

# Tata Motors Limited Lucknow Works

**Represented By :**

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Confederation of Indian Industry

**TATA MOTORS**  
Connecting Aspirations

## National Award for Excellence in Energy Management 2021

Category **Excellent Energy Efficient Unit**

Sector **Automobile**

Unit **CVBU - Lucknow, Tata Motors Limited**

**ISO 50001:2011**

**ISO 45001:2018**

**IATF 16949:2016**

**ISO 14001:2015**

❖ Tata Motors Limited is

- India's largest automobile company,
- Consolidated revenues of **Rs. 2,49,795 crore's (34.70 Billion USD) in 2020~21**
- We are the **leader in commercial vehicles** in each segment

❖ Tata Motors -**CVBU Lucknow** is

- Established in **1992** to meet the demand of Commercial Vehicles in Indian & overseas market.
- Specialized in the designing and manufacturing of a range of modern buses – Low floor, Ultra Low floor, CNG & RE Buses.
- Prominent customers include **DTC , MSRTC, KSRTC,APSRTC, TSRTC JnNURM, UPSRTC and other STUs.**



**MORE WHEN ONE**

**Tata Motors-Lucknow provides complete Mobility solutions for Commercial Vehicles**

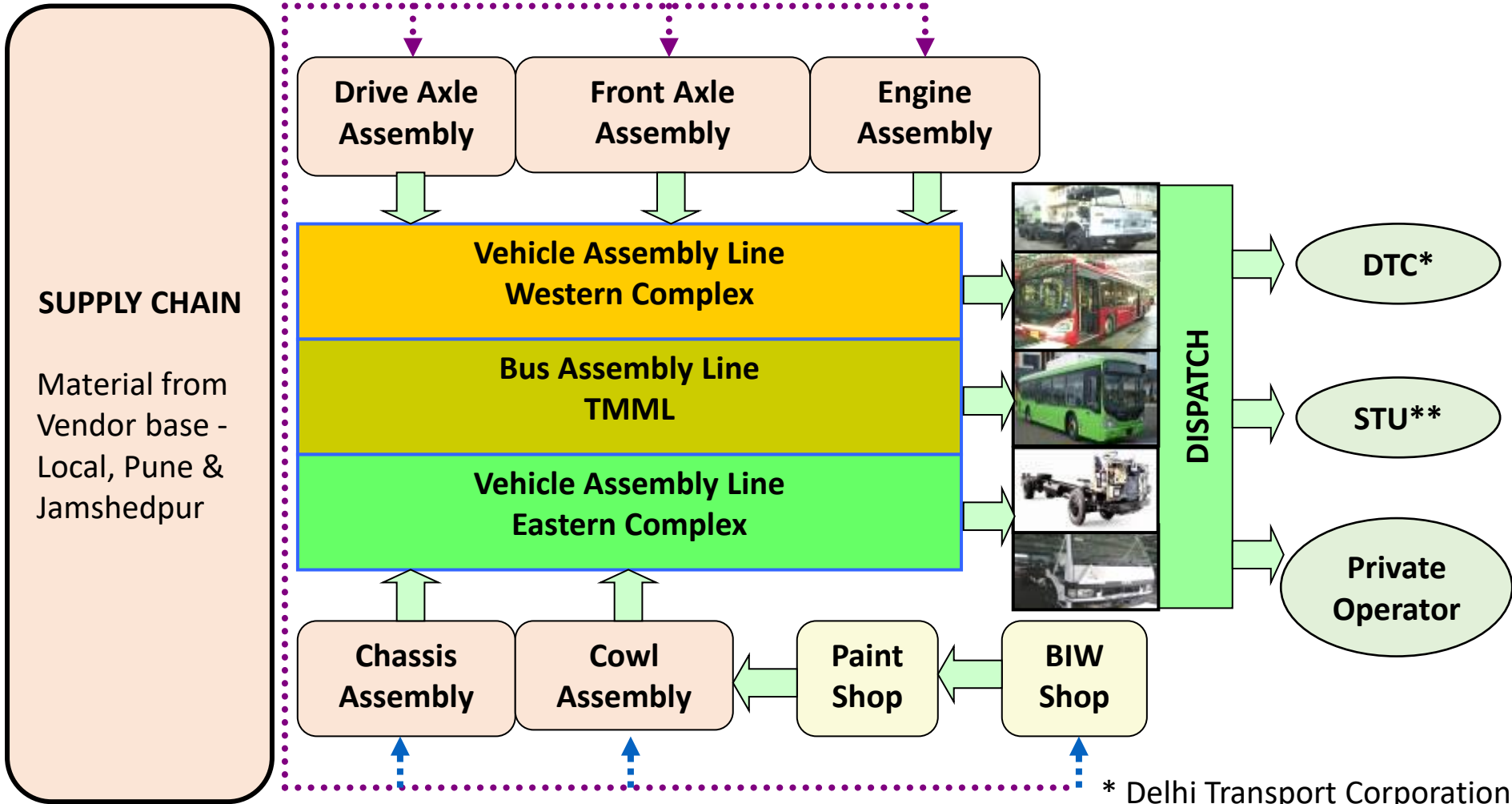
BE BOLD | OWN IT | SOLVE TOGETHER | BE EMPATHETIC

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# Brief introduction on Plant

## Plant Process

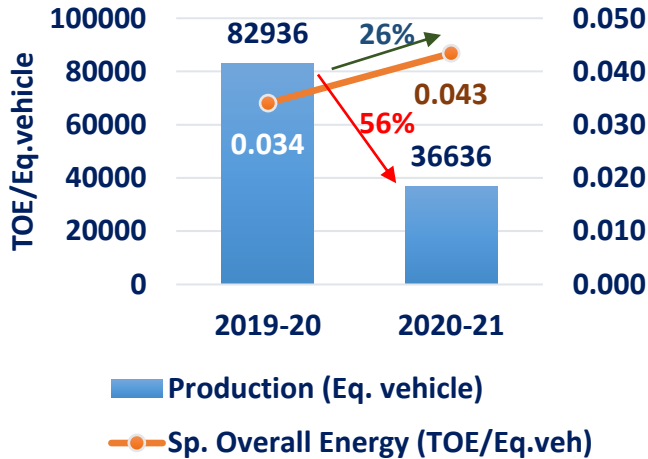


\* Delhi Transport Corporation

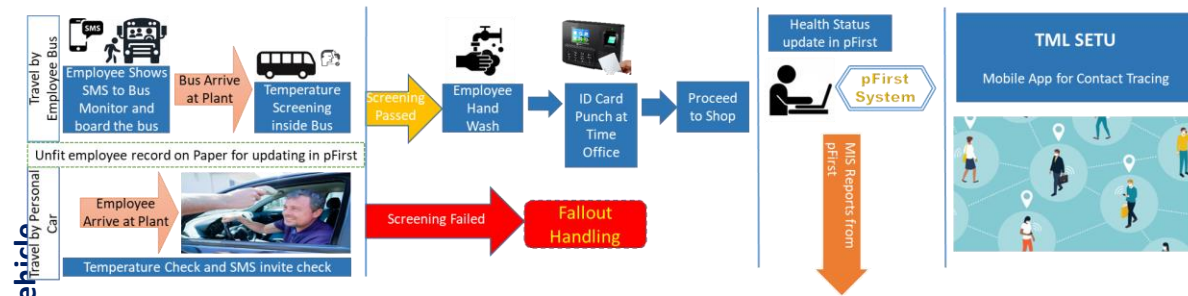
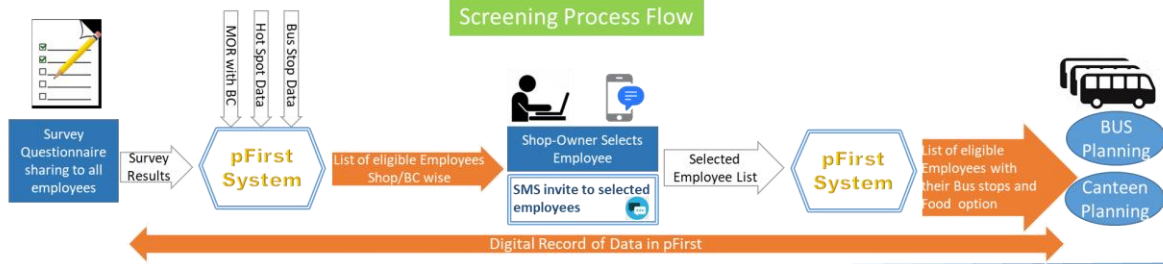
\*\*State Transport Unit

## 2. Impact of COVID 19

- Drastic drop in production by 56% w.r.t. FY2019-20
- Very low production affected specific energy consumption adversely, which got increased by 26% w.r.t. FY2019-20
- Delay in planning and execution of energy conservation projects such as
  - LED lighting migration
  - LT Ring Distribution System for Paint Shop and BIW sub-station
  - Single-phase BLDC fans and so on.



Developed in-house Software 'TML Setu' similar to Arogya Setu for Employee Screening and COVID Contact Tracing



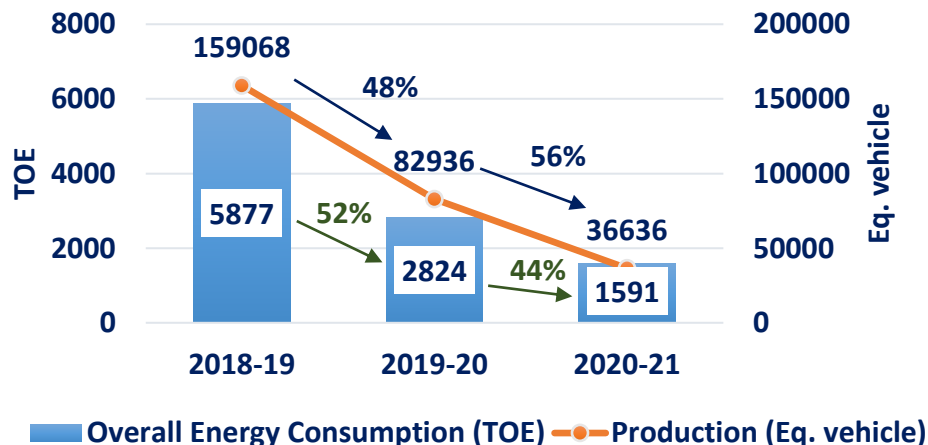
**TML Setu : One-stop Solution for COVID Health Information Flow to all Employees and Stakeholders**



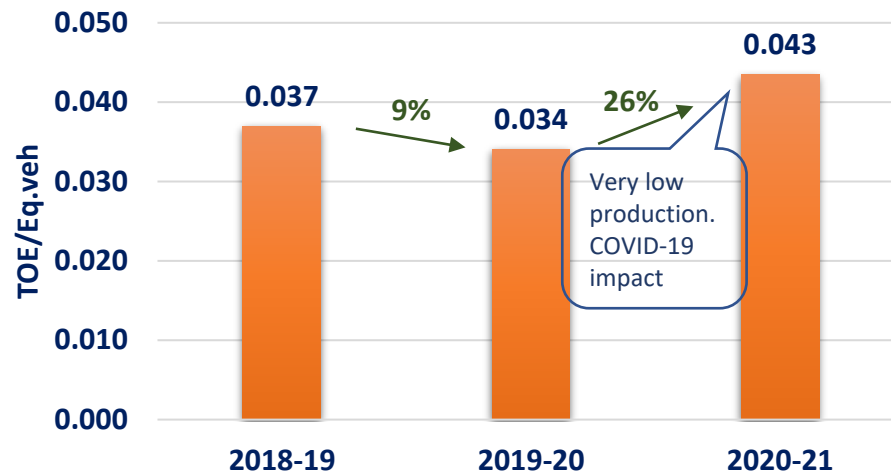
We converted the challenge posed by COVID pandemic into opportunity by focused study of each manufacturing process and identified and implemented actions to reduce Fixed Energy consumption

### 3. Specific Energy Consumption in Last 3 years (2018-21)

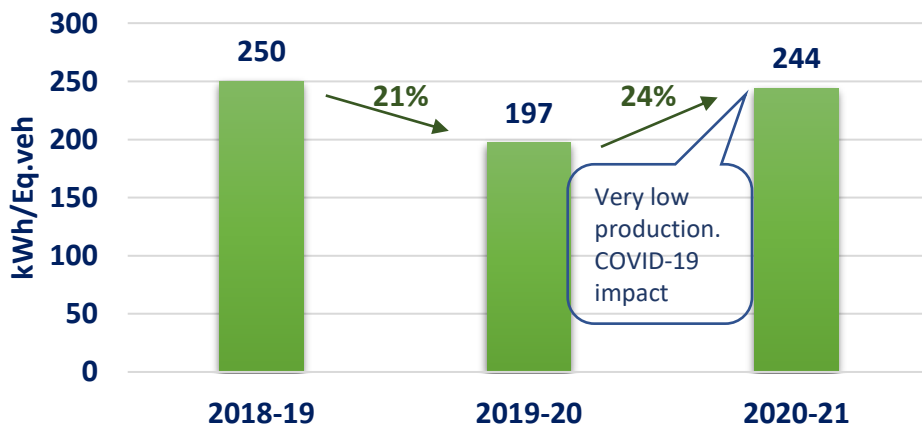
Overall Energy (TOE) and Production – Last 3 years



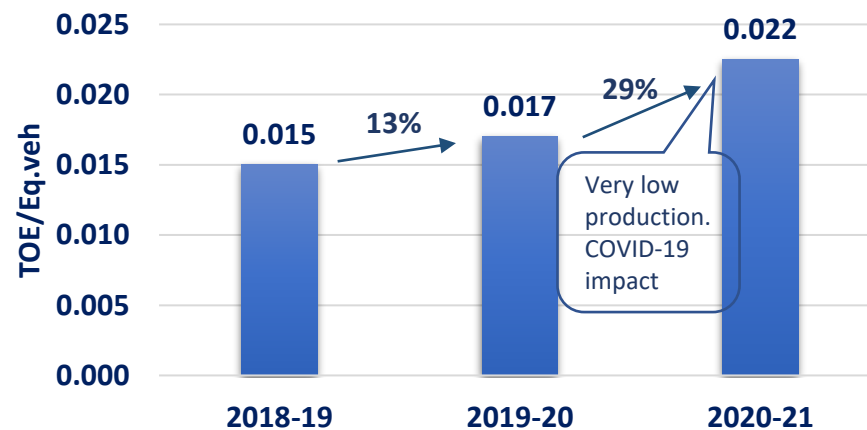
Sp. Overall Energy Consumption (TOE/Eq. veh)



Sp. Electrical Energy Consumption (kWh/Eq. veh)



Sp. Thermal Energy Consumption (TOE/Eq. veh)



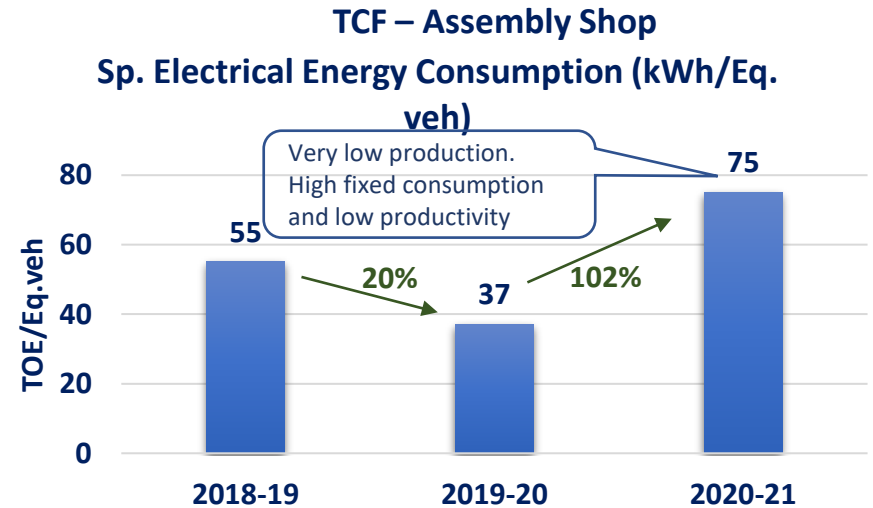
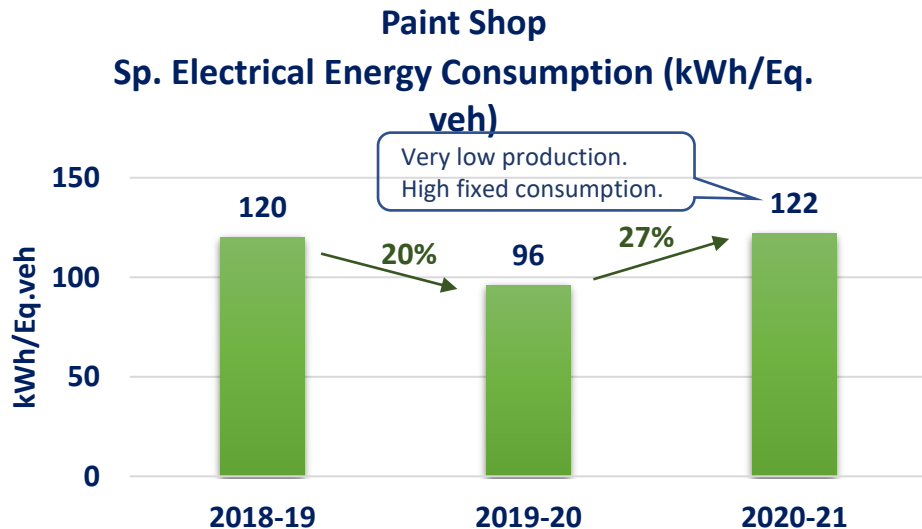
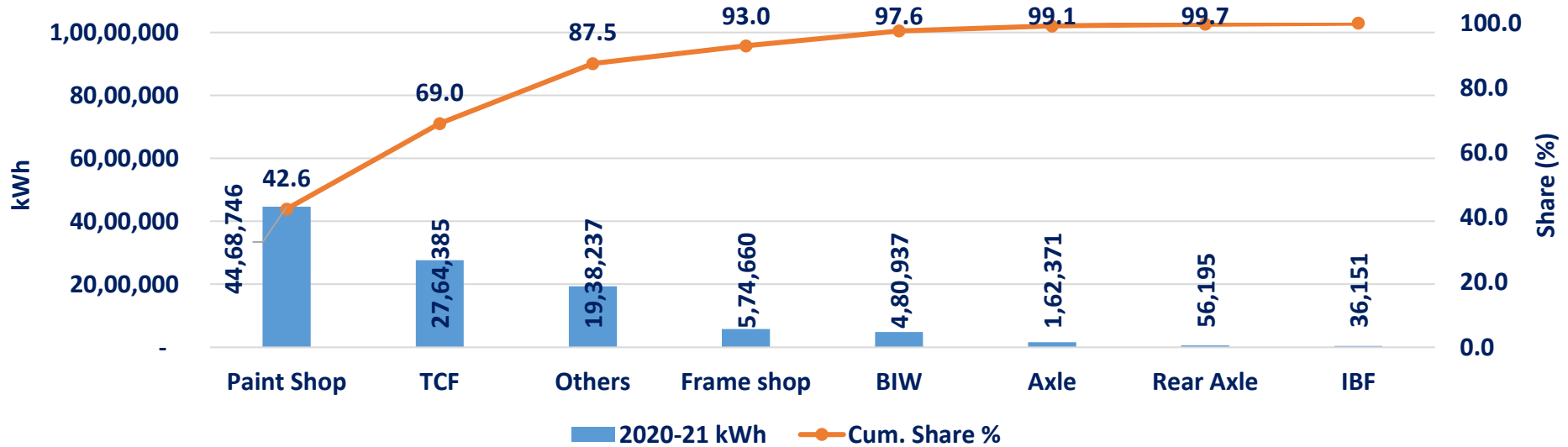
Fuels used in Shops: Propane in Paint Shop

Overall Energy Consumption reduced by 73% over the last 3 years through Fixed Energy reduction measures while production reduced by 77%



### 3. Specific Energy Consumption in Last 3 years (FY 201-21)

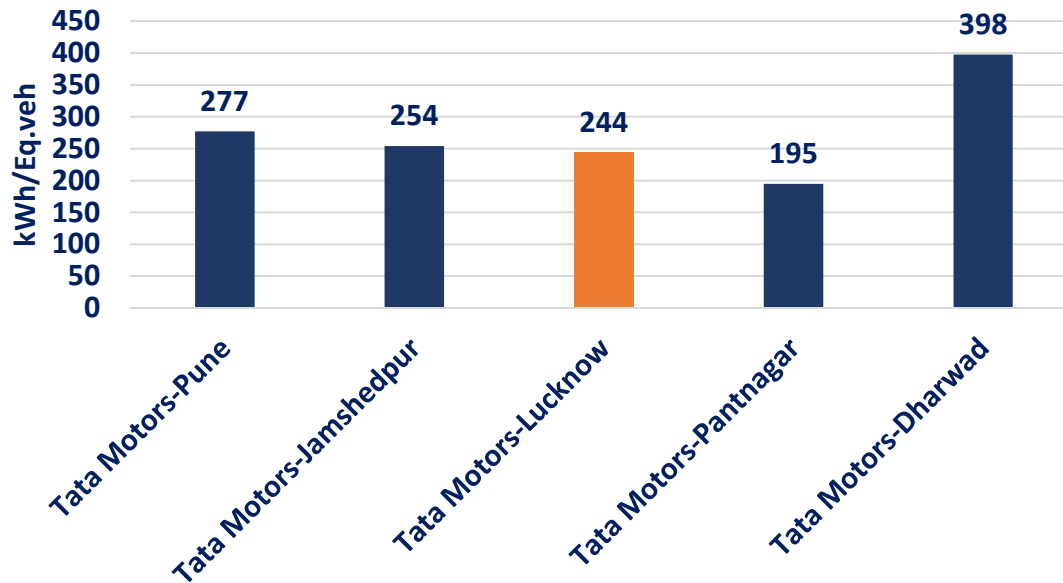
Pareto Analysis : Shopwise Electrical Energy Consumption 2020-21



Low productivity affected Energy Consumption across all Processes and Shops

# 4. Information on Competitors, National & Global benchmark

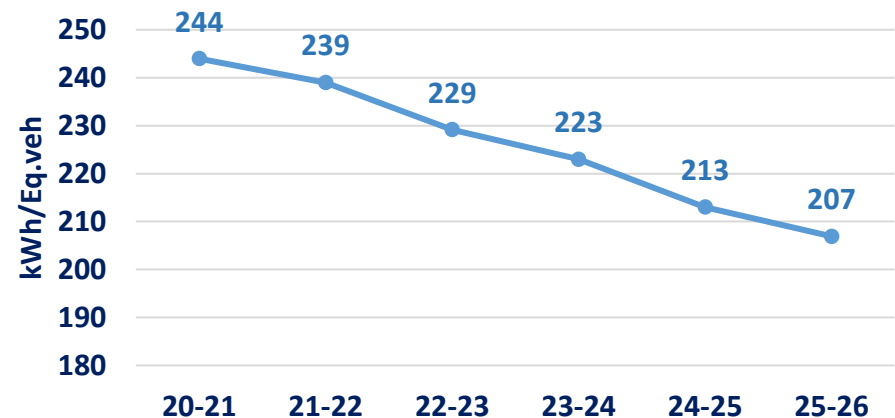
Internal Plant-wise Specific Energy Consumption 2020-21 (kWh/Eq.veh)



## Key Initiatives for Energy Reduction Target

- Reduction of plant's fixed energy consumption on non-working days from 15880 kWh to 11000 kWh
- LED lighting migration from existing 15% to 100% across the plant
- Conversion of 3-phase mancoolers to 1-phase mancoolers 990 nos.
- Implementation of Industry4.0 for process and utilities operations
- Adopting new technologies – reactive power management, energy-efficient motors/pumps/blowers/compressors, VFDs, Heat Pumps.

Short Term and Long Term Target (kWh/Eq.veh)



**Pantnagar plant is the benchmark in energy-efficiency amongst Tata Motors plants**

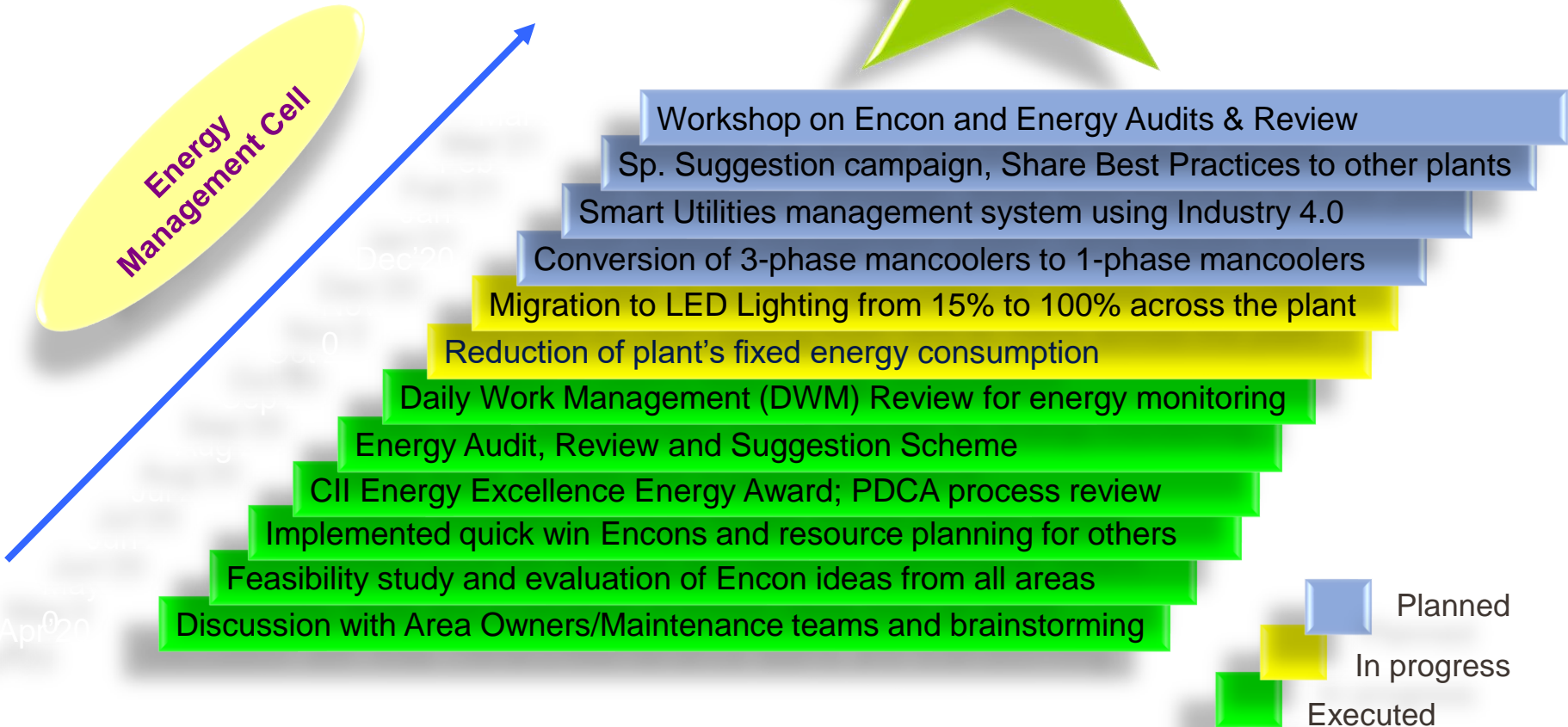




# 4. Information on Competitors, National & Global benchmark

## Roadmap for Achieving Long Term Target of Energy Consumption

Roadmap set for 2021-26



Roadmap has been set for achieving Long Term Target of Energy Consumption

## 4. Information on Competitors, National & Global benchmark

### List of Major Encon Projects Planned in FY 2021-22

### Technological Upgradation, Idle Time elimination, Energy efficiency measures, Localised RE

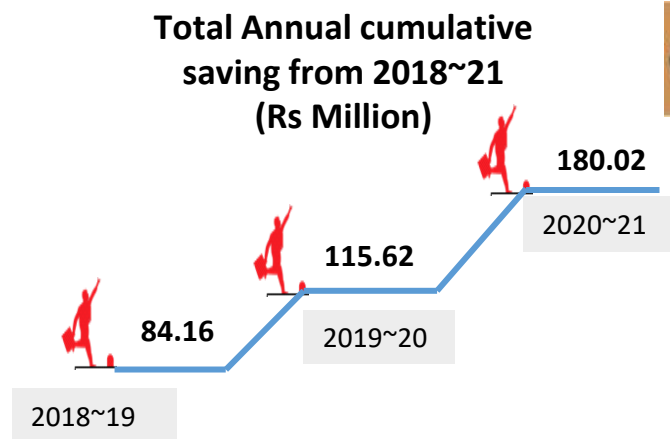
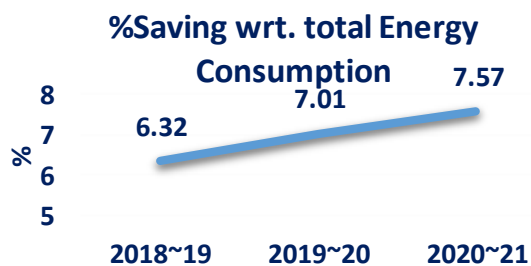
Sr. No.	Status and Action Plan	Annual Electrical saving ( Lacs kwh)	Annual Cost saving (Rs.)	Investment(Rs. Lacs)	Payback Period (Months)
<b>1</b>	<b>Opex Model based Projects</b>				
(a)	Open Access power purchase (Phase-1)	25.20	10.84		
(b)	LED Lighting Migration project (Most Critical) in Eastern Complex and balance Western Complex. Only those luminaires glowing for >8 hours, considered) Luminaires 5459 nos.	18.56	158.71		
(C.)	Replacement of 3-phase mancoolers by single phase mancoolers in TCF, BIW and Axle Shop	5.44	46.49		
<b>2</b>	<b>Capex/Revenue based projects</b>				
(a)	Installation of 5 nos. VFD for ASU Blowers (rated 132kW, 110kW, 90kW, 75kW, 30kW, 22kW, 18.5kW, 15kW, 11kW)	4.03	34.48	105	36 months, considering single shift operations
(b)	LT Ring distribution system TCF and Service sub-stations/AB sub-station (Line-1 SB-5 area)/AA sub-station (Line-1 SB-1 area)- will Connect to BA S/s.	1.44	12.31	13	13
<b>3</b>	<b>RE Based projects</b>				
(a)	Renewable Energy sourcing through Open Access (Phase-2)- Shifting from Brown to Green		5.16		
(b)	Enhanced capacity utilisation of 4 MWp Solar Power Plant. From April/May Diff between LY & CY, Solar Power 431 KW Option Part & solar showcase project.		6.71		

**Total annual Energy saving 53.71 Lac kWh | Total annual Cost saving Rs. 266.49 Lac | Total investment Rs. 118 Lac**

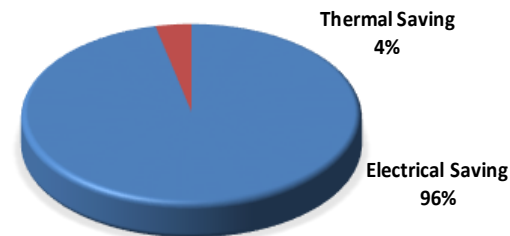
## 5. Energy Saving projects implemented in for last three years

### Encon's Summary

Year	Electrical	Thermal	Annual Electrical Saving (Lakhs kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving Quantity (MT)	Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)	% Saving wrt Total Energy consumption
	Lakhs Kwh	MT								
2018~19	397.20	2040	59.05	51.37	73.00	2.77	54.15	15.3	3.39	6.32
2019~20	163.10	1181	36.21	28.97	65.50	2.49	31.46	16.24	6.20	7.01
2020~21	104.81	648	74.88	64.40	28	1.01	65.41	15.63	2.86	7.57



**CUMULATIVE SAVING IN LAST 3 YEARS RS. Million**



**Total Cumulative annual energy saving in last 3 years is Rs. 18 Cr**

## 5. Energy saving projects implemented – 2018~19

No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving		Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
					Quantity	Unit of Measurement				
1	LED Migration project for Phase-01	2018-2019	2460000	19.7	0	kgs	0	19.7	12.60	7.7
2	Optimization of compressed air energy	2018-2019	400000	3.2	0	kgs	0	3.2	0.2	0.8
3	Elimination of C-Shift production	2018-2019	500000	4.0	0	kgs	4	8.0	0.5	0.8
4	Low Temperature Phosphate Chemical introduction	2018-2019	0	0.0	10000	kgs	0.42	0.4	0	0.0
5	Empty Skid storage installation	2018-2019	0	0.0	25000	kgs	1.05	1.1	2	0.0
6	Installation of Heat Recovery System	2018-2019	0	0.0	35000	kgs	1.47	1.5	0	0.0
7	Implementation of Magnetic Inductor System in the Gas burner units	2018-2019	0	0.0	3000	kgs	0.13	0.1	0	0.0
8	Empty skid storage system	2018-2019	236400	1.9	0	kgs	0	1.9	0	0.0
9	Optimization of pumps operation in PTED	2018-2019	200000	1.6	0	kgs	0	1.6	0	0.0
10	PT/ED line Batch Production	2018-2019	200000	1.6	0	kgs	0	1.6	0	0.0
11	Avoid Chain running of floor conveyors during idle time	2018-2019	75000	0.6	0	kgs	0	0.6	0	0.0
12	Stoppage of production on Saturdays.	2018-2019	100000	0.8	0	kgs	0	0.8	0	0.0
13	To reduce the energy consumption of FDV in BIW by 5%	2018-2019	6832	0.1	0	kgs	0	0.1	0	0.0
14	To reduce the energy consumption of compressed air in BIW by 5%	2018-2019	24075	0.2	0	kgs	0	0.2	0	0.0
15	To reduce the energy consumption of CAB line in BIW by 5%	2018-2019	148277	1.2	0	kgs	0	1.2	0	0.0
16	To reduce the energy consumption of office power consumption by 5%	2018-2019	830489	6.6	0	kgs	0	6.6	0	0.0
17	Reduction in trim assy. Line consumption by 5%	2018-2019	49462	0.4	0	kgs	0	0.4	0	0.0

**Total energy saving in 2018-19 was Rs. 5.43 Cr**

## 5. Energy saving projects implemented – 2018~19

No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving		Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
					Quantity	Unit of Measurement				
18	To reduce the energy consumption of manufacturing by 5%	2018-2019	212140	1.7	0	kgs	0	1.7	0	0.0
19	To reduce the energy consumption of office power consumption by 5%	2018-2019	27	0.0	0	kgs	0	0.0	0	0.0
20	Reduction in trim assy. Line consumption by 5%	2018-2019	48	0.0	0	kgs	0	0.0	0	0.0
21	To reduce the energy consumption of manufacturing by 5% at TCF line 2 & 3	2018-2019	91	0.0	0	kgs	0	0.0	0	0.0
22	Reduction in power consumption of PE shop	2018-2019	32083	0.3	0	kgs	0	0.3	0	0.0
23	LED Street light replacement of 250W to 100W LED for load reduction.	2018-2019	48000	0.4	0	kgs	0	0.4	0	0.0
24	Optimization of street lighting	2018-2019	9500	0.1	0	kgs	0	0.1	0	0.0
25	Astronomical Timer ON/OFF operation control of street light.	2018-2019	12500	0.1	0	kgs	0	0.1	0	0.0
26	Temperature Optimisation	2018-2019	25000	0.2	0	kgs	0	0.2	0	0.0
27	Running hours optimisation of AC plants	2018-2019	50000	0.4	0	kgs	0	0.4	0	0.0
28	Optimising the capacity of AC system by giving alternate solution of cooling.	2018-2019	15000	0.1	0	kgs	0	0.1	0	0.0
29	Replacing of old celdac pads at Eastern Complex	2018-2019	50000	0.4	0	kgs	0	0.4	0	0.0
30	Optimised running hours of Eastern complex FDV blower.	2018-2019	25000	0.2	0	kgs	0	0.2	0	0.0
31	Optimised running of service bay FDV blowers	2018-2019	50000	0.4	0	kgs	0	0.4	0	0.0
32	Optimised operation of FDV in F Block(Trim Line-1)	2018-2019	15000	0.1	0	kgs	0	0.1	0	0.0
33	Reduction of Specific power consumption through optimized running of compressors (mix)	2018-2019	80000	0.6	0	kgs	0	0.6	0	0.0
34	Reduction of Specific power consumption in CV-Cx & TCF line	2018-2019	50000	0.4	0	kgs	0	0.4	0	0.0
<b>Total</b>			<b>5904924</b>	<b>47.2</b>	<b>73000.0</b>	<b>0.0</b>	<b>7.066</b>	<b>54.31</b>	<b>15.30</b>	<b>3.38</b>

**Total energy saving in 2018-19 was Rs. 5.43 Cr**

## 5. Energy saving projects implemented – 2019~2020

No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving		Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
					Quantity	Unit of Measurement				
1	LED lighting migration project (Phase-I) in Line-1 and street lighting system	2019-20	20,61,640	16.78	0	0	0	16.78	12.59	9.00
2	Installation of VFDs in CED circulation pumps of Paint Shop	2019-20	2,01,480	1.64	0	0	0	1.64	0.90	6.59
3	Elimination of idle running of supply and exhaust fans in ED and Top Coat-2 ovens in Paint Shop	2019-20	85,000	0.69	0	0	0	0.69	0.00	-
4	Optimization of running hours of hot water pump of Phosphating heat exchanger in Paint Shop	2019-20	61,250	0.50	0	0	0	0.50	0.00	-
5	Elimination of idle running of overhead conveyor	2019-20	36,675	0.30	0	0	0	0.30	0.00	-
6	Auto switching off of mancoolers in Paint Shop through PLC	2019-20	31,200	0.25	0	0	0	0.25	0.00	-
7	Optimization of conveyor pit lighting system in Line-2 and Trim-2 by installing centralized switch at the entrance of pit	2019-20	30,528	0.25	0	0	0	0.25	0.01	0.48
8	Stopping operation of 150 TR AC plant at Triangular Office by installing 3 TR tower AC in conference room	2019-20	45,000	0.37	0	0	0	0.37	0.06	1.97
9	Study and optimizing Metrology AC plant operation. After a detailed study and checked cross TML location. We optimised running hours of Metrology AC plant. Earlier it was used to be operational for 24X7 absis now we stop after G shift and restart in morning. Energy saving (From Sept to March). Daily consumption in July-976 KWH/day Daily consumption in Oct-72 units/day	2019-20	89,000	0.72	0	0	0	0.72	0.00	-
10	Stopping operation of 150 TR AC plant at triangular office by installing 3 TR tower AC at conference room. Earlier occupants used to ask for central AC plant for B shift officers and stay back. After installation of Tower AC in one of conf room we have eliminated requirement of running central AC plant after office hours as they use to sit in conf room. Daily saving- 650 Units/day	2019-20	36,000	0.29	0	0	0	0.29	0.50	20.5
11	Restricting unauthorized changes in temperature setting of unitary AC's by placing an innovative mode of changes in AC PCB board.	2019-20	12,500	0.10	0	0	0	0.10	0.76	89.63
12	Setting of water cooler temp. to minimum thermostat setting of 2/3 in all water coolers (124 Nos).	2019-20	40,000	0.33	0	0	0	0.33	0.00	-
13	Timer based operation of Water coolers	2019-20	25,000	0.20	0	0	0	0.20	1.12	65.81
14	Single blower operations in all FDV's. Switching off FDV during lunch time.	2019-20	3,46,500	2.82	0	0	0	2.82	0.00	-

**Total energy saving in 2019-20 was Rs. 2.90 Cr**



## 5. Energy saving projects implemented – 2019~2020

No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving		Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
					Quantity	Unit of Measurement				
15	Optimized running of AC at training Centre by combining the class room.	2019-20	13,000	0.11	0	0	0	0.11	0.00	-
16	Setting of office temp from 25±1°C degree to 27±1°C and optimizing AC usage.	2019-20	95,000	0.77	0	0	0	0.77	0.00	-
17	Increasing room temp. from 20±1°C to 25±1°C in all UPS room/networking room.	2019-20	3,000	0.02	0	0	0	0.02	0.00	-
18	<p>Problem: Optimisation of sp. power air generation</p> <p>After improvement done in PMR at paint shop, air demand during non production time reduced drastically from 400 CFM to 90 CFM. So we have lowest capacity compressor at EC Compressor house is 500 cfm. So it runs on partial loading which cause loss of energy due to high sp. air generation i.e. 0.25~0.3 KWH/cub mtr against 0.16 KWH/Cub mtr.</p> <p>Acton Taken:</p> <p>We had taken out one small capacity compressor of 100 cfm from training centre by giving a tapping from interconnection to Prolife from our WC compressed air network and made it operation at CAB compressor house.</p> <p>Now we run this small capacity compressor from CAB compressor house to maintain minimum demand from paint shop. It resulted to normalise the SPC to its optimal level i.e. 0.16 KWH/cub mtr.</p>	2019-20	25,000	0.20	0	0	0	0.20	0.00	-
19	<p>Kaizen ( 1433)</p> <p>-Air supply in unwanted area</p> <p>-Optimization of compressed Air at BIW Shop through a kaizen</p> <p>Approx. 200 KWH/Day saving achieved</p> <p>Provided a separate compressed air point at loading area in such a way entire shop network can be remain isolated during working a t loading area.</p> <p>We have worked on threaded joints to convert into weld joints. There was a difficulty to work as the piping network is located under pit area.</p>	2019-20	25,000	0.20	0	0	0	0.20	0.00	-
20	Developed Portable compressors(3 nos) for using non routing activity at shop floor. Used at TCF Dynalometer, PE shop, TCF R2 Area & Logistic Area in TCF.	2019-20	83,000	0.68	0	0	0	0.68	0.00	-
21	Compressed air connection to punching machine in frame shop at Assembly line 1 from paint kitchen connection.	2019-20	8,000	0.07	0	0	0	0.07	0.00	-

## 5. Energy saving projects implemented – 2019~2020

No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving		Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
					Quantity	Unit of Measurement				
22	A separate pipe line to PMR and wax batch preparation section to eliminate energy loss due to leakages in the shop during non production days.	2019-20	1,02,000	0.83	0	0	0	0.83	0.30	4.34
23	Further reduction in Paint shop. We have provided a portable compressor during Lockdown and found successful to meet the compressed air requirement. It has eliminated requirement of main compressor running from EC compressor house.	2019-20	8,750	0.07	0	0	0	0.07	0.00	-
24	Optimizing of supply air pressure to shops and reduction air pressure to paint shop during non working night shift. Set the delivery pressure to shops as follows: BIW- 5.6 Bar @ Saving is 16,000 KWH/Year TCF- 5.6 Bar @ Saving is 40,000 KWH/Year Paint shop- 5.8 Bar @ Saving is 28000 KWH/Year	2019-20	67,000	0.55	0	0	0	0.55	0.00	-
25	Reducing Fixed Air demand: A separate compressed air provision to rust analyzing machine at Metallurgy lab. At Metallurgy lab, there is fixed compressed air requirement in rust testing machine. It requires continuous air flow in the machine for complete testing cycle of 10 days. Action Taken: Phase 1: A separate compressed air line provided from adjacent installed small compressor for Metrology lab. Now Metallurgy lab team can run this compressor after main compressed air supply from network. So no need to feed compressed air from main network system. Phase 2: We have studied the compressed air network from CAB comp house to Metallurgy lab including all branches of distribution. Found, Valve location and network distribution to be modified so that air can supply to	2019-20	90,000	0.73	0	0	0	0.73	0.00	-
26	Use of monocoat application in CAB painting at Paint shop				20000	Kgs	0.76			
27	Open window optgimisation in top coat & ED oven				18000	Kgs	0.684			
28	Batch production in paint shop by optimising availability of CAB/Cowl from weld shop				27500	Kgs	1.045			
<b>Total</b>			<b>36,21,523</b>	<b>29</b>	<b>65,500</b>	<b>Kgs</b>	<b>2.49</b>	<b>29</b>	<b>16</b>	<b>6.61</b>

## 5. Energy saving projects implemented – 2020~2021

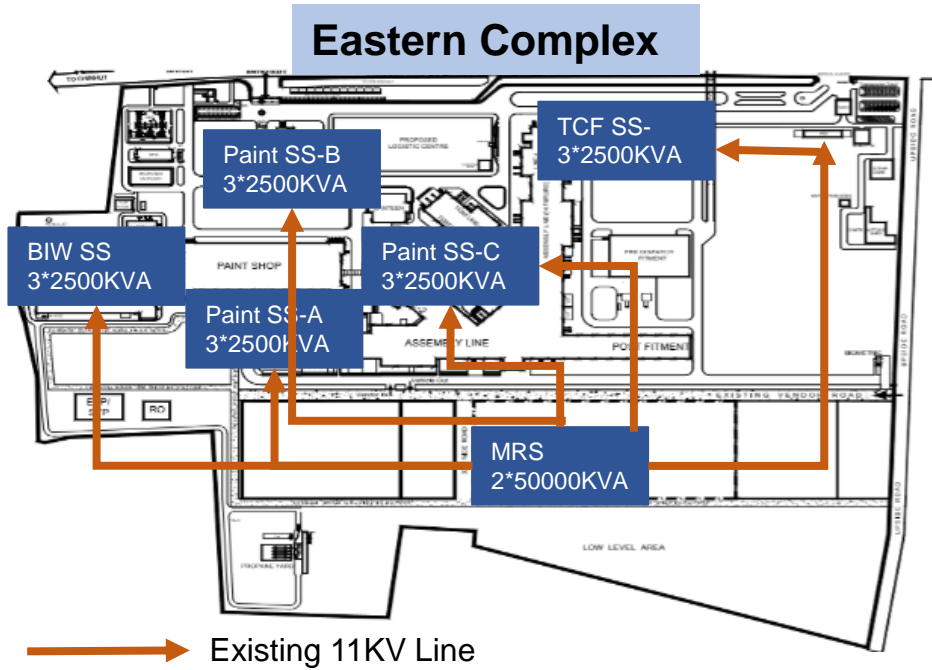
No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving		Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
					Quantity	Unit of Measurement				
1	Controlled use of canteen utilities, training centres, offices etc. w.r.t the operational condition of the plant	2020~21	3,83,721	3.30				3.30	0.00	0
2	Optimization of Air Conditioning services in UPS & Network Rooms	2020~21	89,535	0.77				0.77	0.00	0
3	Assembly Line-1 optimization	2020~21	28,87,047	24.83				24.83	0.00	0
4	Transmission Factory optimization	2020~21	53,041	0.46				0.46	0.00	0
5	IBF shop optimization	2020~21	2,31,155	1.99				1.99	0.00	0
6	Optimization of Street Light W.C.	2020~21	43,953	0.38				0.38	0.00	0
7	Main Office & WGC Office optimization	2020~21	3,00,700	2.59				2.59	0.00	0
8	HT office Partial optimization	2020~21	2,30,512	1.98				1.98	0.00	0
9	Pump House-W.C. partial running	2020~21	74,230	0.64				0.64	0.00	0
10	ETP-W.C. partial running	2020~21	7,790	0.07				0.07	0.00	0
12	FDVs to be kept switched off till Q1 2020	2020~21	4,88,372	4.20				4.20	0.00	0
13	Switching off no-load transformers in MRS and sub-stations	2020~21	14,475	0.12				0.12	0.00	0
14	Extending LT 415V ring distribution system from Paint shop to TCF and Service sub-stations in eastern complex	2020~21	12,558	0.11				0.11	0.00	0
15	Optimization of Utility services – All Water coolers (124 Nos.) will be kept in switched off mode for Qtr 1	2020~21	62,907	0.54				0.54	0.00	0
16	Optimization of Utility services – All desert coolers (230 Nos.) will be kept in switched off mode for Qtr 1	2020~21	62,209	0.54				0.54	0.00	0
17	Reducing the total quantity of installed Hired AC's by 73%	2020~21	1,03,605	0.89				0.89	0.00	0
18	Transfer of Remote switch controller from Line-1 FDV to TCF FDV	2020~21	81,395	0.70				0.70	0.00	0
19	Solar Power plant on RCC roofs over WGC building and Time Office-W.C.	2020~21	14,410	0.12				0.12	0.00	0
20	LED project - Phase -II	2020~21	8,83,721	7.60				7.60	10.00	16
21	Installation of VFDS in ASUs of Paint Shop	2020~21	3,48,837	3.00				3.00	3.00	12

## 5. Energy saving projects implemented – 2020~2021

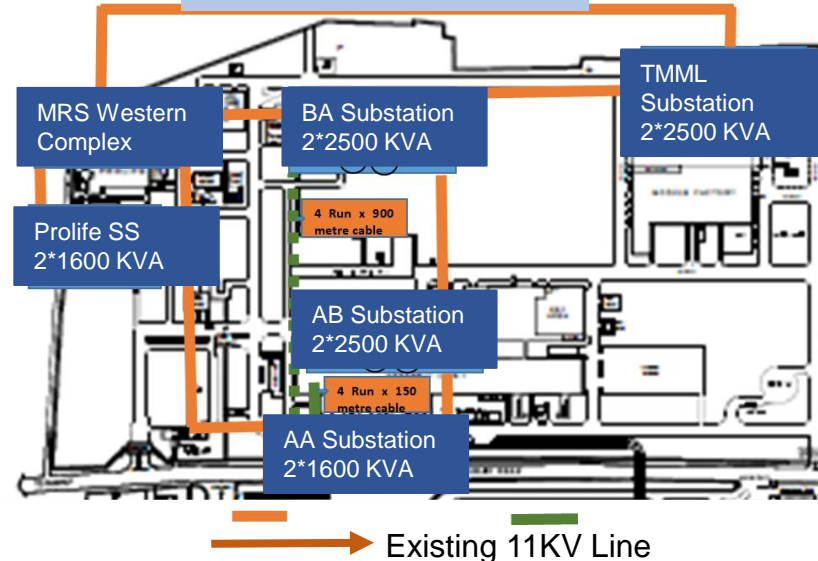
No	Title of Project	Year	Annual Electrical Saving (kWh)	Annual Electrical Cost Saving (Rs million)	Annual Thermal Saving		Annual Thermal Cost Saving (Rs million)	Total Annual Savings (Rs million)	Investment Made (Rs million)	Payback (Months)
					Quantity	Unit of Measurement				
22	Shifting of overhead LED lights of Line-1 to TCF-E.C. as Line-1 will not be operational	2020~21	3,605	0.03				0.03	0.00	0
23	Reduction of ED circulation pump operating frequency from 45Hz to 35Hz	2020~21	1,87,326	1.61				1.61	0.00	0
24	Use of portable compressor for fixed air demand of Paint Shop PMR	2020~21	7,674	0.07				0.07	0.00	0
25	Partial operation of ETP	2020~21	7,790	0.07				0.07	0.00	0
26	Elimination of idle running of mancoolers in Line-1 during lunch breaks and shift change time using day timer	2020~21	4,470	0.04				0.04	0.00	0
27	All Office AC's ( CAB building, Triangular Office, WGC building, Training center, Recruitment center, SB-5 old office, HT office) will be kept in switched off mode for Qtr 1	2020~21	4,68,837	4.03				4.03	0.00	0
28	Smart control system for switching off mancoolers and lights in TCF-E.C. during lunch breaks and shift change time	2020~21	93,023	0.80				0.80	0.00	0
29	Elimination of idle running of mancoolers in Line-1 during lunch breaks and shift change time using GSM-based remote switching unit	2020~21	71,513	0.62				0.62	0.30	6
30	Individual shut-off valves for Front wall, sub-structure and Mainframer lines in BIW	2020~21	30,649	0.26				0.26	0.23	10
31	Timer based operation of Water cooler	2020~21	25,581	0.22				0.22	0.01	1
32	Solar walkway between Tyre Yard-E.C. and MDH-E.C.	2020~21	20,344	0.17				0.17	0.00	0
33	Man coolers switch mapping zone wise as per usage	2020~21	13,023	0.11				0.11	0.07	8
34	Zone-wise compressed air valve for TCF-E.C.	2020~21	73,674	0.63				0.63	0.50	9
35	FDV or Man Coolers to be on only one at a time	2020~21	69,767	0.60				0.60	0.00	0
36	Occupancy sensors for lights at all TCF washrooms	2020~21	2,882	0.02				0.02	0.02	10
37	Prohibit use of lifts	2020~21	3,723	0.03				0.03	0.00	0
38	Elimination of idle running of mancoolers in Line-1 during lunch breaks and shift change time using day timer	2020~21	4,470	0.04				0.04	0.00	0
39	Reorientation of Propane gas pipeline for Paint Shop to optimize consumption	2020~21			28	MT	1.01	1.01	1.50	18
40	Optimized usage of UPS at TCF-E.C.	2020~21	25,776	0.22				0.22	0.00	0
<b>Total - Lucknow Plant</b>			<b>74,88,303</b>	<b>64.40</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>65.41</b>	<b>15.63</b>	<b>2.86</b>

# 6. Innovative Project Implemented

## LT Ring Distribution System between Paint shop Sub-station and BIW Sub-station (Eastern Complex)



## Western Complex



**Problem Definition:** Some of the transformers kept to be switched on during Non-Working day & the contribution in total distribution loss was 44% which needs to be reduced for reduction in fixed energy consumption of NWD.



**Brainstorming by Plant team including CPED, Paint Shop, BIW, Civil and Utilities for reduction of distribution loss**

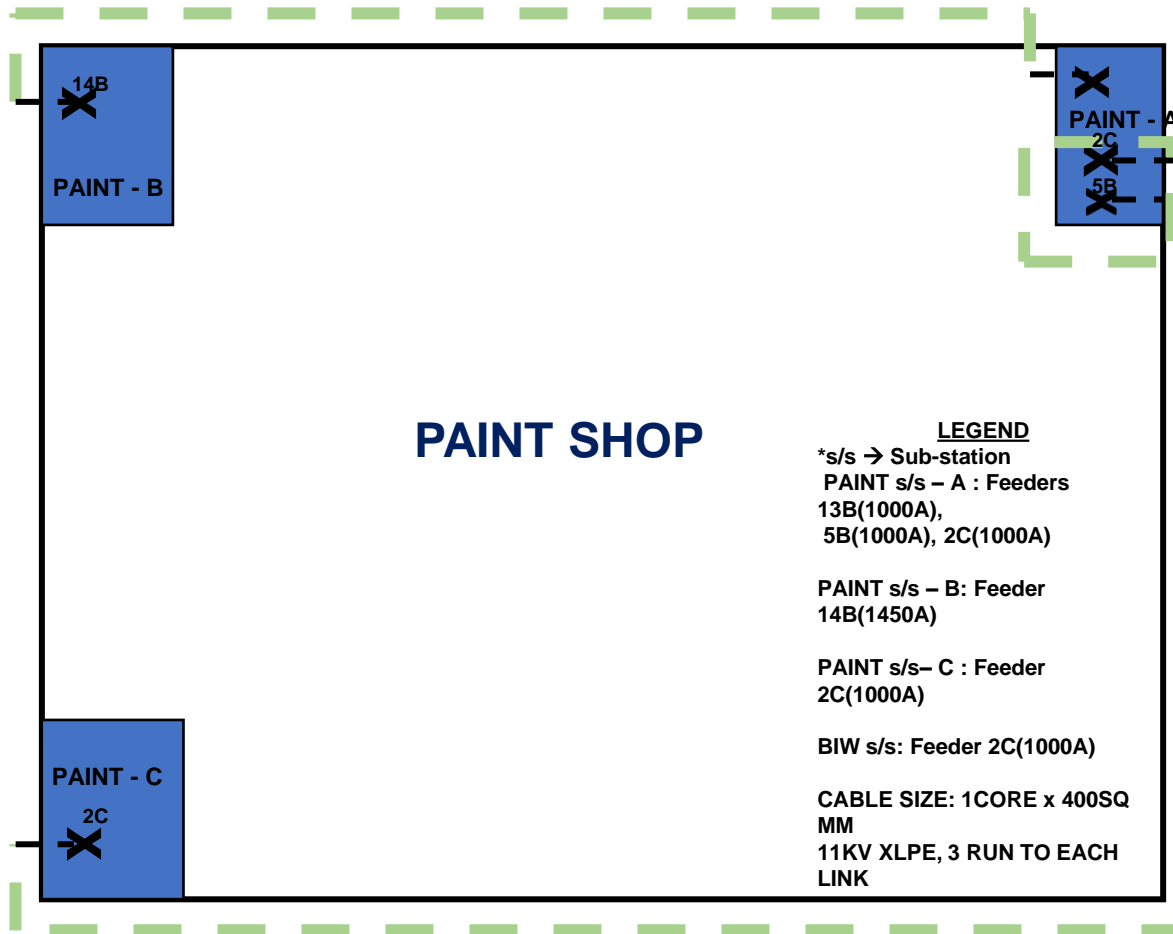
**LT Ring system between Substations across plant**

**Phase-I: Paint shop A,B,C & BIW s/s (Eastern Complex)**

**Phase-II: AA,AB & BA s/s (Western Complex)**

Substation	Transformer Rating (KVA)	No. of Transformer installed (Nos.)	No. of Transformers required to be switched on for Non-working day	Iron Loss of Transformer as per specifications (kw)	Consumption due to iron loss/ Non-Working Day(kwh)
MRS Swithyard	50000	2	2	20	960
Paint Shop SS-A	2500	3	2	5	240
Paint Shop SS-B	2500	3	1	5	120
Paint Shop SS-C	2500	3	1	5	120
TCF	2500	3	1	5	120
BIW	2500	3	1	5	120
Service	2500	3	1	5	120
AA- Substation	1600	2	1	3	77
AB-Substation	1600	2	1	3	77
BA-Substation	2500	2	1	5	120
Prolife Substation	1600	1	1	3	77
Marcopolo Substation	2500	2	1	5	120
<b>Total</b>					<b>2270</b>
				<b>% Contribution in Total Loss</b>	<b>44.01</b>

# LT Ring Distribution System between Paint shop Sub-station and BIW Sub-station (Eastern Complex)



### 6.3.1 Project details:

Power cable of 400 sq.mm was laid **between Paint shop s/s A,B,C and BIW s/s** for creating **LT ring distribution system (415V)**. With this, the transformer of Paint shop s/s B, C & BIW can be switched off on non-working days and its load will be fed through Paint shop s/s A. **Thus the transformer's no-load losses and copper losses are saved.**

\*s/s → Sub-station



**Saving: 50,880  
kWh per year**

**6.3.2 Replication Potential:** LT Ring system can be replicated to substations of Western Complex also.

**Saving Potential (Western Complex):** 33,580 kwh/annum.

**6.4 Impact/Saving:** After implementation of LT Ring system in Eastern Complex only 1No. Transformer need to be kept switched on out of total 5 Nos. transformers which leads to energy consumption saving of **50,880 kwh** by elimination of fixed iron losses of transformer.



## 7. Utilization of Renewable Energy Sources

Year	Technology (Electrical)	Type of Energy	Onsite/Offsite	Installed Capacity (MWp)	Generation(million kwh)	% of overall Electrical Energy
2018-19	Solar PV	Solar	Onsite	2 MWp	44.4	5.51
2019-20	Solar PV	Solar	Onsite	4 MWp	31.6	23.79
2020-21	Solar PV	Solar	Onsite	4.072 MWp	34.8	28.33

Lucknow plant's solar capacity is 22% of Tata Motors' total installed solar capacity of 18.14 MWp

### Roof-top Locations for Solar Plant Installation in Eastern Complex



 Solar plant Locations completed in **Phase-I**: BIW, Option Part and TCF Line-2&3.

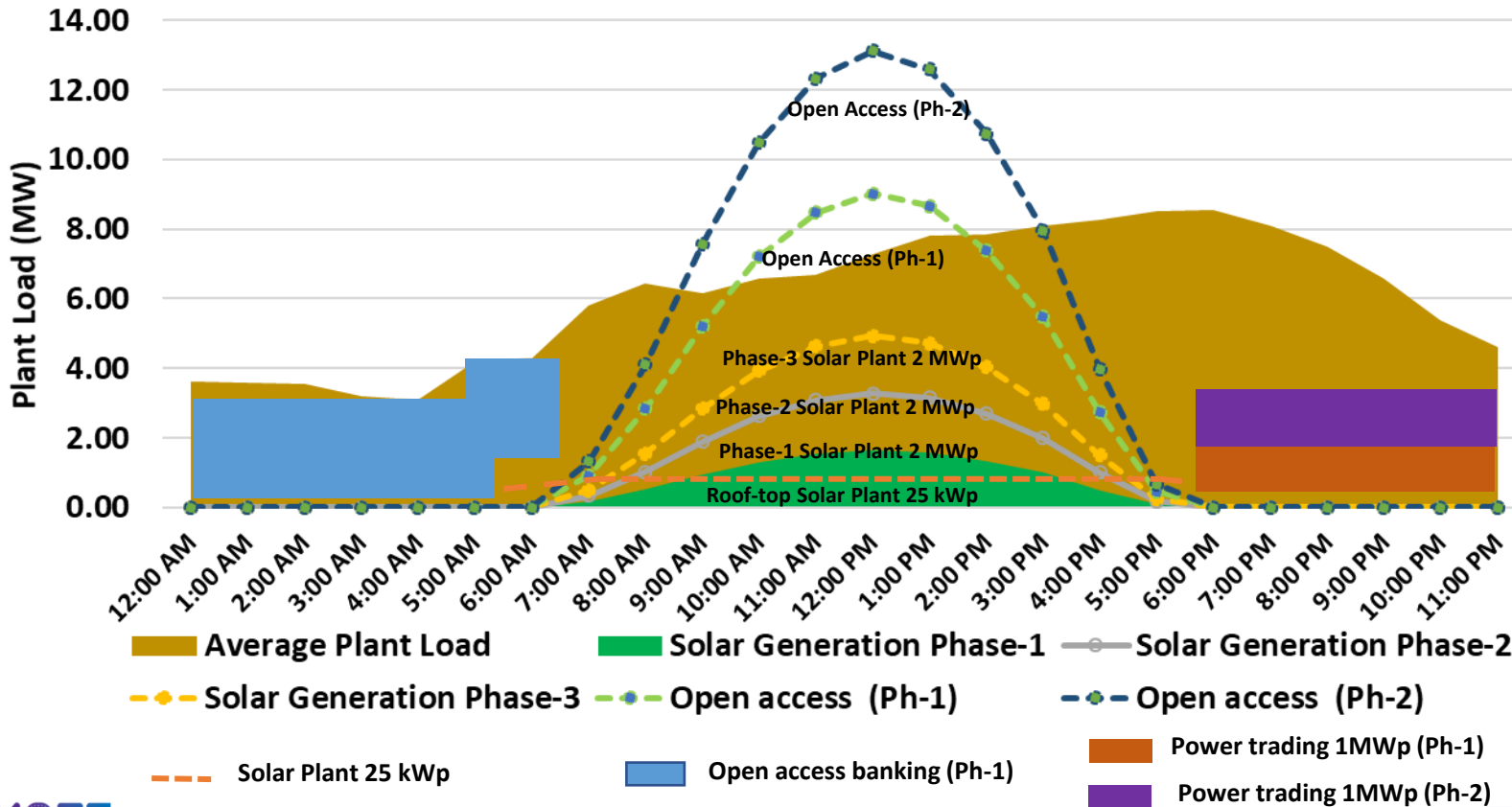
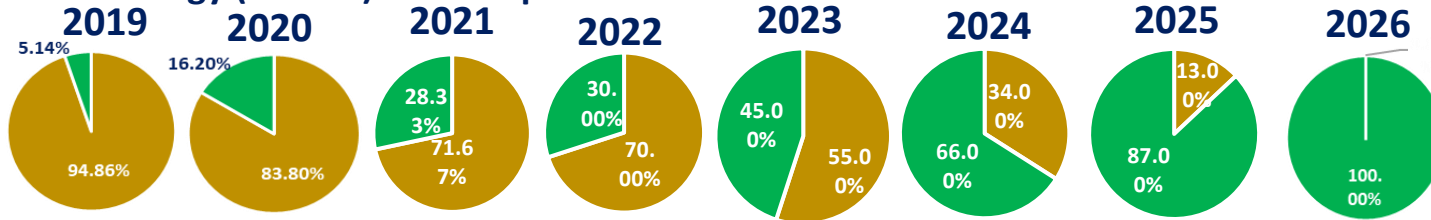
 Solar plant Locations completed in **Phase-II**: Tyre Yard, Rear Axle shop, TCF-2&3 (south roof) and Trim Line-2&3.

 Solar plant Locations completed in **Phase-III**: Medical Center Eastern Complex.

**Lucknow plant RE contribution is 28.33% for FY 20-21.**

# 7. Utilization of Renewable Energy Sources

## Renewable Energy (RE-100) Roadmap



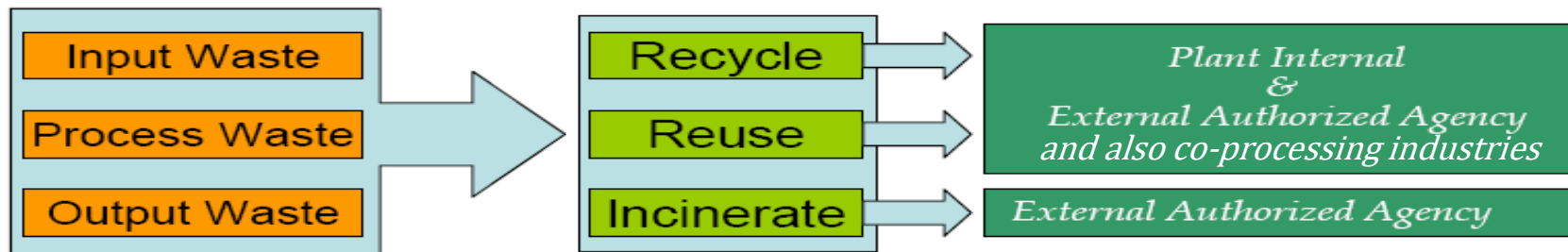
- 2012:** Roof-top solar plant 25 kWp, 0.37 Lac kWh p.a.
- 2018:** Phase-1 solar plant 2 MWp, 29 Lac kWh p.a.
- 2019:** Phase-2 solar plant 2 MWp, 29 Lac kWh p.a.
- 2020-22:** Open Access (Phase-1), 26 Lac kWh p.a.
- 2022:** Power Trading 1 MW, 14.80 Lac kWh p.a.
- 2022:** Phase-3 solar plant 2 MWp, 29 Lac kWh p.a.
- 2024:** Open Access power banking (Phase-1) 1.6 MWp, 13.40 Lac kWh p.a.
- 2025:** Power Trading 1 MW, 14.80 Lac kWh p.a.
- 2026:** New & innovative technologies for RE-100

Action Plan prepared for achieving 100% Renewable Energy sourcing by 2026

## 8. Waste utilization and Management

### Utilisation of Waste as fuel

Please include the list of waste material used as substitution for conventional energy.  
Mention waste fuel as % of total energy consumption.



*Nothing is Waste in this world !!!*

### Waste Disposal method

S. No	Year	Type of Waste Generated	Annual Qty. of waste generated (MT)	Disposal Method
1	20-21	Carton	556	Sold to waste collecting vendor
2	20-21	Wood	335	Sold to waste collecting vendor
3	20-21	Plastic	33	Sold to plastic management vendor authorized by UP Pollution Control Board
4	20-21	Waste thinner	1.6	Disposed to vendor authorized by UP Pollution Control Board
5	20-21	Used Oil	21.22	Disposed to vendor authorized by UP Pollution Control Board
6	20-21	ETP Sludge	23.43	Disposed to vendor authorized by UP Pollution Control Board

## 8. Waste Utilization and Management

Type of Waste Material

Carton

Wood

ETP Sludge

Waste Thinner

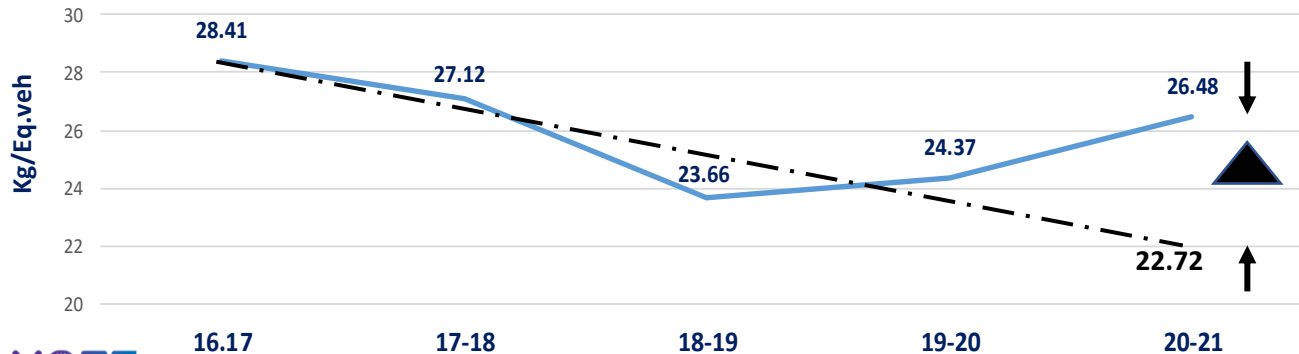
Plastic

Used Oil

### Utilization of waste as fuel (Alternative fuel utilization )

18-19		19-20			20-21			Waste fuel as % of total Fuel	
Name of the Fuel	Quantity of Waste fuel Used	Heat Value (million kcal /Year)	Name of the Fuel	Quantity of Waste fuel Used	Heat Value (million kcal /Year)	Name of the Fuel	Quantity of Waste fuel Used		Heat Value (million kcal /Year)
Carton	2157	7621	Carton	957	3381	Carton	556	1964	25.42
Wood	1361	4807	Wood	805	2843	Wood	335	1183	15.31
Plastic	97	1041	Plastic	128	1374	Plastic	33	354	4.58
Waste thinner	6	38	Waste thinner	6.7	43	Waste thinner	1.6	10	0.13
Used Oil	56	482	Used Oil	51	439	Used Oil	21.22	183	2.36
ETP Sludge	86.5	326	ETP Sludge	73.84	278	ETP Sludge	23.43	88	1.14
	<b>3764</b>	<b>14315</b>		<b>2022</b>	<b>8358</b>		<b>970</b>	<b>3783</b>	<b>48.95</b>

Quantity of waste (Kg/Eq veh)



COVID pandemic impact, very low production.

Mutilation process for conversion from BS3 to BSVI generated lot of Plastic , wood & carton for packaging of new parts that increase the Waste generation

Waste Utilized as Fuel in 20-21 is 49% of total fuel consumption



## Replacing of Urea 1 KL Plastic Barrels with Bulk storage Tank

### Earlier Condition -

1. Urea Solution was coming in 1000 lts plastic tank .
2. 10 lts wastage noted every 1000 lts .
3. Polythene was used for wrapping of barrels.
4. Empty plastic Barrels was disposed through hazardous waste disposal Process.



### Implemented condition

1. Urea Bulk Storage tank is established to eliminate plastic barrels .
2. Storage tank is refilled with tanker .
3. 10 lts urea wastage is eliminated and having potential saving of 10.8 lacs/annum
4. Use of Plastic barrel & polythene wrapper is eliminated and having potential savings of 149 lacs/annum



Saving 1.79 Crs

## Optimization of waste Underbody Sealant & Sealer

**1** Brush application for floor areas after sealer gun to be replaced by extracted sealer from recti application



**2** UBS WFT will be reduced from average of 450 micron to average to 330 micron after floor conveyor introduction



Done

**3** UBS nozzle to be replaced from 425 no to 421 for omission sequencing to optimize overspray.



Total saving Rs. 698544

**Saving calculation**  
Sealer saved per body 35 gm  
Per day cab production=150  
Total sealer saving per year=1512 Kg  
Total cost saving per year=Rs. 148176

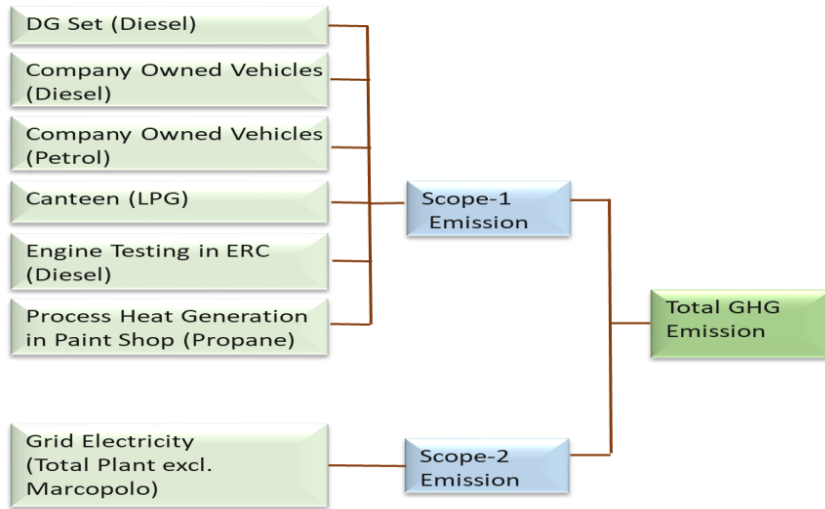
100 micron equivalent to 3744 Kg /year  
Total cost saving per year=Rs. 366912

Sealer saved per body 25 gm  
Per day cowl/cab production=260  
Total sealer saving per year=1872 Kg  
Total cost saving per year=Rs. 183456

**Saving achieved of Rs. 1.56 Cr through Waste Utilization system**

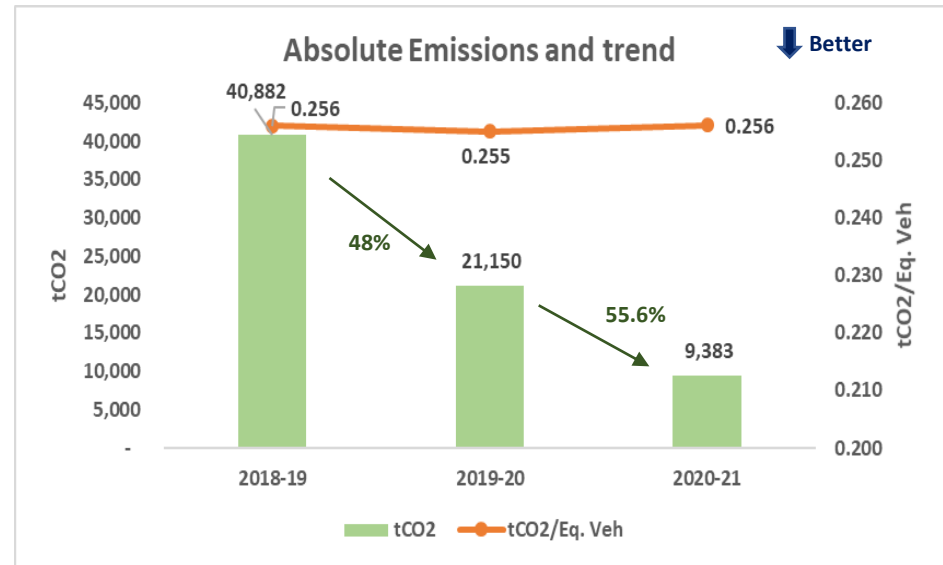
# 9. GHG Inventorization

## GHG Inventory at Lucknow Plant:



Presently we are considering only **Scope-1 and Scope-2** emissions for our reporting.

## Carbon Footprint Absolute Emissions



## Public Disclosures

- ✓ **Responsible Business Rankings:** Tata Motors has received the Leadership Rating (A) in Supplier Engagement Ranking in CDP2020. The CDP is a non-profit organization which runs global carbon disclosure system and over 500 investors are signatory to CDP. They track carbon strategies/ performance to drive investments towards the low carbon economy.
- ✓ **TML won the Award under the broader title of Product Stewardship & Life Cycle Assessment (LCA) of CII-GreenCO in July 2020.**

**GHG Emission intensity in 20-21 sustained at 19-20 level in spite of COVID constraints**



# 9. GHG Inventorization

**Lucknow ::Target (short term/long term) for CO2 emission reduction**

Consumption Point	Unit	20-21	21-22	22-23	23-24	24-25	25-26	Remarks
Eq. Vehicle Projection for	Nos.	36,636	51,589	75,328	99,067	122,805	146,544	2025-26 volume increases by 4 times of 2020-21, considered FY 2021-22 as budget volumes
Sp. Power consumption	kWh/Eq.veh	329	319	309	299	289	279	Considered all areas which are considered for GHG emission calculations, i.e. ERC, Prolife, Sales & Service office etc. Considered 15% efficiency improvement.
Total electrical energy	kWh	12,053,345	16,456,891	23,276,275	29,620,884	35,490,717	40,885,776	
Scope 2-Power (Grid Electricity)	kWh	8,572,242	11,456,891	12,801,951	10,071,100	4,613,793	-	
Renewable Energy	kWh	3,481,103	5,000,000	10,474,324	19,549,783	30,876,924	40,885,776	
<b>Scope-2 Total GHG Emission</b>	TCO2	7029	9395	10498	8258	3783	0	
Sp. GHG emission	TCO2 / Eq. veh	0.192	0.182	0.139	0.083	0.031	0	
RE share %	%	28.3	30	45	66	87	100	

## RE 100 Roadmap to ensure 100% RE-based power sourcing by 2025-26

### Action Plan:

1. Increase RE Contribution of from 28.53% to 100% by 2025-26
2. Purchase Green Power through open access scheme.
3. Purchase Green Power through Group Captive Power Plant
4. Purchase of Green Power through UPPCL - Grid
5. Installation of Micro Wind / Micro Hydel Power Plant & Bio gas power plant according to capacity feasibility.
6. ENCON Measures / Technological Upgradation to reduce the energy demand.

### Current Challenges :

1. UPPCL has to roll out special scheme for green power supply at applicable charges
2. Group Captive Power Plant Initial Capital of Rs. 30 Lac's/ MW.
3. Open access Infrastructure readiness is in progress, UPPCL is applying cross subsidy charges from time to time to make their tariff's at par with the open access rates.

RE 100 Roadmap is prepared to ensure 100% RE based power by 2025-26



# 10. Initiatives taken in supply chain to reduce energy consumption

## Projects and Initiatives taken in Supply chain to reduce plastic waste generation

Project	Evaluation by	Benefits
Primary Packing – 1/ polythene Secondary - Pallet Polythene weight : 100g/ part	Supply chain team ,Energy Cell	2.36T of Annual Polythene waste generation eliminated

Before



After



Project	After	Benefits
Primary Packing - 1/ Bubble pack Secondary - Corrugated Box Polythene weight : 160 g/ part	Primary Packing – 1/ Rexene Jacket Secondary Packing – PP box	3.5 T of Annual Polythene waste generation eliminated

Before



After



Project	Evaluation	Benefits
Primary Packing - 1/ Polypack Secondary - Trolley Polythene weight : 62 g	Material Dept, Supply chain , Energy cell	3.1 T of Annual Polythene waste generation eliminated

Before



After



Project	Evaluation	Benefits
Primary Packing - 1/ Polybag Secondary - Corrugated Box Polythene weight : 140 g/ part	Primary Packing – Nil Secondary Packing – PP box	Annual Saving of 1.54 cr

Before



After



# 11. Teamwork, Employee Involvement & Monitoring

**2020-21**

## Daily Monitoring System

Awareness level ↑

**2017-18**

Reporting of energy consumption of the plant and individual shops on **fortnightly** and **monthly** basis

**2018-19**

**H1:** Reporting of entire plant's energy consumption on **daily** basis  
**Daily Energy Audit Report (DEAR)** circulated across the plant to minimize energy wastage.  
**H2:** Reporting of entire plant's and **shop-wise** energy consumption on **daily** basis.

**2019-20**

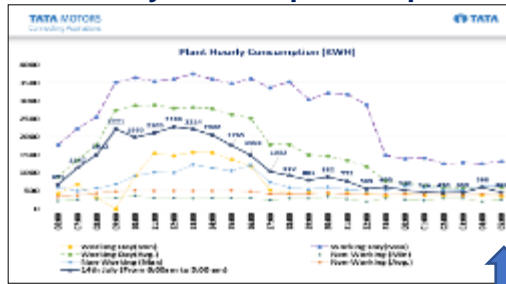
**H1:** Reporting of shop-wise energy consumption started on **hourly** basis.  
**H1:** Reporting of **working day's** and **non-working day's consumption** separately for identification of areas/processes of energy wastage.  
**H2:** Automatic reporting of energy consumption through SCADA for eliminating manual errors and minimizing the time required for report preparation.

**H1:** Assigning shop wise target on daily basis as per budgeted volume. Reporting target vs actual plant and shop wise on daily basis.  
**H2:** Reporting of daily GHG emission performance.  
Continued and sustained previous year approach of daily reports, i.e, hourly shop wise energy consumption, reporting of working and non working day consumption, SCADA reporting.

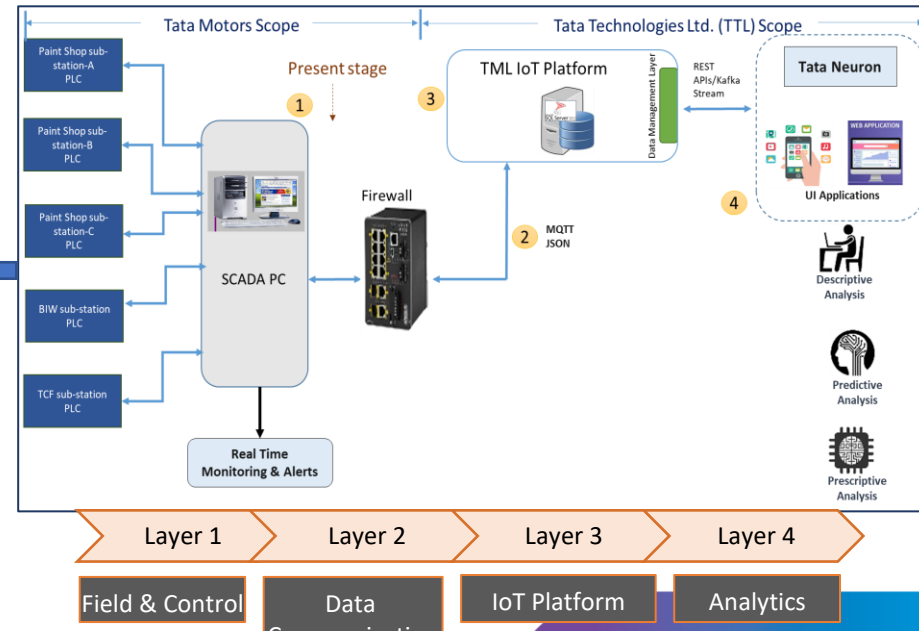
### Energy Review Meeting : Chaired by Plant Head

**Energy Management Cell**  
– Prepares the Energy report –Hourly, Daily, Monthly (M), Quarterly (Q), Half-yearly (H) & Annual reports. Plant Head & MD reviews M, QY, HY, Annual reports.

### Hourly Consumption Report



### IoT Architecture for Energy Management System



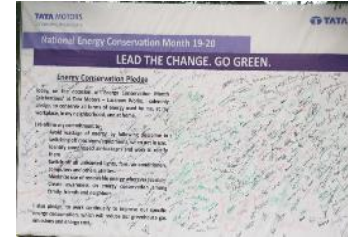
### Separate budget for Energy Conservation

Sr No.	Year	Project description	Purchase Order No.	Budget Value (Rs.)
1	2020-21	LED lights installation in TCF-R1, R2 and Option part area.	4510030866	1,442,914
2	2020-21	Cable laying-Transformer optimization with LT ring system	4430013201	2,91,776



# 11. Teamwork, Employee Involvement & Monitoring

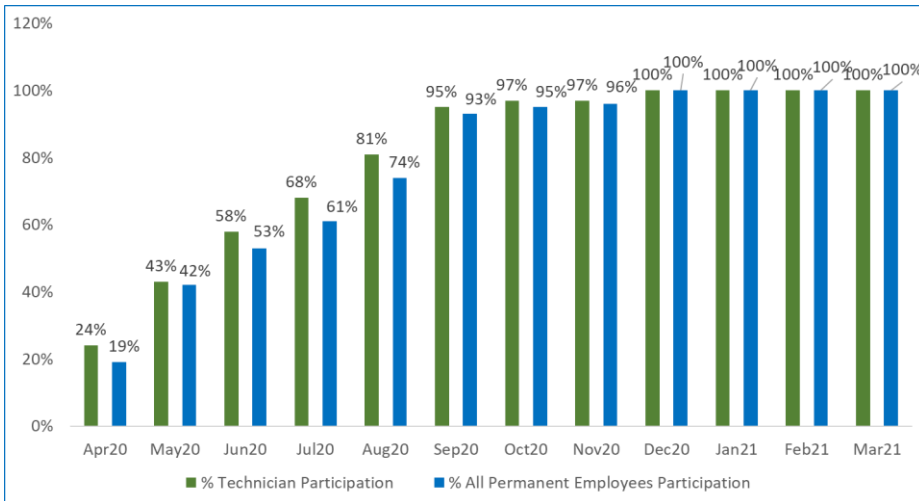
## Energy efficiency / awareness Training Programmes



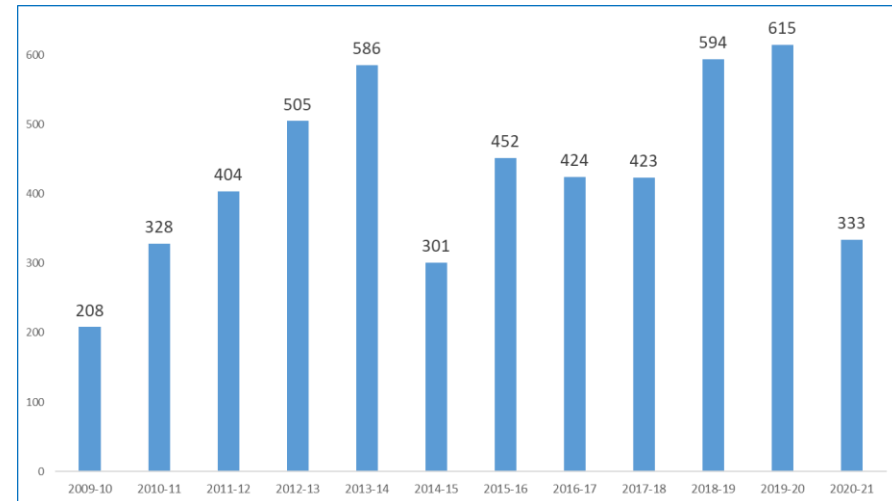
Glimpses of energy conservation month celebration-Jan-2021

## Workers and Supervisor Involvement through Suggestion Scheme/Kaizen

### Employee Participation in Suggestion Scheme (%)



### Savings through High Value Suggestions (Rs. Lac)



Employee participation in FY 2018-19, FY 2019-20 and FY 2020-21 : 100%

Savings through High Value Suggestions  
FY 20-21: Rs. 333 Lac

**100% Employee involvement in Energy Awareness Programmes and Suggestions Schemes/Kaizens**

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

We have Energy Management Cell in our Plant, which initiates & manages all sorts of Energy Conservation measures across the Plant.

## Energy Policy



## ISO 50001 Certificate



2013

2016

2019 onwards

## Team Structure – ISO 50001

Mr. Vijay K Menon  
Plant Head Lucknow

MR -Lko Works  
Dr. S.B. Matta

DH – Mr. Mohd. Amir  
CPED

DH – Mr. V. Hiremath  
Paint shop

DH – Mr. R.K. Singh  
TCF

DH – Mr. V. Hiremath  
BIW

DH – Mr. Sunil Awasthi  
IBF

## # DH – Divisional Head

DH – Mr. Sunil Awasthi  
Axle Shop

DH –Mr. Vishal Agrawal  
Technical Services

DH – Mr. Vivek Saxena  
Materials & ADD

DH – Mr. Mohan Ganta  
HR

DH – Mr. Sunil Awasthi  
Line-1

Tata Motors-Lucknow is ISO50001 certified through structured Energy Management System

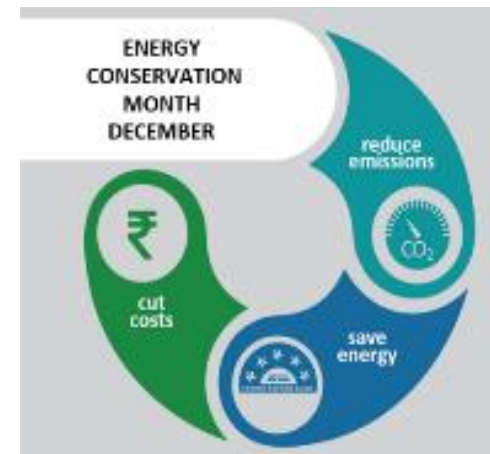


## 12. Implementation of ISO 50001/Green Co/IGBC rating

### Events Planned for Energy Conservation Month Celebrations as a part of ISO50001

- Energy Conservation Flag Hoisting
- Energy Conservation Pledge
- Slogan writing
- Essay Writing
- Poster designing
- Technical Seminars & Product Display
- Energy Conservation Workshops

- Expert Hour sessions
- Energy Conservation Projects
- Kaizen Events
- Best Energy efficient shop competition
- Best Energy efficient office competition
- Energy Nuggets
- Awareness programs



Investment of Tata Motors-Lucknow plant on Energy Saving projects is 1.76% of the Operating Cost, 0.008% of the Turnover

Events focused on ISO50001 are conducted throughout the year

### 13. Learning from past CII award program



**Canfan Private Limited**



**Single phase Man cooler**

S No.	Name of Company	Business Profile
1	<b>DCL</b>	Dust control and loading systems
2	<b>Oorja energy engineering</b>	The Cleantech Heating & Cooling Co.
3	<b>Thermax</b>	Energy and Environment Solutions for Sustainable Growth
4	<b>AAD TECH (INDIA) PVT. LTD.</b>	Intelligent Air handling
5	<b>Turbotech Energy</b>	Global Energy Solution Provider
6	<b>Emerich Energy Pvt Ltd</b>	Advanced PQ Solutions
7	<b>E-view Global Pvt. Ltd</b>	Energy Conservation thru Daylight harvesting
8	<b>Forbes Marshall</b>	Solutions to Conserve Energy
9	<b>InPhase Power Technologies Pvt Ltd</b>	harmonic-Reactive power - Unbalance
10	<b>Danfoss</b>	Danfoss Drives - for your applications
11	<b>Bridge Things</b>	Building Energy Management & Information Systems
12	<b>AIRTRON</b>	Energy Saving
13	<b>Yaskawa</b>	Electric motors and their applications
14	<b>Thermin Power Systems Pvt Ltd</b>	Energy And Power
15	<b>Greenovative</b>	Energy Management
16	<b>Emerson</b>	Emerson Heat pump Series
17	<b>NOVENCO Schako Group And Xero Energy</b>	Energy Saving
18	<b>AIRpipe</b>	
19	<b>Systel</b>	Complete Solutions For Compressed Air Management
20	<b>Skyshade</b>	Energy Monitoring System and Electric Lighting Control
21	<b>My Green Bin</b>	Seggregate, Compost, Convert your Kitchen waste into Organic Manure
22	<b>TEIKNOCRAT'S partner with Green Magic</b>	Energy Saving in Air Conditioning Audits
23	<b>ECOGREEN</b>	Automatic Tube Cleaning System
24	<b>AIRZON</b>	Energy efficient Fans

Several energy-efficient technologies/equipments learnt from CII Award forum



# Major Achievement : CII Environmental Best Practices Award 2020

## CII Environmental Best Practices Award 2020

29, 30 & 31 July 2020  
(3-Day Digital Conference)



- ❑ **CII-GreenCO** had organized a **Digital Conference on Best Practices Award 2020** from **29th – 31st July 2020** and we are pleased to inform you that **Tata Motors Ltd., Lucknow - Prolife** won the **Most Innovative Environmental Project Award** during the conference.
- ❑ TML Lucknow Prolife and Corporate Sustainability team presented the project on “**Prolife: A Circular Economy Initiative**” on re-manufacturing of vehicle aggregates and thus conserving material and avoiding carbon emissions, won the Award under the broader title of **Product Stewardship & Life Cycle Assessment (LCA)** of GreenCO.





# List of Awards and Recognitions

- 1) Tata Motors Lucknow won the have bagged **“FIRST PRIZE”** in the Industrial Category of UP State Energy Conservation Award – 2018 competition
- 2) Tata Motors CVBU-Lucknow Plant bagged the prestigious **‘1st Runner-Up Prize’ – State Energy Conservation Award-2017** conducted by UP NEDA on 14<sup>th</sup> December at Lucknow
- 3) TATA Motors Lucknow Works has been awarded **Second Prize in Automobile Sector** at the prestigious National Energy Conservation Award (NECA-2016) for the Excellence in Energy conservation and its Management
- 4) Tata Motors Lucknow won the CII Excellent energy efficient award 2012 for the forth consecutive years.
- 5) Tata Motors was awarded the Certificate of Commendation for Significant Achievement at the CII-ITC Sustainability Awards 2011, for demonstrating excellent performance in the area of sustainable development
- 6) Tata Motors CVBU-Lucknow Plant bagged the most prestigious **“ Excellent Energy Efficient Unit Award-2009”** conducted by CII on 19<sup>th</sup> & 20<sup>th</sup> of Nov’2009 at Chennai.
- 7) Tata Motors CVBU-Lucknow Plant bagged the most prestigious **“ Excellent Energy Efficient Unit Award-2010”** conducted by CII on 01<sup>st</sup> & 2<sup>nd</sup> Nov’2010 at Chennai
- 8) Tata Motors CVBU-Lucknow Plant has bagged 1<sup>st</sup> Prize in National Energy Conservation Award (NECA)-2010 under Automobile sector at New Delhi on 14<sup>th</sup> Dec 2010
- 9) Tata Motors CVBU-Lucknow Plant has received Silver award in automobile sector in 11<sup>th</sup> Global Tech 2010 Excellence Award at Hyderabad on 12<sup>th</sup> Dec 2010.
- 10) Tata Motors CVBU-Lucknow Plant bagged the most prestigious **“ Excellent Energy Efficient Unit Award-2020”** conducted by CII on 16<sup>th</sup> of Sept’2020 at Hyderabad.
- 11) Tata Motors CVBU-Lucknow Plant bagged the prestigious **‘1st Runner-Up Prize’ – State Energy Conservation Award-2020** conducted by UP NEDA at Lucknow.
- 12) Tata Motors Lucknow has been conferred the **Second prize of National Energy Conservation Award 2020** by BEE, Ministry of Power.



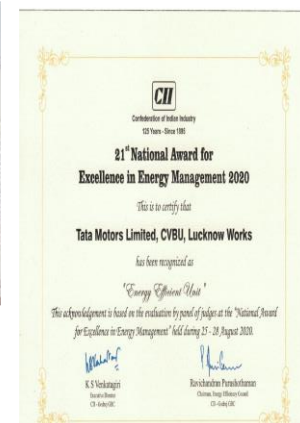
**BEE- 2020**



**CII- 2019**



**UPSECA-2020**



**CII- 2020**

**BEE- 10,11,12,16&20, Sustainability Award – 2011,  
UPSECA- 16,17,18 & 20, CII – 09,10,11,12,14,  
16,17,18,19,20 Green Tech -09,10,11,12,13 & 14**

**Tata Motors-Lucknow has been winning Energy awards consistently over the past several years**



# Thank You