CII National Award in Excellence in Energy Management 2021

Tata Motors Limited, Pantnagar

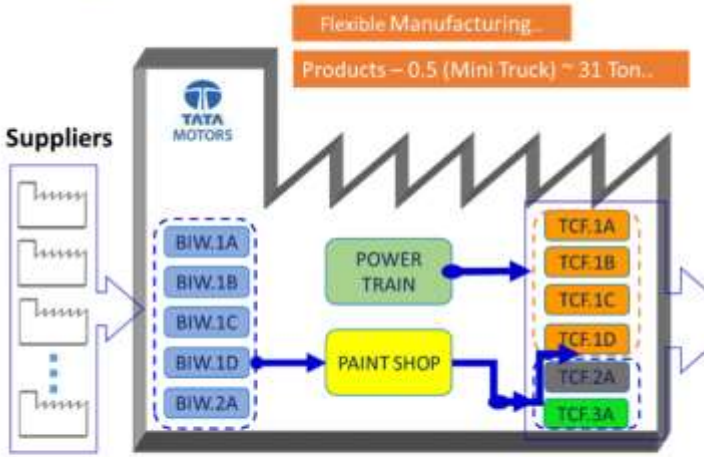
Team Members :

1. Sanjay Waghchaure , Head Paint Shop
2. Sudhakar Kumar , Energy Cell
3. Deepika Gandhi , Sr Manager CPED

1. Company Profile

About Tata Motors Pantnagar

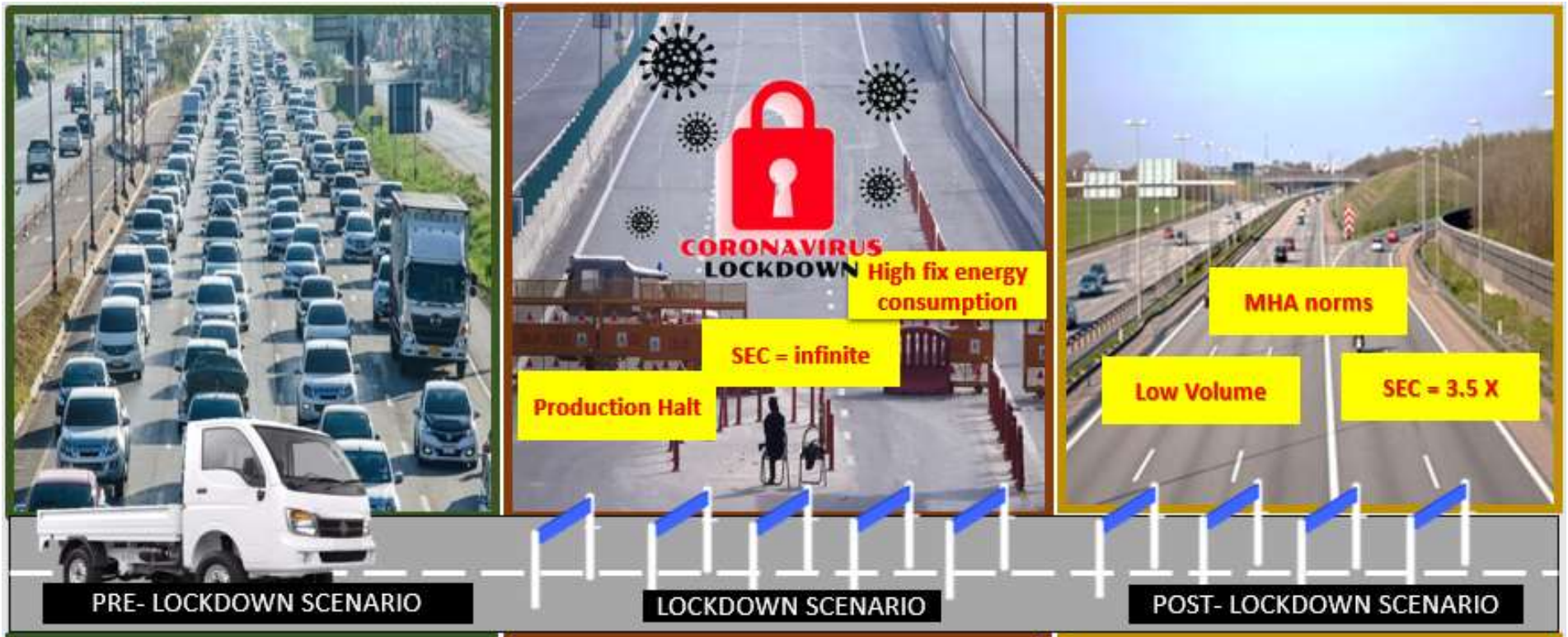
How we produce...



Key achievements in Energy Management

- TML Pantnagar Plant wins GreenCO Star Performer Award 2020
- 2nd Runner up in 7th CII - Northern Region EHS Competition 2020
- CII National Award for Excellence in Energy Management 2020

2. Impact of Covid 19 Pandemic and Mitigation Action



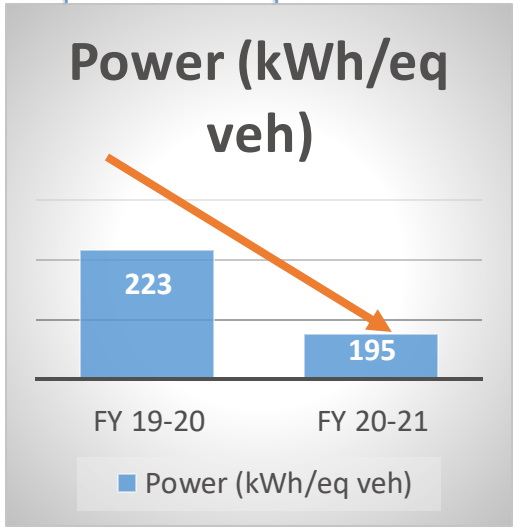
Pre- Lockdown Scenario :
1. Steady or High Volume
2. Low SEC=223 KWH/Eq. veh
3. Ramping up of BS- VI vehicles
4. No restriction on manpower deployment

Measures taken
1. Virtual Meetings and hourly energy monitoring
2. Fixed energy consumption areas identified
3. 54 SOPS to avoid covid risk & continue operations
4. SDCA to sustain the implemented gains
5. Six Sigma Project taken for energy saving performance improvement

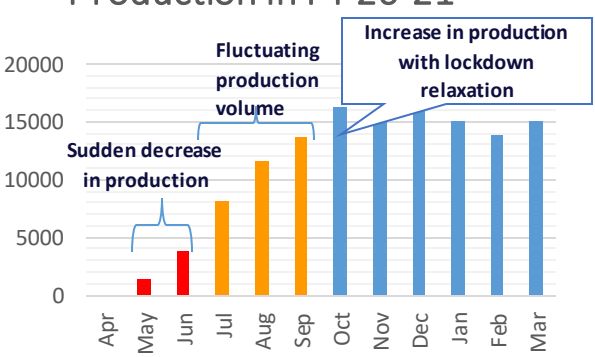
Measures taken
1. Lowest SEC benchmark achieved= 195 kWH/ Eq. veh
2. Solar Plant 2 MWp installed
3. Standardised SOPs
4. Dynamic Target settings
5. SDCA revised as per new challenges
6. SDCA standard in TMOS portal

Specific Energy Consumption of last two years

Decrease in energy consumption despite of covid-19 pandemic

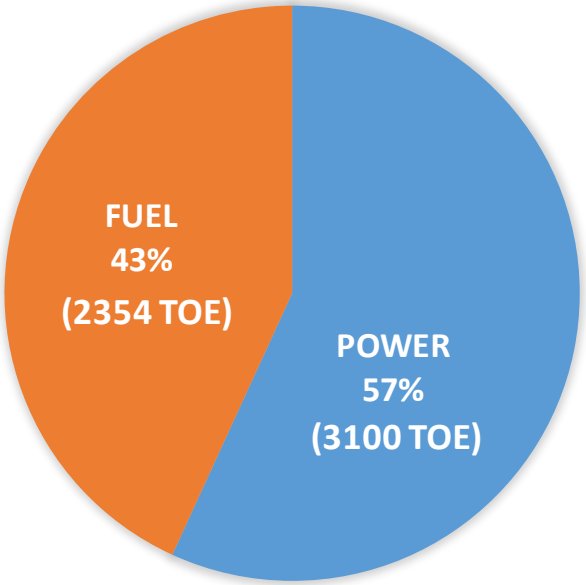


Production Management to achieve target

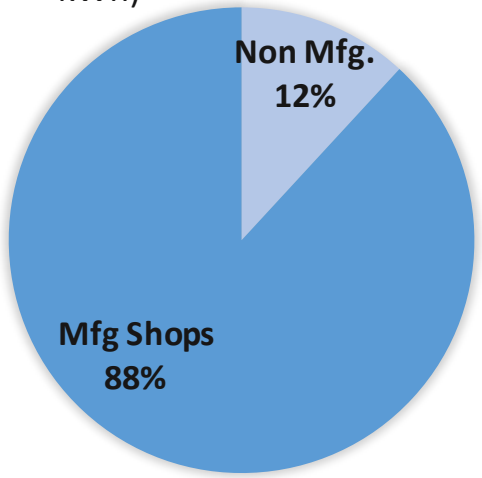


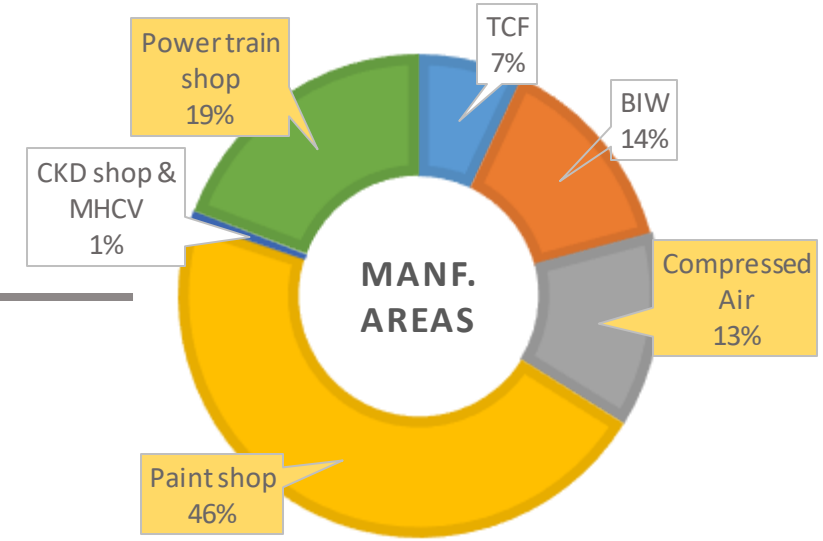
3. Energy Consumption Overview

Total Energy = 5454 TOE



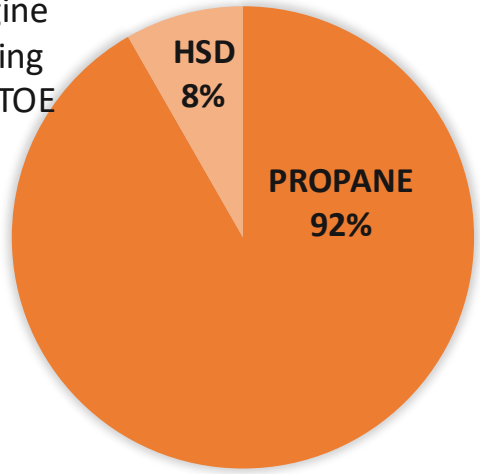
Power consumption = 3100 TOE (36.05 Million kWh)



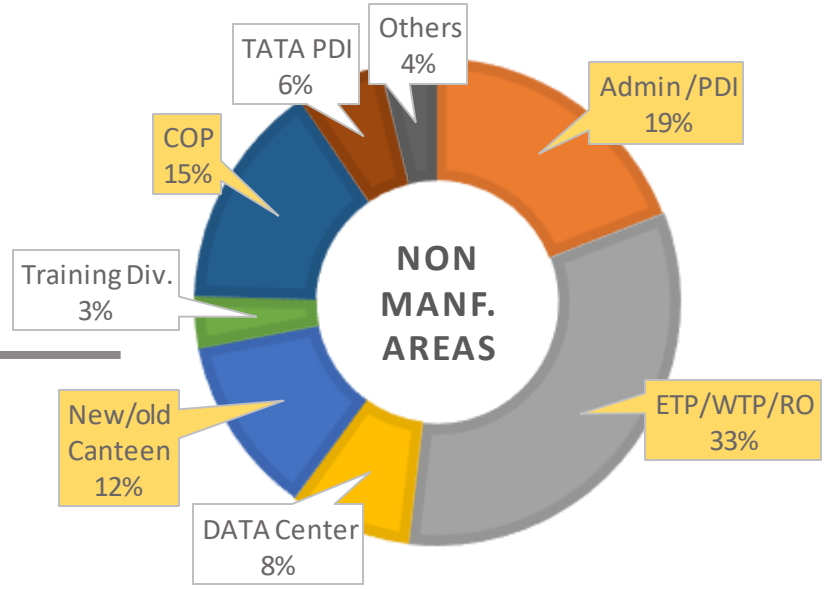


Total Fuel= 2354 TOE

Engine testing 195 TOE



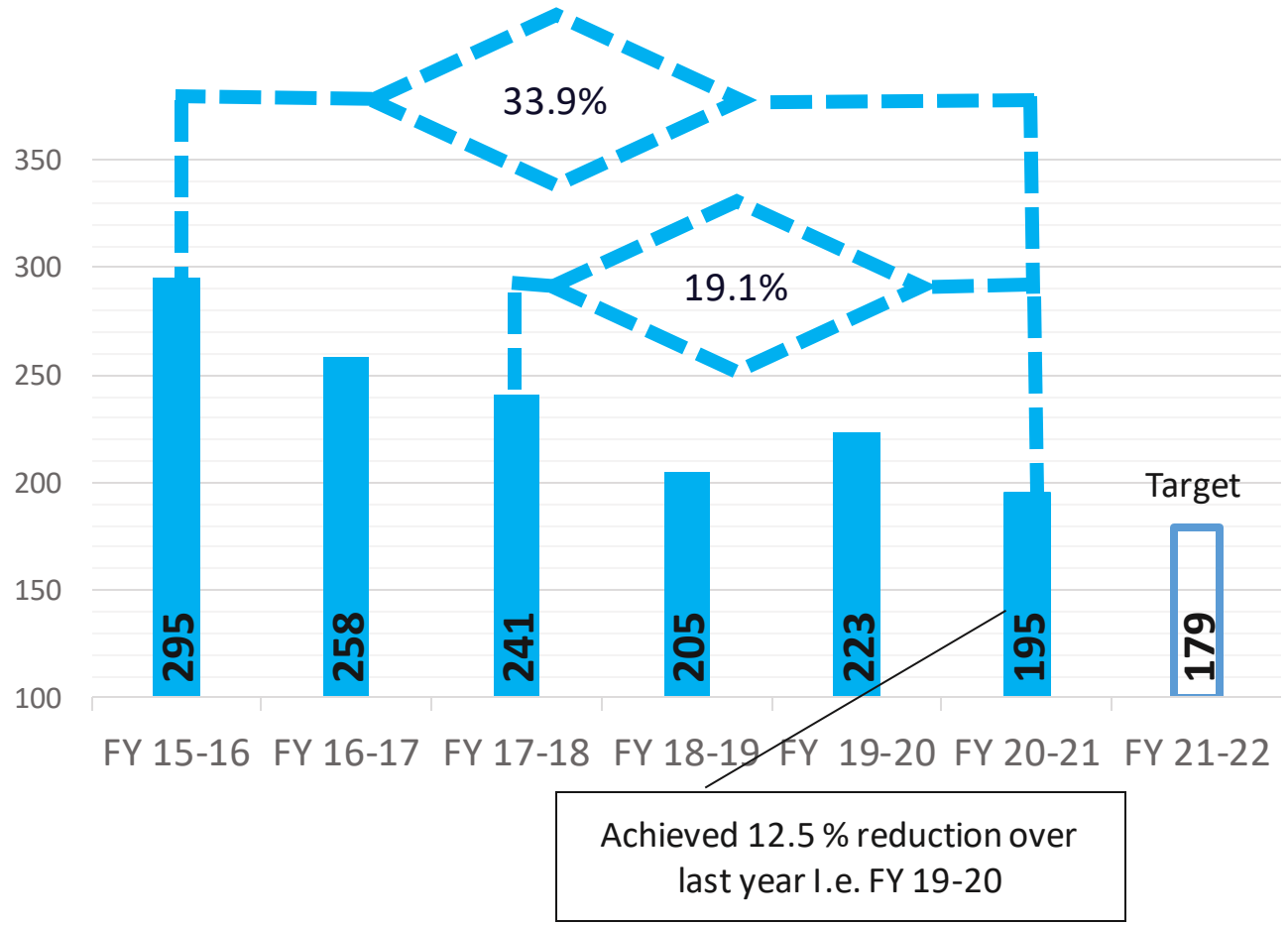
Paint shop 2159 TOE



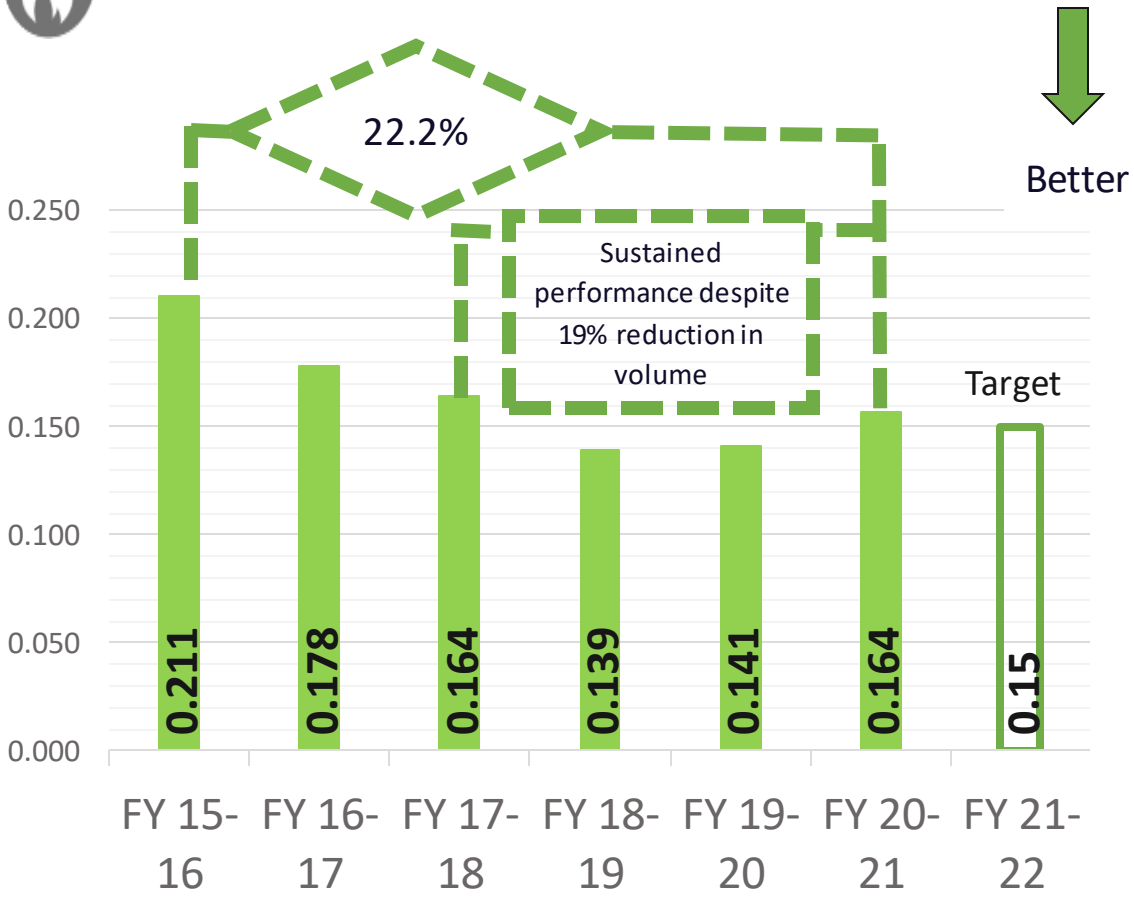
Energy distribution as per FY 18-19 data
FY 19-20 – Q4 is not comparable due to BS 6 migration
FY 20-21 not suitable to see energy distribution as Q1 impacted due to Covid 19 impact.

Sp. Energy Consumption in last 3 years (FY 2018-21)

POWER (KWh/ Eq veh)



FUEL (MkCal/ Eq veh)



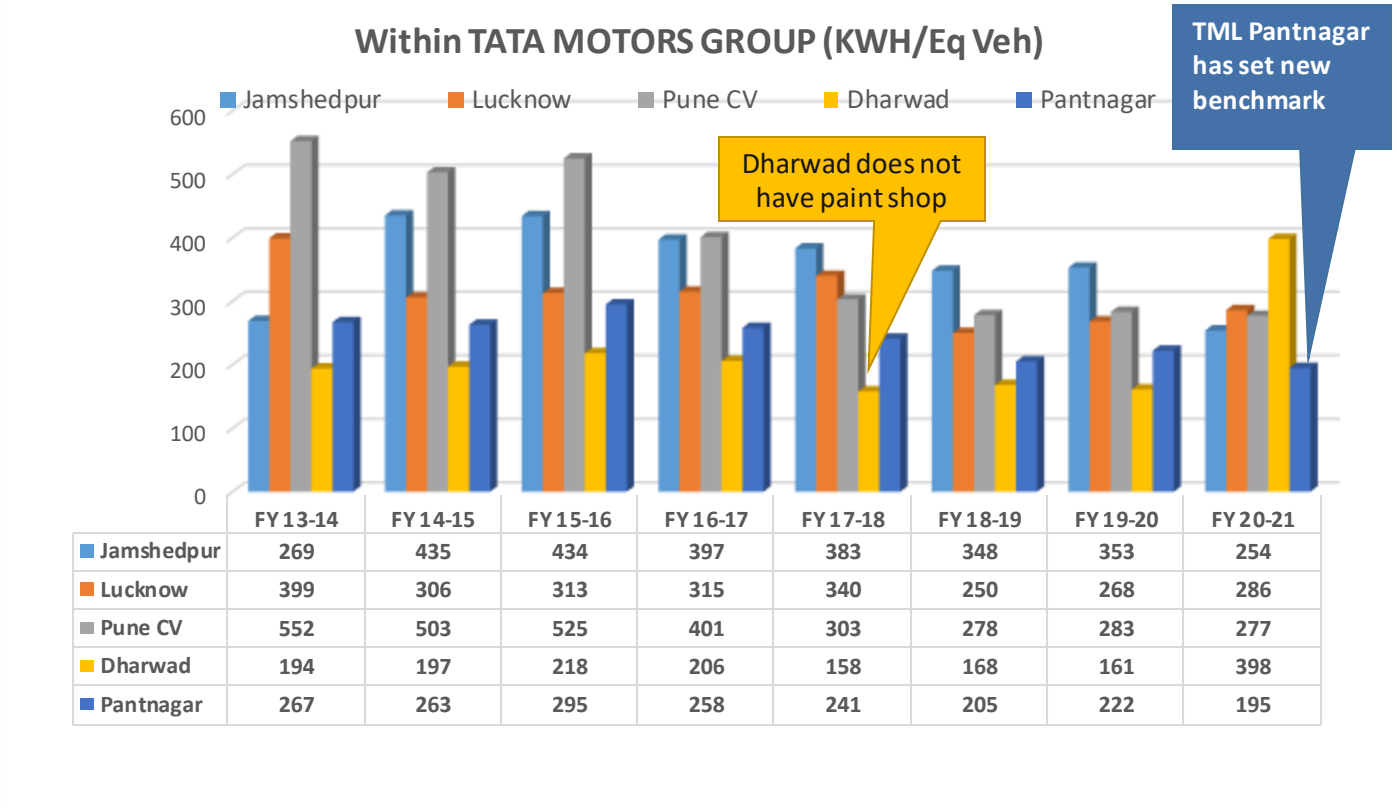
TML Pantnagar achieved New Benchmark level in power despite of Covid challenges.

4. Information on Competitors, National & Global benchmark

BENCHMARKING

INTERNAL	EXTERNAL
TML group level	With Competitor National & Global
With past best performance of plant, factory or machine	
Performance Comparison : Shop to shop, Equip. to equip.	
for non production days	

Benchmarking within Tata Group companies (KWH/Eq Veh)



	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21
Jamshedpur	269	435	434	397	383	348	353	254
Lucknow	399	306	313	315	340	250	268	286
Pune CV	552	503	525	401	303	278	283	277
Dharwad	194	197	218	206	158	168	161	398
Pantnagar	267	263	295	258	241	205	222	195

TML Pantnagar has set a new benchmark again among TML- CV Group companies who have in-house painting process.

4.1 Process benchmarking (National)

Process Level Benchmarking: Painting (Significant process)

Organization	Power (kWh/ Veh)	Production / day	Painting technology / Process
Maruti - Manesar new plant	**68**	1400	3C1B (03 coat 1 base)
Mahindra & Mahindra - Chakan	200	500	3C2B & 3C1B
Hyundai Plant 1	140	600	NA
Hyundai Plant 2	170	400	NA
TML – K block Pune	160	250	3C2B
TML Pantnagar	83.9 **(70.4 best achieved)**	550 (800 nos)	3C1B

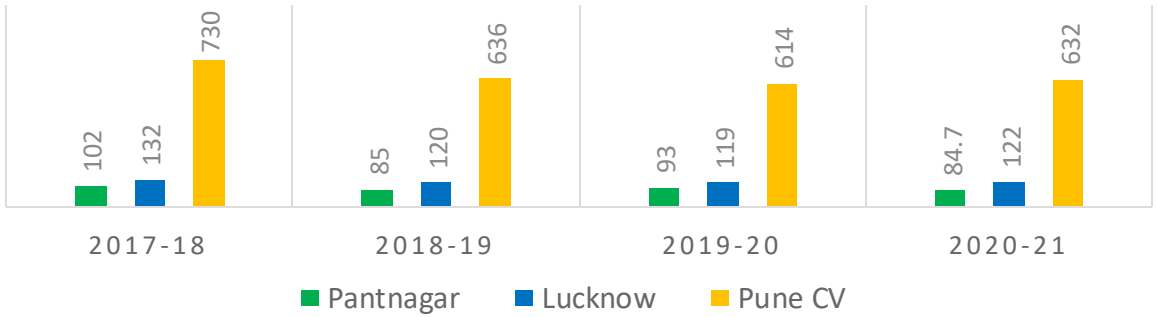
TML Pantnagar achieved National Benchmark level at production level of 800 nos / day. Significant improvement over last year.

Process Level Benchmarking: Assembly process (National)

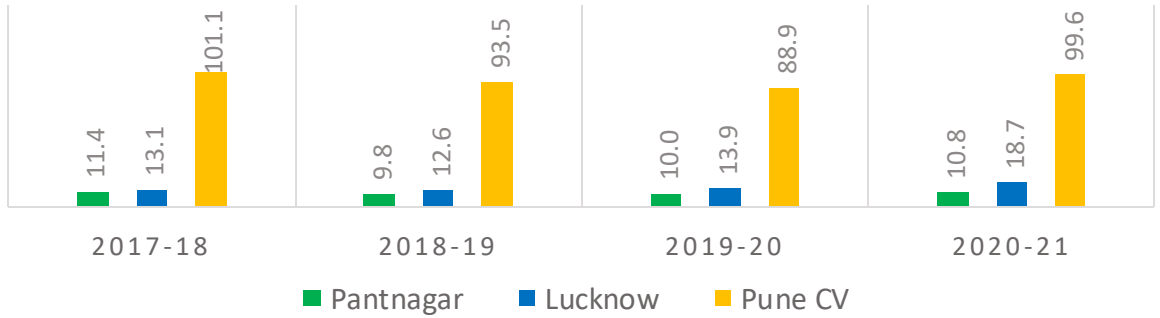
Sanand	Mahindra	TML Pantnagar	Maruti Gurgaon
Models – Tata Tiago, Tigor Average Power Consumption - **42 kWh/ Vehicle** In winter- **33kWh/ Vehicle**	Models- Bolero (220/ Shift) Average Power Consumption – **21 kWh/ Vehicle**	Production- 590 Average Power Consumption- **13.6 kWh/ Vehicle**	Models- Swift Average Power Consumption – **09kWh/ Vehicle**

Assembly shop specific is better than Mahindra and TML Sanand but chasing to achieve Maruti benchmark

Benchmarking with TML Group companies (kWH/ Eq Painted body)



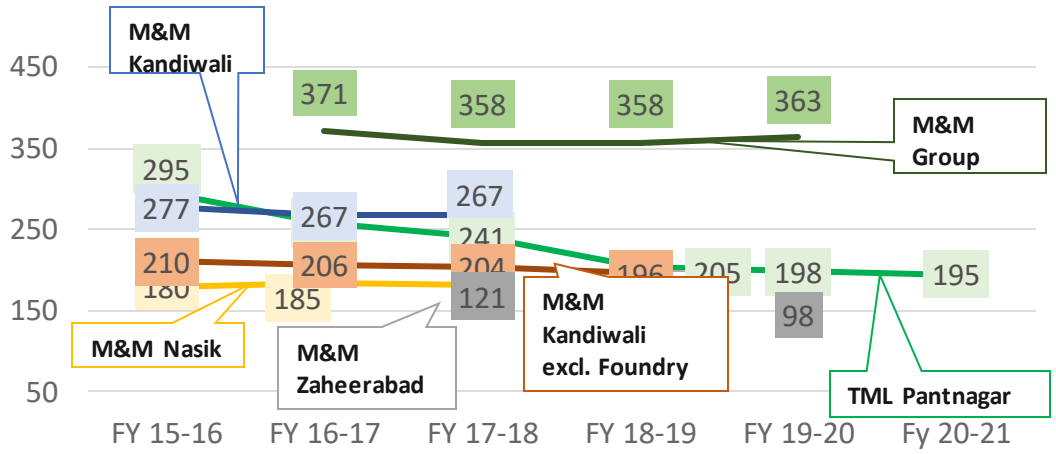
Paint shop benchmarking with TML Group companies (kG/ Eq paint body)



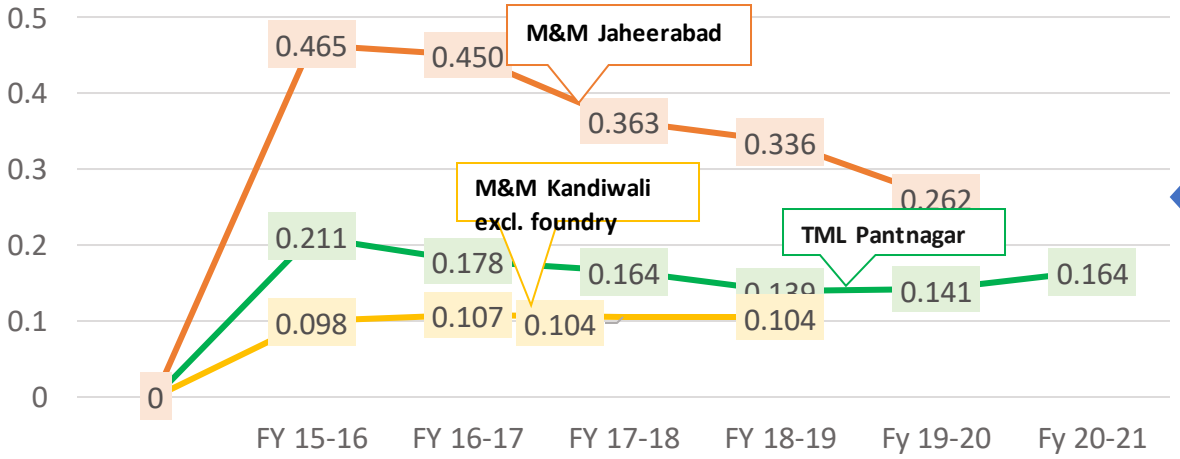
TML Pantnagar achieved National Benchmark level in power and is the best performing plant among TML plants.

4.2 Plant level benchmarking (National & International)

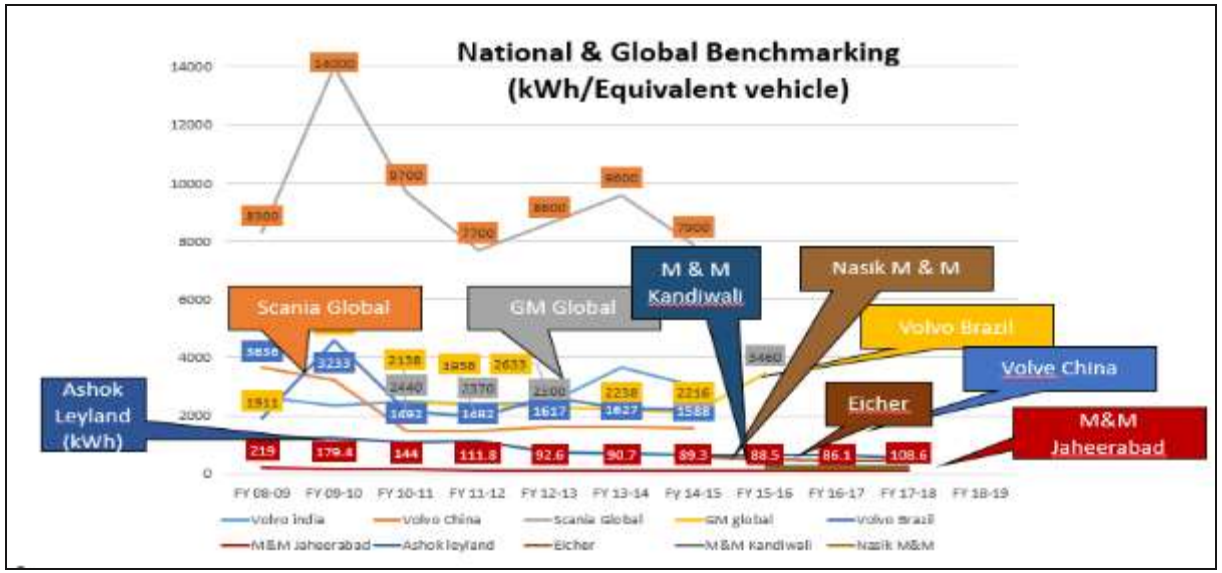
National benchmarking for Power (kWh/ Eq Veh)



National benchmarking for Fuel (MKCal/ Eq Veh)



International & National Benchmarking

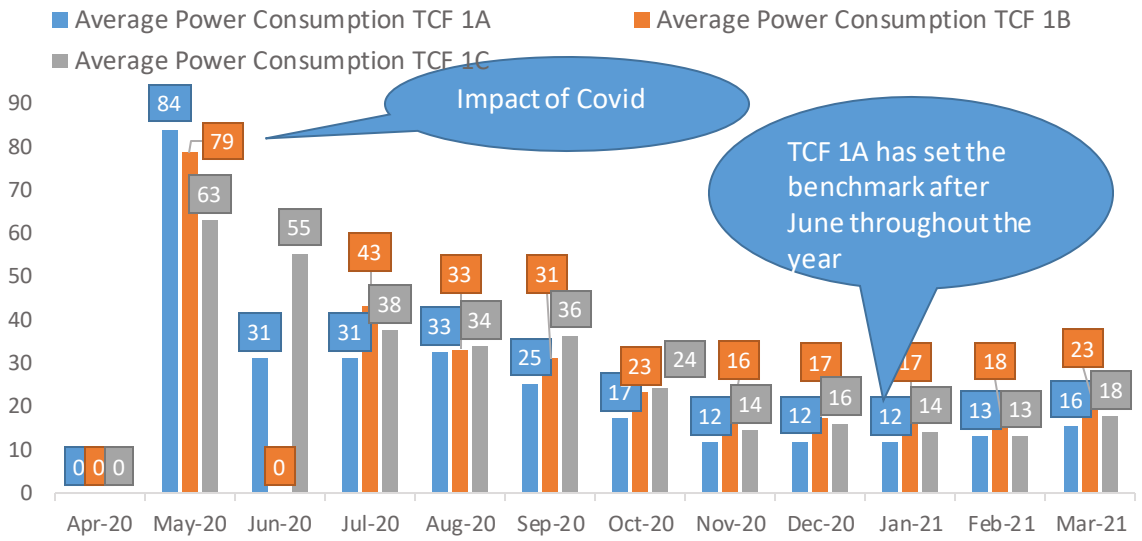


TML Pantnagar is Second best industry benchmark with fastest improving SEC year on year better than its competitor.

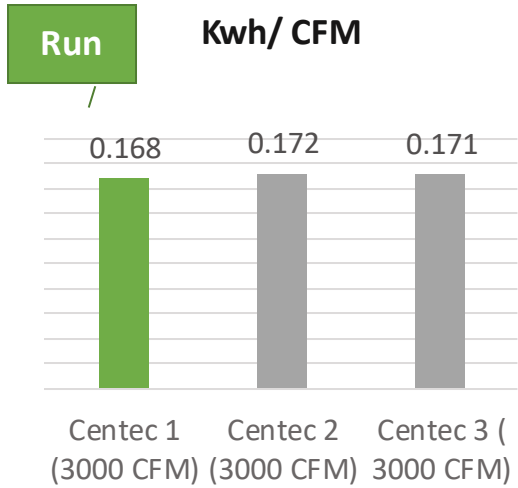
however accurate benchmarking can not be done due to different processes, size of product (UVs).

4.3 Internal Benchmarking

Shop to shop benchmarking



Machine to Machine benchmarking : Example: Centrifugal compressors (kW/ CFM)



Benchmarking wrt Design :Example : Compressors

Comp. Name	Model No	(CFM)	d kW/ CFM	Current kW/ CFM
Comp. 1 (VFD)	ZR250 VSD	1500	0.167	0.162
Comp. 2 to 4	ZR250	1500	0.167	2> 0.164, 3> 0.161, 4> 0.164
PS comp. 3 with inbuilt drier	ZR250 FF	1500	0.210	0.201
PS comp. 2 (VFD)	ZR250 FF-VSD	1500	0.167	0.168
PS comp. 1 (VFD)	ZR160 FF-VSD	1000	0.167	0.169
Centec 1-3	Centec	3000	0.174	0.168

Benchmarking for Non working days: with no maintenance activity

2016-17

Non working day benchmark 2016-17

23740 kWh/ Day

2017-18

Earlier Benchmark for block closure day

19 Oct 2017

18859 kWh/ Day

2019-20

New benchmark set in 2019 15 Aug 2019

17287 kWh/ Day

2019-20

New benchmark set in 29 Mar 2020

15325 kWh/ Day

2020-21

New benchmark set on 01 May 2020

14765 kWh/ Day

Sunday benchmark with Maintenance activities:

Sunday with maintenance activities

27000 kWh

FY 20 : 22000 kwh

4.4 Roadmap to surpass and sustain National Benchmark and major projects planned in FY22

FY19
- Conducting brainstorming workshops for idea generation
- Solar plant 1MWp
- Heat pump trials in WM
- Waste heat recovery

FY20
- BLDC motors in AHUs, ASPs
- Heat pump HD in all processes
- EMS & ESCO Encon projects- LED, Motors
- Waste heat recovery
- ToD based operations

FY21
- Load reduction 01 MW
- Industry 4.0 EMS with automatic process control
- Motor replacement program through EESL
- LED replacement under ESCO model for remaining lights
- Solar power plant additional 02 MWp

FY 22
- Industry 4.0 solutions- Process information on mobile
- Automated process controls
- ToD based operations

Major projects planned in FY 22

- Digitalization project : online energy monitoring system
- Digitalization project : Equipment monitoring system
- Zero energy- super energy efficient blower for ASP plant (04 Nos) HVLS fan in specific area like Dressing line, Assembly lines
- 400 W high-bay lamp replacement with 150 W LED
- Smart Joule Chillers upgradation and digitalization in paint shop, engine assembly and GB assembly
- Heat pumps procurement for Washing machines in Engine shop (06 Nos)
- Testbed blower speed & dampers control through automation

4.5 Key EnCon Projects

Key EnCon Projects FY 2020-21

Idea given by supervisor

Idea given by operator

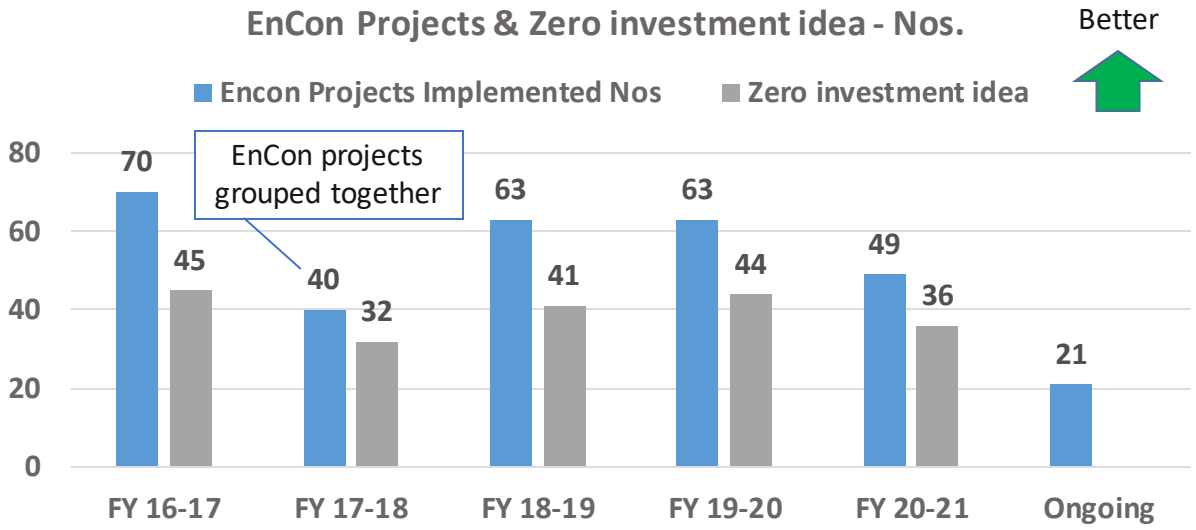
S.No.	Title of Project	Year	Estimated Annual Electrical Savings, Million kWh	Estimated Annual Thermal Savings, Million K Cal	Investment Million Rs
1	20 Nos more Day light installation in Paint shop (Till date 20 Installed)	2020-21	0.077		0.85
2	Power saving by switching off unwanted tube lights in robotic zone at PVC booth & Paint Booth.	2020-21	0.154		
3	LED implementation in whole Paint shop.	2020-21	0.384		1.31
4	All Oven Running hour optimization by Sequential Switching	2020-21	0.038		
5	Power optimization by switching of spray & circulation pump during Lunch, Dinner & Gap.	2020-21	0.307		
6	Power saving by switching off PTED conveyer during idle time at the end of B shift	2020-21	0.077		
7	Conversion of Pneumatic Paint circulation Pumps into Electrical Paint circulation Pumps.	2020-21	1.429		4.29
8	Elimination of halogen lamp from sealant machine	2020-21	0.001		
9	Installation of VFD at BIW-1A ASP	2020-21	0.291		0.50
10	Cooling tower to be control from remote IO which will be install in frame shop	2020-21	0.025		0.20
11	Installation of LED lamp at Highbay points	2020-21	0.087		0.30
12	Optimization of ASP-1 use by installation of damper	2020-21	0.109		0.15
13	Eliminate heating in Interim washing by chemical change.	2020-21	0.240		
14	Heat pump on ESCO model in remaining 13 nos washing machines	2020-21	3.498		0.90
15	Using compressor house heat to Heat up coolant in washing machines.	2020-21	2.416		15.00
16	Solenoid Control on/off system for main Air supply header for easy and effective control	2020-21	0.010		0.20
17	Day light panel installation in Powertrain Shop-20 Nos.	2020-21	0.117		0.85
18	Motion sensor to be provided at Under pit areas.	2020-21	0.024		0.50
19	Currently working on GPS tracking LoRa Kit . This system will track down the Forklift and other vehicle for starting and stopping of engine along with the distance travelled and route. In this way, diesel consumption will be monitored for each vehicle giving us the opportunities to optimize its route so as reduce the usage of diesel consumption.	2020-21	to be estimated		
20	Replacement of high bay lamp with LED lights -	2020-21	0.294		0.10
21	Solar day light installation in TCF shop - 20 Nos	2020-21	0.03468		0.85
22	Bellzona coating inside blowers	2020-21	0.306		1.07
23	Installation of portable compressor / Blower for robot sensors.	2020-21	0.0136		
24	Installation of magnetic resonator for fuel saving	2020-21		1050	10.00
25	Replacement of approx. 300 nos conventional motors to IE3 motors under EESL agreement for replacement of all conventi				
26	Replacement of normal lights to LED lights under Philips agreement for replacement of all conventional lights into LED lights				

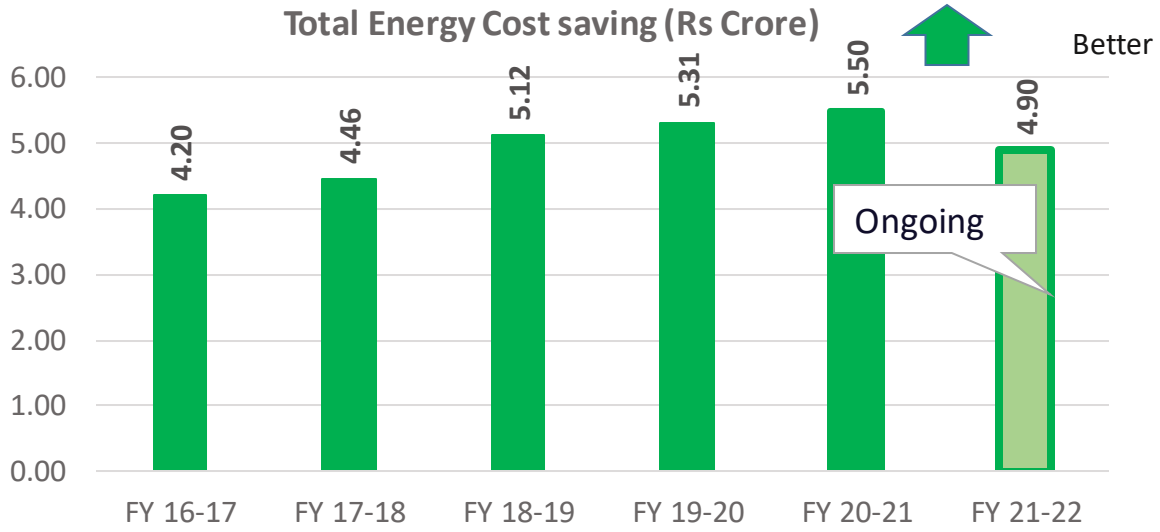
4617 tCO2 reduction

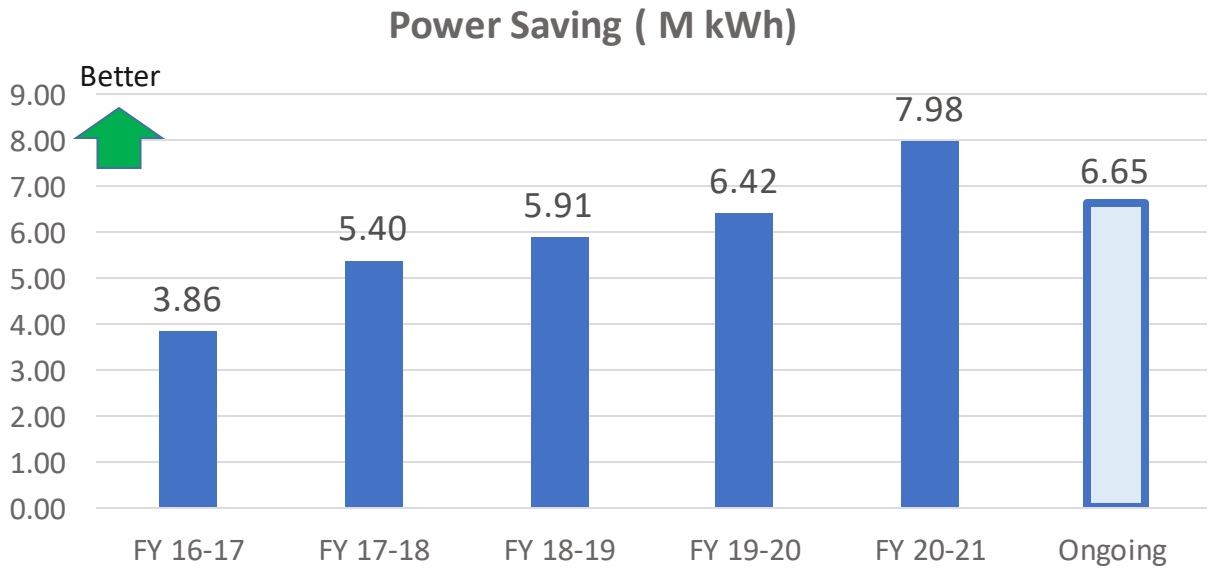
Total No of projects = 49 Nos

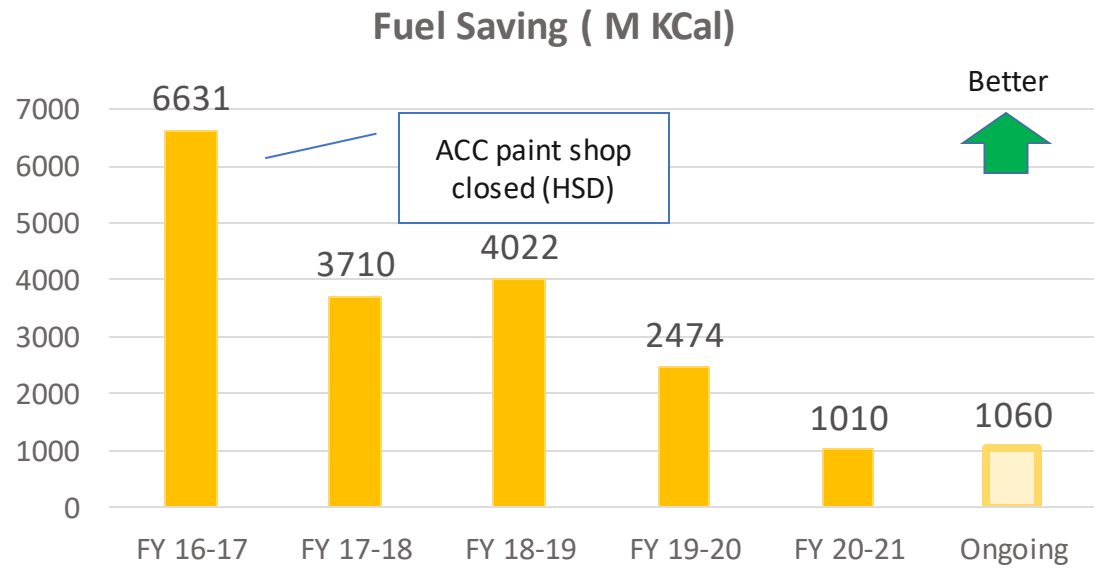
Zero investment projects = 36 nos

5. Energy Saving projects implemented in for last three years

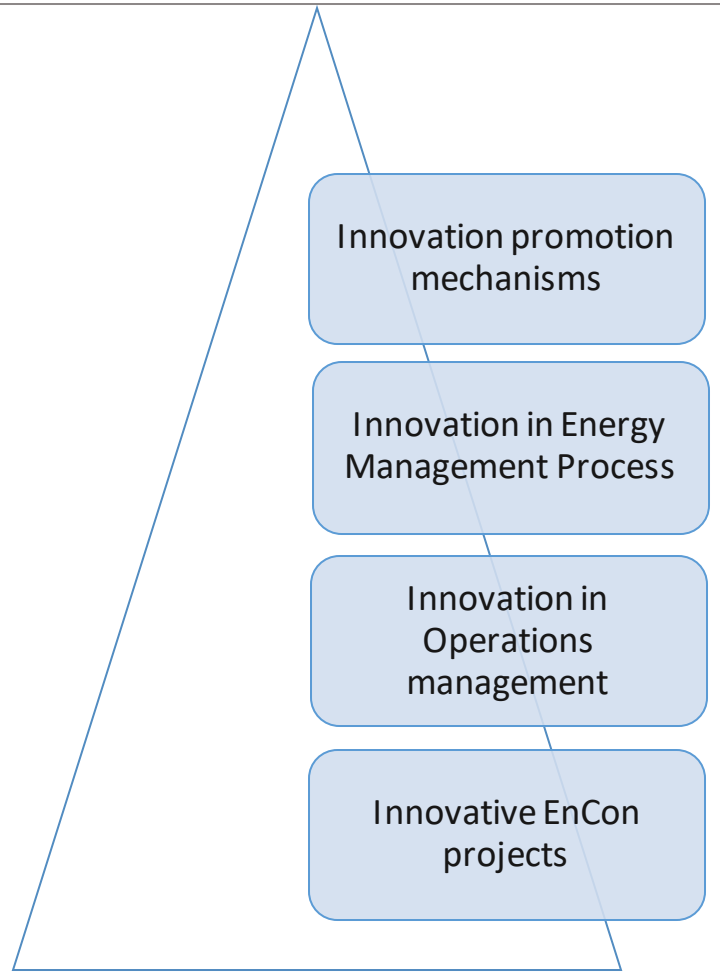








6. Innovative Projects implemented



- Innovista, Innovision, Innoengine and Hackathon challenge
- Leader's workshop
- Suggestions and Kaizens promotion
- Energy conservation month- Best Innovative project award
- In-house Energy Expo (Technology day) & Trainings

Existing systems/ activities

Operations management:

- Production strategy for best Energy performance
- Investment through ESCO model

FY 18-19 : New process introduction :

- CLT (Cross location team) – Utilities –Power & Fuel (Lead : TML Pantnagar)
- G-E-A-R process for EnCon ideas implementation
- 5 Year Energy Strategy workshop

FY 19-20: New innovative initiatives

- Six Sigma project for power cost reduction
- Dynamic target setting through statistical analyses
- IT based manpower deployment for energy saving in first Hour output

FY 21 & FY 22: New Innovative Approaches

1. **SIX SIGMA project for energy performance improvement**
2. **Under strategic & approach related interventions- two new levers were add**
3. **Process standardization and horizontal deployment in other business units/ plants through TMOS Portal**
4. **Statistics based Dynamic target setting in low volume scenario**
5. **Statistics based Production planning for optimum energy consumption**
6. **SDCA (Standardize- Do- Check and Act) standard development to sustain the gains of last 3 years EnCon projects**

EnCon projects:

- AI-ML and big data analyses for energy saving

Innovative approach : Six Sigma Black belt project for energy performance improvement

Problem statement:

Reduce energy cost reduction by 8% in UTK plant.

1) Specific : Current level : Rs 1863 per Eq Veh YTD Sep 2019, Target level : Rs 1713 per Eq Veh. (Last year FY 18-19 = Rs 1829/ Eq veh)
2) Absolute saving target (Cr) : 2.58 Cr (08 % reduction over FY 19 spend 32.22 Cr)

Why is it innovative?

- **First time in TML** for Energy
- Conventionally Six sigma projects are taken for quality improvement and not for energy improvement
- Applied statistical methods innovatively

DMAIC Methodology:

Define	Measure and Analyse	Improve	Control
• Risk Assessment • Problem Definition • Justify the choice • Team Charter • Project Plan • Past data analysis • Process Mapping • Gemba • Quick win • Quick win Sustenance	• Operational definition • MSA • Baseline • List of SSVs • Tool Identification • Data Collection • Analysis • Cause Validation • Subcase Ident cation	• Solution Generation • Solution Evaluation • Risk Assessment • Solution Finalization • Pilot Batch • Result Verification • Permanent action • Quantification of benefits	• Controls for X's • Monitoring system for Ys, Xs • Updating system documents • Training • Sustenance audit • Horizontal deployment • Future Actions • Lessons learnt

Team size : Project Mentor + Project Leader + 09 Members

Six Sigma Black Belt Project — LearnEX

Reduce energy cost reduction by 8% in UTK plant.
1) Specific : Current level : Rs 1863 per Eq Veh YTD Sep 2019, Target level : Rs 1713 per Eq Veh. (Last year FY 18-19 = Rs 1829/ Eq veh)
2) Absolute saving target (Cr) : 2.58 Cr (08 % reduction over FY 19 spend 32.22 Cr)

Project Start Date: 01.10.2019
Current Status: Control

Organization: Tata Motors Pantnagar

Team	Name	Department
Mentor	Mr Chinmoy Roy	Head- TS
Leader	Vivek Gupta	Energy cell
Member	Randhir Singh	Power train
Member	Sudhakar Kumar	Paint shop
Member	Ram Gupta	IT
Member	Ashish Kumar	Weld Shop
Member	Amit Gupta	TCF- Assembly shop
Member	Afaq Hasan	PPC
Member	Abhishek Ranjan	SCM
Faculty	Mahesh Hegde	Learnex Consultants
Faculty	Prasad Shende	Learnex Consultants

Tangible advantage :

- Finance certified cost reduction : Rs 68 / Eq Veh, Spend reduced by 4.02 Cr and saving against projected volume @ specific cost reduction by Rs 1.09 Cr

Intangible advantage :

- New insights into the process
- Morale improved
- Developed systems to sustain the gains and new projects in pipeline

Finance Certified Savings

Strategic Approach & Standardization

UTK plant's key interventions to effectively drive CLT Utilities & Conservation

Strategic & Approach related interventions	Target setting process and performance indicator standardized	Introduced Levers (07+02)	Development of 5 Years strategy	Inclusion of other plants such as Foundry, Forge and ERC					
Process centered initiatives	Idea generation workshop methodology standardized	ERASE methodology developed for ideas generation	Adopted customized GEAR process ideas implementation	CLT process standardization through TMOS	SDCA development and HD in all plants for sustaining the gains				
Tactical & New Technology introduction	UTK team visited all plants to conduct idea generation workshops	Started Best practice sharing by each plant in each review meeting	Created Best Practices Idea Bank and HO through applicability matrix	Standardized GEAR weekly tracking and performance review template	Introduced new technologies such as Heat pump, HVLS fan, Air circulator fan etc	Energy Cost initiatives such as recovery of fix charges during lockdown and reduction in contract demand	Energy cost reduction by recovery of fix charges during lockdown and reduction in contract demand	Initiated various process automation projects such as HVAC operation at reduced rpm in paint shop	

Idea generation process

7 + 02 New levers

- Measurement & Analysis
- Operational Efficiency
- New technology introduction
- Renewable energy
- Benchmarking
- Energy cost
- Knowledge & Capability building
- Fix cost reduction
- Standardisation

ERASE idea generation workshop
13 Magical questions

E- Eliminate 'Need'
- Do we really need this process for desirable outcome ?
- Do we need Energy input in this process for desired outcome?

R- Reduce Abs & Sp. Energy consumption
- How much is productive and non-productive energy?
- How can I reduce non-productive energy use?
- How can I improve throughput ?

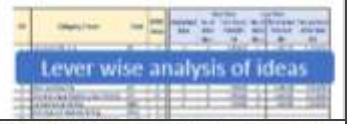
A- Alternative energy sources & Application innovation
- Is there an alternative cost effective energy source available?
- What is my application advantage ?

S-Sizing of equipment
- What is the equipment capacity?
- What is the actual demand ?
- How can I right-size the equipment capacity?

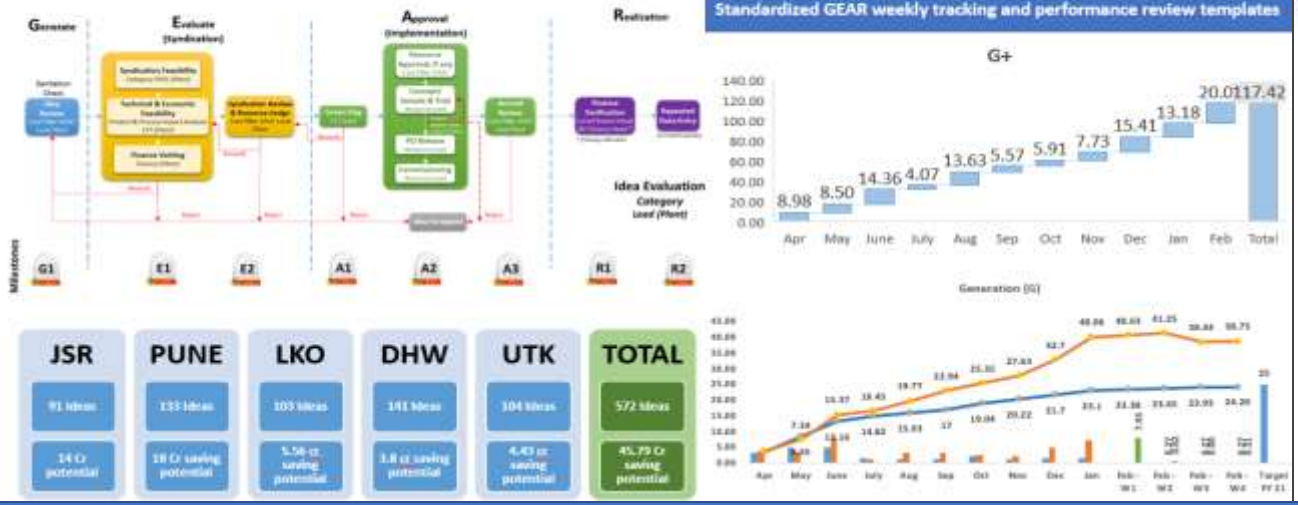
E-Efficiency improvements / Elimination of losses
- Is there excessive Noise, Heat, Vibration, Radiation or leakage ?
- What is my equipment/process energy efficiency?
- What is the best efficiency point?

Workshops at three levels

Plant Level & Cross location workshop
Factory Level
Line/ station level TL and Operators



Idea implementation & Realization process



Standardized GEAR weekly tracking and performance review templates

JSR	PUNE	LKO	DHW	UTK	TOTAL
91 Ideas	133 Ideas	103 Ideas	141 Ideas	104 Ideas	572 Ideas
14 Cr potential	18 Cr saving potential	5.58 Cr saving potential	3.8 Cr saving potential	4.43 Cr saving potential	45.79 Cr saving potential

Process standardization and horizontal deployment in other business units/ plants through TMOS Portal

Process centered initiatives
CLT process standardization through TMOS

The name of this process is defined as **"Energy Cost Management (OS 0802 0502)".**

Mapping of this process has been done in the TMOS portal and team is working on development of process documents. Work in process.

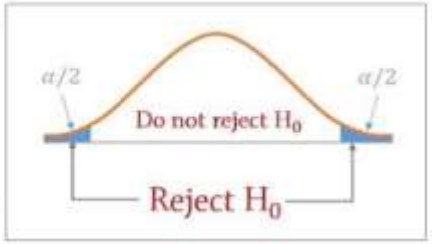
We have started our CLT journey in FY 18-19. In FY 20-21, CLT process approach with standards such as 9 levers, ERASE for idea generation and GEAR for Idea implementation and SDCA TO SUSTAIN GAINS.

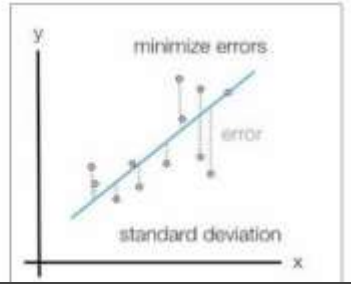
Statistical analyses for Effective production planning

Objective : To have a daily production plan for best energy performance.

Methodology :
Study involved Hypothesis testing & Regression analyses of various situations such as:

- **Hypotheses test :** Deploying more manpower improves energy performance in Paint shop
- **Hypotheses test :** BIW 1C is more energy efficient compared to BIW 1A & BIW 1B
- **Hypotheses test :** TCF 1C is more energy efficient compared to TCF 1A & TCF 1B
- **Regression analyses:** To identify, Which model should be produced in which BIW Shop
- **Regression analyses:** To identify, Which model should be produced in which TCF Shop
- **Preparation of Decision Matrix**



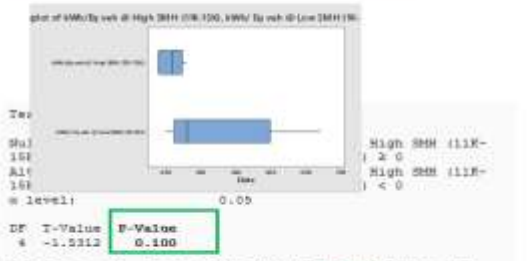


Analyse Samples : Hypothesis testing

Hypothesis test : Deploying more manpower improves energy performance in Plant shop

Ha = μ (kWh/ Eq veh) at higher SMH < μ (kWh/ Eq veh) at lower SMH

Ho = μ (kWh/ Eq veh) at higher SMH >= μ (kWh/ Eq veh) at lower SMH

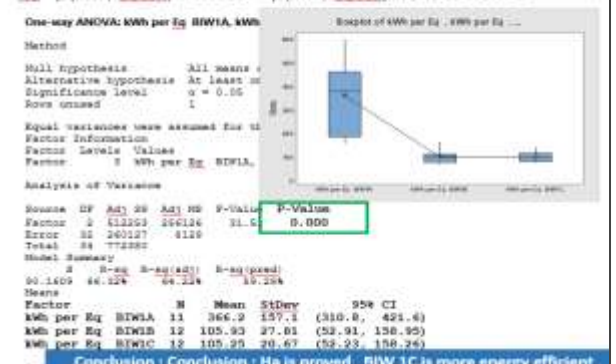


Conclusion : Ha is rejected, In paint shop, Deployment of more manpower does not reduce specific energy consumption.

Hypothesis test : BIW 1C is more efficient than BIW 1A or BIW 1B

Ha = μ (kWh/ Eq veh) in BIW 1C < μ (kWh/ Eq veh) in BIW 1B & BIW 1A

Ho = μ (kWh/ Eq veh) in BIW 1C >= μ (kWh/ Eq veh) in BIW 1B & BIW 1A



Conclusion : Conclusion : Ha is proved, BIW 1C is more energy efficient

Analyse Sample : Regression analyses

Regression Analysis: kWH BIW 1A versus EDGE INTRA BS6 V10 STD, EDGE INTRA V13.6 STD

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	2	44768	22384	2.09	0.158
EDGE INTRA BS6 V10 STD	1	19343	19343	1.81	0.199
EDGE INTRA V13.6 STD	1	43790	43790	4.09	0.061
Error	15	160689	10713		
Total	17	205457			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
103.502	21.79%	11.36%	0.00%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value	VIF
Constant	2211	131	16.85	0.000	
EDGE INTRA BS6 V10 STD	-2.07	1.54	-1.34	0.199	2.38
EDGE INTRA V13.6 STD	-3.36	1.66	-2.02	0.061	2.38

Fits and Diagnostics for Unusual Observations

Obs	kWH BIW 1A	Fit	Resid	Std Resid	
10	2203.5	1993.3	210.2	2.14	R

R Large residual

Regression analyses results of BIW 1A, 1B & 1C

Regression Equation : BIW 1A

kWH BIW 1A = 2211 - 2.07 (EDGE INTRA BS6 V10 STD) - 3.36 (EDGE INTRA V13.6 STD)

Regression Equation : BIW 1B

kWH BIW 1B = 1805 + 4.04 ACE GOLD 700CC BS6 + 4.55 ACE GOLD 7.6 PETROL + 30.8 MAGIC EXP M2.6

Regression Equation : BIW 1C

kWH BIW 1C = 1498.6 + 2.789 ACE GOLD 700CC BS6_1 + 0.403 ACE GOLD 7.6 PETROL_1

Decision Matrix for production planning: Which model should be produced on which line?

BIW shops

			Model / Variable cons.	Model / Variable cons.	Model / Variable cons.	Model / Variable cons.	Model / Variable cons.
		Daily plan	148	89	10	44	50
		Fix consumption	ACE GOLD 700CC BS6	ACE GOLD 7.6 PETROL	MAGIC EXP M2.6	EDGE INTRA BS6 V10 STD	EDGE INTRA V13.6 STD
Shop	Shift capacity	kWh	Variable cons per Veh (kWh/ Veh)				
BIW 1A	110	2211				-2.07	-3.36
BIW 1B	120	1805	4.04	4.55	30.8		
BIW 1C	120	1498	2.78	0.403			

Conclusion: Make maximum Ace Gold & 7.6 Petrol in BIW 1C as BIW 1C proves to be more efficient

TCF shops

			Model / Variable cons.	Model / Variable cons.	Model / Variable cons.	Model / Variable cons.	Model / Variable cons.	Model / Variable cons.
		Daily plan	148	89	10	4	44	50
		Fix consumption	IR CRM ACE 700 CC BSVI W-O TCU	IR CRM ACE GOLD PETROL BS-VI	ARC_WHITE-MAG EXPRESS D+9 BSVI	AZURE_BLUE-ACE MEGA XL BS-III	TITANIUM WHT-V10 STD BSVI	TIT_WHT-INTRA 1300 BSVI STD
Shop	Shift capacity	kWh	Variable cons per Veh (kWh/ Veh)					
TCF 1A	140	1420	4.27	(0.50)	10.8			
TCF 1B	120	1463	1.99	2.68		0.95		
TCF 1C	110	2256	0.13				2.33	1.37

Conclusions : Make maximum Ace 700 CC BS VI in TCF 1B, Make maximum Ace Gold Petrol in TCF 1A

Energy efficient production planning using statistical tools

Key advantages of revised process & SOPs for energy optimization:

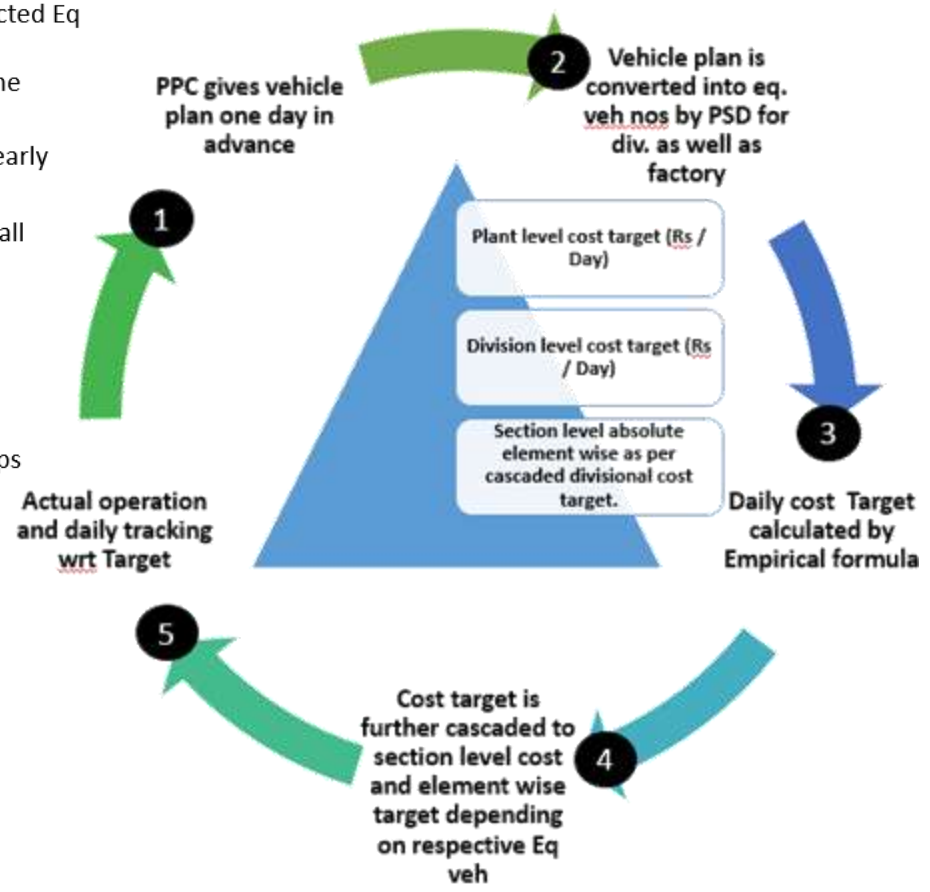
Key advantages of revised process :

Target Setting:

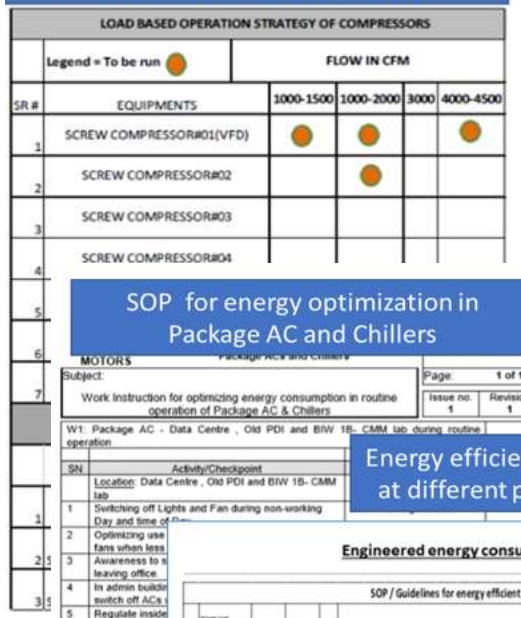
1. Daily target can be given for tomorrows expected Eq Veh from the empirical formula.
2. Fix and Variable factor are also identified in the empirical formula
3. Opportunities to deploy less resources are clearly visible for same No of Eq veh.
4. It can be easily implemented and adopted at all levels in the organisation due to its simplicity

Production planning:

1. Model wise strategy prepared for optimum energy performance
2. Benchmarking : Triggers to look into the shops for variation in energy performance

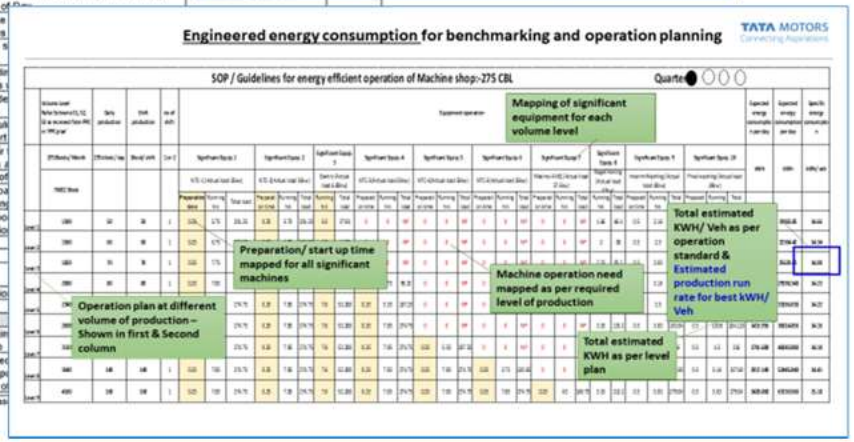


SOP for compressed air operation at different demand levels at UTK



SOP for energy optimization in Package AC and Chillers

Energy efficiency evaluation of machine shop at different production levels – Power train



Overall we changed the complete target setting and production planning process and created SOPs for efficient energy use
It results were realised in Six sigma project

Tactical & New Technology initiatives
Employee involvement through Energy conservation month (14 Dec 20 to 14 Jan 2021)

TATA MOTORS
Connecting Aspirations

Shop competitions to improve plant energy performance

- Best Shop Award
- Best non manf area award
- Fix consumption reduction award etc
- Best QC story competition
- Best QCC competition

Idea generation and Innovation promotion

- Brainstorming sessions
- Innovative project competition
- Innovative Encon & mobility concept competition

Employee Awareness events

- Energy Oath
- Daily mailers
- Banners display, posters etc
- Rangoli competition
- Tree plantation

Employees Capability building

- Star employee Award
- Star Team leader award
- Technology Day
- Expert hour sessions
- Focused trainings

Suppliers energy performance improvement

- Energy Champion award for suppliers
- Expert hour session for suppliers

CSR & Community reach

- Urjarakshan cycle rally : 50 KM
- Awareness campaigns with CSR partners

Employee family awareness

- Family visits to the plant
- Drawing competition for kids on energy conservation them

The events were planned to create awareness with all stakeholders and to drive energy performance.

Tactical & New Technology initiatives
Started Best practice sharing by each plant in each review meeting

TATA MOTORS
Connecting Aspirations

UTK: Pump efficiency improvement by Belzona coating : Sustainable

UTK: Encon ideas yielding results

UTK: Energy optimization of steam bath tables – A smart energy saver

UTK: IT based Manpower Deployment in Power Train

Savings:

UTK: Reduction in Engine Testing time

More the engine testing time more will be the fuel and power consumption and thus to meet the customer demand the engine test beds are run in all the shifts.

Trigger of Project : Excess running hours of the test beds to meet the customer demand.

Abnormalities


Toggle clamp getting loosen as dowel pin is shifted


Spring stiffness was less and bush thickness was 6mm


Engine resting pad are hard & getting damage


Spindle bush damaged due to misalign of trolley


Engine clutch center was out


Block dislodge & damaged due to vibration

Earlier Situation

We were testing engine in **33 minutes**. Engine testing is done in **all the shifts** to meet customer demand

Validated causes

1. Low Power
2. Low oil Pressure
3. Test bed mechanical issue
   (Resonator fitted in TCF shop)


Engine power transmit to test bed dynamo through clutch plate, Due to high surface finishing of flywheel clutch plate butting surface, clutch plate slippage.

Current Oil quantity

1. **Green Engine – 3.5 lit**
2. Dipstick Max – 3 lit
3. Dipstick Min – 1.8 lit


Only air filter is fitted during engine testing but Resonator is fitted in TCF vehicle assembly.

Current Solution

We are testing engine in **22 minutes.**

- Engine testing is done in **two shifts** to meet customer demand

Improvements done

1. Flywheel position changed as Transmission losses were caused because of that.
2. Oil level is reduced by 400 ml, no crankshaft dipping in engine oil
3. Resonator is fitted in engine shop .


Flywheel face's surface finish to be restored to Ra1.6µm (N7-ISO Grade) for all 7.6D Flywheels.

Proposed Oil quantity Confirmed by ERC

1. **Green Engine – 3.1 lit**
2. Dipstick Max – 2.6 lit
3. Dipstick Min – 1.6 lit


After:- Resonator included in air intake circuit in all 7.6D test beds

Improvements


Dowel pin height fixed to match with Engine mounting


Increased the wall thickness and spring stiffness


Provided soft resting at left side to maintain the resting position


Replaced the spline bush on condition basis


Clutch plate alignment mandrel changed in Assembly


Lock nut provided to prevent nut loosen

Savings:

30.3 % reduction in engine testing time

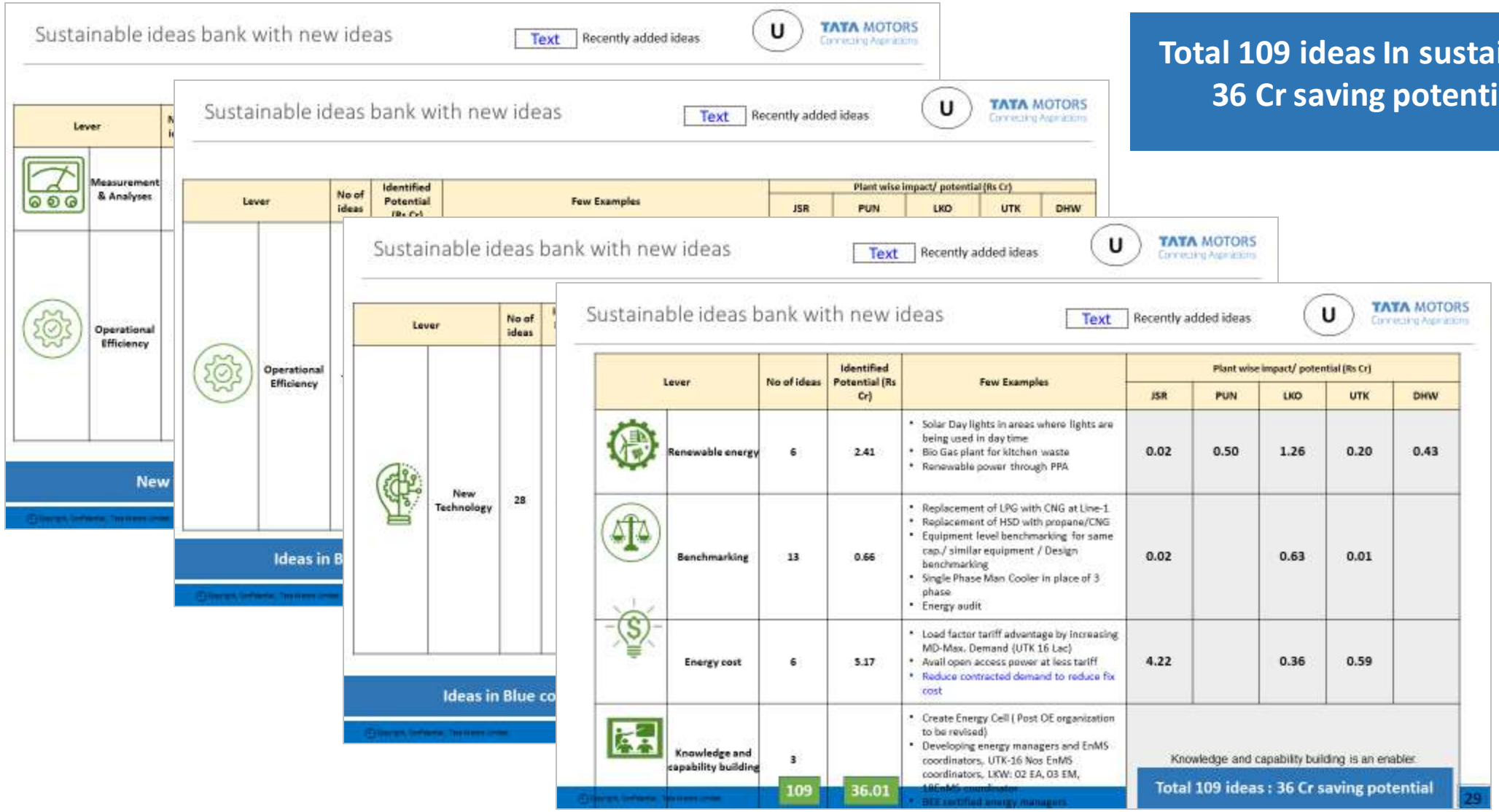
Total annual saving : 7,64,400 kWh and fuel saving 2,028,000 Litres

Applicability:

Plant	Applicable
LKO	Feasibility needs to be checked
JSR	Feasibility needs to be checked
Pune CV	Feasibility needs to be checked
UTK	Yes implemented
DHW	Feasibility needs to be checked

Tactical & New Technology initiatives
Created Best Practices Idea Bank and HD through applicability matrix

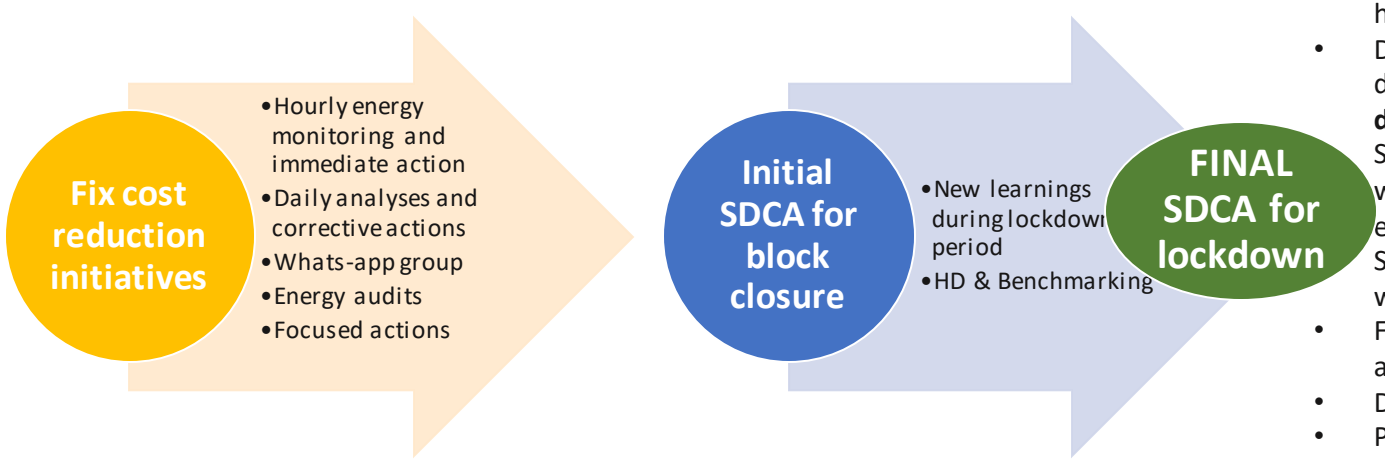
TATA MOTORS
Connecting Aspirations



Total 109 ideas In sustainable idea bank
36 Cr saving potential estimated

SDCA (Standardize- Do- Check and Act) standard development to sustain the gains of last 3 years EnCon projects

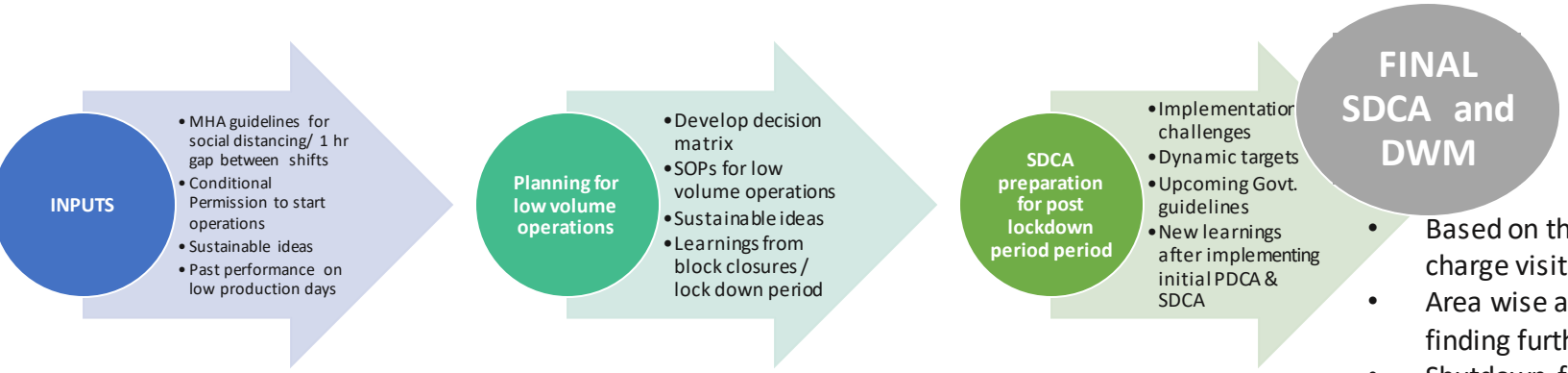
For lockdown period:

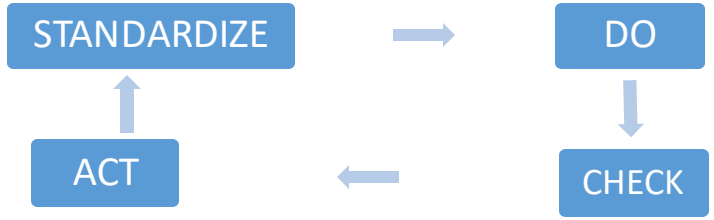


- Hourly Measurement Standard
- Target allotment - Area Wise based on historical data
- Developed **standard procedures** for shutting down unnecessary loads **in second shift one day prior of any non working day**
  Standard template for capturing hourly working and approximation of consumption of each area
  Shift in-charge for Block Closure and normal working days
- Fixed time for compressed air availability across the plant for equipment trial after PM.
- Deployment plan for portable compressor unit
- Plan for complete shutdown of certain facilities from power panel

- Facility shutdown, transformer switching, Compressed air header shutdown and power panel switching off as per standard procedure developed
- Deployment of portable compressor unit as per plan- For lockdown period – no compressed air usage except in paint shop
- Monitoring and notifying to area in-charges every 4 hours to control consumption for the day
- In-charge with EnMS team visiting work areas to identify energy waste.
- Adherence to agreed plan of consumption

For low volume scenario post lockdown :





- Based on the gaps identified, shift In-charge visits the work areas.
- Area wise analyses sharing for finding further opportunities.
- Shutdown feeders / compressed air, smaller loads such as computers/ printers etc. if unnecessary consumption is kept ON.
- Learnings are captured for next Block Closure.

- 4 Hourly monitoring of area wise consumption against target and sharing the information through WhatsApp Group
- Trend analyses of daily consumption and benchmark analyses with historic data shop wise, shift wise , Time period wise etc.
- Comparing the Consumption of same hour last day

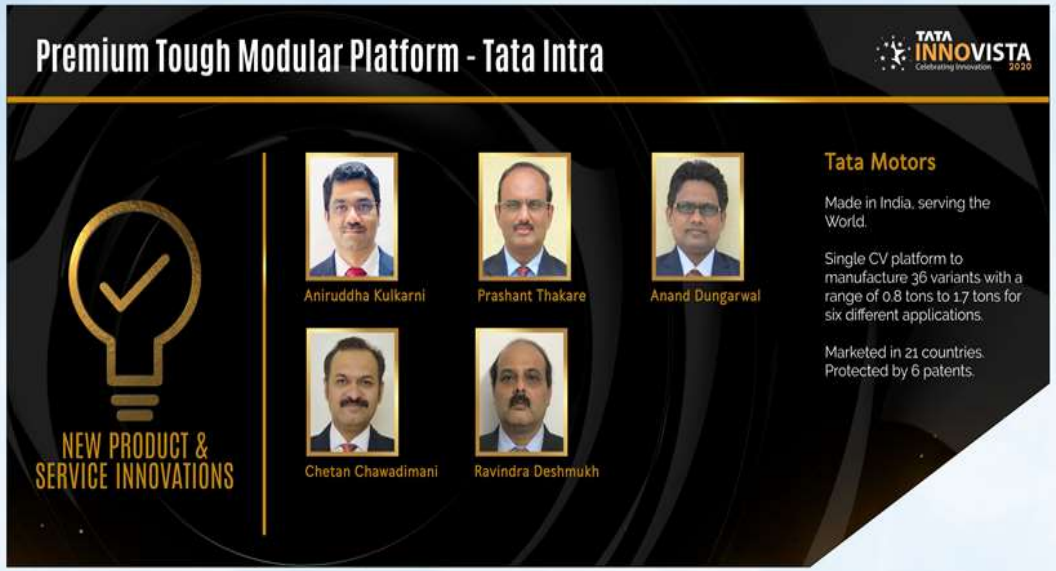
Tata Group level Innovation promotion platform

Tata Motors wins big at Tata InnoVista 2020

We are delighted to share that Tata Motors bagged 3 awards at the 15th Edition of the Tata InnoVista 2020 in the following categories: Innovation award category namely Design Honor, Implemented Innovations- New Products & Services and Piloted Technologies.

In a first, the final round was conducted virtually, given the current scenario.
This edition of Tata InnoVista received a total of 10,939 projects from 56 Tata companies. These projects were evaluated at 3 stages and a total of 69 projects were shortlisted for the final round. 8 teams from Tata Motors were in the finals of Tata InnoVista 2020 including One of our Supplier Partners.

Our heartiest congratulations to the winning teams for making us proud once again and showcasing our innovativeness and winning culture.



Innovista categories of recognition

PILOTED TECHNOLOGIES
For successfully piloted technologies that are yet to be commercialized (between TRL 4 & 7)

In-Progress Innovations
For innovation Projects that are in pipeline
Process, Service , Business Models : TRL 2 to TRL 8
Product Technologies : TRL 2 OR TRL 8

DARE TO TRY
For audacious attempts that could not succeed

IMPLEMENTED INNOVATIONS
For innovations that are successfully implemented & commercialized

DESIGN HONOUR
For implemented designs that deliver a great user experience through functional and aesthetics

Definition	This award recognizes those new technologies that have been developed and tested / piloted successfully but are yet to be commercialized. These technologies hold a promise to deliver noteworthy innovations. The award category is only applicable for product technologies
Qualification criteria	Project should be at TRL - 4 & should not have crossed TRL – 7 as on Sept 30, 2017.
Evaluation Criteria	Novelty / Uniqueness of the technology
	Alignment with Company goals
	Potential impact of the outcome Type: Economic, Environmental, Social On: Customer, Company, Industry, Community

Few Key Projects in FY 20-21

- Heat pump installation in Washing machine- Powertrain shop -

Problem statement: Energy Saving by improving efficiency of component washing machine.

BEFORE CONDITION – Photograph/ Sketch/ diagram

Brief Description: Electrical heaters are used for heating in washing machines.

AFTER CONDITION- Photograph/ Sketch/ diagram

Brief Description: Heat Pumps used in place of electrical heaters for heating

Energy Saving:
FY 19-20 Till Dec'19 = 71136 KW-H
Annual Savings = 94848 KW-H

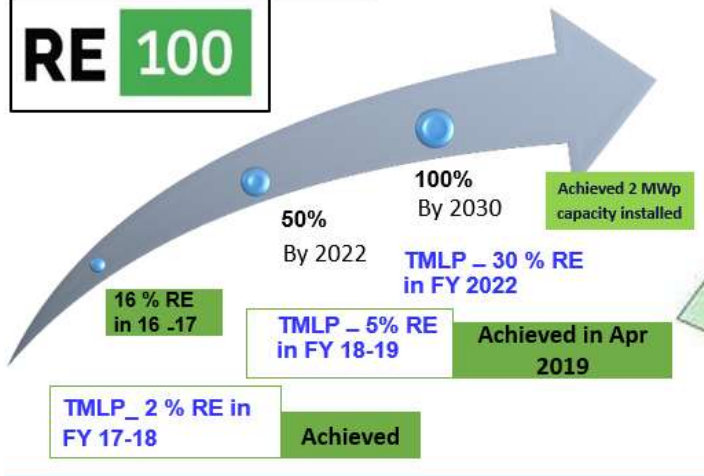
Cost Saving:
FY 19-20 Till Dec'19 = Rs. 4.375 Lac
Annual Savings = Rs. 5.83 Lac

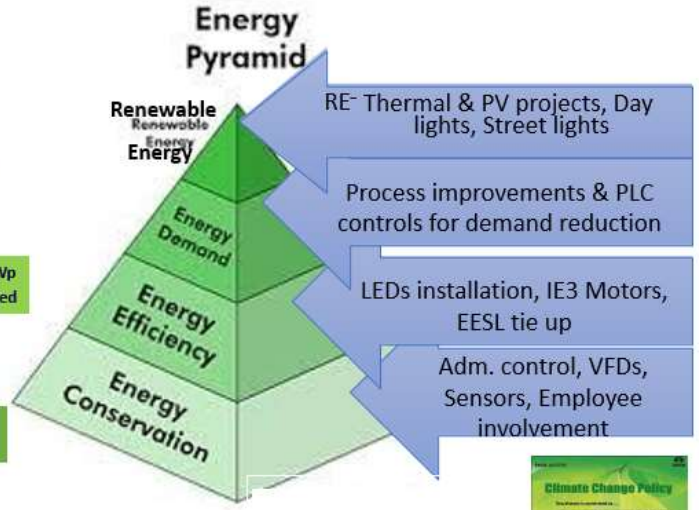
CO2 footprint Saving:
FY 19-20 Till Dec'19 = 58331Kg
Annually = 77775 Kg

7. Utilization of Renewable Energy sources

2nd Indian company to sign RE100 initiative!

RE 100



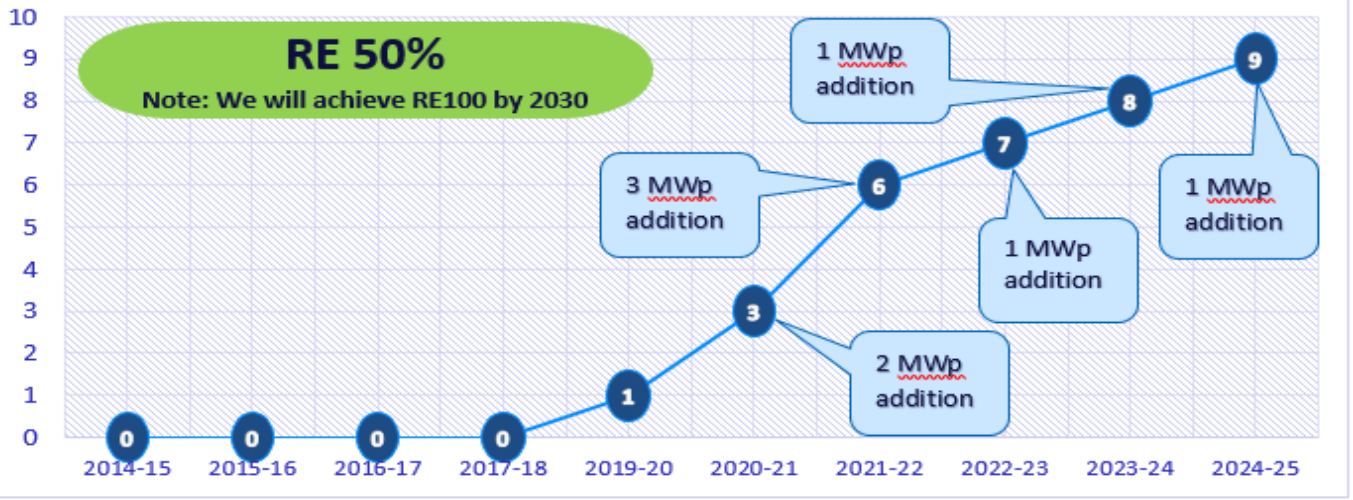


In FY 20-21, 2 MWp solar plant has been installed. The installation was done in post lockdown period despite of covid challenges.

Renewable Energy : Actions taken

Year	FY 18-19	FY 19-20	FY 20-21
Technology	Solar PV	Solar PV	Solar PV
Type of Energy	Electrical	Electrical	Electrical
Onsite/offsite	Onsite	Onsite	Onsite
Installed capacity (MW)	-	1.02	3.00
Generation Million kWh / Year	-	13.97 Lac kWh	24.1 Lac kWh
% of overall Electrical energy consumption	-	4.0 %	10%

Glide path 5 yr plan- RE installations- CV pantnagar



Solar PV - Small capacities in multiple locations

Sr no	Solar plant location to meet fix load of the building	Capacity (kWp)
1	New DG House	4
2	220 kV Sub station	5
3	Tata PDI	6
4	Data center	1.5
5	New canteen	1.5
6	Gate no 5	1.5

Other Renewable Energy Applications

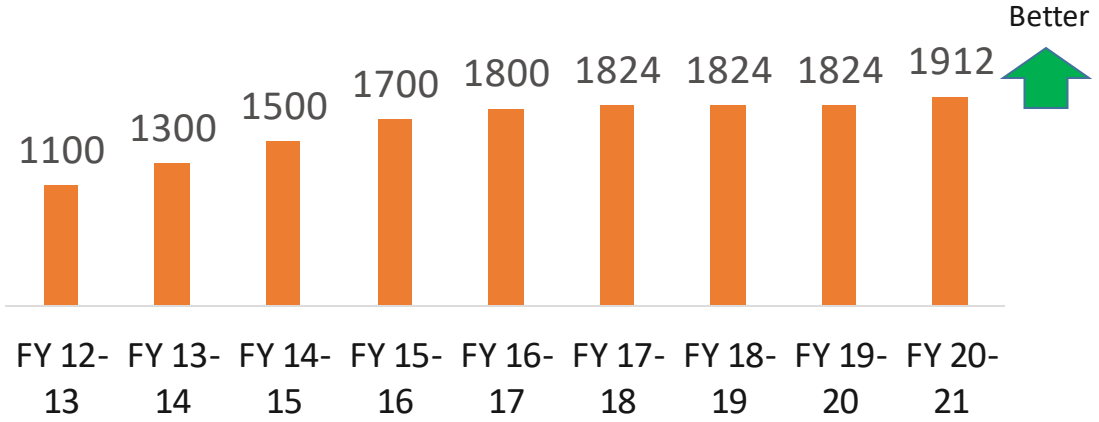
Solar Thermal 5000 Ltr per day

Solar Street lights: 55 Nos

Solar day light pipe & Dome 46 Nos

Wind ventilators

Cumulative Nos (wind ventilators)

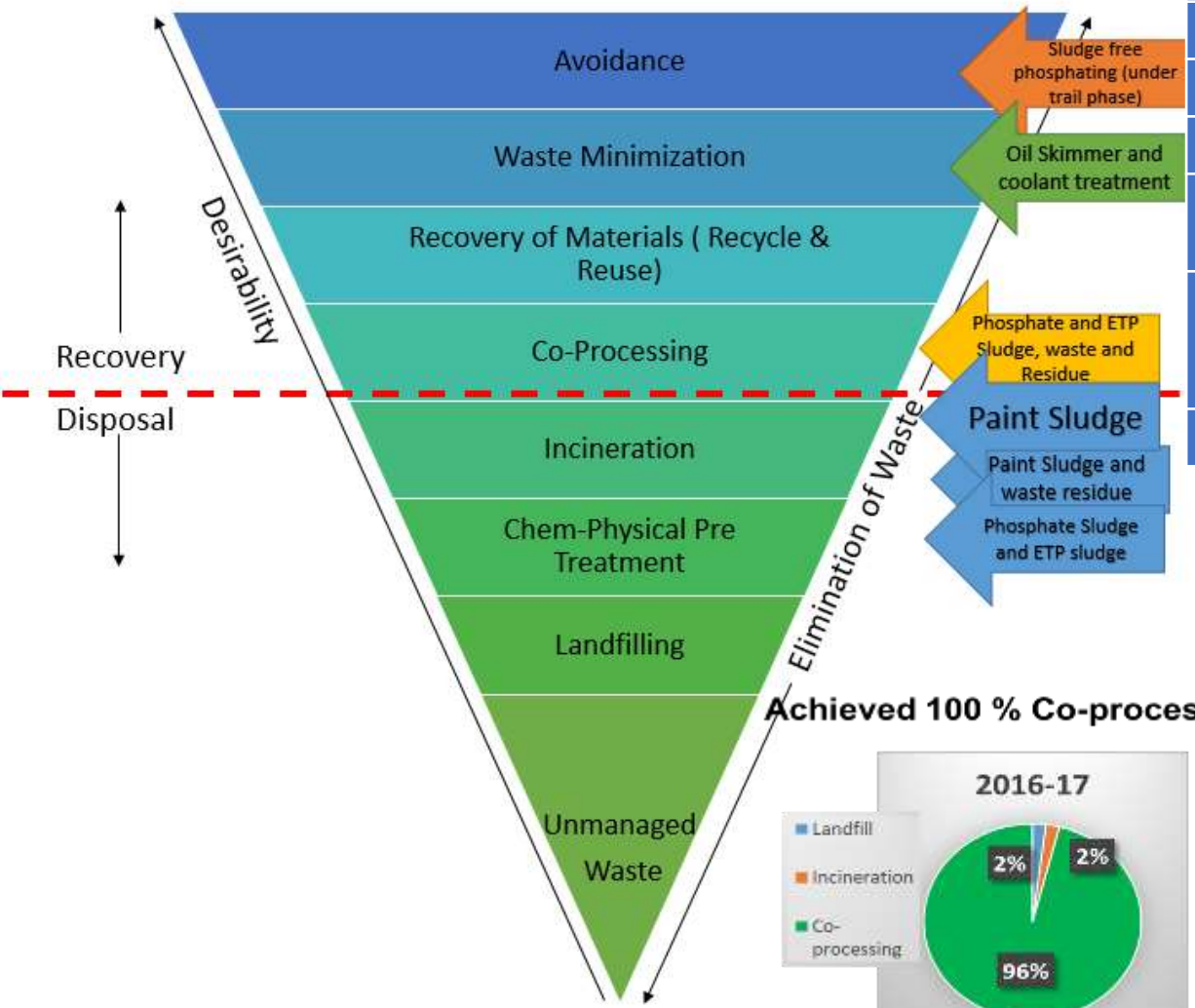


In process : Solar dish for washing machine – Engine Shop

8. Waste utilization and management

Mile Stone achieved :

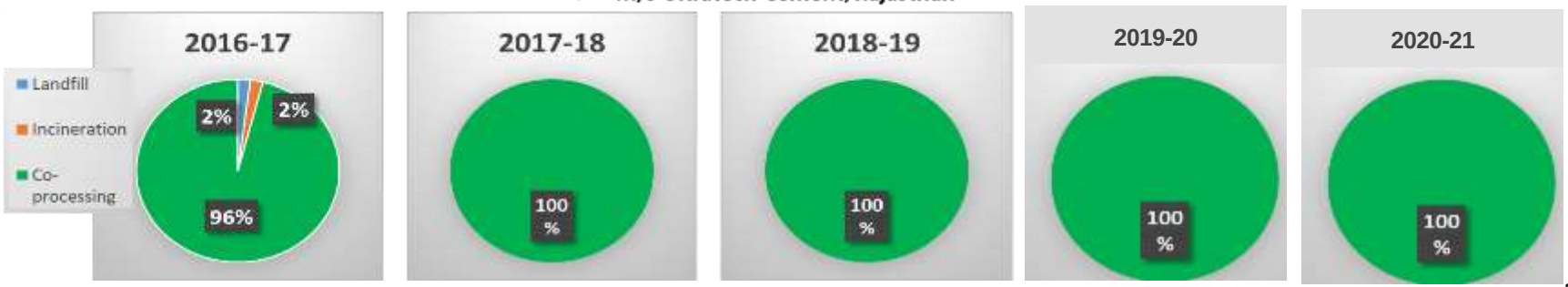
1) 100 % Elimination of Incineration and Landfill
2) 100 % Co-processing of Hazardous waste



S.No	Type of waste	Unit	Waste disposed (FY 18-19)	Disposal Mechanism
1	Used/Spent Oil	MT	13.99	Recycling
2	Waste and Residue	MT	151.58	Co-processing
3	Phosphate Sludge	MT	88.23	Co-processing
4	Contaminated Solvent	MT	43.88	Recycling
5	Paint Sludge	MT	158.58 29.64	Co-processing Recycling
6	Chemical Sludge (ETP Sludge)	MT	185.90	Co-processing Brick Manufacturing
7	Contaminated barrels	MT	19.48	Recycling

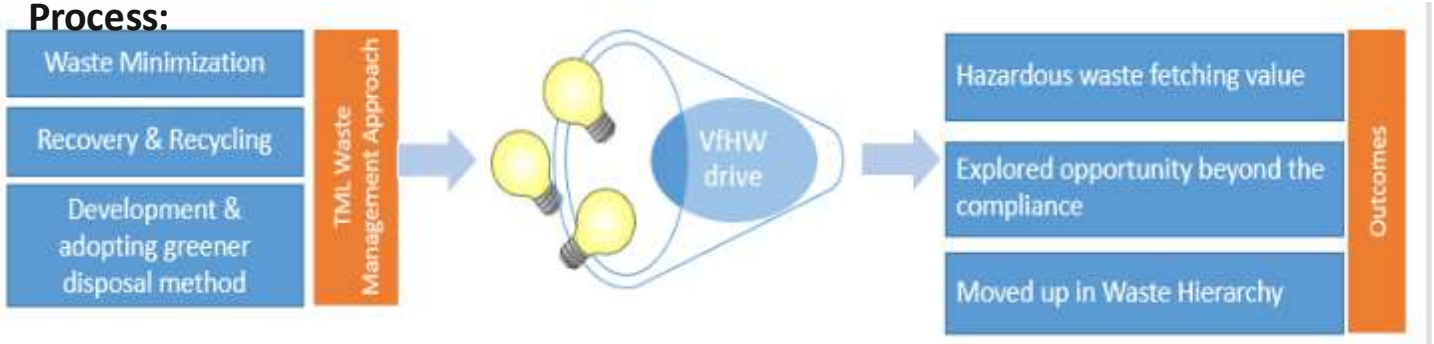
Achieved 100 % Co-processing

- M/s Shree Cement Ltd, Bewer
- M/s Ambuja Cement, Rabriyawas
- M/s Ultratech Cement, Rajasthan



FY 19-20 : Initiative for Hazardous Waste reduction and Cost avoidance

Process:



Big ticket Projects

- Recycling of Paint Sludge
- Glass Glazing Sealant waste reduction
- Reduction in flushing thinner consumption in Paint Shop
- Changes in surface activation bath discarding frequency 15days to 45 days (paint shop)
- Reduction in consumption of Anabond 702 Sealant
- Reuse of oil in Engine Shop

3Cr Saving

Value from Hazardous waste

- **PAN TML level drive**
- Considering **HW as an opportunity rather than burden to the industry**
- **Hazardous waste reduction & fetching value**
- Explored **opportunity beyond the compliance**
- Moved up **in Waste Hierarchy**
- **3R (Reduce, Reuse & Recycle) Principle**

Example

Reduction in Hazardous Waste Generation:

There is a net reduction in generation of hazardous waste by:

1. 20.43 % reduction in Paint sludge
2. 12.00% reduction in Phosphate sludge
3. 25.58 % reduction in Waste & Residue

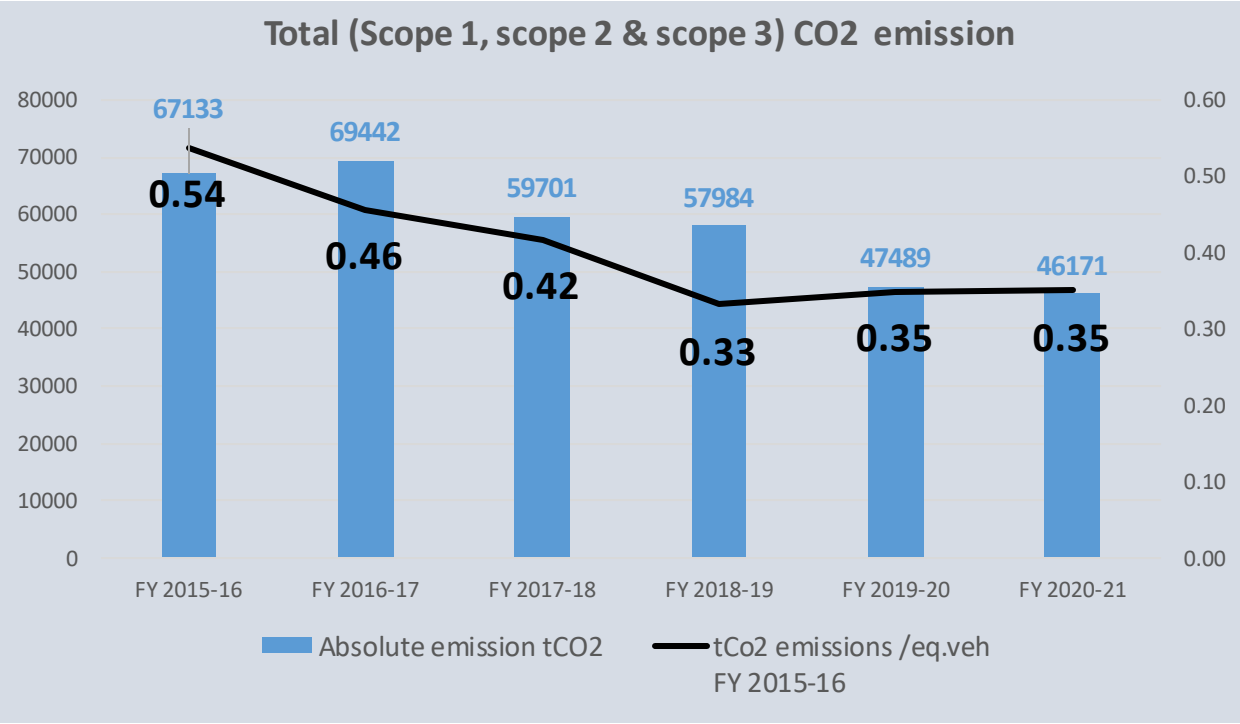
Reuse & Recycling of Hazardous Waste Generated:

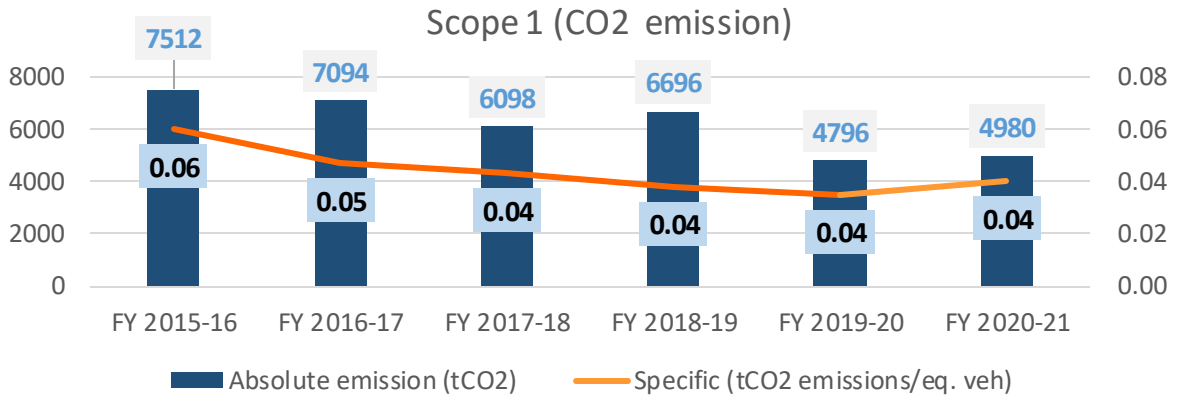
Biogas from kitchen waste and biodegradable waste (1000 kG/ day) – in process,

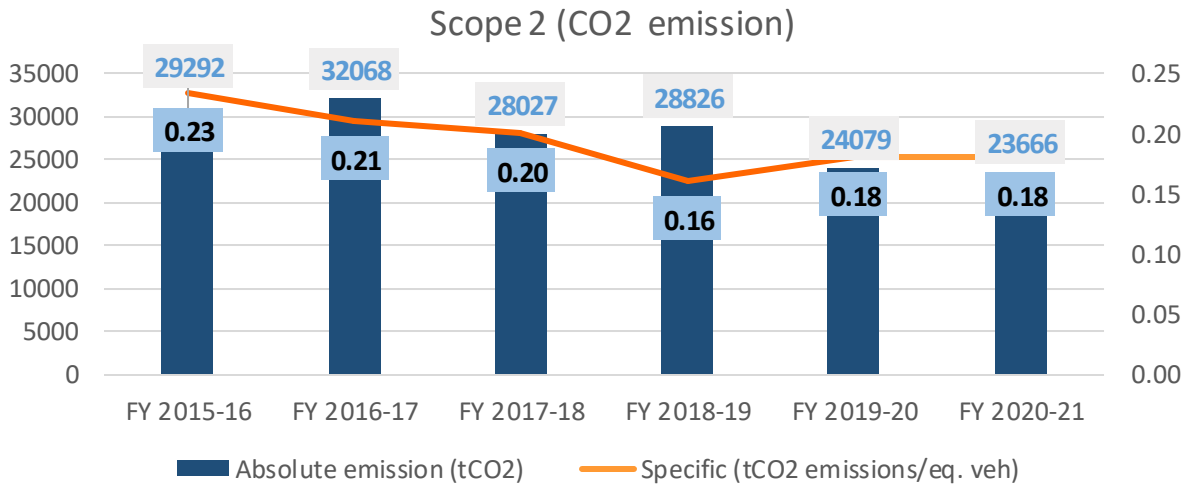
9. GHG Inventorisation

Reduction in Sp. GHG emission (Kg CO2 emission/ 25 SMH based Eq. Vehicle Produced).

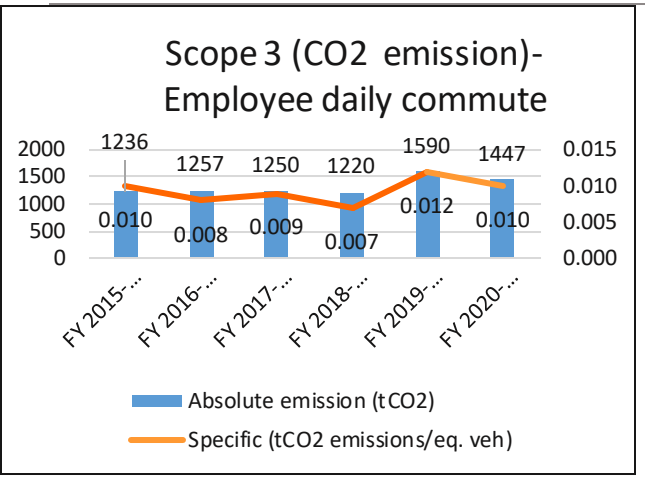
Public disclosure is done through annual Sustainability report at Tata Motors Group level

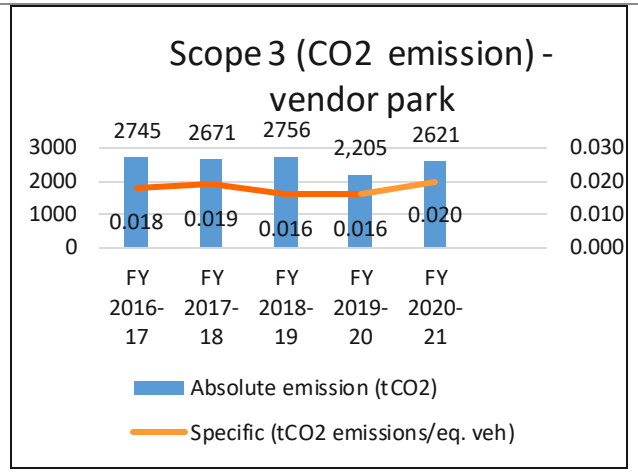


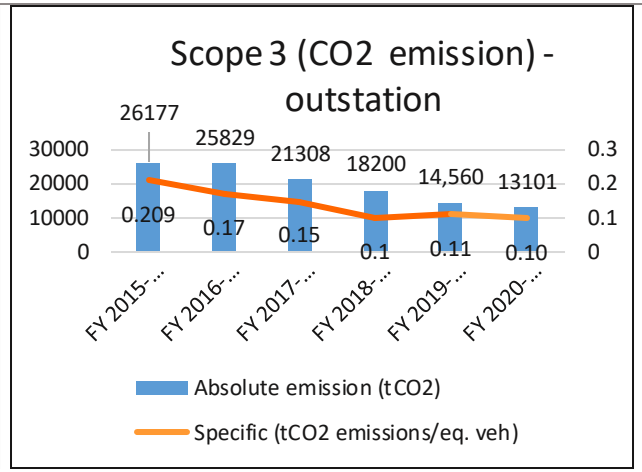


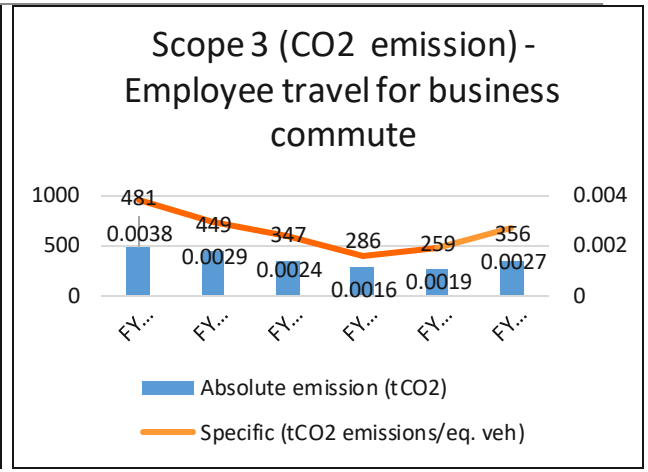


GHG – Scope 3 emissions

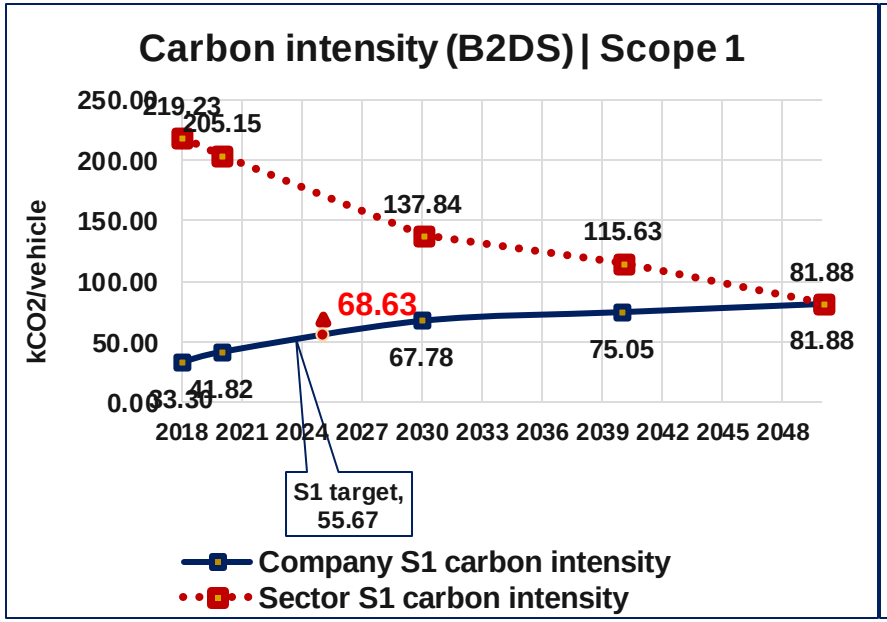


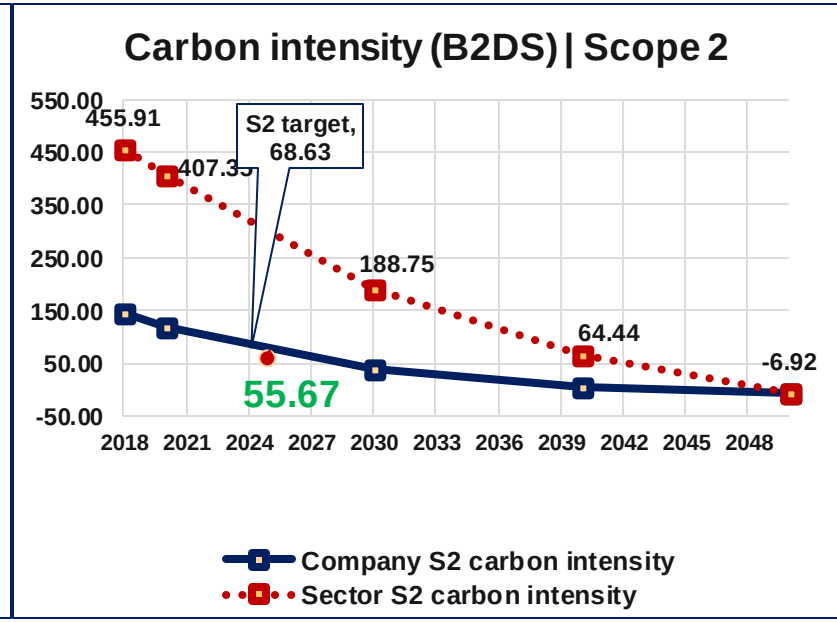


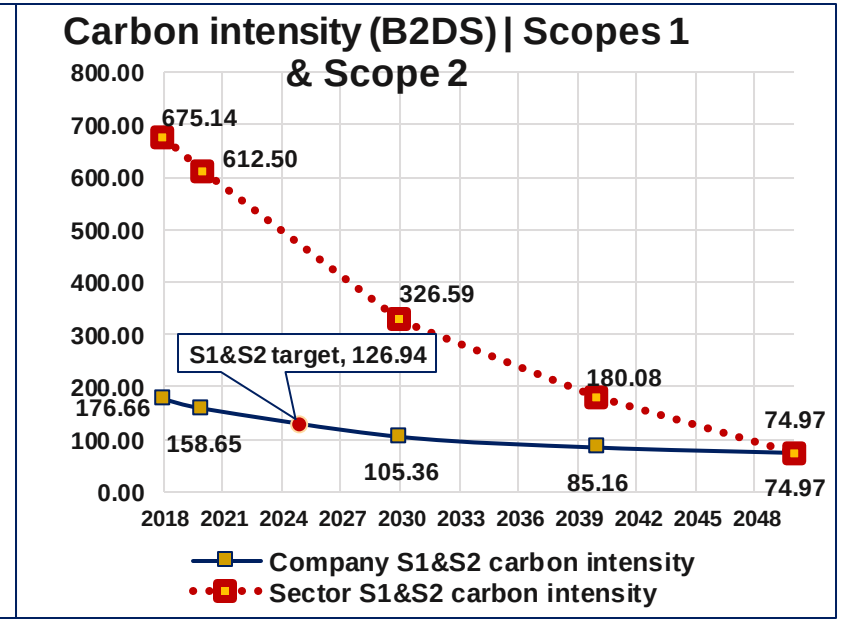




GHG Intensity 5 Year Glide Path – UTK till FY 2024-25 as per SBTI Tool







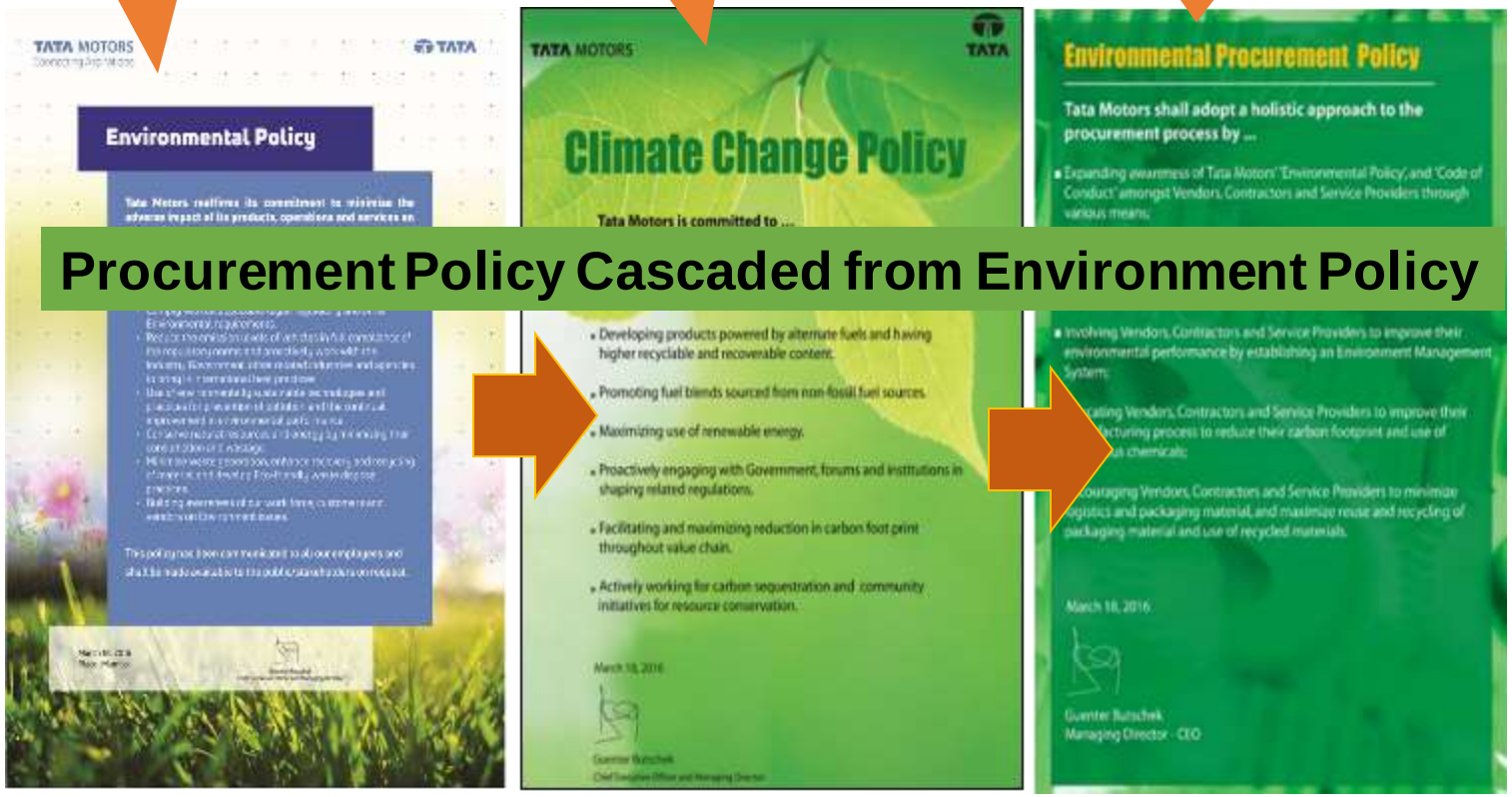
As per SBTi Tool - Target for Scopes 1 & Scope 2 is 28.21% reduction by Year 2024-25 from base year FY 18-19

10. Green Supply Chain Management

Building awareness of our workforce, customers and vendors on Environment issues.

Facilitating and maximizing reduction in carbon footprint throughout value chain.

Awareness… Evaluating environmental performance… Involving, Educating & Encouraging vendors…



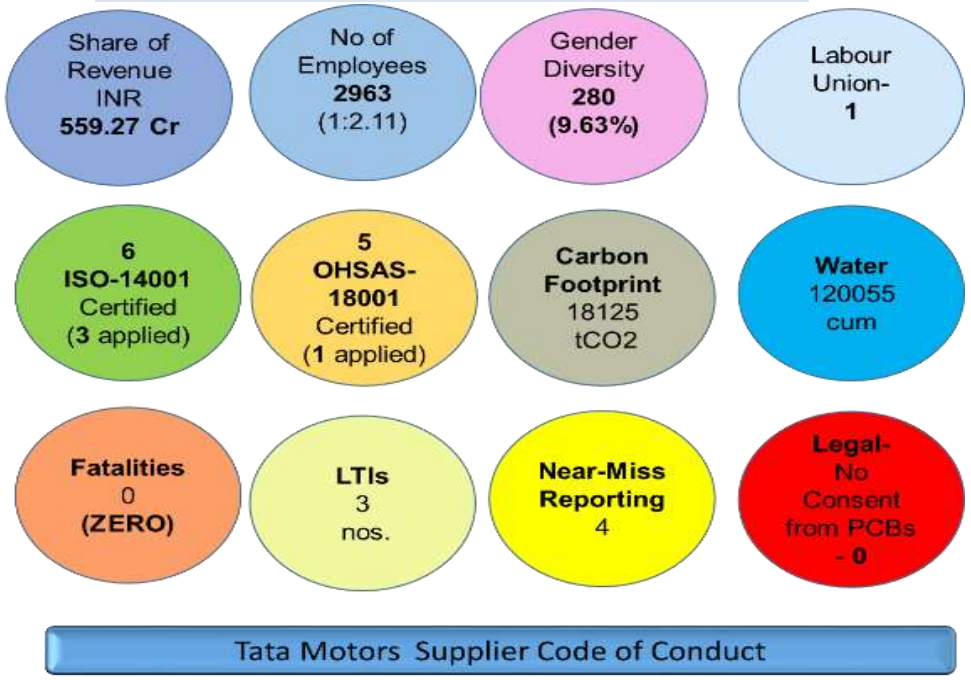
Procurement Policy Cascaded from Environment Policy

Approaches

- **Set up local vendor park with 64 suppliers**
- Sequential supplies for vendor park suppliers
- Procurement policy cascaded from environment
- Resource allocation in SCM
- **Supplier sustainability**
- Training & awareness creation for suppliers
- Supplier selection: MSA

Supplier Sustainability Dashboard

Supplier Sustainability Overview:



Education & awareness creation for suppliers:

Activities in Sustainable Supply Chain Initiative	No of Suppliers
Total Suppliers in Vendor Park	72 (66 Active)
No of Supplier Workshop done	46
Site assessment done	24
Supplier's Felicitation	7

Sustainable Procurement Implementation Guideline:

1) Supplier Selection : Manufacturing Site Assessment (MSA)
2) Evaluation of Supplier
3) Managing Supply Chain : Maximizing Usage of Returnable Packaging
4) Supplier Sustainability : Training and capacity building of suppliers on sustainability

Sequential supplies for vendor park suppliers

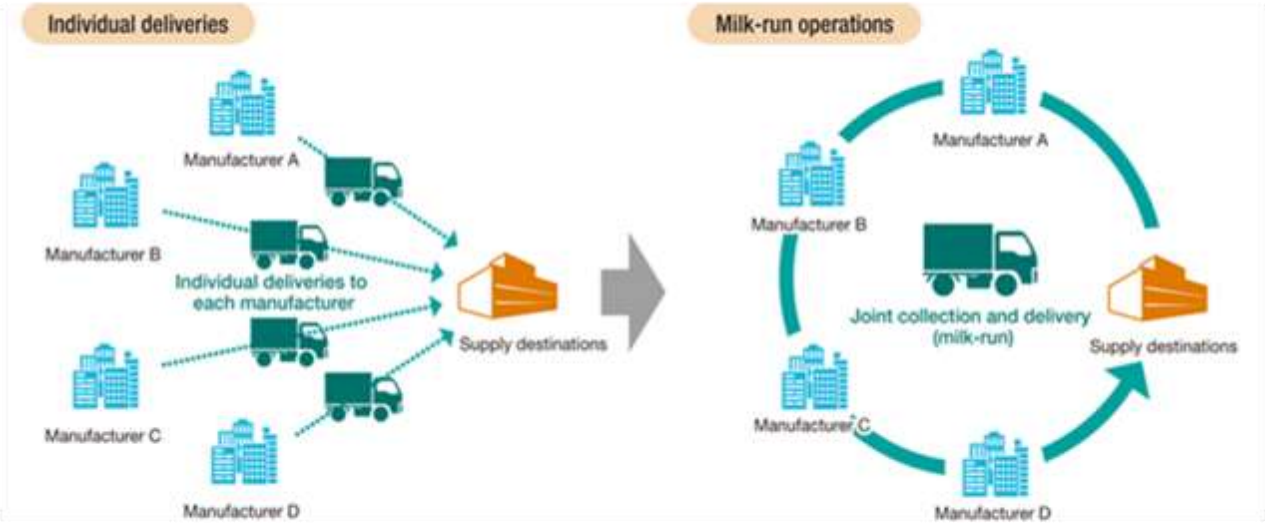
Supplier	Commodity	No. of Parts (FY 18-19)	No of parts (FY 20-21)	Status
M/s Adient	Front seat	17	23	Done
M/s Mutual	Front Bumper	18	24	Done
M/s D&S	Fuel Tank	2	4	Done
M/s Mitter & Mitter	Steering Wheel	2	6	Done
M/s Syndicate	Silencer	7	12	Done
M/s Mahabal	Front Axle	5	18	Done
M/s Taco	Front Panel	17	21	Done
M/s Spicer	Rear Axle	3	8	Done
M/s Tata Toyo	Radiator	2	6	Done
M/s Jay Suspension	Suspensions	0	10	Done
M/s Mayur	Door Pads	0	12	Done
	Total	73	144	

Green Packaging

Environment Related points in Supplier Selection:

1.3. Does the organization follow EMS standard, environmental statutory and regulatory norms? Does the organization have responsibility defined internally?
1.3a Does the Organization follows statutory and regulatory norms related to IMDS, Conflict of Mineral and Persistent Organic Pollutant (POP) requirements?

Other Initiatives at Supplier End



TML_PANTNAGAR COULD SAVE APPROX. 50,000 LTR OF DIESEL ANNUALLY EACH YEAR SINCE 2014 TILL LAST FY DUE TO SUCCESSFUL IMPLEMENTATION OF MILK-ROUTES AT PUNE, DELHI & CHENNAI ~ 4% Reduced

Green Packaging (Examples):

Part Name: Bumper

Supplier: Tata Autocomp

Model: Intra

Problem: Parts Supplied in polythene

Action Taken: Supplier started supply without Polythene. Polythene eliminated 4.45 MT

Status Green

Part Name: Dashboard

Supplier: Mutual

Model: Ace

Poly Bag for packaging of Dash Board

Action Taken: Implemented Covered Trolley and eliminated use of poly bag

Status Green

Milk routes efficacy & Polythene elimination (New Initiative in FY 20-21)

100 % Polythene Free suppliers

- Acey Engineering
- Bhavani
- Castmaster
- Jai Suspension
- KLT
- Lucas UTK
- Mahabal
- Mahindra CIE
- Mantri
- Motherson
- Mutual
- National Eng.
- New Allenberry
- Q shield
- Shriram Foundry
- Spicer
- Supreme
- Syndicate Auto
- Yazaki
- Jai Hind
- Mayur

Recent Implemented Case : Localization of CNG Procurement

Earlier	Improved
Procured from Bareilly	Localized to Rudrapur

Diesel Consumption Reduced / Trip	36 Ltr.
Average Annual Trips Reqd.	164 Nos.
Total Reduction in Consumption	5,904 Ltr.
REDUCE CARBON EMISSION MT	15 MT

Fuel type	Kg of CO2 per unit of consumption
Grid Electricity	0.81 per kWh
Natural gas	2.142 per kg
Diesel fuel	2.68 per litre
Petrol	2.31 per litre
Coal	2.418 per kg
LPG	1.51 per litre

Returnable Packaging: L & L Products Pune

Existing Practice

Supplier : L & L (Pune) → Warehouse : TML (Pune) → Plant : TML (Pantnagar)

INCO Terms	FLS
Logistics Ownership	Wooden
Inventory	7 – 9 Days

Proposed Practice

Returnable Trolleys

Supplier : L & L (Pune) → Warehouse : L & L (Pantnagar) → Plant : TML (Pantnagar)

INCO Terms	FH
Logistics Ownership	Returnable
Inventory	1 – 2 Days

FY 20-21 : 124 MT per year Polythene bags eliminated / converted to returnable packaging.
The Diesel Vehicles had been replaced with CNG vehicles in transportation from Bareilly, UP & UTK.
Localization of INTRA model parts
1200MT CO2 reduction

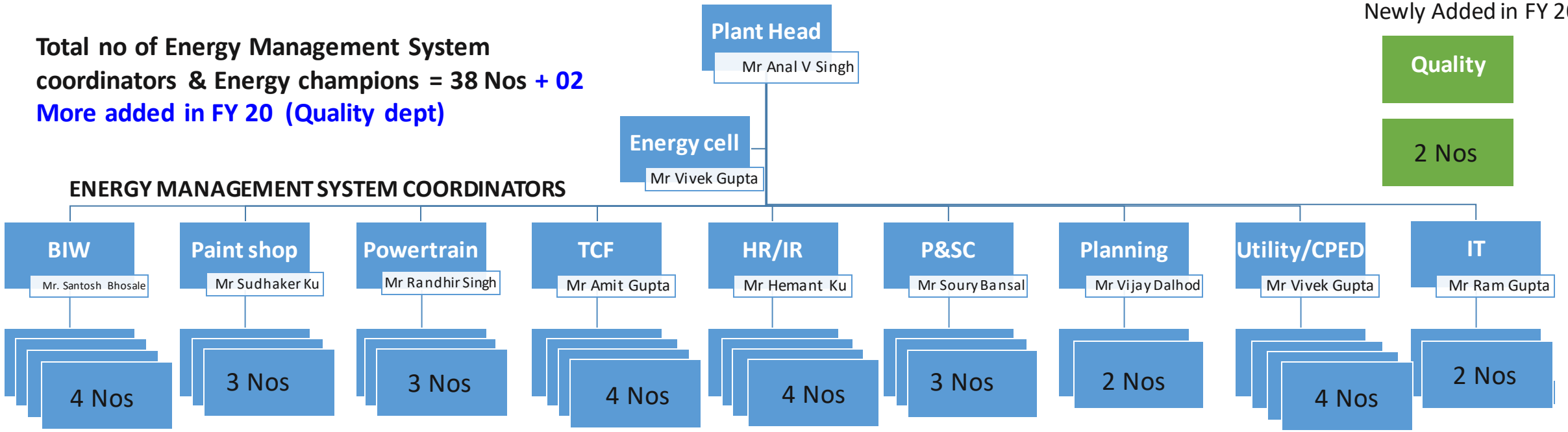
11. Teamwork, Employee Involvement & Monitoring

Total no of Energy Management System coordinators & Energy champions = 38 Nos + 02 More added in FY 20 (Quality dept)

Newly Added in FY 20

Quality

2 Nos



ENERGY CHAMPIONS- AREA WISE

- Daily monitoring & control
- Gap analyses
- Zero investment idea implementation
- Operational efficiency during fluctuating demand
- Idea generation
- Motivate employee involvement
- Training need identification

- Facilitate external training
- Participation in external events
- Rewards and recognition

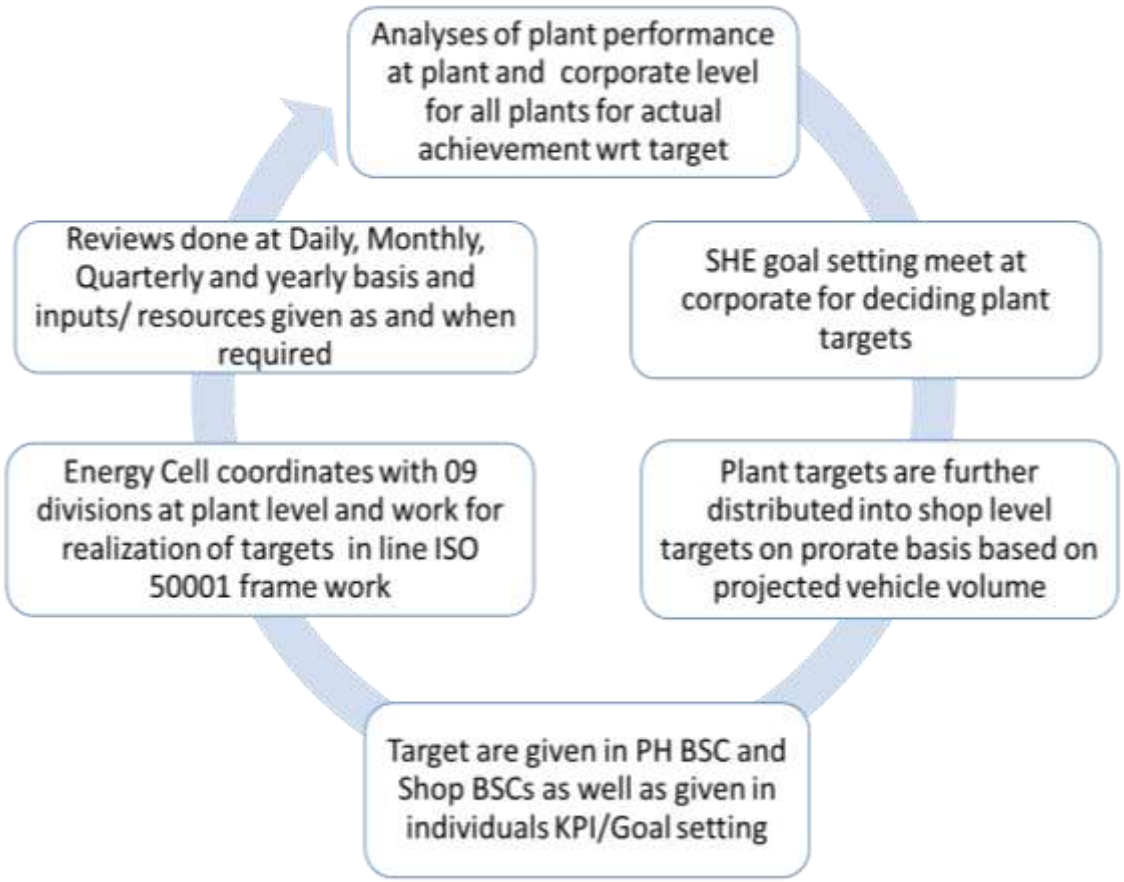
- Green supply chain initiatives
- Supplier training
- Sharing best practices to supplier thru supplier meet
- ISO 50001 handholding for implementation

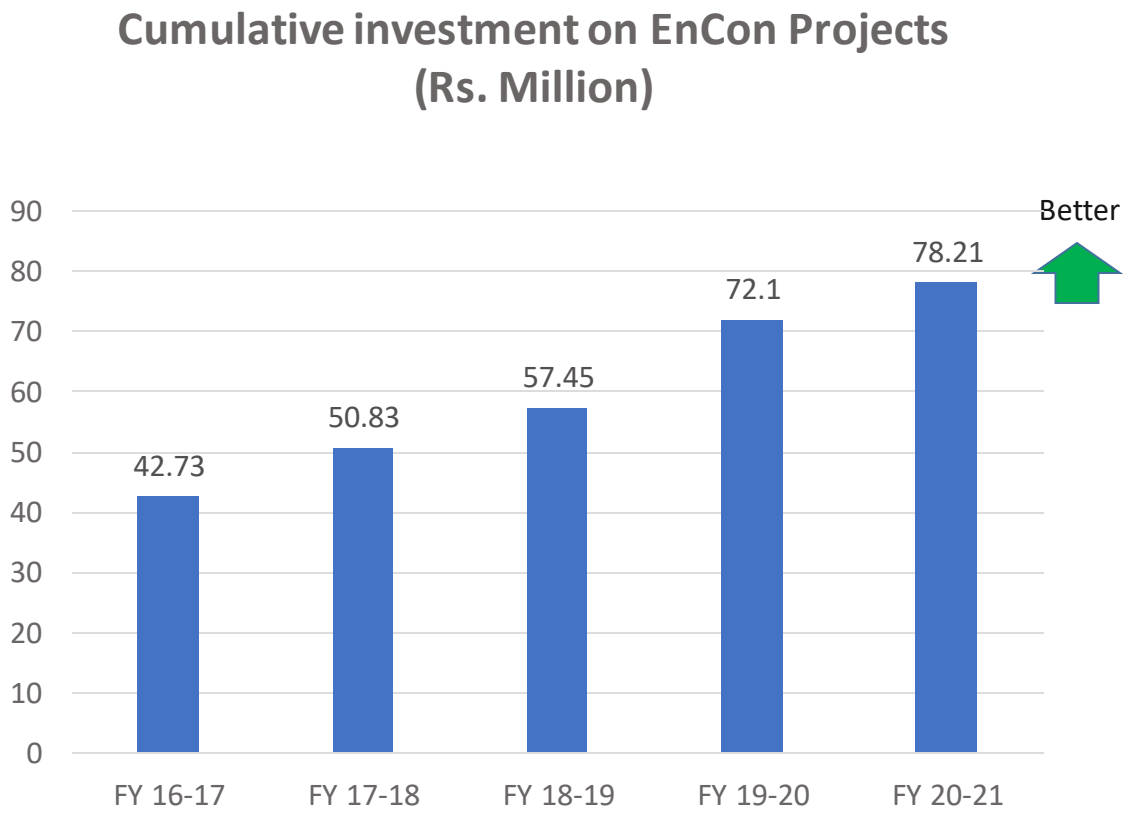
- Energy eff. Facility planning
- Upgradation to eff. Technologies
- Process study and gap analyses
- Benchmarking

- Efficient O&M of utility/IT facilities
- Energy eff. Facility planning
- Upgradation to eff. Technologies
- Process study Benchmarking

Energy target setting, Budgeting & Monitoring Systems

Target Setting





Budget allocation through :

1) CAPEX route
2) REVENUE route
3) Special budget approvals for important projects by the Plant Head (up to 50 Lac)

Energy monitoring and compressed air leakage audit

Daily Energy Monitoring

Energy Monitoring : DAILY

Plant Head review on daily basis - (Plant & Factory wise)

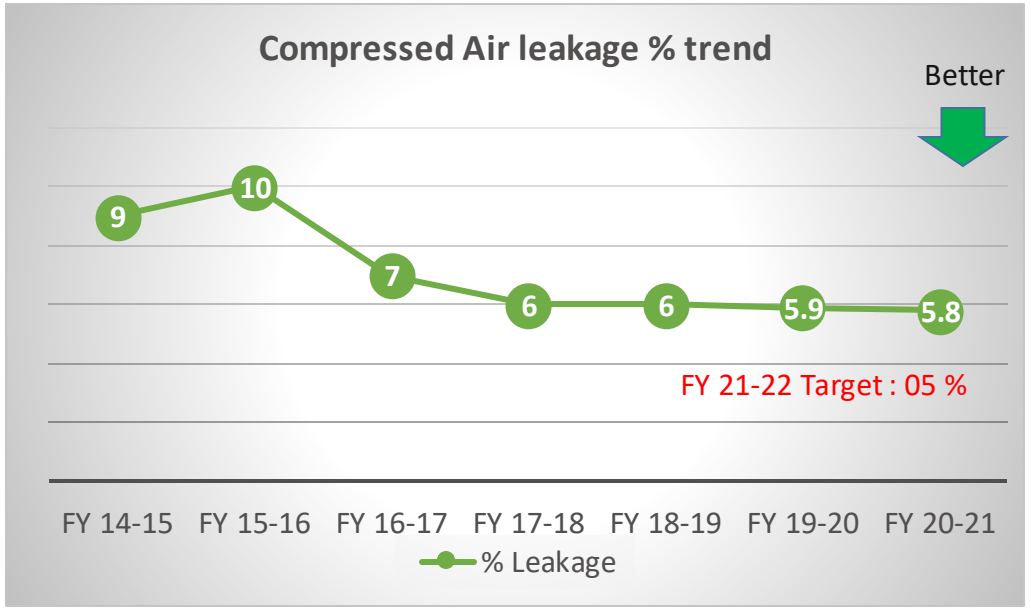
POWER	FUEL	COMPRESSED AIR	SHOP WISE ENERGY CONSUMPTION VS TARGET	PREVIOUS DAY STATUS & CORRECTIVE ACTION
Absolute, Specific, Cost & Interruptions	Propane, HSD, Petrol, CNG			

Energy Monitoring : MONTHLY

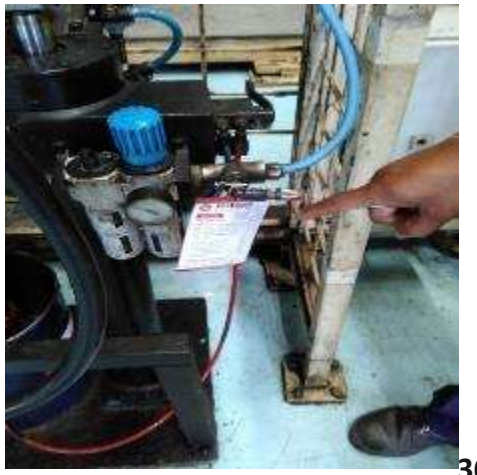
Energy & environment report

POWER & FUEL	ENERGY COST ANALYSES	COMPRESSED AIR	ENVIRONMENT FOOTPRINT	HAZARDDOUS WASTE, WATER etc
Absolute, Specific, Cost & Interruptions Shop wise		Shop wise comparison and		

Compressed air leakage monthly audit



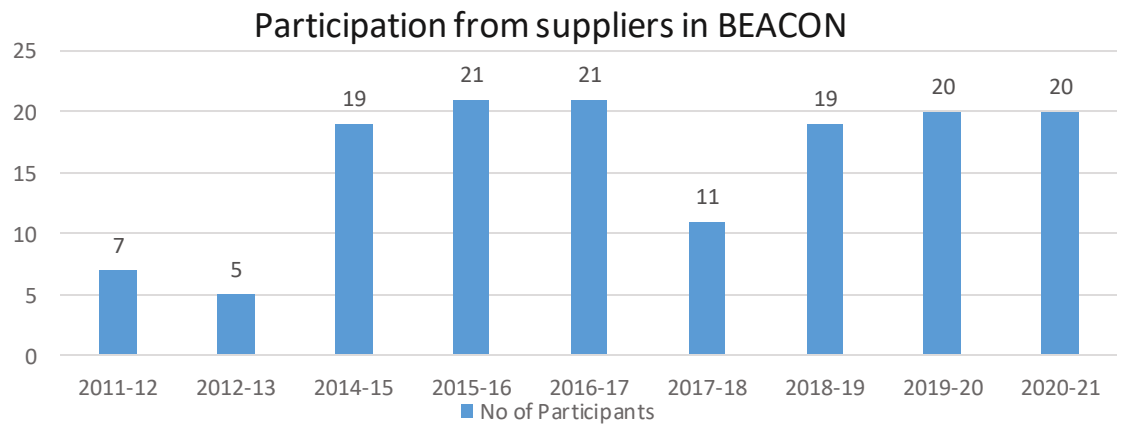
- Leakage % mapping
- Shop floor audit
- RED tag on leakage points
- Rectification
- System Improvements



Training and Employee involvement

Trainings mechanisms on Energy Management :

S N	Description	Frequency
1	Energy management system – ISO 50001 training through HR	Monthly
2	Participation in external trainings	Need based
3	Participation in Award functions and expositions	Frequent- need based
4	Online training through Tata motors academy	Online – always available
5	Participation in 30 Nos events in Energy conservation months	30 -35 days in a year
6	Energy Nuggets – through email	30 -40 mailer



17 employees trained in 2018 version of energy management system ISO 50001 by bureau Veritas. These are certified to conduct energy audits.

Online suggestion portal

- Average 55000 suggestions per year
- Monitory reward – Rs 200 – Rs 5000
- Special suggestions schemes

Kaizen Promotion Cell
Monthly Area Wise Kaizen Tracking

Suggestions generated in Unique EnCon suggestion scheme

Sugg ID	Date Entry	Title	Category Name	Pertaining Category	Place Applicable	Name Of Block	Scheme Type	Present Status	Proposed Changes	Benefits
2023408	02/04/2021	Digitization done of machine manual and other documents.	Environment	PROCESS	Power train	NTC machines	IMPLEMENTED	Earlier There was no provision for checking soft copy of machine manual or its history cards insistently.	Generate separate QR code for each machine and pasted on machine or panel.	1) Document Digitization done 2) Paper saving
2023980	07/04/2021	OCCUPATIONAL HELTH AND ENVIRONMENT	Environment	PROCESS	WELD SHOP	WIND MOVING EXHAUST ON SHOP ROOF	NORMAL	EXHAUST FOR SHOP FUME AND ALL GASES FLOW OUT TO OUTSIDE OF THE SHOP. BUT DUE TO SHOP HEIGHT, WELDING FUME SPREADED ON SHOP FLOOR AND ALL	FROM WIND MOVING EXHAUST TO WELDING STATION . IN THIS CASE WELDING FUME EXHAUSTED COMPLETLY FROM STATION AND NO CHANCE TO SPREADED WHOLE	NO HEALTH ISSUE REGARDING LUNG DISEASE FOR ALL EMPLOYEE OPERATOR MORAL HIGH
2030336	03/06/2021	Addon Holding tank installation for BOD TSS reduction	Environment	PROCESS	STP	HOLDING TANK	IMPLEMENTED	No provision of holding tank leads to floc and high TSS ,BOD load over the Fine Screen	additional Holding tank with aeration system added in the system which reduce the floc load and reduce TSS & BOD	improve the quality of treated effluent of the STP
2030338	03/06/2021	Online Real time Monitoring system	Environment	PROCESS	STP	OCEQMS	IMPLEMENTED	No continuous monitoring System to check the system efficacy	OCEQMS system implemented for continuous monitoring of parameter	helps in system quality parameter efficacy check
2030340	03/06/2021	Fine screen implementation to improve the STP parameter	Environment	PROCESS	STP	SS FINE SCREEN	IMPLEMENTED	MS fine Screen	SS fine screen with high capacity	reduce TSS load over the STP System
2030341	03/06/2021	STP Upgradation; Design Improvement , Preventive Maintenance	Environment	PROCESS	stp	INLET TANK	IMPLEMENTED	NO BAFFLE IN THE SYSTEM	BAFFLE AND LAUNDER ADDED IN THE INLET TANK	REDUCE THE TSS AND FLOCS TO THE SYSTEM
2031845	13/06/2021	RBT should be done in a closed chamber	Environment	PROCESS	ALL TCF SHOPS	RBT	SPECIAL	At present, RBT is done in open area due to which all smoke got spread in environment and ultimately which is causing pollution and health issues to the workers.	It should be done in closed chamber so that all smoke can exhaust directly from the shop.	1. Pollution will reduce 2. Chances of Health issues will reduce
2031846	13/06/2021	Oil Tray should be available in Mechanical line	Environment	PROCESS	TCF 1B	Mechanical Line	SPECIAL	At Present, whenever there is any leakage in vehicle all oil got spilled on floor which ultimately make environment polluted.	leakage in vehicle all oil will be collected in it which can further easily be transferred in scrap oil drum. This will help to reduce pollution.	1. Pollution will reduce 2. Chances of slip will reduce
2031847	13/06/2021	Install Aerators in Washrooms	Environment	PROCESS	All shops		SPECIAL	At Present there is no provision to control the flow of water due to which water wastage are more in plant.	There should be taps having low-flow aerators installed to reduce water wastage.	1. water saving
2032035	14/06/2021	Shower water not timely recycling.	Environment	PROCESS	On tcf 1A shower.	shower testing machine .	NORMAL	Unpleasent smell coming on shower due to shower water not timely recycling .	timely shower water recycling.	For benefits of environment & operator helth .
2032633	16/06/2021	fresh air ventilation	Environment	PROCESS	Powertrain/ Engine assembly	Clean room conveyor	NORMAL	Presently not any system for fresh air ventilation inside clean room conveyor. There is ac system presently	Need to provide ventilation for fresh air it may be provide by normal filtration system of fresh air	Safety from covid
2033835	21/06/2021	Provided new design mist collector to prevent mist fumes hazard to operator.	Environment	PROCESS	B00 CC CBL HONING	Honing machine (Ghearing,Nagel)	IMPLEMENTED	Mist filter not in working, mist fumes not extracted by filter.	Mounted new mist collector for effective mist collection and prevent hazard from operator.	Operator health, environment
2036364	28/06/2021	ENERGY SAVING IDEA	Energy Saving	PROCESS	ALL SHOP FLOOR	SHOP FLOOR LUX LEVEL	NORMAL	starting me light ki jarurat hoti hai , uske baad 10-11 am tak sun ki light se kam chal jata hai, lekin light on rahti hai , switch off karna bhul jate hai. Energy loss hota hai.	waha par light Sensor(photo sensor) lagaya jana chahiye . jo station par 300-400 lux level se jayada hone par light ko off kar denge.	Energy saving Cost saving Operator Moral high

Beacon 6.0 Suggestions

Energy Conservation Month : Train and compete to improve energy performance

14 Dec to 14 Jan every year – An Energy festival of Tata motors Pantnagar

Plant Head led the cyclist event by coming from his home to the plant on bicycle

80+ Encon ideas from Leader's Workshop

8000+ LEDs distributed through EESL stall

5000+ employee participation

900+ hits in Online Quiz

80 nomination in Star employees and Team leader award lead to section of 20 Star performers

30 EVENTS

55 team (200+ employees) in collage competition

26 COMPETITIONS

40 team in round table quiz (80 employees)

200 + Offline and online ideas

TECHNOLOGY DAY- An energy Expo.

(20 OEM energy sector companies)

108 nos Encon projects initiated after Technology Day exhibition and leader's

Glimpses- Energy Conservation Month

30 events | 4000+ Employees | 30 Jury | 25 Auto Suppliers | 25 Energy companies | 200+ Ideas generated |40 Team Project

Achieved compressed leakage to below 5 % by Zero resource waste award | 8 Supplier companies – Energy Champions

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

Green Gold Certified Building since 2012

ISO 50001 certified company since 2013

GreenCo- platinum Rating factory in 2018,
(Upgraded from Gold rating in 2015)

GreenCo Star Performer 2020

13. learning from CII Energy Award 2020 or any other award program

- Learned about ESCO model
- Picked up heat pump project for Powertrain shop
- Interacted with many suppliers from energy sector
- Learned unique applications of VFD
- Learned about heat recovery system and interaction with suppliers for the same
- Learned best practices from other automobile companies
- Increased the % dependence on RE sources (such as Solar Power, Green Power Purchase)

Vision 2024 for EE : RE 100 and become industry benchmark

Lever wise and year wise Roadmap from 2019 to 2024 with short term and long term goals

Measurement & Analyses

FINAL PRIORITIES	2019-20	2020-21	2021-22
> Installation of measurement & monitoring system	> Power panel level communicable metering (Cx)	> Power panel level communicable metering (Process)	> Power panel level communicable metering (Sub Process / Equipment)
> Leverage IT for integration, data capture, storage & big data analyses			
> Process driven EQ (Heat treatment and Paint Shop)	> Process dri Capturing pro and analysing > Calculating on existing methodology analyse comp data		

Operational Efficiency

FINAL PRIORITIES	2019-20	2020-21	2021-22	2022-23	2023-24
> Upgradation & Adoption of New Technologies	Implementation of new technologies pertaining to supply and usage side (e.g. Melting, Heat treatment, Ovens, Compressed Air, HVAC, Pumping and lighting etc)				
> Process Optimization - a) Response w.r.t. volume fluctuations (MOP) b) Make Vs buy decision (i implementation of PAT)	> Measurement of losses and daily accounting > Administrative control				
> Efficient operations man manpower deployment, s optimization etc)					

New Tech.

Energy Sustainability consi for technology introductio upgradation

RE

Increase RE mix to reduce cost of Energy

FINAL PRIORITIES	2019-20	2020-21	2021-22	2022-23	2023-24
Bechmarking Process & technology benchmarking	> Inter plant process benchmarking	> External benchmarking - Process level benchmarking			
Energy Cost Management of energy cost	>Measurement of power quality (harmonics, PF etc) > Review power purchase contracts > Energy mix as applicable (Open access, RE etc)				
Capability building Capability Building	Energy cell establishment at all locations BEE certified Energy managers Knowledge building for new technologies	BEE certified energy auditors Knowledge building for new technologies	Knowledge building for new technologies	Knowledge building for new technologies	Knowledge building for new technologies
Approach Others: Structured approach for energy management (like safety)		> Creating energy organization with independent Cost center and GL codes	> Strengthening Energy organization		

Thanks to CII for creating this platform

Thank You

We heart fully thank CII for :

- Giving us wonderful platform to learn and share our best practices
- We have picked up many project from CII planforms
- Benchmarking data
- Given wonderful standards such as GreenCo and Green Building