

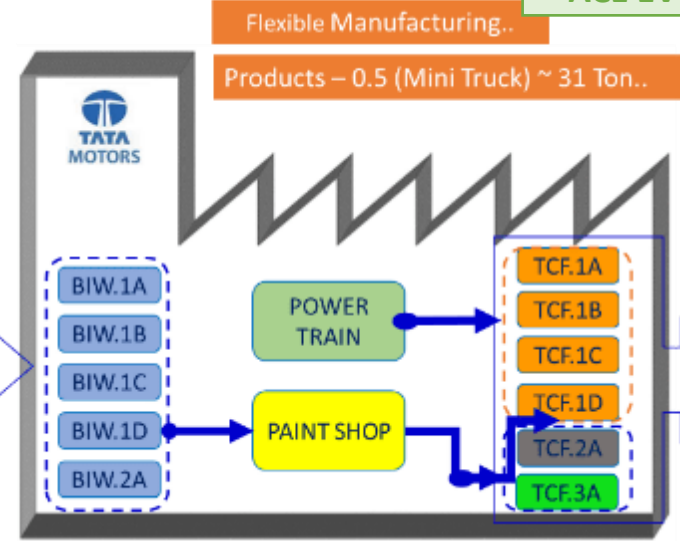
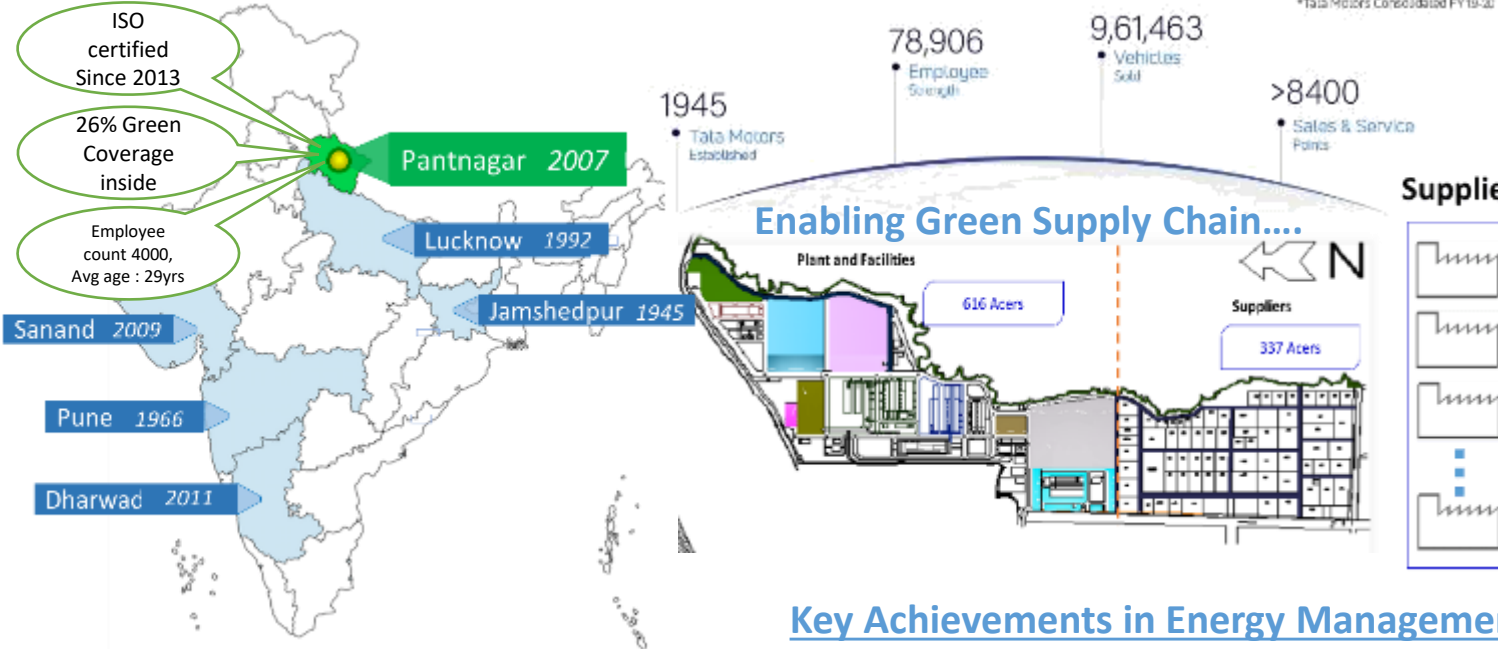


## CII National Award in Excellence in Energy Management 2022

Tata Motors Limited, Pantnagar

### Team Members :

1. Manjeet Singh (Central Maintenance Services-Energy Cell)
2. Archana Yadav ( Assembly Shop)
3. Ashwani Sharma (Paint Shop)



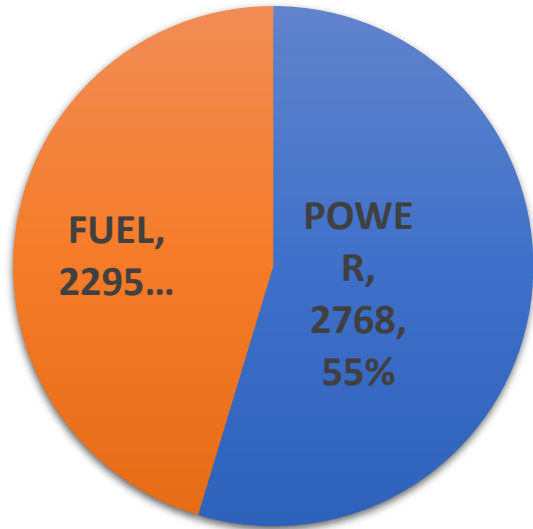
## Key Achievements in Energy Management

Green Co Gold Rating 2015	Golden Peacock Environment award 2015	CII National Energy Management Award 16-17	Golden Peacock Environment Management Award 2016	CII National Energy Management Award 2017	CII Energy Efficiency Circle competition Winner 17-18	CII National Energy Management Award 2018	Golden Peacock Award for Energy Efficiency 2018	Green CO Platinum Rating 2018	Winner of overall SHE performance	CII National Award for Excellence in Energy Management 2019	Green Co Star Performer Award 2020	CII National Award for Excellence in Energy Management 2020	Winner of 8th CII Northern Region Inter Industry Competition on EHS	CII National Award for Excellence in Energy Management 2021	
2015		2016		2017		2018		2019		2020		2021			

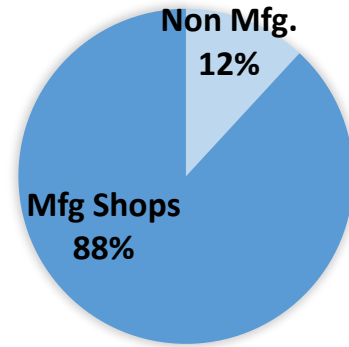
Winner of CII National Energy Leader 2018, 2019, 2020 and 2021



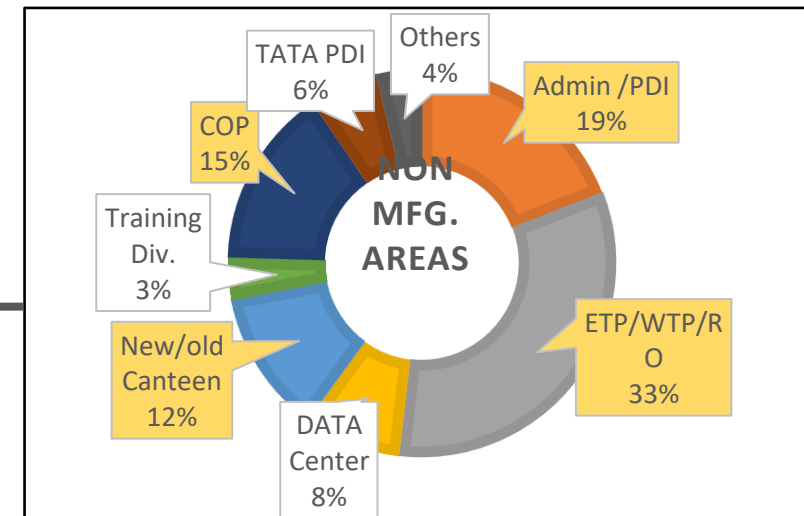
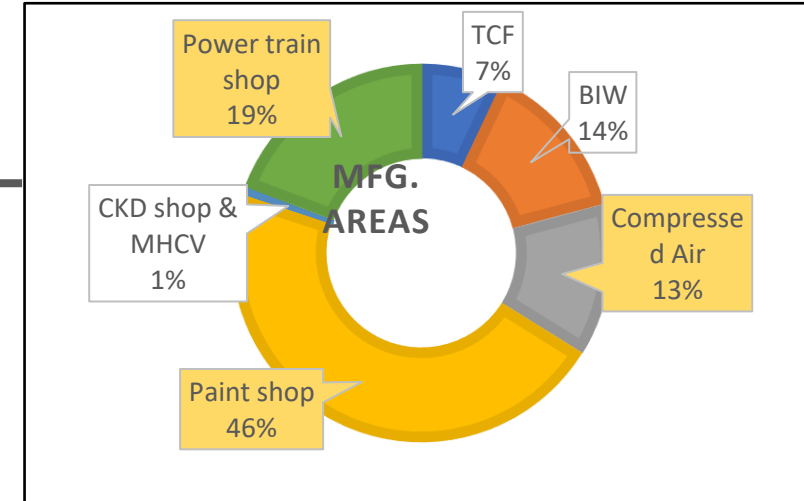
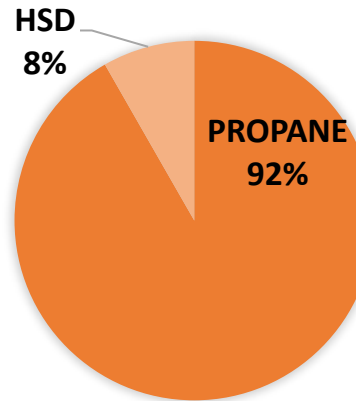
Energy Consumption 5063 TOE

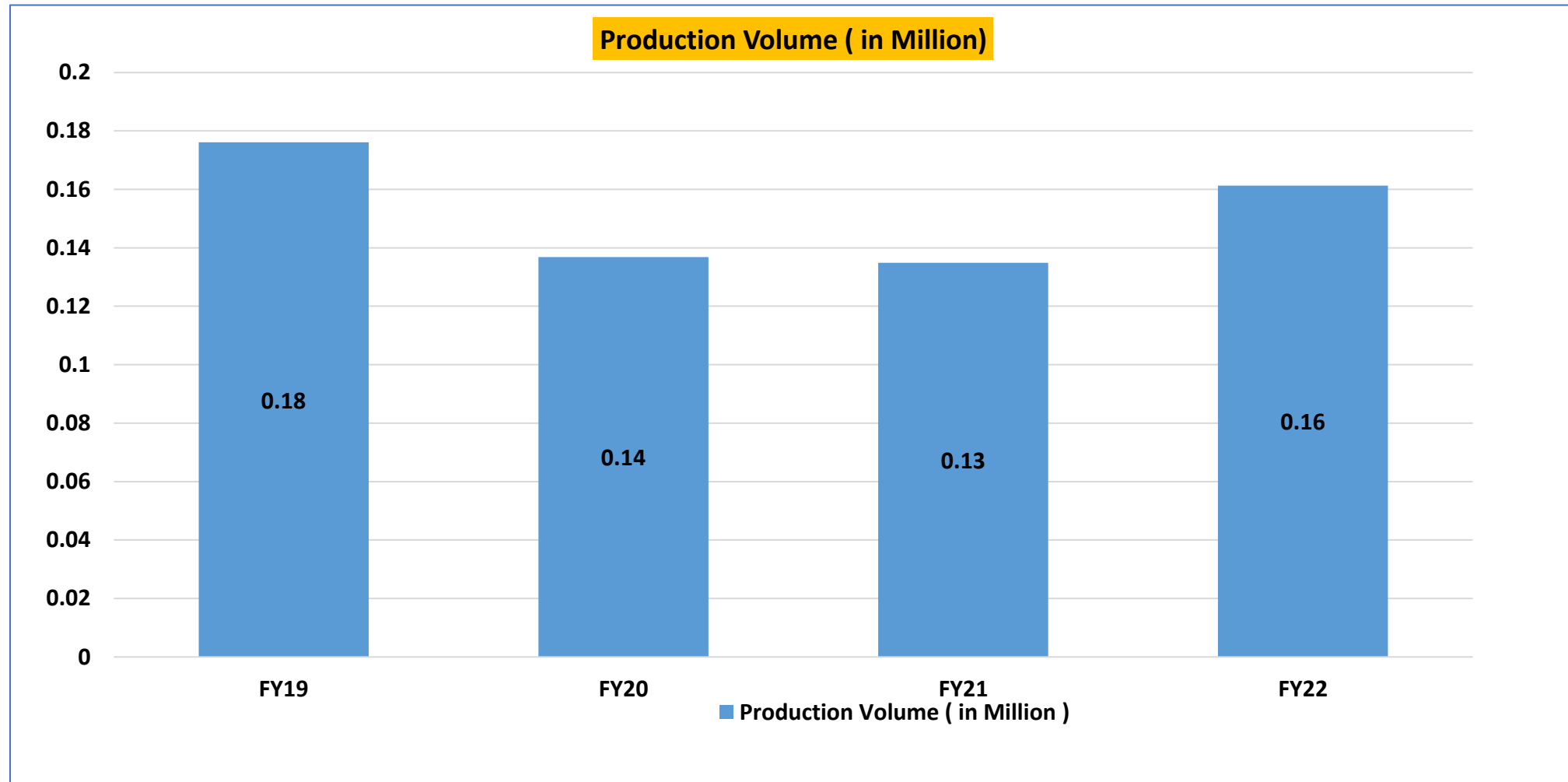


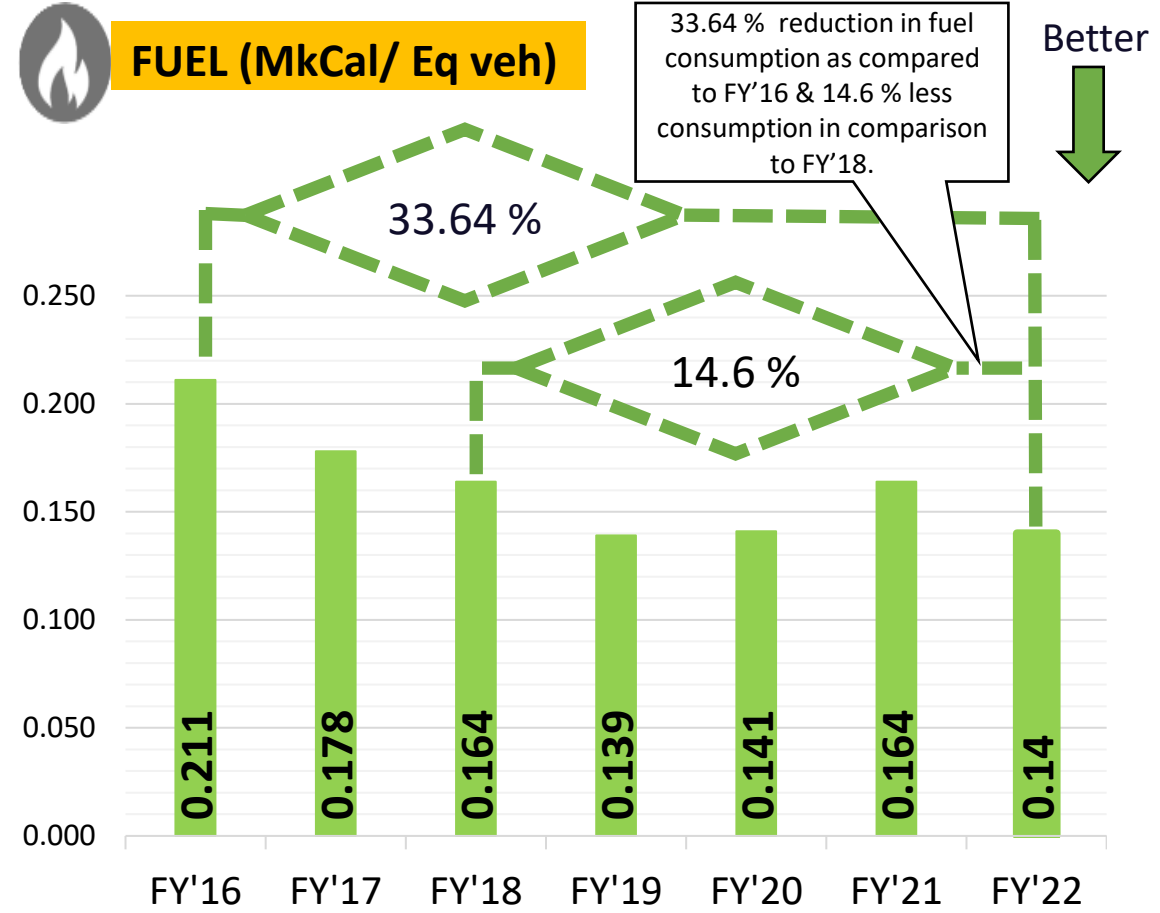
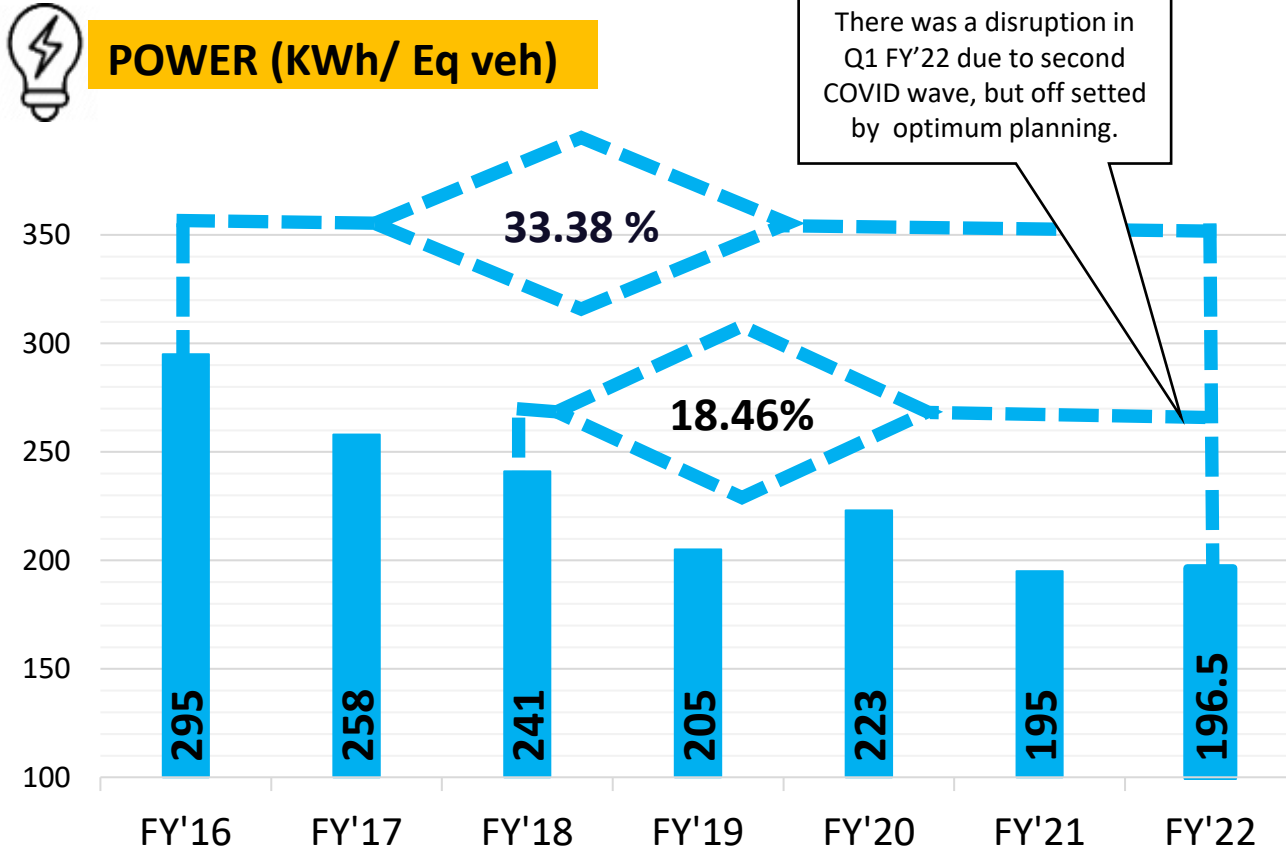
Power Consumption: 2768 TOE  
( 32.19 Million Kwh)



Fuel Consumption: 2295 TOE







TML Pantnagar nearly sustained its New Benchmark level set in power last year despite 40 % increase in load and 24% increase in production in comparison to last year. Also, Fuel consumption reduced by 14.6 % from last year.

**Process Level Benchmarking: Painting (Significant process)**

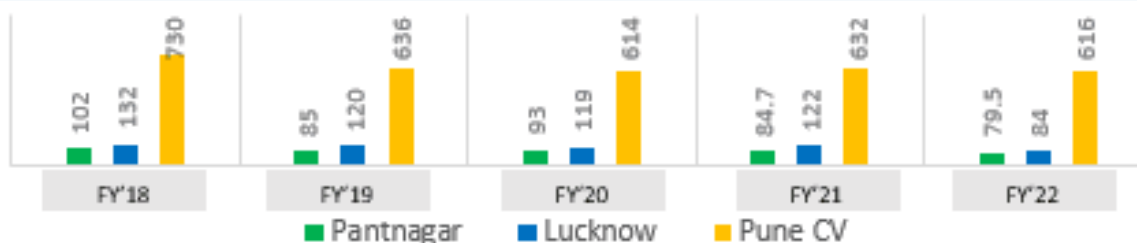
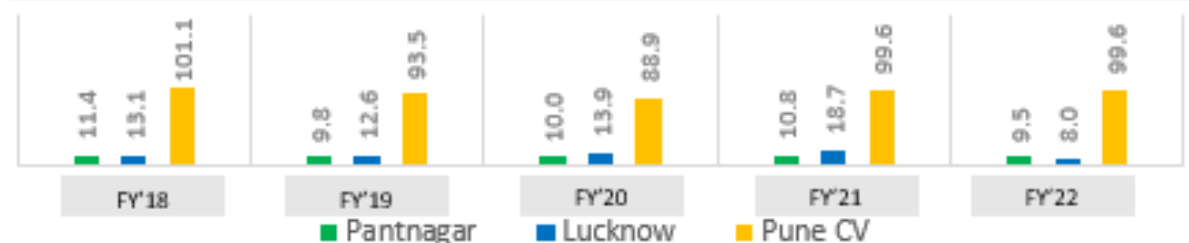
Organization	Power (kWh/ Veh)	Production / day	Painting technology / Process
Maruti - Manesar new plant	<b>68</b>	1400	3C1B (O3 coat 1 base)
Mahindra & Mahindra - Chakan	200	500	3C2B & 3C1B
Hyundai Plant 1	140	600	NA
Hyundai Plant 2	170	400	NA
TML - K block Pune	160	250	3C2B
TML Pantnagar	83.9 ( <b>70.4 best achieved</b> )	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	Models- Bolero (220/ shift)	Production- 590	Models- Swift
Average Power Consumption - 42 kWh/ Vehicle In winter- 33kWh/ Vehicle	Average Power Consumption - 21 kWh/ Vehicle	Average Power Consumption- 13.6 kWh/ Vehicle	Average Power Consumption - 09kWh/ Vehicle

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

**Benchmarking With TML Companies ( kWh/ Eq Painted Body)**

**Paint Shop Benchmarking With TML Companies ( Kg/ Eq Paint Body)**


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

1

- Digitalization project : Industry 4.0 for resource and process parameters in Power Train shop(Second most power consumer after Paint shop)

2

- Upgradation of IFC units to optimize compressed air flow

3

- 400 W high-bay lamp replacement with 150 W LED

4

- DO based aeration system in ETP

5

- Use of dampers in ASP to eliminate air flow requirement to unused areas

6

- Use of VFDs with Energy efficient motors for different process applications

7

- Auto isolation systems at shop locations to eliminate wastage of compressed area

(depending on design) and non-working days

Year	No of Energy saving projects	Investments (INR Million)	Electrical savings ( Million kWh)	Thermal savings ( Million Kcal/ MTOE)	Savings ( INR Million)	Impact on SEC (Electrical, thermal)
FY'20	16	5.43	3.037	1260	22.698	
FY'21	26	7.17	4.073	1050	26.567	
FY '22	28	9.34	5.453	53594	31.347	



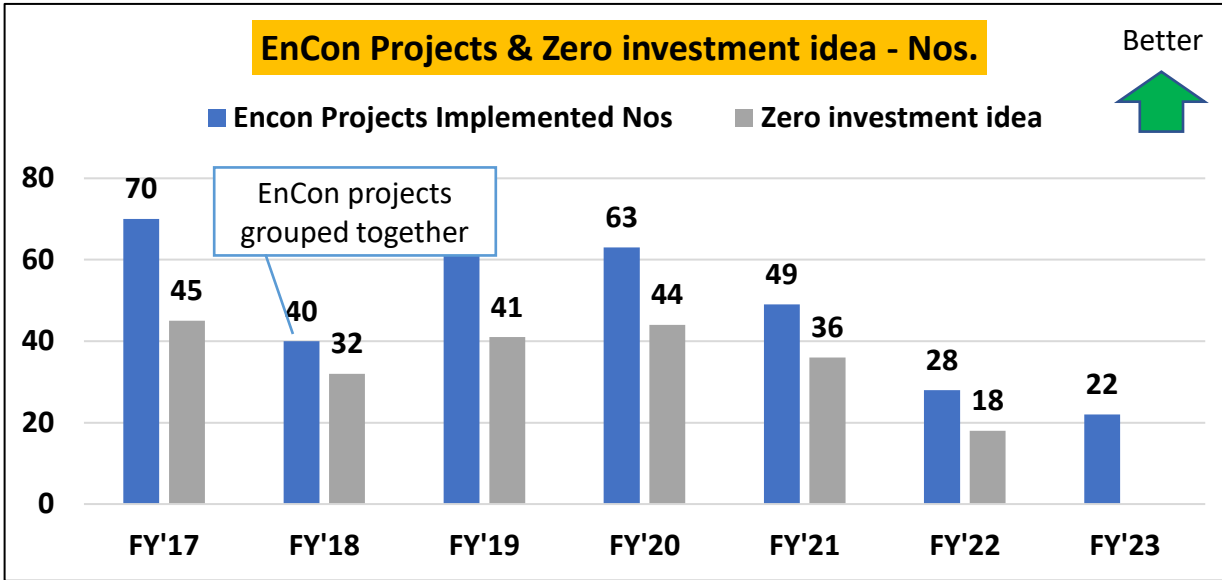
## Key Encon Projects FY 2021-22

Sr. no	Title of Project	Idea given by Supervisor		Annual Thermal Saving, Million kcal	CO2 footprint KG
		Idea given by Operator			
1	Developed paint supplier for Titanium white mono coat color and robot teaching done with reduced bell distance from body (22 CM from 25 CM) and robot speed optimization for uniform thickness and DFT.	2021-22	0.171468	48870 KG propane	287214
2	PLC based control for switching off lights automatically	2021-22	0.0054		4428
3	Pumps used to keep switched off during non-working days and holidays	2021-22	0.0163		13304
4	Based on TTR study – Baking temperature of sealer oven reduced by 5 Deg. C	2021-22		4524 KG propane	19573
5	Pump efficiency improvement by Belzona coating in PT line Pumps	2021-22	0.0051		4182
6	Replacement of faulty 2X28 W tube light with single 30 W single LED tube light	2021-22	0.277		22719
7	PLC programming for automatic switch off of blowers in paint shop by sensing body shell exit movement and oven heat up	2021-22	0.122		9934
8	Transformer switching at optimized load in paint shop	2021-22	0.143		11769
9	Station-wise data tracking in short block line in powertrain shop for early fault capture (Industry 4.0)	2021-22	-	-	-
10	Heating temperature reduction in washing machine	2021-22	0.87		71367
11	Energy savings by VFD for spray pumps in 2 new washing machines	2021-22	0.17		14056
12	Water filling control in water cooler by valves	2021-22	120m3 (water savings)		-
13	NTC block 4 cycle time reduction after reconditioning	2021-22	0.18		15350
14	Fan regulators for energy savings	2021-22	3320/-		
15	Compressed air leakage in hemming areas in idle hours	2021-22			
16	Replacing halogen lamps	2021-22	0.25		
17	Centralized switching off lights & equipment	2021-22	0.0017		881
18	Utilization of existing fume suction system for exhaust	2021-22	0.21		17712
19	Valve provided at closure area to stop extra water flow	2021-22	0.55		270167
20	Engine sub-assy conveyor running at reduced frequency of 15 Hz (from 45Hz to 30 Hz)	2021-22	0.007		612
21	Exhaust lift table running time optimized by providing timer	2021-22	0.0006		512
22	PLC programming done to modify motor carrier travel time	2021-22	Variable		Variable
23	Air booster quantity reduced from 2 to 1 by implementing NRV in it		Variable		Variable
24	Duracell make battery preferred over Panasonic make to reduce battery replacement frequency		Variable		Variable
25	No. of blowers reduced for shower testing facility (from 6nos. to 4 nos.)				
26	Automatic switching of Shower Booth lights				
27	Automatic switching of street lights				
28	Zero leakage in pneumatic pipes after pipe material replacement				

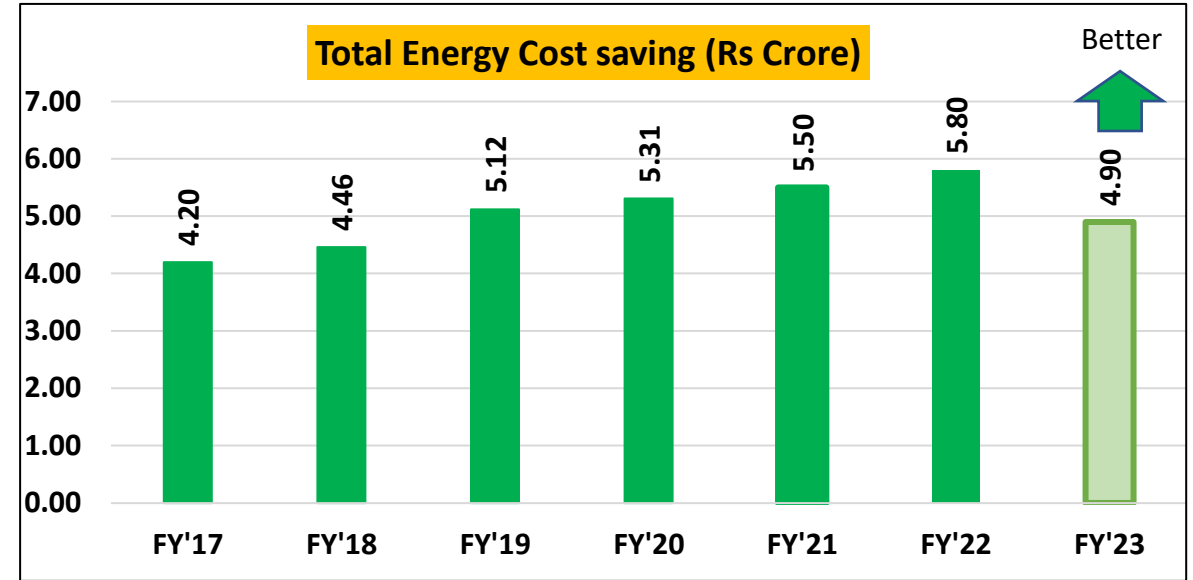
7942  
tCO2  
reduction

No of Projects=28 Nos  
Zero Investment Ideas= 18

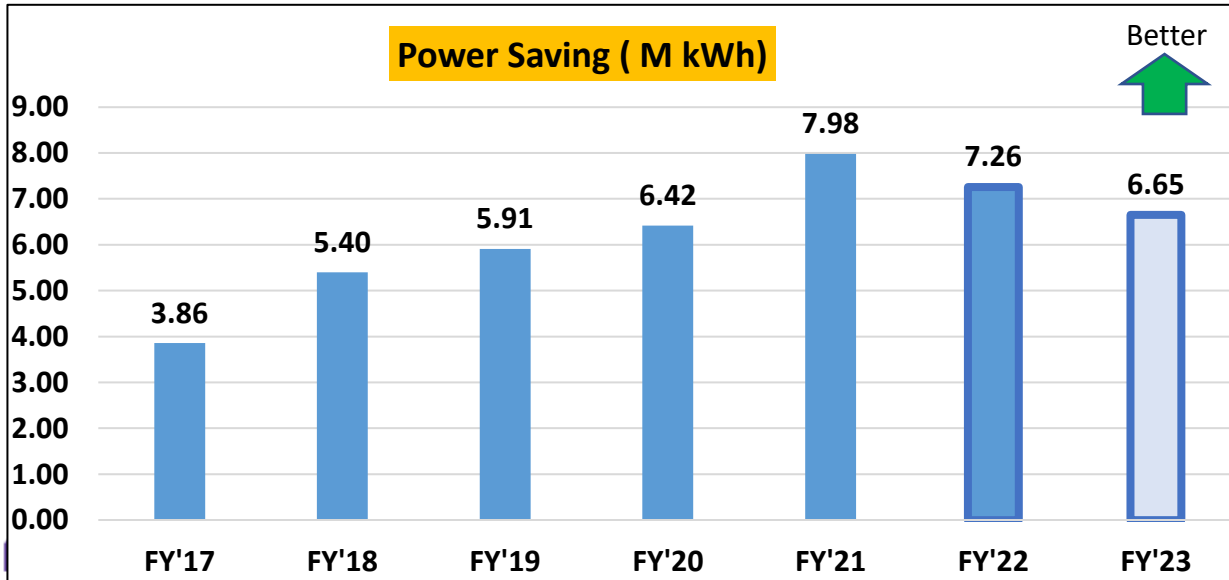
**EnCon Projects & Zero investment idea - Nos.**



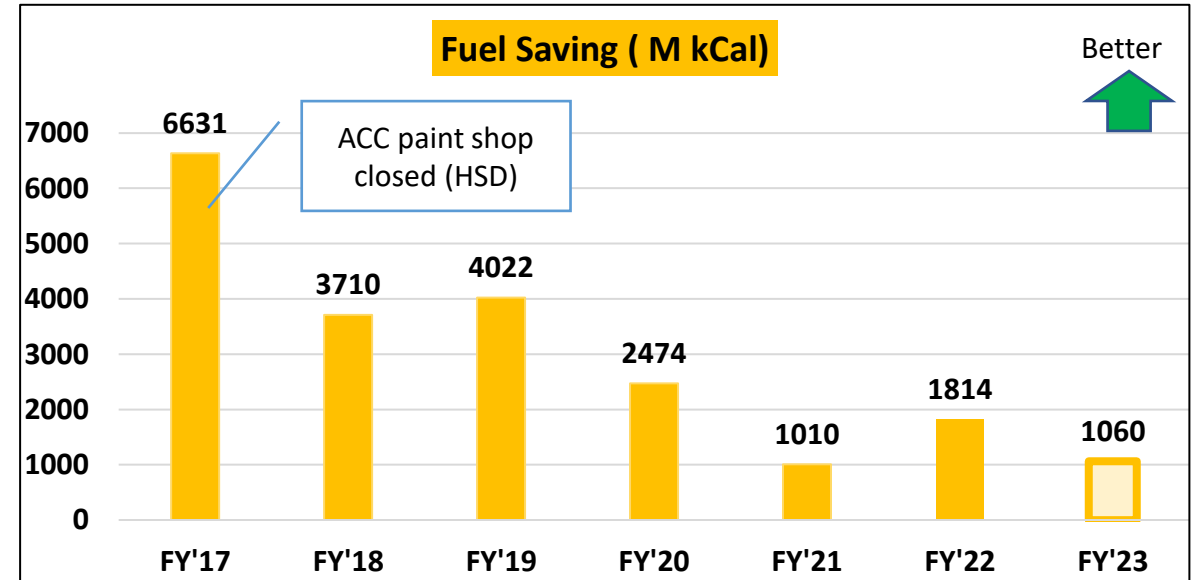
**Total Energy Cost saving (Rs Crore)**



**Power Saving ( M kWh)**



**Fuel Saving ( M kCal)**





Innovation promotion mechanisms

Innovation in Energy Management Process

Innovation in Operations management

Innovative EnCon projects

- 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

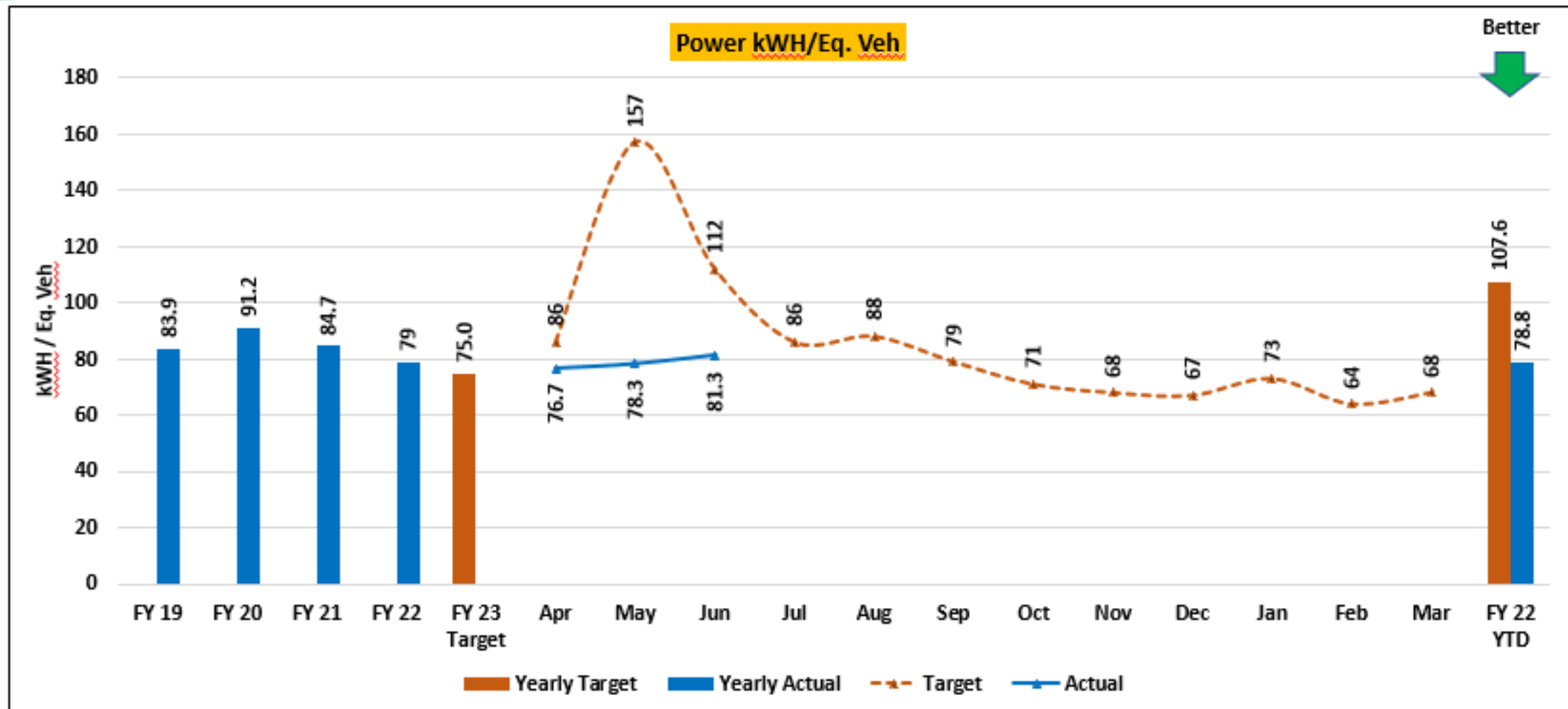
- SIX SIGMA project for energy performance improvement
- Under strategic & approach related interventions - two new levers were added
- Process standardization and horizontal deployment in other business units/ plants through TMOS Portal
- Statistics based Dynamic target setting in low volume scenario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

#### FY 22 & FY 23

- Industry 4.0 to improve energy monitoring in energy intensive Shops
- Adoption of new technologies such as smart meters & smart sensors to keep set of energy guzzler equipment in check.
- Adoption of 4-layer architecture for real-time equipment energy monitoring in shops
- As the real-time monitoring project takes off, and we gather enough data, we plan to migrate to an enhanced IOT platform with AI-ML usage for more accurate predictive analysis for energy trends.

#### EnCon projects:

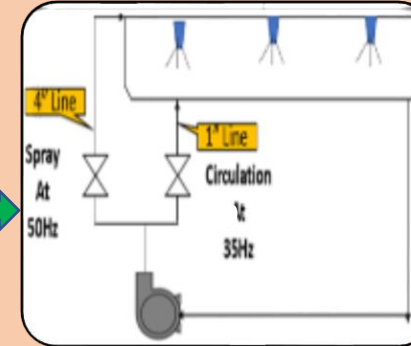
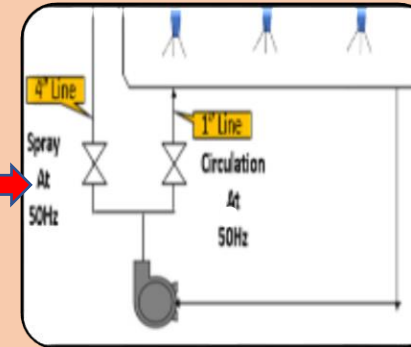
- AI-ML and big data analyses for energy saving



FY 23 power consumption FTM June 22 is 81.3 KWH / Eq. Veh against target of 83 KWH / Eq. Veh and YTD till June 22 is 78.8 against target of 83 KWH/Eq. Veh

**VFD introduction in pumps running with throttling of valves**
**Phosphate  
Exit spray  
Pump**

**Pre-  
Degreasing  
Pump**

**ED Line  
UF-3 Pump**


**Tangible Benefits**  
 Energy-saving  
**150852**  
**KWH / Year**

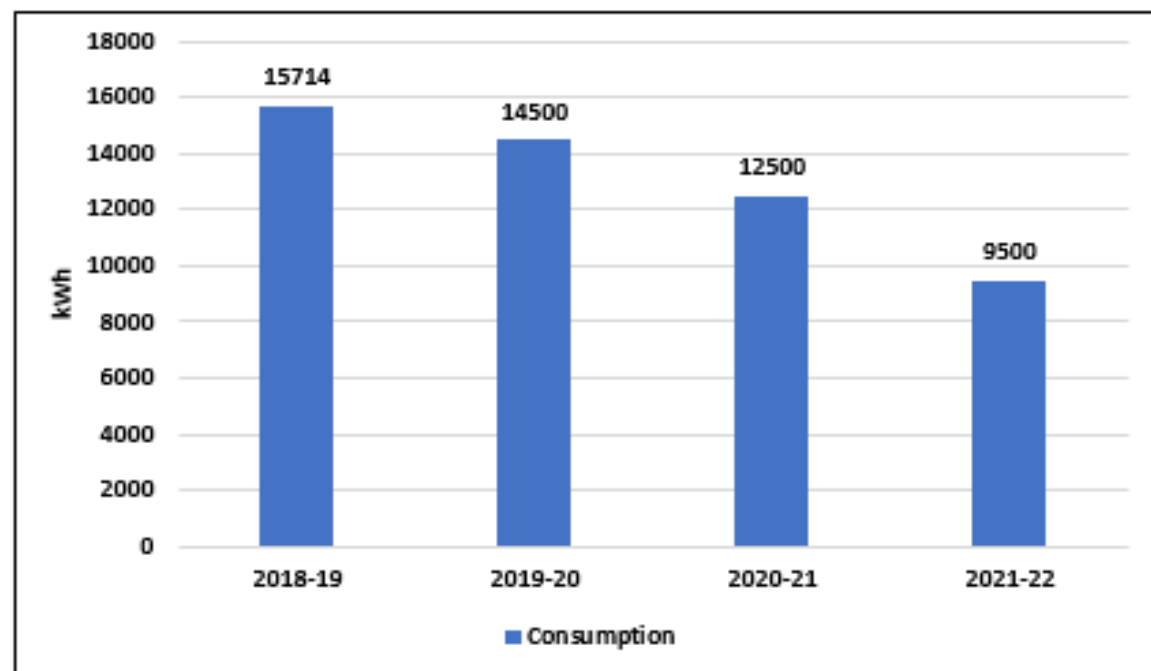
**Intangible Benefits**  
 87.24 Metric Tons  
 of Carbon foot  
 print reduction.

**Saving**  
**Rs.9.49**  
**Lacs/Annum**

**Before** →

**After** →

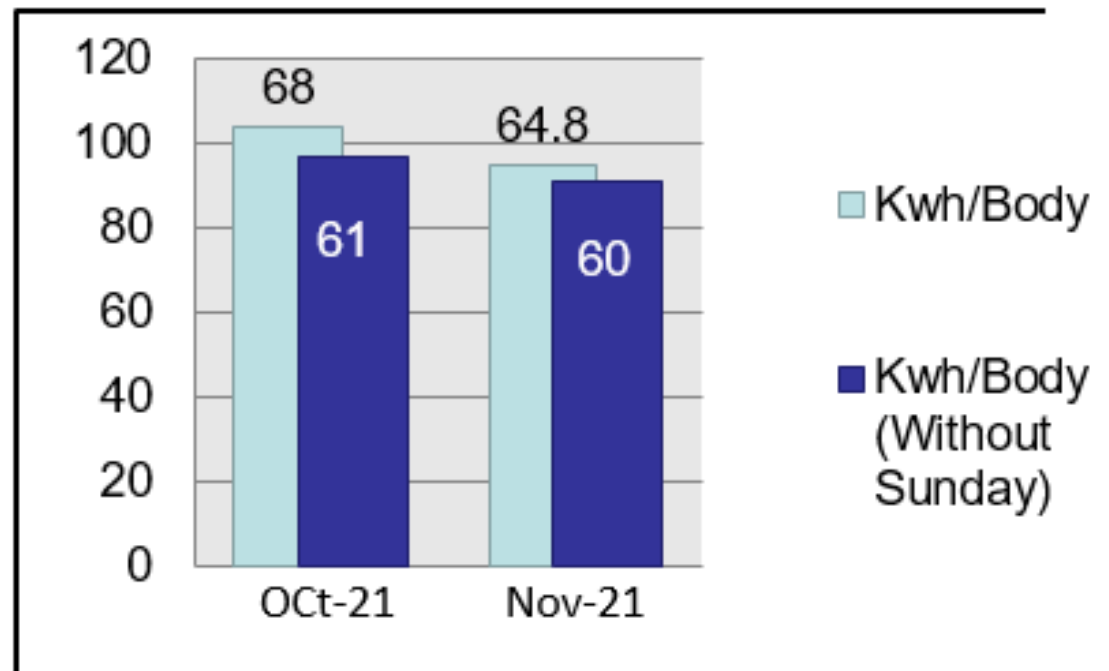
## Per Holiday Average Comparison



Monthly Savings =  $3000 * 4 = 12,000$  Kwh

Savings in Rs. =  $12000 * 5 * 12 = 7.2$  Lacs/ Year

## Sunday Contribution in Monthly Ave.



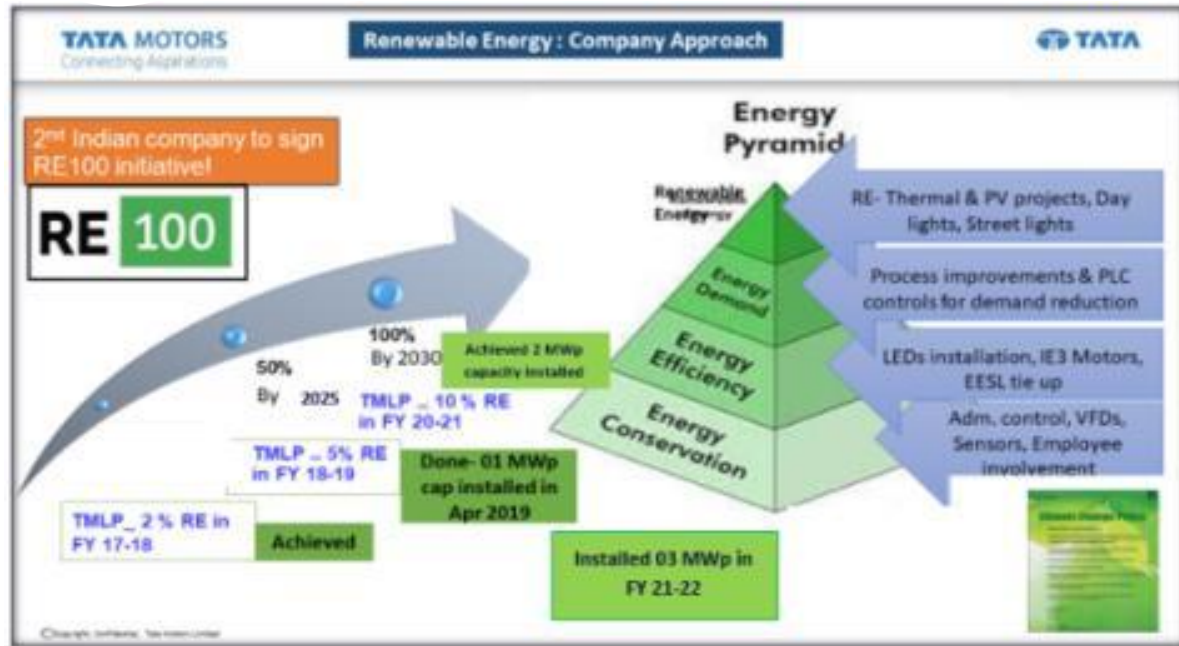
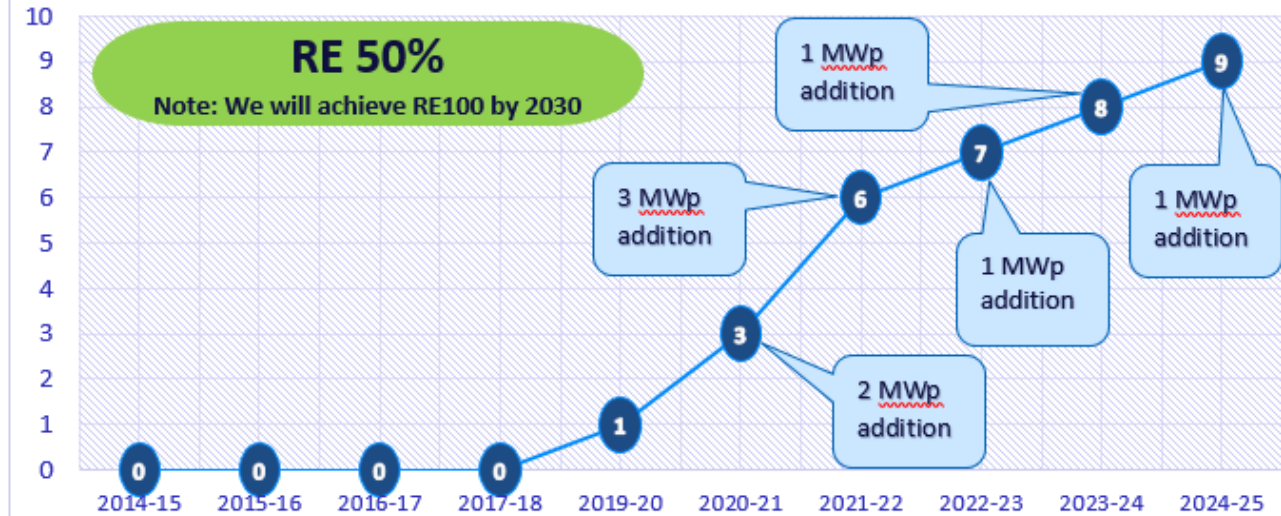
In OCT (Kwh/Body) = 7

In NOV (Kwh/Body) = 4.8

Savings in (Kwh/Body) = 2.2



107.7 tCO<sub>2</sub>e/  
year


**Glide path 5 yr plan- RE installations- CV pantnagar**

**Renewable Energy : Actions taken**

Year	FY'19	FY '20	FY'21	FY'22
Technology	Solar PV	Solar PV	Solar PV	Solar PV
Type of Energy	Electrical	Electrical	Electrical	Electrical
Onsite/offsite	Onsite	Onsite	Onsite	Onsite
Installed Capacity (MW)	-	1.02	3.00	6.00
Generation Million kWh/Year	-	13.97 Lac kWh	24.1 Lac kWh	48.2 Lac kWh
% of overall Electrical Energy Consumption	-	4 %	10%	15%

**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

**Solar Thermal**  
5000 Ltr per day



**Solar Street Lights: 55**  
Nos



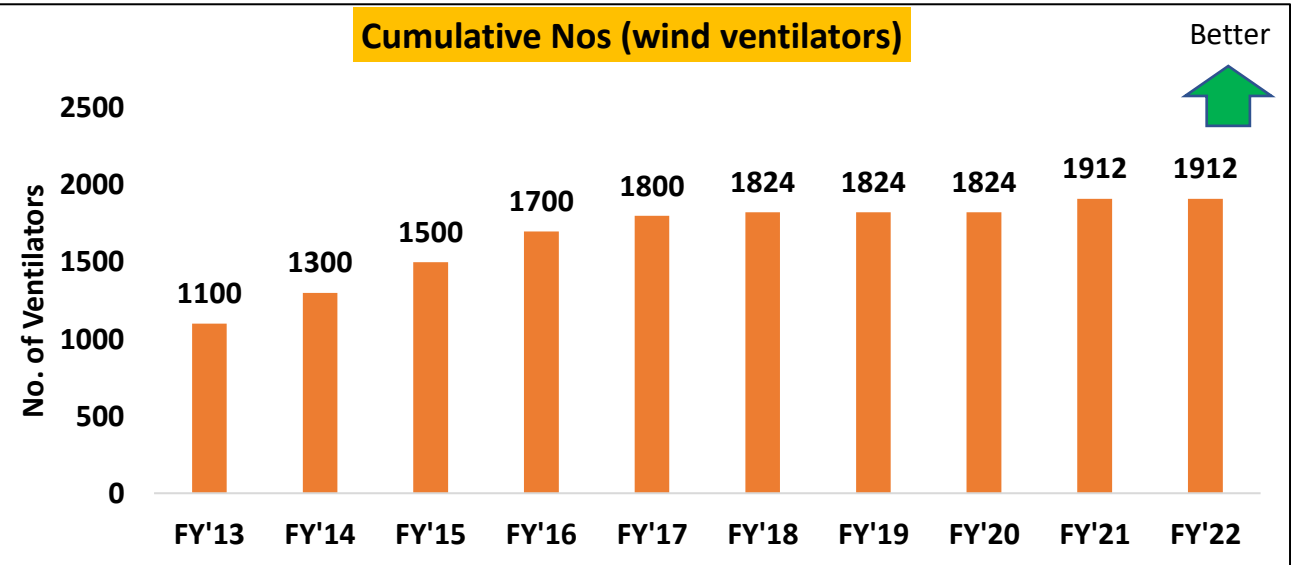
**Wind ventilators**



**Solar day light pipe & Dome 46 Nos**



**Cumulative Nos (wind ventilators)**



**In process : Solar dish for washing machine – Engine Shop**

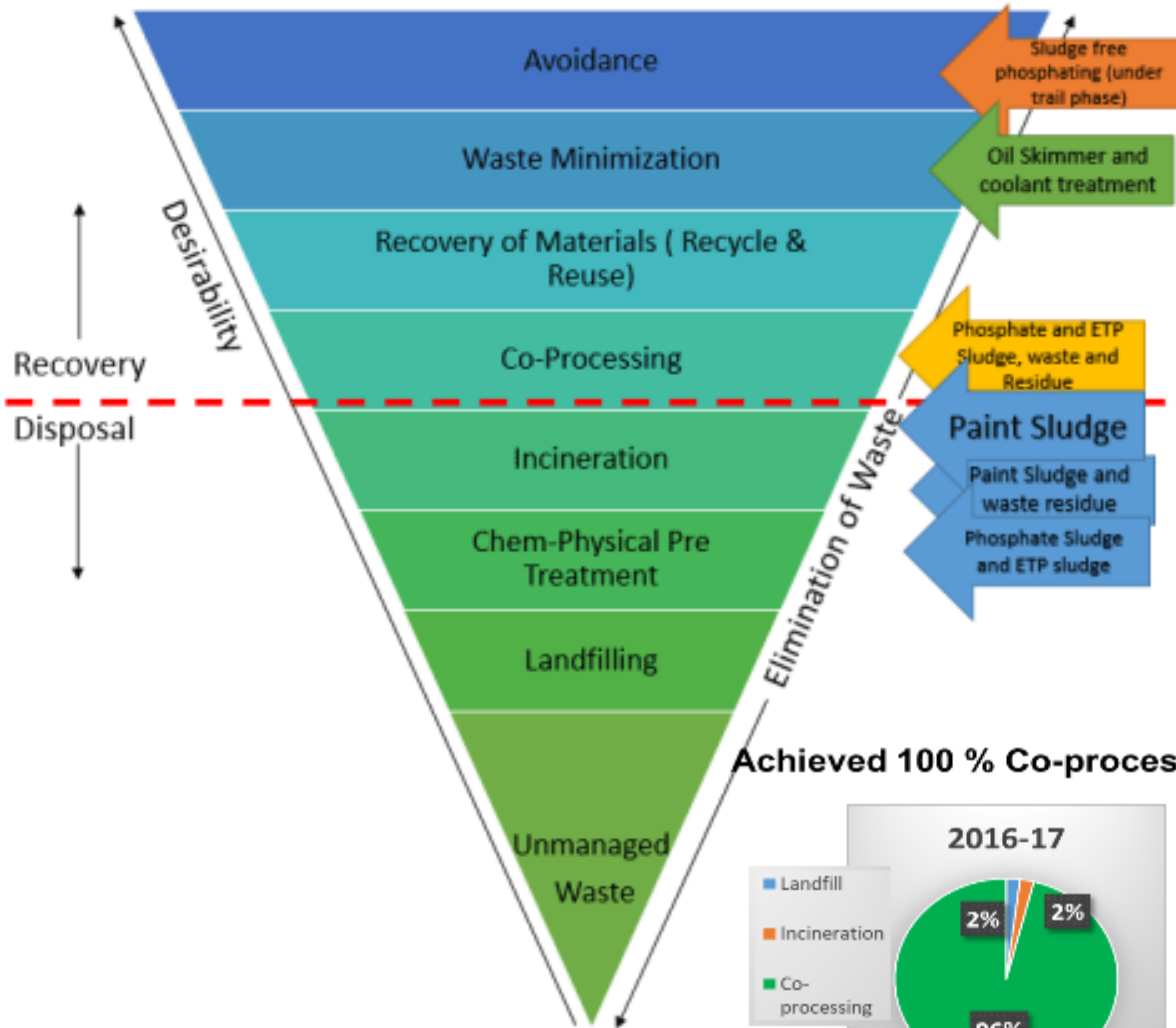


**Mile Stone achieved :**

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

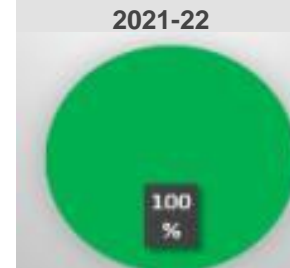
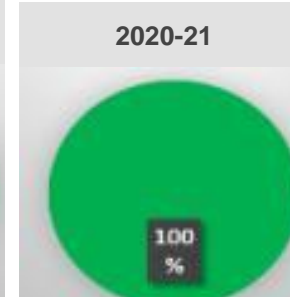
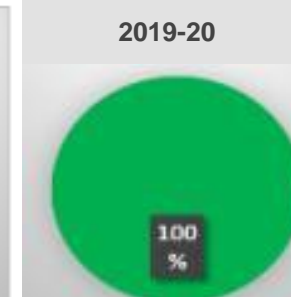
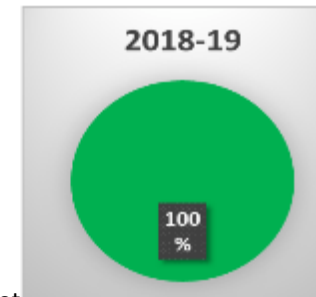
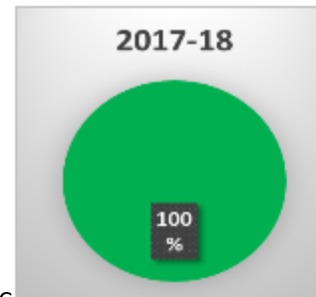
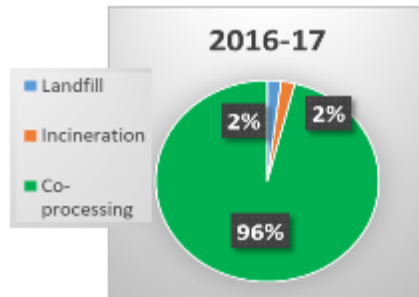
**UTILIZATION OF WASTE AS FUEL (ALTERNATIVE FUEL UTILIZATION)**

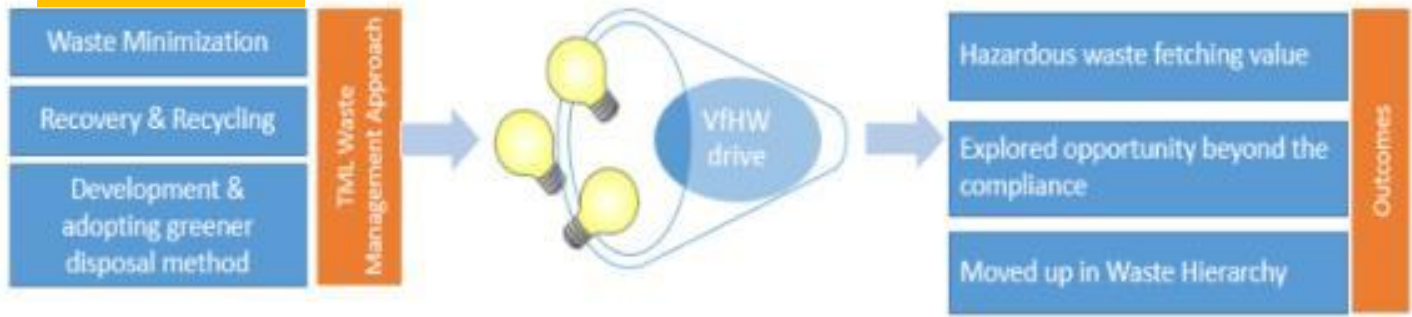
Name of the Fuel / Waste	GCV of fuel (kcal/kg)	2018-19		2019-20		2020-21		2021-22		Waste Fuel as % of total energy used
		Quantity of waste Fuel used (MT/year)	Heat Value (million kcal/year)	Quantity of waste Fuel used (MT/year)	Heat Value (million kcal/year)	Quantity of waste Fuel used (MT/year)	Heat Value (million kcal/year)	Quantity of waste Fuel used (MT/year)	Heat Value (million kcal/year)	
Paint sludge	5000	163.53	817.65	100.31	501.55	83.61	418.05	66.48	323.66	0.70
ETP sludge		185.9	0	298.59	0	137.44	0	173.06	0	0.00
Phosphate Sludge		88.23	0	60.68	0	43.9	0	52.13	0	0.00
Waste & Residue	2000	151.58	303.16	87.57	175.14	84.79	169.58	84.15	168.94	168.94



**Achieved 100 % Co-processing**

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

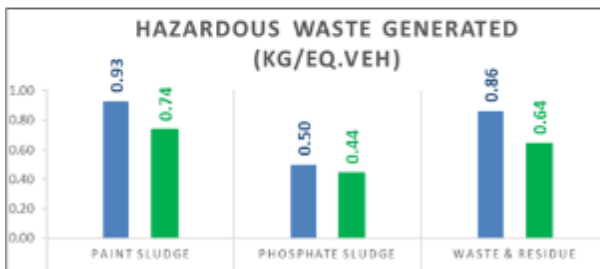


**Process:**

**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


**Savings under VfHW (Cr)**
**2.7**


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

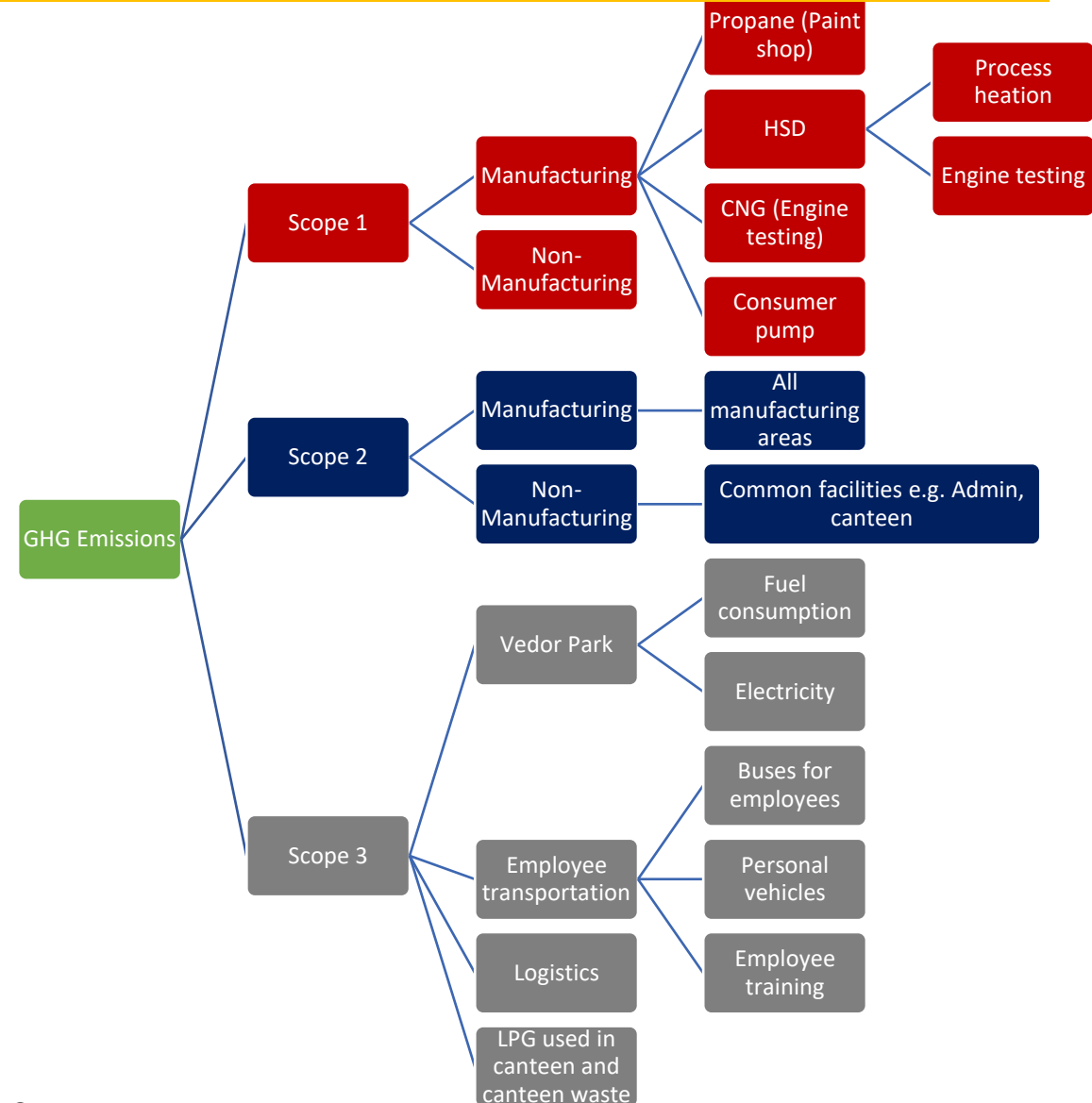
**Examples :**
**Reduction in Hazardous Waste Generation:**

**Reuse & Recycling of Hazardous Waste Generated:**

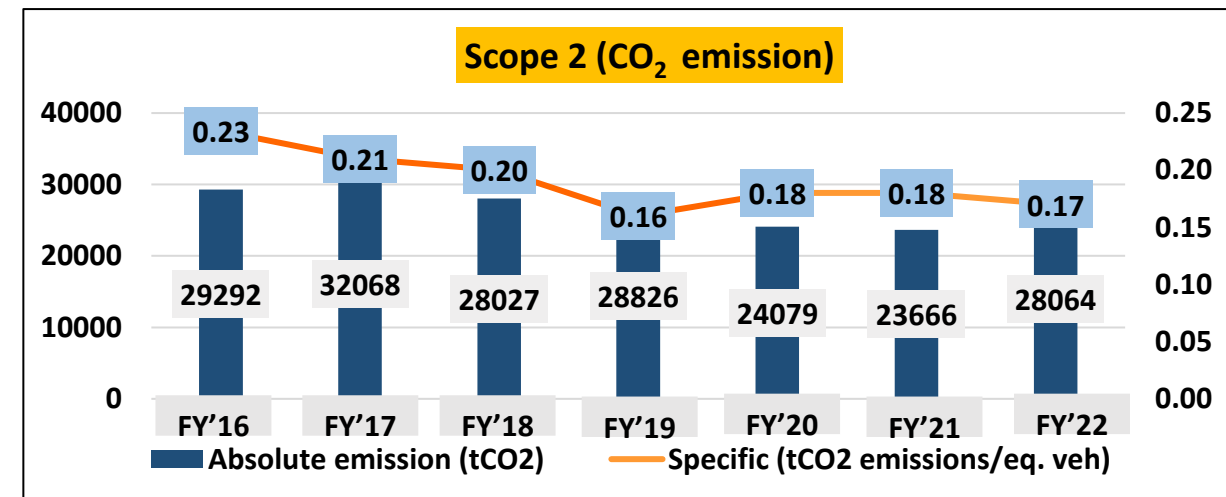
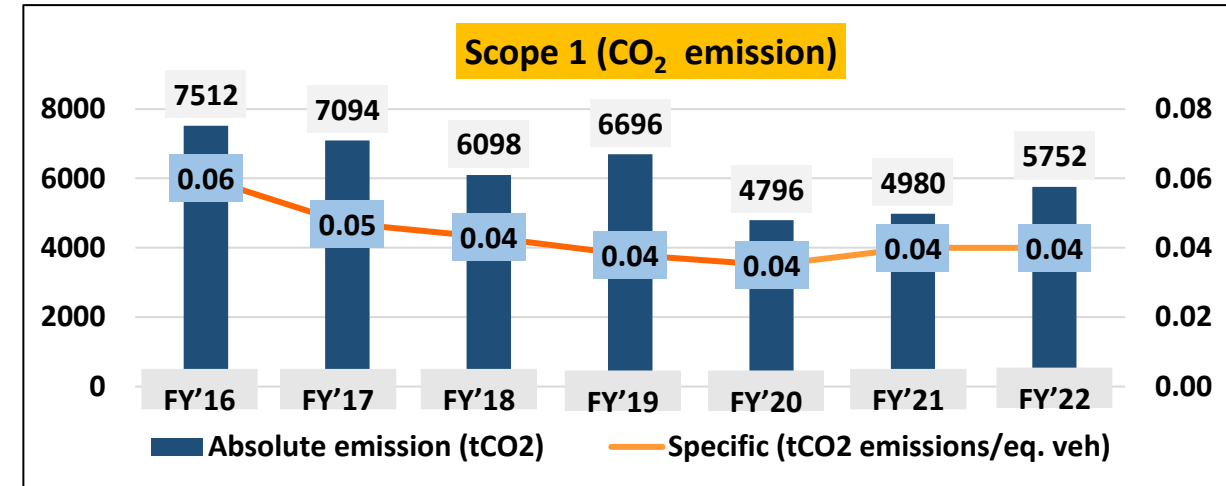
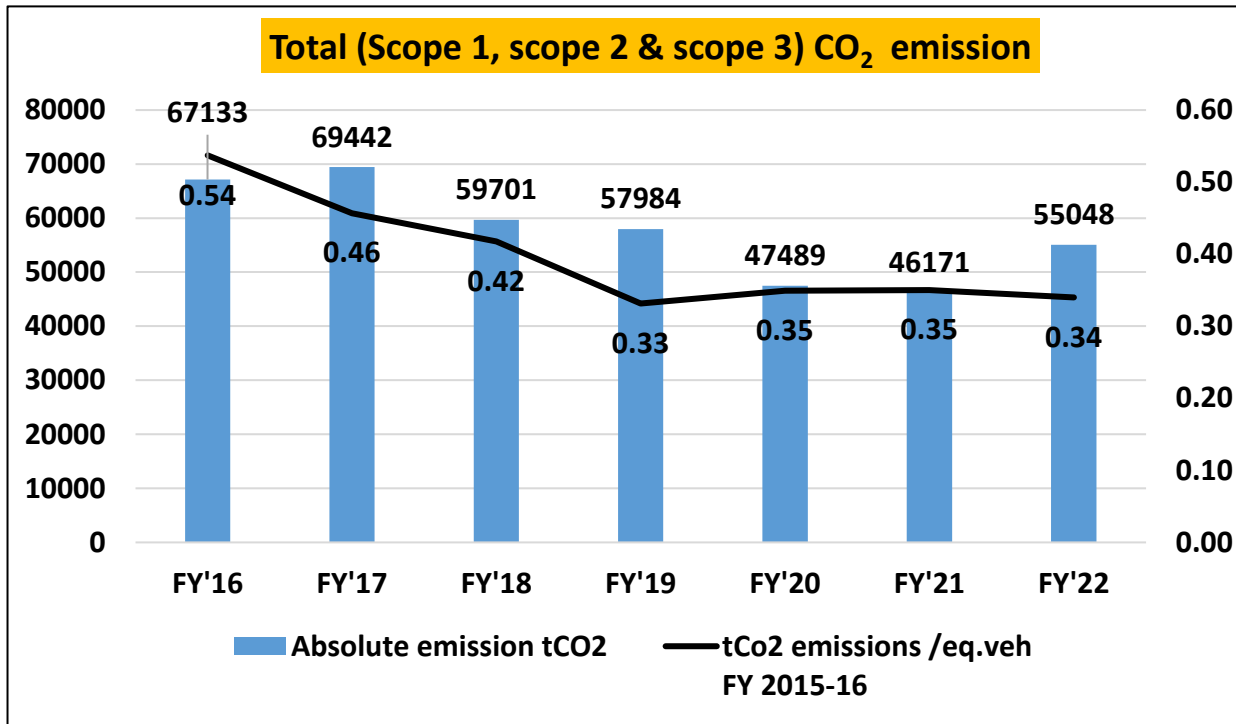

Biogas from kitchen waste and biodegradable waste (1000 kg/ day) – in process,

**GHG Inventorization Management in TML Pantnagar**

- ❑ Scope 1 –direct GHG emission which includes Manufacturing and non manufacturing areas which use the fuel (HSD, CNG,Propane ) in the process, vehicle testing and along with vehicle.
- ❑ Scope 2 encompasses indirect emissions from generation of purchased electricity, steam, heating and cooling etc.
- ❑ Scope 3 accounts for all other indirect emission that occur such as supply chain in vendor park , canteen related, employee transportation and business trips. All business trip requests are monitored through Quest2travel portal. The 3 scopes are defined in the Greenhouse gas (GHG) Protocol.



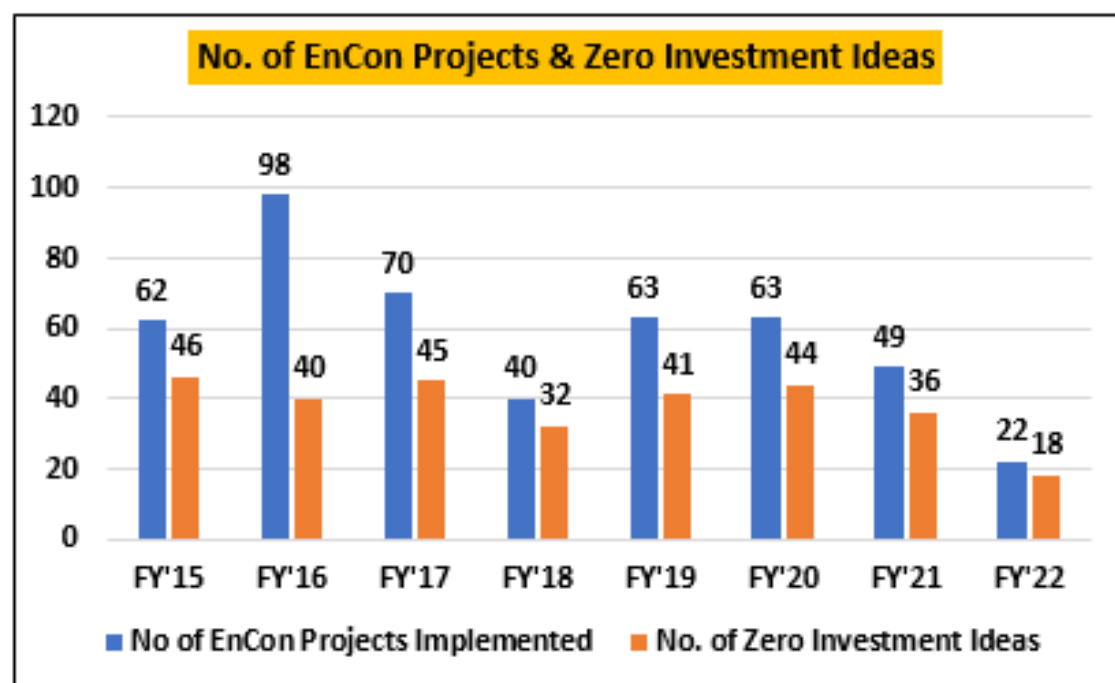
Reduction in Sp. GHG emission (kg CO<sub>2</sub> emission/ 25 SMH based Eq. Vehicle Produced).  
Public disclosure is done through Annual Sustainability Report at TML



Supplier Scope 3 data collection from inside and outside vendor park is done in a structured manner and the frequency of collection is quarterly

In FY'22, a total of 22 projects were implemented and 16 more are planned/ongoing which will be implemented in next 3 years.

Fewer but impactful project resulted in total **electrical savings of 0.726 Million kWh** and we maintained the same level as last year despite increased activity due to increased volumes and new lines set up at engine shop.



Year	Projects Implemented (Nos)	Zero Investment Ideas (Nos)	Electrical Saving (Million kWh)	Fuel (M K Cal)	Cost Saving (Rs Million)
FY '19	63	41	5.91	4022	51.20
FY '20	63	44	6.75	2474	51.30
FY '21	49	36	7.981	1009	55.024
FY'22	22	18	7.26	1814	63.124

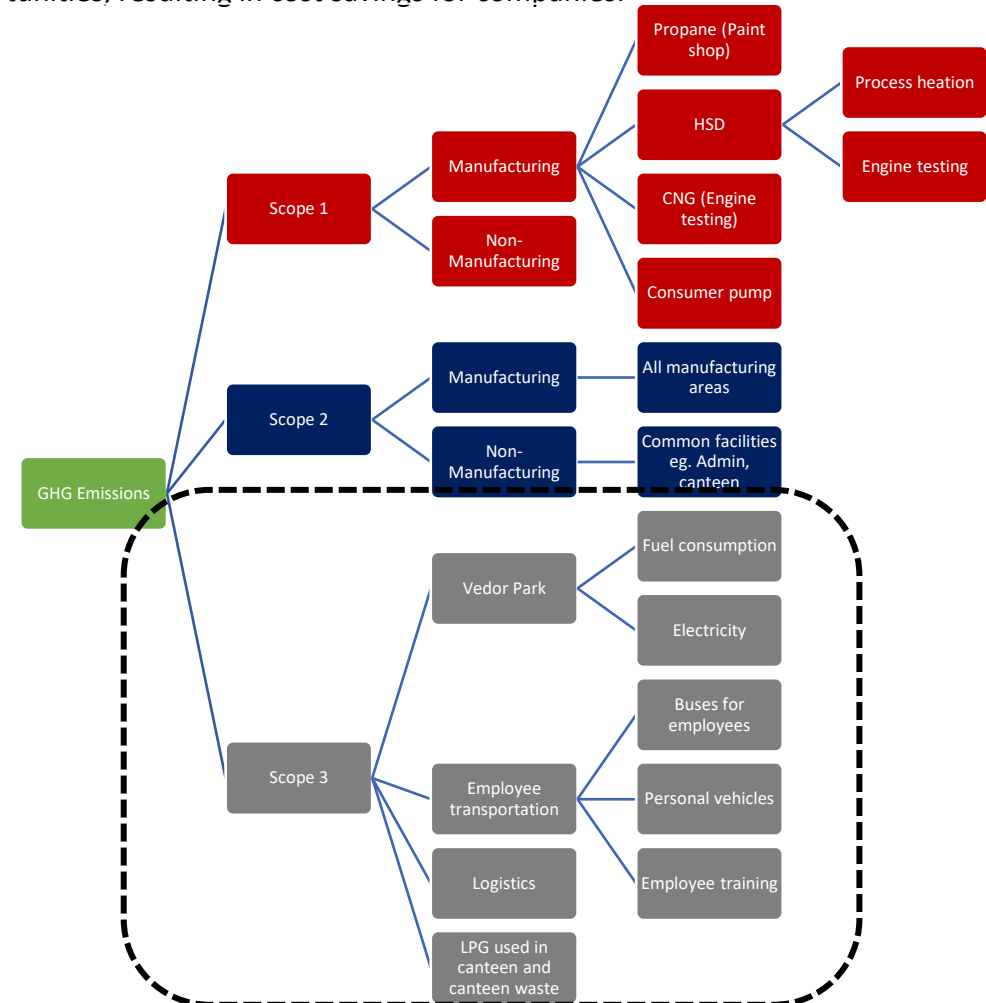
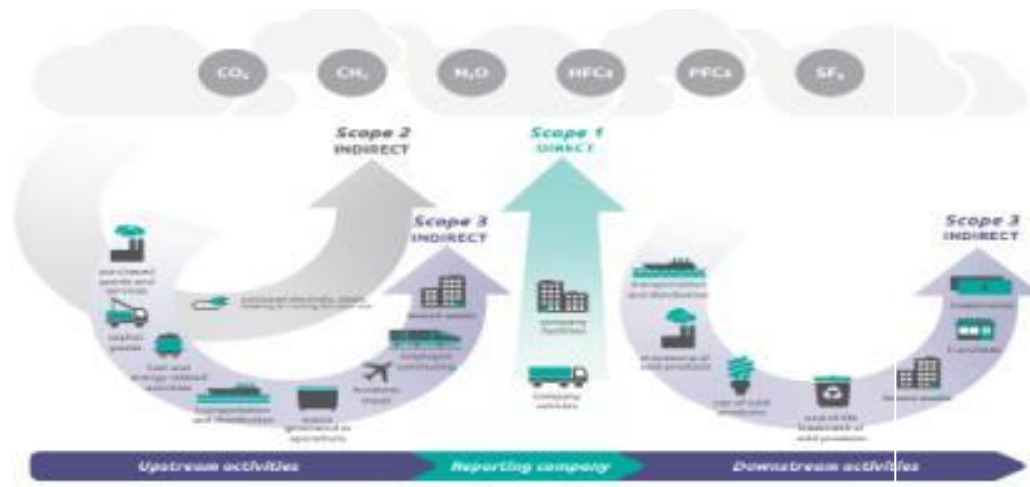
Scope 1 tCO2e	4796	4853	6095	7173	8598	10407	10407	10592	10778	10890	11001	11150
Target (Alingana)	28868	28868	28868	28868	28868	28868	28868	28868	28868	28868	21651	21651
Production Volumes(Lakh Units)	1.51	1.31	1.64	1.93	2.31	2.80	2.80	2.85	2.90	2.93	2.96	3.00

The scope 3 inventory provides a quantitative tool to identify and prioritize emissions-reduction opportunities along their value chain. Scope 3 inventories provide detailed information on the relative size and scale of emission-generating activities within and across the various scope 3 categories. This information may be used to identify the largest emission sources in the value chain and focus efforts on the most effective emission-reduction opportunities, resulting in cost savings for companies.

For scope 3 inventorization , we have collected the data from various agencies for calculated the scope 3 emission :-

1. Supply chain team(Material logistics from vendor park)
2. Material Logistics from outside of location.
3. Admin team-Employee transportation for daily commute.
4. Admin team-Employee transportation for Business travel.

All business trip requests are monitored through Quest2travel portal.





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**

The collage shows three main documents:

- Environmental Policy:** Tata Motors reaffirms its commitment to minimize the adverse impact of its products, operations and services on the environment.
- Climate Change Policy:** Tata Motors is committed to...
  - Developing products powered by alternate fuels and having higher recyclable and recoverable contents.
  - Promoting fuel blends sourced from non-fossil fuel sources.
  - Maximizing use of renewable energy.
  - Proactively engaging with Government, forums and institutions in shaping related regulations.
  - Facilitating and maximizing reduction in carbon footprint throughout value chain.
  - Actively working for carbon sequestration and community initiatives for resource conservation.
- Environmental Procurement Policy:** Tata Motors shall adopt a holistic approach to the procurement process by...
  - Expanding awareness of Tata Motors' Environmental Policy, and 'Code of Conduct' amongst Vendors, Contractors and Service Providers through various means;
  - Involving Vendors, Contractors and Service Providers to improve their environmental performance by establishing an Environment Management System.
  - Encouraging Vendors, Contractors and Service Providers to improve their facturing process to reduce their carbon footprint and use of chemicals.
  - Encouraging Vendors, Contractors and Service Providers to minimize logistics and packaging material, and maximize reuse and recycling of packaging material and use of recycled materials.

## 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



Corrugated box packaging replaced with returnable trolleys for alternators.

Before



After



Corrugated box packaging replaced with FLC boxes

Before



After



Corrugated box packaging replaced with returnable trolleys for dashboards.

Before



After



Corrugated box packaging replaced with FLC boxes

Before



After



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



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

**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**



- 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)

Thanks to CII for creating this 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.

**Premium Tough Modular Platform - Tata Intra**

**Tata Motors**  
Made in India, serving the World.

Single CV platform to manufacture 36 variants with a range of 0.8 tons to 17 tons for six different applications.

Marketed in 21 countries. Protected by 6 patents.

**Team Members:**  
Aniradha Kulkarni, Prashant Thakare, Arvind Duggarwal, Chetan Chaudhary, Ravindra Deshpande

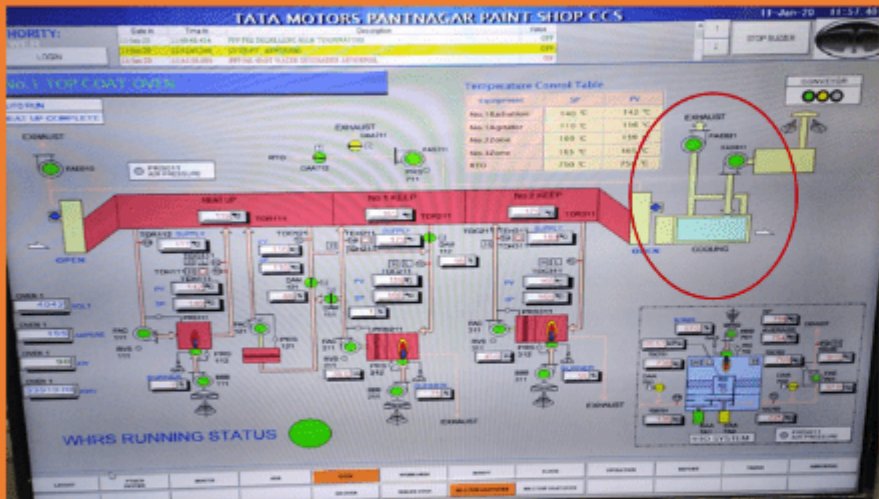
## Innovista categories of recognition

<b>PILOTED TECHNOLOGIES</b> For successfully piloted technologies that are yet to be commercialized (between TRL 4 & 7)	<b>Definition</b> 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
<b>In-Progress Innovations</b> For innovation Projects that are in pipeline Process, Service, Business Models : TRL 2 to TRL 8 Product Technologies : TRL 2 QR TRL 8	
<b>DARE TO TRY</b> For audacious attempts that could not succeed	<b>Qualification criteria</b> Project should be at TRL - 4 & should not have crossed TRL - 7 as on Sept 30, 2017.
<b>IMPLEMENTED INNOVATIONS</b> For innovations that are successfully implemented & commercialized	<b>Evaluation Criteria</b> Novelty / Uniqueness of the technology Alignment with Company goals Potential impact of the outcome Type: Economic, Environmental, Social On: Customer, Company, Industry, Community
<b>DESIGN HONOUR</b> For implemented designs that deliver a great user experience through functional and aesthetics	



**Problem statement:** In sealer oven cooling supply (30 KW) and exhaust blower (18.5) are for cooling down hot body which are exiting from oven, during heat up time when bodies are not exiting from oven, these blowers used to run idle (During lunch, tea and heat up time)

## BEFORE CONDITION – Photograph/ Sketch/ diagram

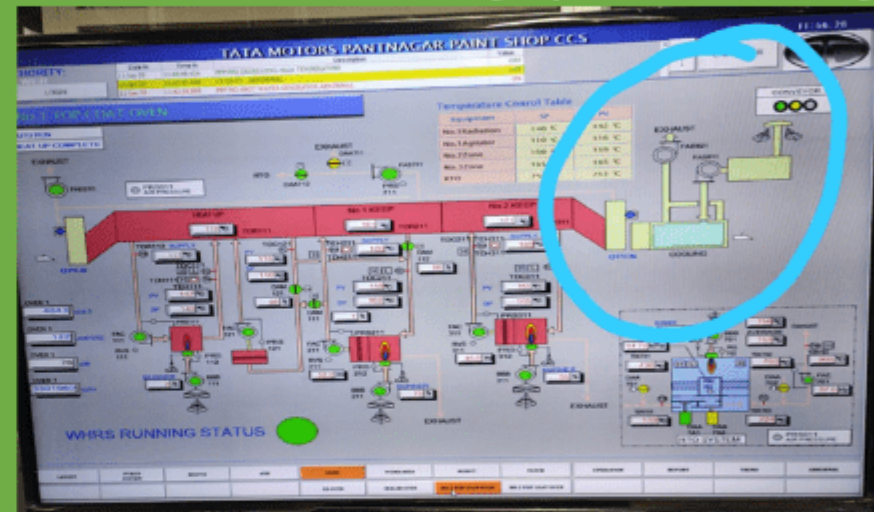


**Brief Description:** Idle running of cooling supply and exhaust blower when there is no heat up and bodies are not coming out of oven.

**Energy Saving:** Annual Power saving of 12115 KWH

**Cost Saving:** Annual cost savings of Rs. 0.8 Lacs

## AFTER CONDITION- Photograph/ Sketch/ diagram



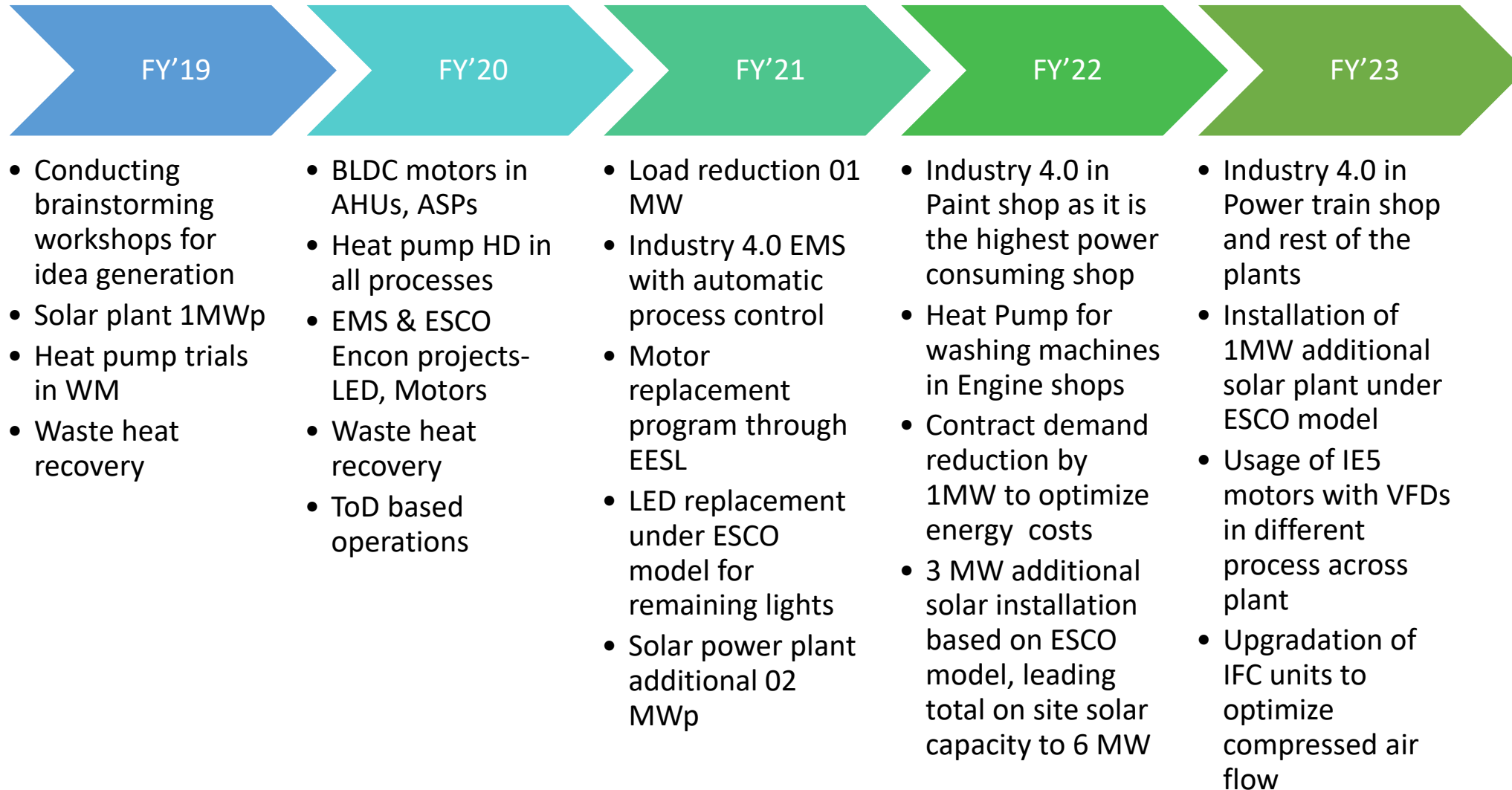
**Brief Description:** Now switched off these blowers when bodies are not exiting from oven and heat up of oven is not completed from PLC programming.



Zero Investment

**CO2 footprint Saving:** 9934 KG

# Roadmap To Surpass And Sustain National Benchmark



# 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