan 4
achieved .
2) 23040 KWH/year saving.
3) Total 195840 INR/Year saved
4) Maintenance cost & BD redu
5) Increased the AHU CFM cap
6) Low vibration & noise level i

Horizontal Deployment completed:
- Base coat AHU
- Hard coat UV cooling



Benefit-195840 INR
Cost- 200000 INR
ROI-12 Months
CO2 offset:-19.5 Ton

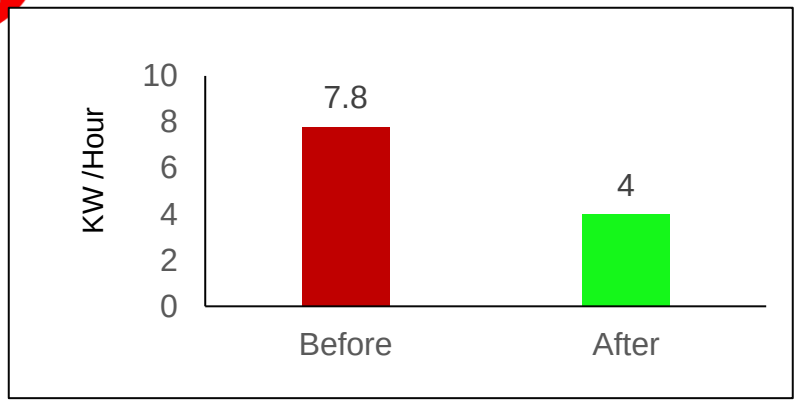
Major Project 2 :-2020-21
Evaporative cooling system.

Before- Conventional small fans are used for individual work stations. Extra spare required for each fan. Also air was not cool

After- Evaporative cooling system installed in plant. Now all individual station fans are removed. Cool air circulated on line.

Horizontal Deployment -
Plant-2

Benefits –
1) Cool and filtered air.
2) Space saving on assembly station



Benefit-28454 INR/year
Cost- 1.2 Mil. INR
CO2 offset-2.7 Ton

Major Project 3 :-2020-21
Evaporative cooling system.


Before- KDI-1000 type, 7.5 HP two IE1 class induction motors are working for cooling tower water circulation.


After- installed one 160M-2 type, 15HP IE3 Class motor with energy efficient pump against two IE1 motors

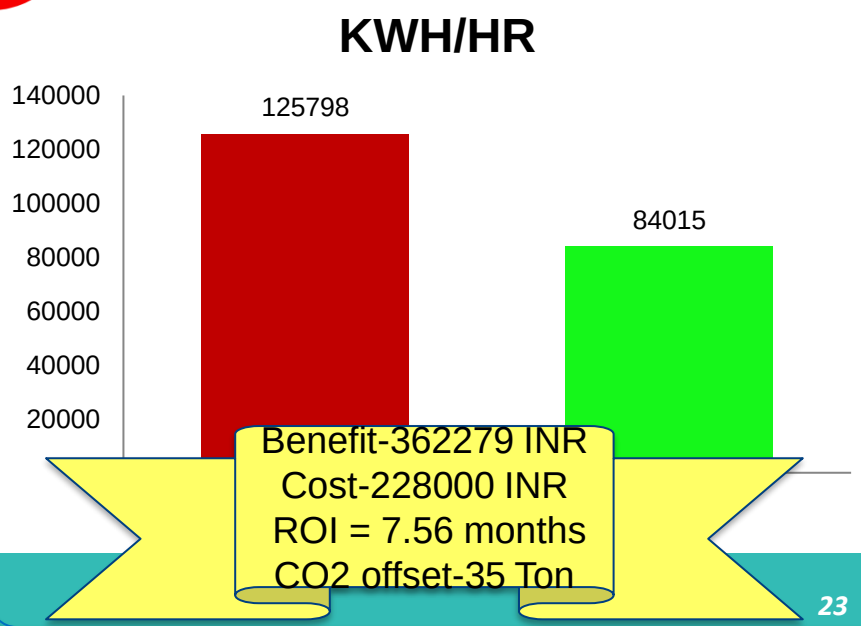
P D A C

Horizontal Deployment –

- Chiller water circulation pump
- IE1 motors -37 Nos.-Planned

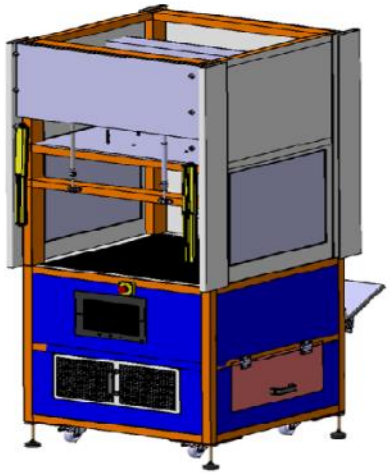
Benefits –

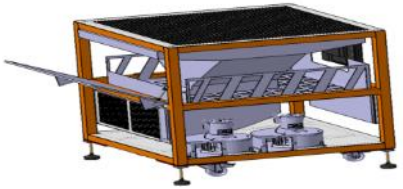
1) After installation of Pump 33.15% energy savings achieved .
2) Average 41737 KWH/year saving



Innovative Project-1: 2020-21
To Reduce Compressed Air Consumption for Lens Cooling

Before- Compressed Air used for the cooling the lens on 4K Molding to reduce cracks issue.



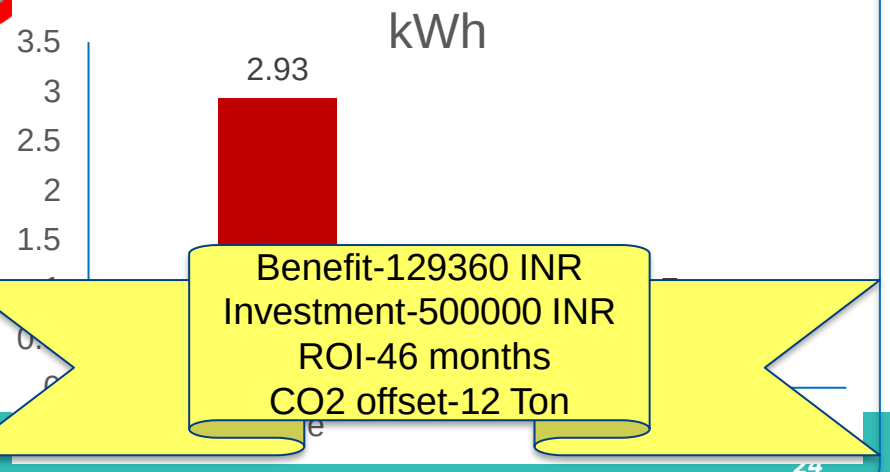


After- In house cooling chamber developed for cooling and static charges elimination for Rear lens.

P D A C

Horizontal Deployment Planned –

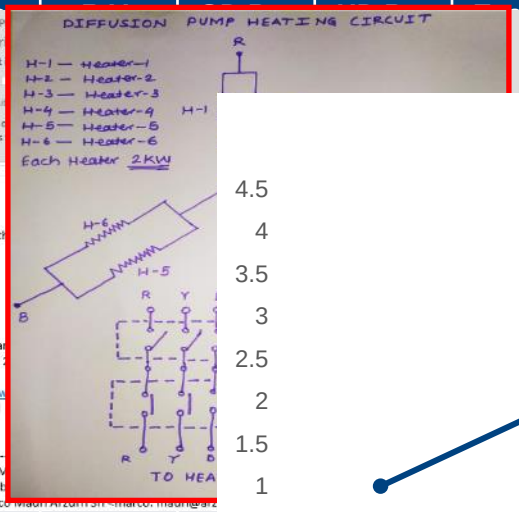
- Engel 2
- Engel 4

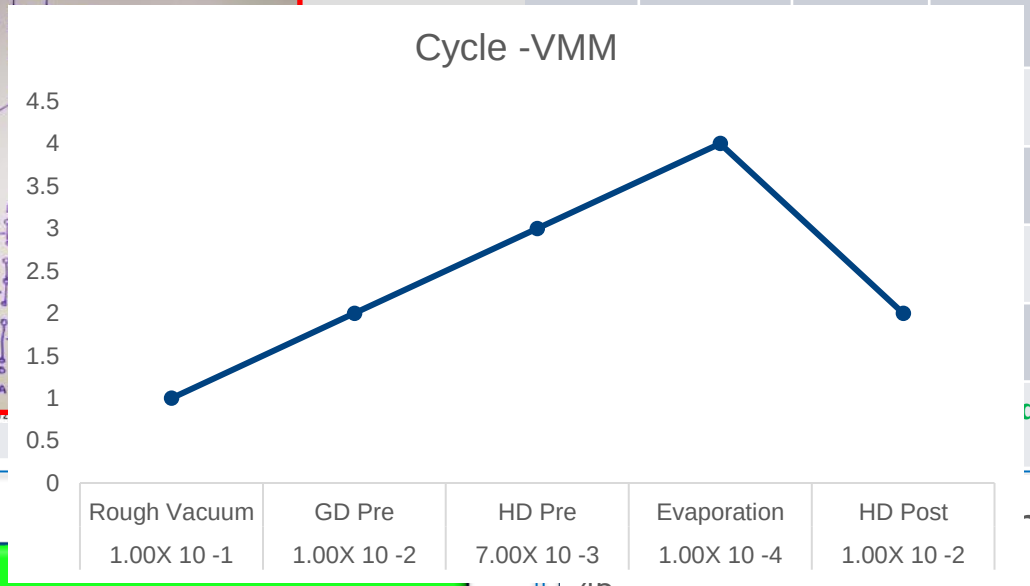


Benefit-129360 INR
Investment-500000 INR
ROI-46 months
CO2 offset-12 Ton

Innovative Project -2: 2020-21
Diffusion Pump Optimization

Pump	Status	R.V.	GD Pre	HD Pre	Evaporation	HD post
Rota				Yes	Yes	Yes
				Yes	Yes	Yes
Roc				Yes	Yes	Yes
				Yes	Yes	Yes
D.F				No	Yes	No
				Stand By	Yes	Stand By





- Horizontal Deployment

Arzuffi -2,3,4,5
Tecnovacuum

Utilization of renewable energy source

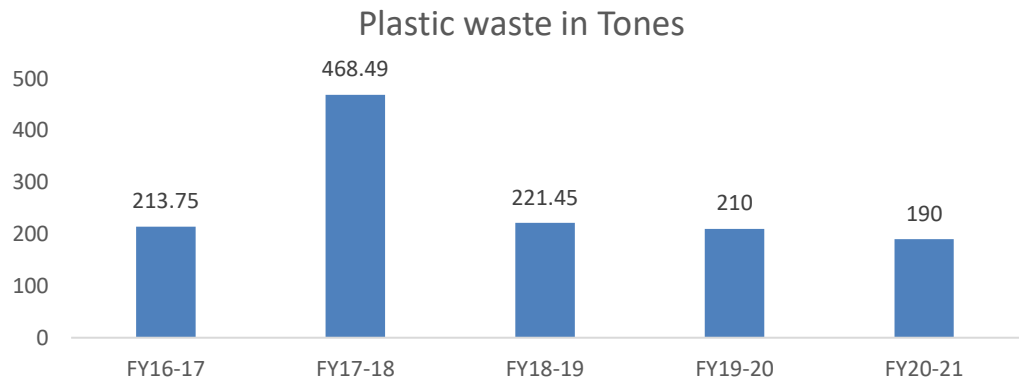
UTILIZATION OF RENEWABLE SOURCES

	Installed capacity Mil Kcal /annum (Thermal)	Inst. Plant capacity –Plant onsite(Electrical) kWp	Generation kWh	% of electrical energy	Onsite Inst. Capacity MMLI Group
2015-16	260	0	0	0	0
2016-17	260	608	365113	4.2	608
2017-18	260	891	756738	6.7	1490
2018-19	78.0	891	939584	9.2	1790
2019-20	0	891	1088696	12.5	2090
2020-21	0	1000	1032877	15.13	2800
Target 2021-22	0	1000	1387000	17%	3000

Total units kWh	6664899	8693047	11279868	10260381	8573770	6826955
Renewable kWh	0	365113	756738	939584	1088696	1032977
% of renewable	0	4.2	6.7	9.2	12.50	15.13
Tonnes of CO2 Offset	0	310	643	799	925	878

Waste Utilization & Management

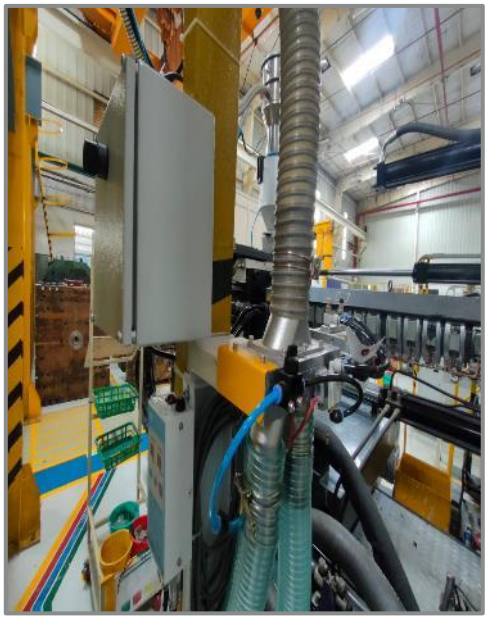
Types of Waste	Waste generation FY 20-21	CO2 emission in Tonnes	Projects to reduce wastes
Plastic waste (in Tonnes)	90	540	1) Online gate grinders for runner reusage on 6 Machines in FY 20-21 2) Part weight reduction by runner size reduction
Packaging plastic waste (in KG)	710	1.2	1) Wrapping role size reduction, wrapping elimination 2) Polybag recirculation started
General Waste (in Tonnes)	17	11.82	1)Instead of wooden pallets usage of reusable plastic pallets 2)Reduction in general waste, stationery etc.



Project 1-Waste utilization

BEFORE:
Scrapping plastic runners, gates & rejected parts

AFTER:
Online gate grinder installed on 4 machines in FY 20-21



Benefit to Environment

Plastic waste reduced by

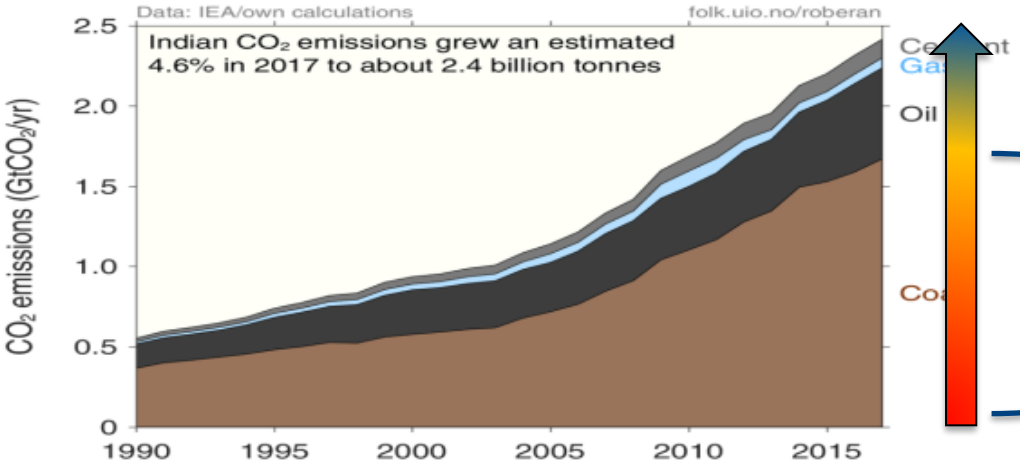
25920 kg/annum

CO2 emission is reduced by 156 Ton

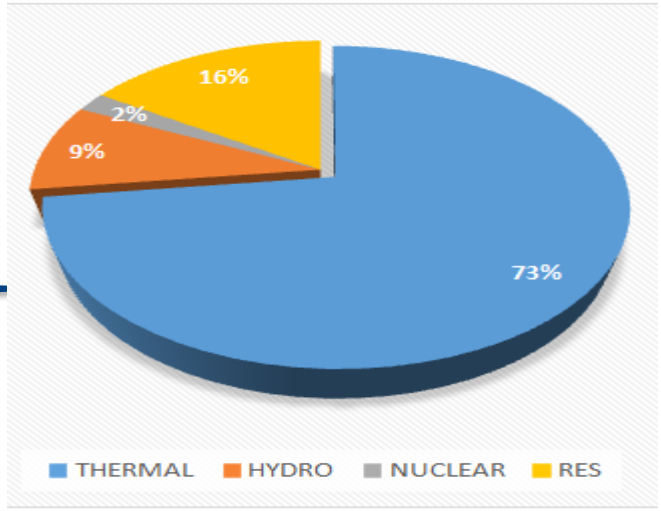
Saving– 4.0 Mil INR /year
Investment–2.0 Mil. INR
ROI –6 Months

GHG Inventorisation

Indian CO2 emission contributors



Maharashtra Power Contribution



Scope		Parameters	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 19-20
Scope 1	MMM Operations direct	CO2 emission in Tonnes	106.2	165.8	138.1	135.9	86
		LPG Consumption in KG	12750	13050	5400	0	0
		Diesel Consumption in Litre	25450	47345	45506	51217	32984
Scope 2	Purchased Electricity	CO2 emission in Tonnes	7317.3	9613.4	8755.9	6277	5188
		Energy Consumption in MW	8608.5	11309.8	10301	7384	5687

GHG Inventorisation

Electricity		2018-19	CO2 offset	2019-20	CO2 offset	2020-21	CO2 offset
	Solar	939584 kWH	798.6 Tones	1088696 kWH	926 Tones	1032977	878 tones
	Electricity consumption Savings	714285 kWH	607.2 Tones	640920 kWH	545 Tones	529355	622 Tones
LPG							
	LPG gas saved	10850 Kg	32.3 Tones	13000 Kg	39 Tones	NA	NA
Plastic RM							
	RM recycled	80 Tones	480 Tones	110 Tones	660 Tones	90 Tones	540 Tones
Plastic packaging	Plastic packaging reduced (49 Projects)	14.4 Tones	71 Tones	16 Tones	80 Tones	17 Ton	34 Tones
	Total CO2 Offset		1989.1 Tonnes		2250 Tones		2113 Tones

22.36 % of total CO2 emission

35.09 % of total CO2 emission

22.36 % of total CO2 emission

GHG Inventorisation

KPI

KPI		Unit			Apr'21	May'21	Jun'21	Jul'21	Aug'21
Carbon offset to Total emission	=Total carbon offset/Total carbon emissions	%	Target	To be Defined by Unit	33%	33%	33%	33%	
			Actual		24%	24%	28%	18.32%	
% of Green Power used to Toal Power consumed	=Total green kWh used/Total kWH used	%	Target	To be Defined by Unit					
			Actual		16%	15%	14%	11%	
Total Power consumed to process Raw Material	= Total kWH used/Total raw material processed	kWh/kg	Target	Use internal benchmark					
			Actual		6.05	6.52	6.33	6.77	
Total Power consumed to Total Machine hrs.	= Total kWH used/Total machine hrs.	kWh/hrs.	Target	Use internal benchmark					
Total Power cost to sales	= Total Power cost/Total sales	%							
Rain Water Harvesting capacity	= no. of pits X capacity of eact pit	Kltr.							
Water neutrality (Cummulative)	= Amount of water harvested - total fresh water used in the	Kltr.							
Reprocess Raw Material usage % to total consumption	= Total reprocess material used / Total raw material used	%							
Packaging plastic		Ton							
General waste		Ton							
Hazardous waste		Ton							

Group level Targets defined f

Export

	CO_2-eq (kg/year)	
Scope 1	3,192.08	0.28%
Scope 2	620,485.38	53.81%
Scope 3	529,337.59	45.91%

Scope 3 Breakdown view	CO_2-eq value (kg/year)	
Category 1 Purchased goods and services	249,935.55	47.22%
Category 2 Capital goods	0.00	0.00%
Category 3 Fuel- and Energy-Related Activities, Not Included in Scope 1 or Scope 2	61,873.39	11.69%
Category 4 Upstream transport	4,364.05	0.82%
Category 5 Waste generated in operations	272.61	0.05%
Category 6 Business travel	46.30	0.01%
Category 7 [illegible]	[illegible]	0.14%
Category 8 Upstream leased assets	0.00	0.00%

Scope 3 calculation started on Spend base method-Apr.2021

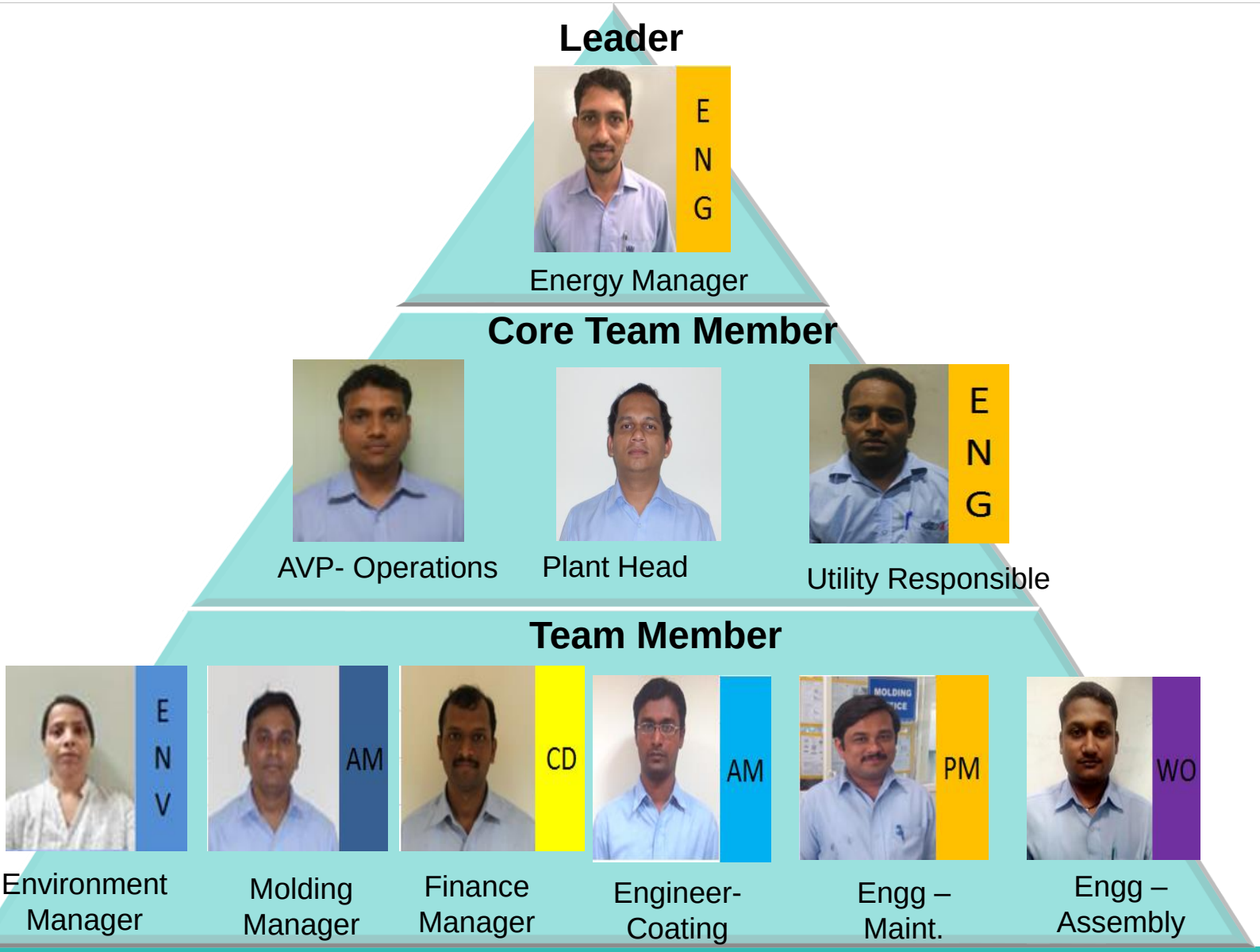
Green Supply chain Activities Implemented

Function wise Role in Green supply chain at plant level

Maintenance	Production	Purchase	Logistics	Design	SQA
Energy auditing at supplier end	Process parameter optimization for lesser energy consumption	Guidelines for emotionless material usage	Truck utilization in Environment friendly way	Support to use Env. Friendly design and manufacturing for tolling and fixtures	Implementation of ISO 14001
Horizontal deployment of kaizens from Plant	Eco friendly material usage for process set up/tool Maint.	Vendor resources provision	Environment friendly packaging material usage		Green supply policy making and implementation
Training to team		Green supply policy implementation support	Packaging material recirculation		Periodic auditing of Green supply chain
New technologies and ideas introduction					
Energy efficient equipment MP info. transfer					
Support to emission calculation and offset tracking					

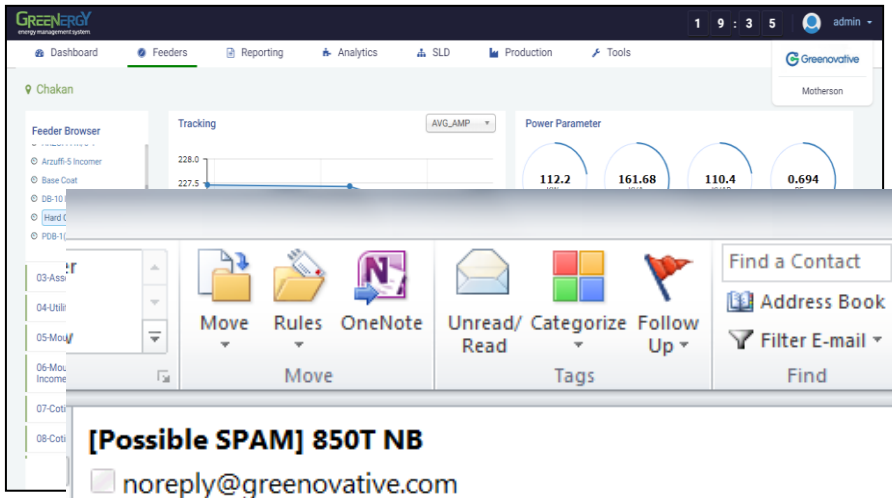
- 68% suppliers certified ISO 14001, 22% from rest planned in FY 2021-22
- SEC monitoring and review during routine supplier audits
- 65% suppliers inline with target and Emission targets given

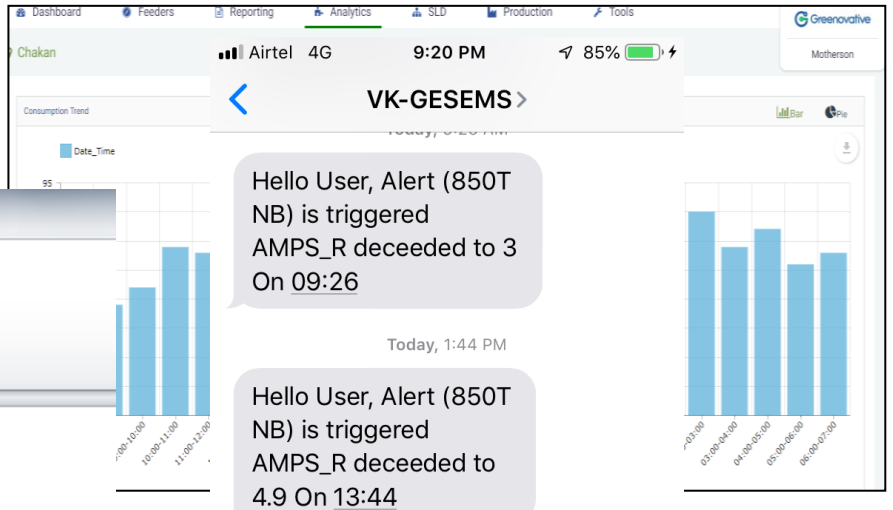
Teamwork, Employee Involvement & Monitoring

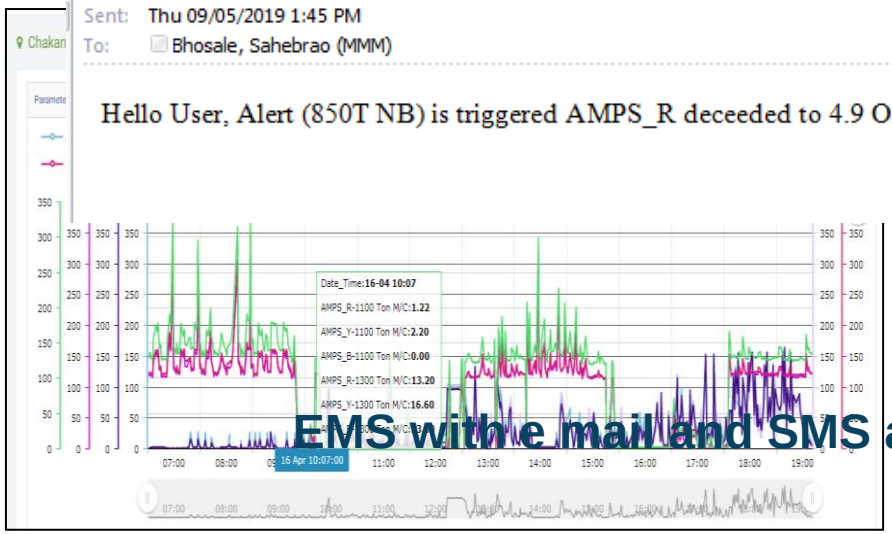


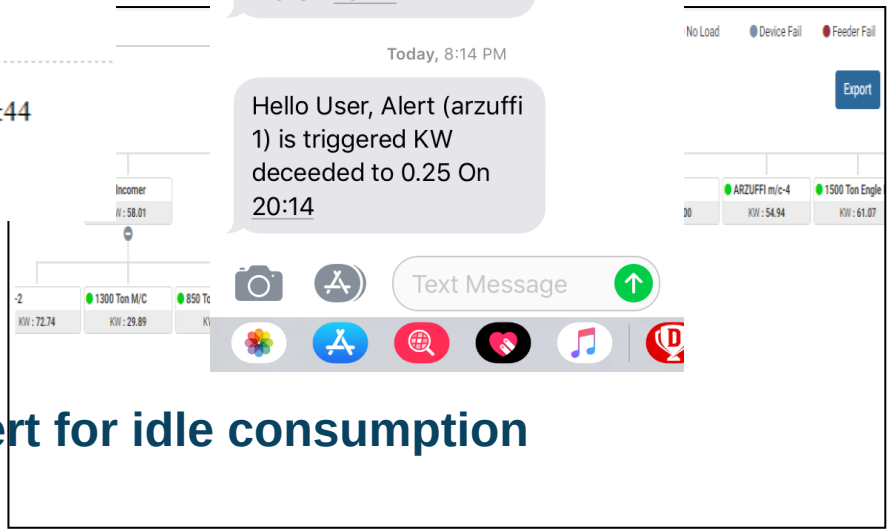
Teamwork, Employee Involvement & Monitoring

Installation of Electric energy Measurement instruments:





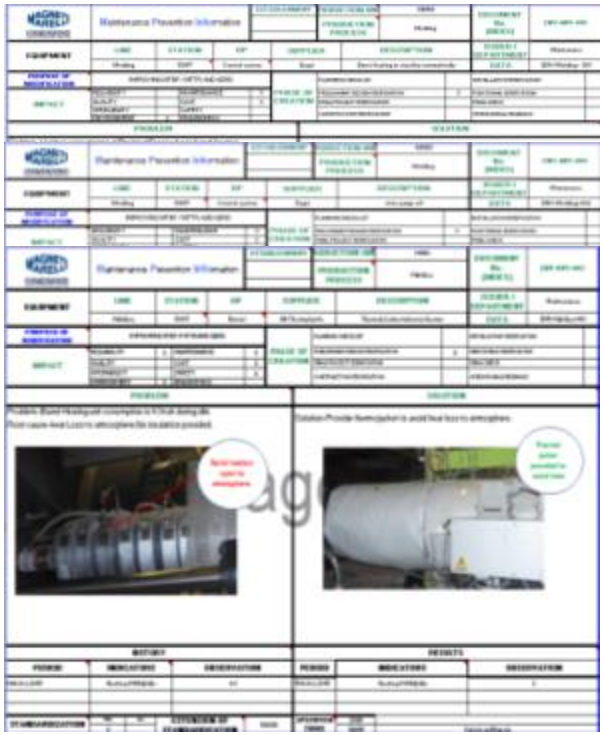




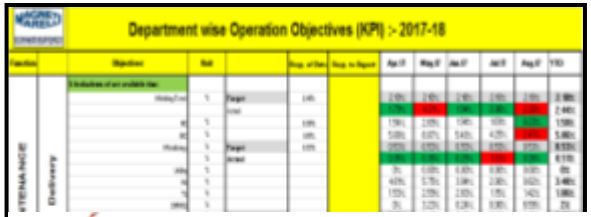
EMS with e mail and SMS alert for idle consumption

Teamwork, Employee Involvement & Monitoring

Energy saving practices standardization



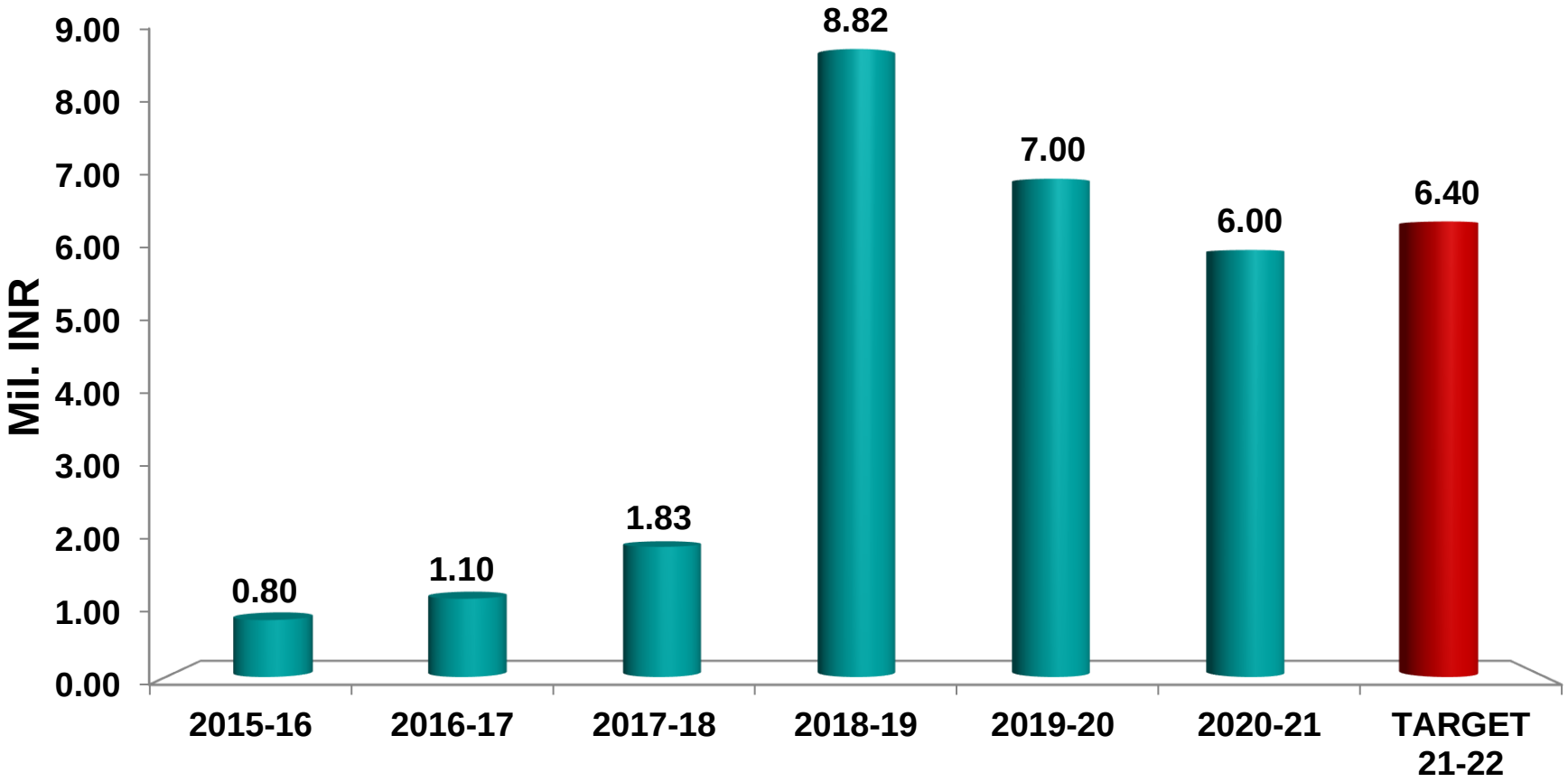
Communication & Review



Visuals

Teamwork, Employee involvement & Monitoring

Year wise Investments for Energy Conservation

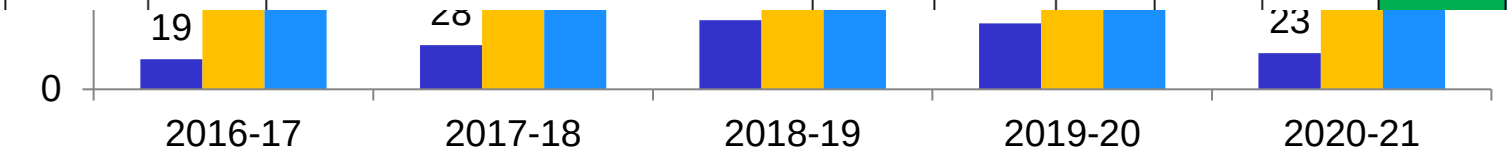


Teamwork, Employee Involvement & Monitoring

Blue Collar Involvement in EC activities

Sr.NO	Project Category	Department	Project	Leader	KWh Current Consn.	(RS) Annual Loss	CO2 offset/hour	Co2 offset kg/Annum	Project plan P	D	C	A
1	Energy Loss	Maintenance	Demand Benefit due to shifting of machines and Solar (1600 KVA t	Bharat		518400	0	0				
2	Energy Loss	Maintenance	P2 -Demand Charges reduction (575 ----350)	Bharat	660	2125440	0		20-Apr-21	5-May-21	12-May-21	14-May-21
3	Energy Loss	Maintenance	Hard coat Exhaust IE 3 Motors (6.5 to 5 KWH),Overall 115 KWH to 113.5 KWH (EC Fan)	Prashant P	5.23	95040	1.26	8467	26-Jun-21	11-Jul-21	18-Jul-21	20-Jul-21
4	Energy Loss	Maintenance	cooling tower circulation pump to be replace by high efficiency (16.94 to 12 .81) overall Utility 269 t[illegible] KWH	Prashar	16.81	264960	4.6704	33626.88	12-Apr-21	27-Apr-21	4-May-21	6-May-21
5	Energy Loss	Maintenance	BMC 2 Vacuum pump optimization replacing[illegible]			10687	1.218	8769.6	18-Apr-21	3-May-21	10-May-21	12-May-21
6	Energy Loss	Maintenance	Finanace and quality AC idel Off (6[illegible]			183756	0.4095	1474.2	8-Apr-21	23-Apr-21	30-Apr-21	2-May-21
7	Energy Loss	Maintenance	TOD benefit BC 6 to 10 PM off			20800	0		1-Jul-21	11-Jul-21	18-Jul-21	20-Jul-21
8	Energy Loss	Maintenance	Chiller Circulation Pump IE3 Motor with Pump -1 Nos	Prash[illegible]	15.2	250272	3.318	23889.6	25-Aug-21	1-Sep-21	8-Sep-21	10-Sep-21
9	Energy Loss	Maintenance	Arz- 2 Circulation pump replace with IE 3 -1 Nos	Prashant P	4.15	79200	1.05	7560	25-Aug-21	1-Sep-21	8-Sep-21	10-Sep-21
10	Energy Loss	Maintenance	Antistatic Blower at 430 T	Sachin B	1.25	99360	0.84	5644.8	15-Jun-21	30-Jun-21	7-Jul-21	9-Jul-21
11	Energy Loss	Maintenance	Antistatic Blower at 550 T-2	Nitin C	1.25	99360	0.84	5644.8	23-May-21	7-Jun-21	14-Jun-21	16-Jun-21
12	Energy Loss	Maintenance	Antistatic Blower at 900 T-1	Mangesh	1.25	99360	0.84	5644.8	23-May-21	7-Jun-21	14-Jun-21	16-Jun-21

36 Ideas
49 Projects



Other innovative technologies implemented

- **Automated production monitoring system**

- **Computerized maintenance management system, Mobile app & alert for Maint. Engineers**

- **Auto SEC Live calculation to avoid losses**

- **Auto data capturing for Energy Consumption**

Implementation of ISO 50001:2011

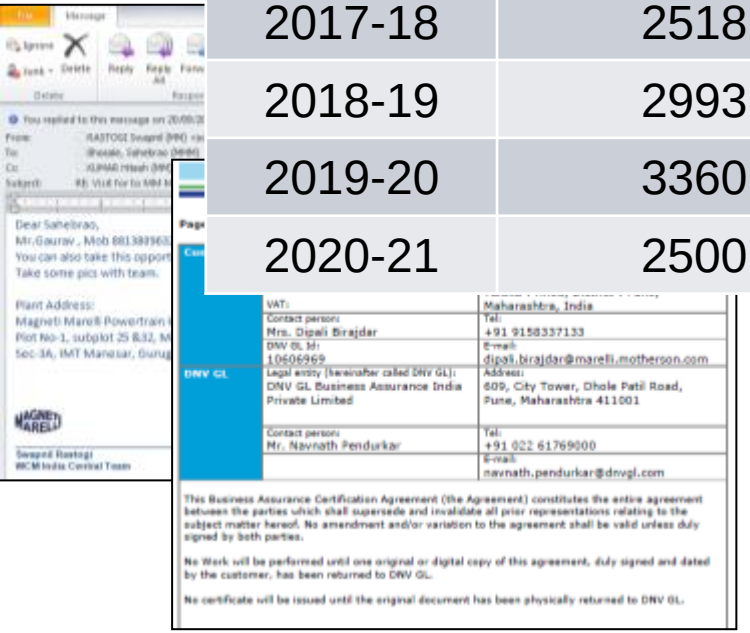
Plan for ISO:50001

• Dec.2019

Benchmarki

Sales turnover v/s Encon Investment %

Year	Sales Turnover M.Inr	Encon Investment M. Inr	% of Encon investment
2016-17	1508	0.9	0.06%
2017-18	2518	1.84	0.07%
2018-19	2993	7.83	0.26%
2019-20	3360	7.0	0.21%
2020-21	2500	6.0	0.25%



Assessmen t

• Sept.2021

Stage 1 Assessmen t

• Nov.2021

Stage 2 Assessmen t

Apr.2022

Learning from CII Energy awards

- Power analyser and micro level measurement of consumption for type 7 losses
- Demand side controller for compressors-Learning at stall
- Energy efficient BLDC fans-Learning at exhibition

Awards & Achievements – Energy Conservation

Year	Award	Competition	Category
2019	First Prize	State Level-MEDA (Govt. of Maharashtra)	Auto & Engg.
2020	Second Prize	State Level-MEDA (Govt. of Maharashtra)	Auto & Engg.
2018	Second Prize	State Level-MEDA (Govt. of Maharashtra)	General
2020	Excellent Energy efficient Unit	CII National Awards	Auto,Engg & Rlwy
2019	Energy Efficient Unit	CII National Awards	Auto,Engg & Rlwy


Journey continuous..