TATA MOTORS

JAMSHEDPUR

CII – NATIONAL AWARD FOR EXCELLENCE IN ENERGY MANAGEMENT 2023

DEEPAK KUMAR	GENERAL MANGER (CCE)
RANDHIR PRASAD	DGM (ELECTRICAL MAINT., PAINT SHOP)
RAMIT DUTT	SENIOR MANAGER (ENERGY MANAGEMENT)

Introduction

01 COMPANY PROFILE

02 PRODUCT PORTFOLIO

03 KEY MANUFACTURING PROCESSES

1. TATA MOTORS - JAMSHEDPUR : PROFILE

TATA MOTORS
Connecting Aspirations

CUSTOMERS

- **M&HCV Products - 19 Ton to 60 Ton** for Domestic market including export to 36 countries.
- **55 % of CV Business Revenue from JSR operations**
- Products for CRPF, BSF, Ordinance Factory, LASTEC DRDO
- Institutional Customers - BEL, DGP, Police
- **Aggregates also manufactured for CV LKO, PUN & DHW**
- **Spare Parts**

TECHNOLOGY

Plant with State-of-the-art manufacturing facilities

- 5 L Engine Manufacturing facility.
- Vehicle Electronics: Flashing & Diagnostics
- Robotic Framing & Door Robotic Hemming
- Camber Correction & Cut to Length including 5000Ton Press, CED Painting, CNC Punching
- Paint Shop: CED technology & Robotic Painting
- Profile Grinding, Dry Cutting, Laser Cutting
- Cold Box Core making, Medium Frequency Furnace. Stress Relieving & Shot Blasting
- Digital & Industry 4.0

PRODUCT

- M&HCV Products – Truck, Tractor, Tipper & Defence
- Plant Capacity – **440 Vehicles Per Day** (BS-1 to BS-6)
- **397 Vehicle Combinations** (VCs)
- Emission Norms from BS-I to BS-VI
- **CKD kits, VFJ Kits, Aggregate Business** (Genset Engine, Excavator Engine, Etc.)

GREEN CO

- First Company in eastern India to achieve the prestigious "GREENCO GOLD" Rating

ENERGY MANAGEMENT

- ISO 50001
- Operational Efficiency
- Renewable Energy
- New Technology
- GHG Protocol

PRODUCTS

- Over 200 models, ranging from multi-axle trucks, tractor-trailers, tippers, mixers and special application vehicles

FACILITIES

- Manufacturing facility spread over 600 acres and an integrated township of over 1250 acres

INCEPTION

- Mother Plant of TML established in 1954 with state-of-the-art manufacturing facility

PRODUCT PORTFOLIO : JAMSHEDPUR PLANT

TATA MOTORS
Connecting Aspirations

M&HCV PRODUCTS (BS I to BS VI range) 380 VC's

M&HCV - Trucks

117 VCs

M&HCV - Tippers

123 VCs

M&HCV - Tractors

48 VCs

M&HCV - IB & Defence

IB- 73 VCs; Defence- 19 VCs

AGGREGATES

Axles

Front Axle- Single Steer & Twin Steer

70 Variants

Rear Axle- Single Reduction, Hub Reduction, Tandem

135 Variants

WhAP

Gearboxes (6S to 9S)

GBS-750 (6S)

45 Variants

TC-2500

6 Variants

GBS-950 (6S)

8 Variants

AGB-1210

5 Variants

GBS-1150(9S)

15 Variants

Engines (130 HP to 450 HP)

5 L Engine (Inhouse)

13 Variants

697 Engine (Inhouse)

19 Variants

Ashwamedha 5.6L (TCL)

30 Variants

Atulya 6.7(TCL)

77 Variants

Cabs & Cowls (AC & Blower)

Cowl

1210 Cowl & 1516 Cowl

Cab

SIGNA & PRIMA- Sleeper & Non- Sleeper

M&HCV- Medium & Heavy Commercial Vehicles**; VC**- Vehicle Configuration; **IB-** International Business;
WhAP- Wheel Armoured Platform; **TC-** Transfer Case; **AGB-** Auxiliary Gearbox

2. KEY MANUFACTURING PROCESSES AT TML - JAMSHEDPUR

TATA MOTORS
Connecting Aspirations

VEHICLE ASLY. LINE-1&2

- ASSLY. LINE – I & II
- FINAL INSPECTION & RECTIFICATION

TRIM ASSLY.

- NEW TRIM LINE
- CAB TRIM LINES

FOUNDRY

- MOULDING LINE
- MELTING LINE
- CORE MAKING AREA

FRAME SHOP

- 5000 TON PRESS
- LM PTCED SETUP
- ASSY. LINE
- PAINTING, BAKING, STORAGE

TRANSMISSION

- MACHINE SHOP
- GEAR ASSLY. LINE
- HEAT TREATMENT FURNACEs

VEHICLE ASLY. LINE-3

- VEHICLE FACTORY – III
- PRIMA TRIM LINE
- FORCED DRAFT VENTILATION (FDV's)

ENGINE SHOP

- CYLINDER HEAD & BLOCK LINE
- CRANK SHAFT / CAM SHAFT MACHINING & HARDENING
- ENGINE ASSEMBLY

BIW SHOP

- FABRICATION LINES – LP, EDAG, SFC, TILT CAB, PRIMA
- ROBOTIC WELDING

PAINT SHOP

- PT CED
- PAINT KITCHEN, CHILLER PLANT, DM WATER PLANT
- COLOR LINES, ROBOTIC PAINTING & BAKING

AXLE

- FRONT AXLE
- REAR AXLE
- DRIVE HEAD
- HEAT TREATMENT FURNACES

MORE WHEN ONE

Energy Performance

01 OVERALL ENERGY & SPECIFIC ENERGY CONSUMPTION TREND

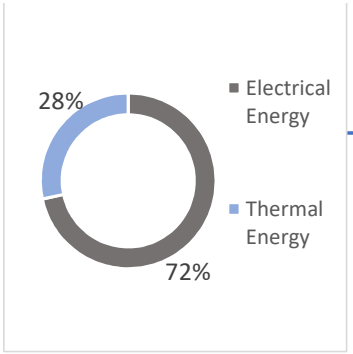
02 OVERALL & PROCESS WISE SPECIFIC ENERGY PERFORMANCE TREND

03 BENCHMARKING ENERGY PERFORMANCE

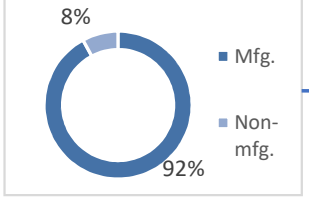
3. ENERGY – OVERALL AND SPECIFIC CONSUMPTION

TATA MOTORS
Connecting Aspirations

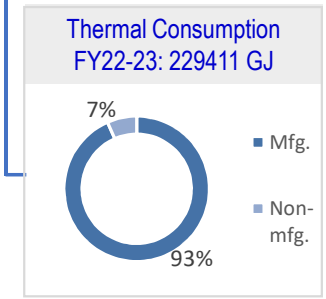
Overall Energy Consumption FY 22-23
810344 GJ

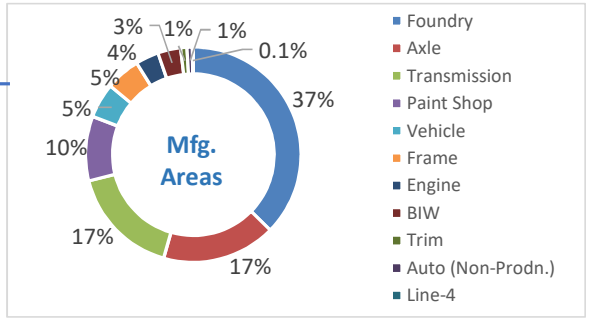


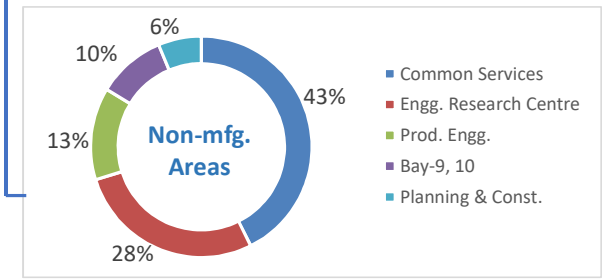
Electrical Consumption FY22-23: 580933 GJ



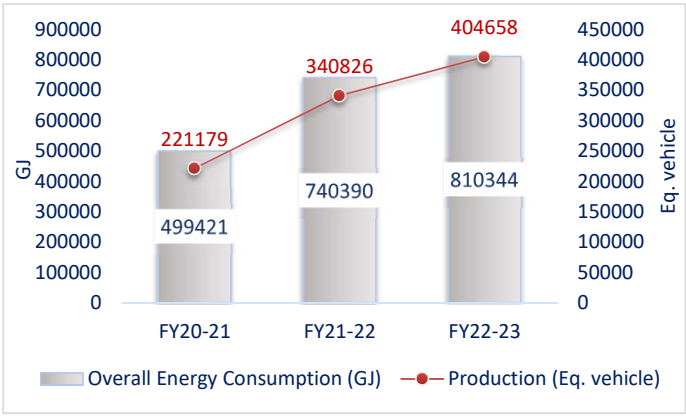
Thermal Consumption FY22-23: 229411 GJ



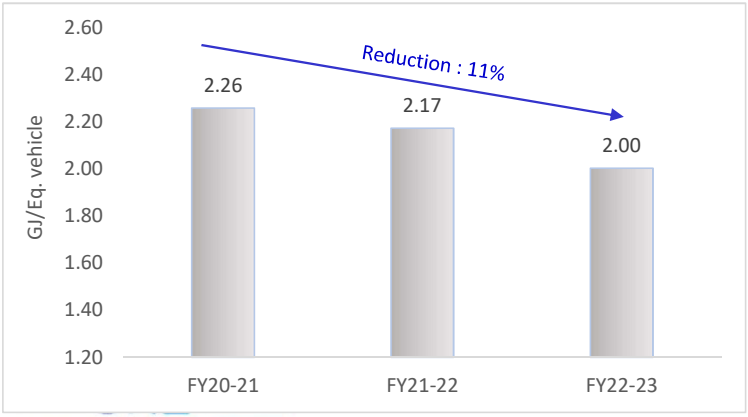




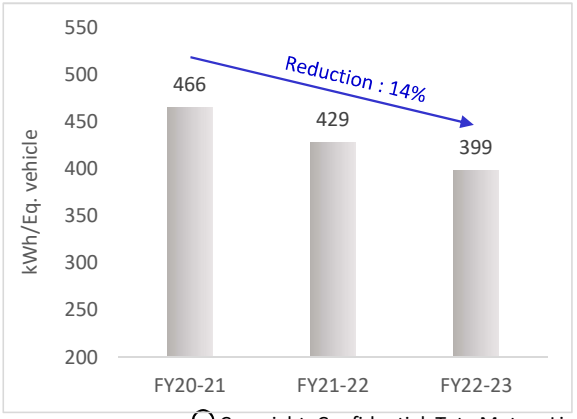
Overall Energy Consumption (GJ) and Production



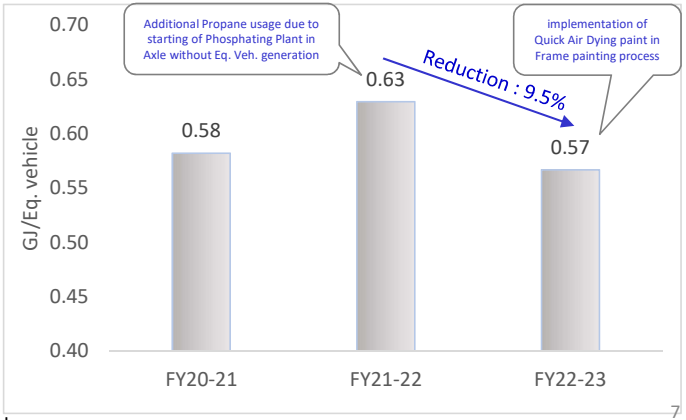
Overall Sp. Energy Consumption (GJ/Eq. Vehicle)



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



Sp. Thermal Energy Consumption (GJ/Eq. Vehicle)



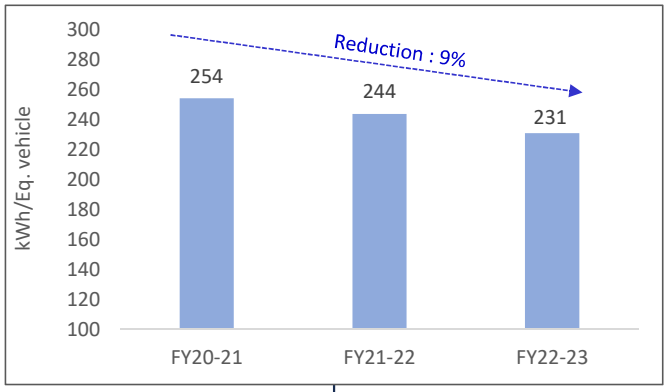
3. SPECIFIC ENERGY CONSUMPTION

TATA MOTORS
Connecting Aspirations

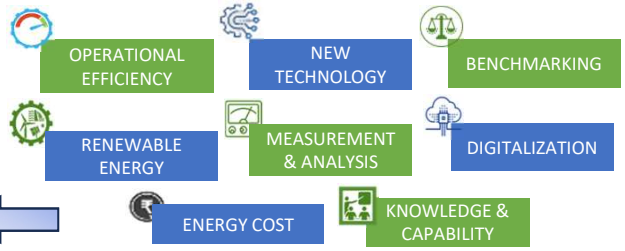
Energy Mgmt. – Governance Structure

	MENTOR :	**Mr Ravindra Kulkarni**
	LEADER:	**Deepak Kumar**
	CO LEADER:	**Randhir Prasad**
DIVISION	**CORE TEAM**	**SUPPORT TEAM**
Vehicle	M. Mahapatra	S. Bandyopadhyay, P. Joshi
Frame	Mukesh Kumar	Ashok Kumar, Mayank Mishra
Engine	R. Sonowal	B. Paul, S. Bhattacharya
BIW	Saket Roshan	S. Mukherjee, Arka Ghatak
TRIM	Tamal Das	Yogesh Sharma
CPS	Randhir Prasad	Akshay Purohit,
Axle	Vikas Kumar, S. Jha	A. Chakraborty, H. Hazarika
Gear	Rahul Thakur	Neeraj Rohila, Tapas Maiti

AUTO TOTAL : Sp. Electrical Energy (kWh/Eq. Veh)

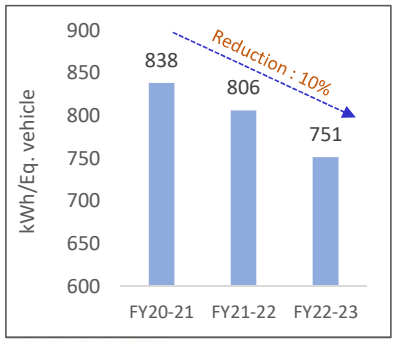


Key Levers

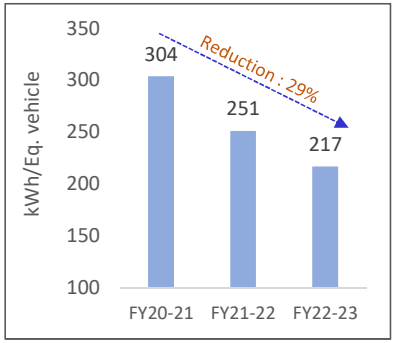


Ideation Workshops & Expert Hour Sessions

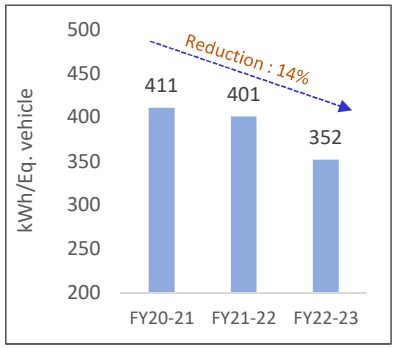
PAINT : Sp. Electrical Energy (kWh/Eq. Veh)



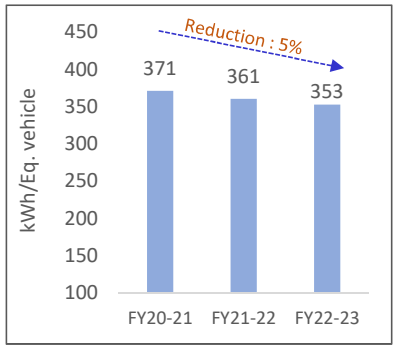
FRAME: Sp. Electrical Energy (kWh/Eq. Veh)



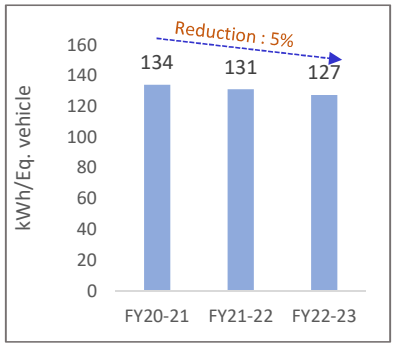
ENGINE : Sp. Electrical Energy (kWh/Eq. Veh)



AXLE : Sp. Electrical Energy (kWh/Eq. Veh)



BIW : Sp. Electrical Energy (kWh/Eq. Veh)



MORE WHEN ONE

4a. INFORMATION ON COMPETITORS, NATIONAL AND GLOBAL BENCHMARK

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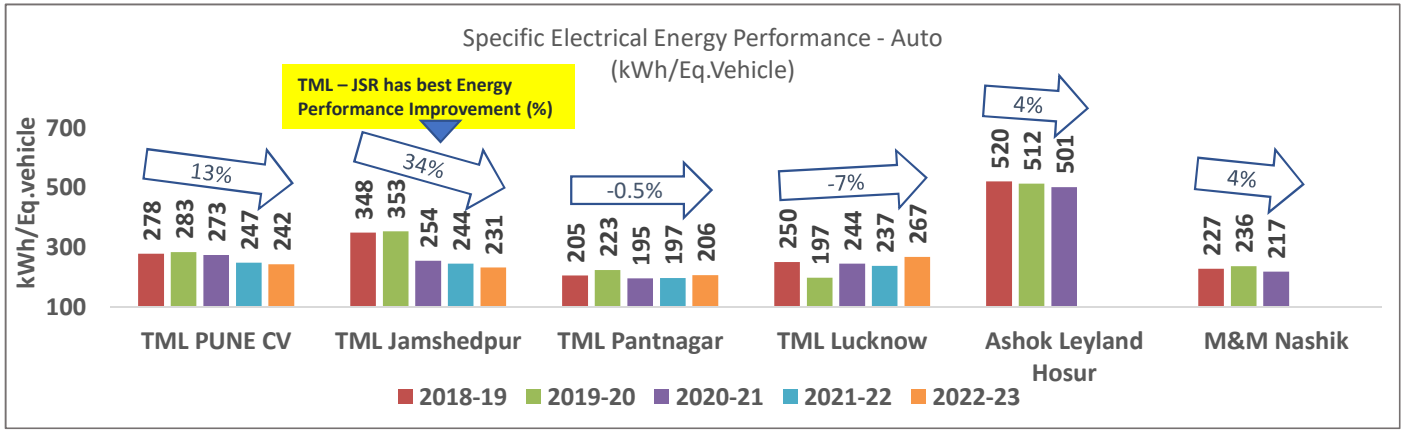
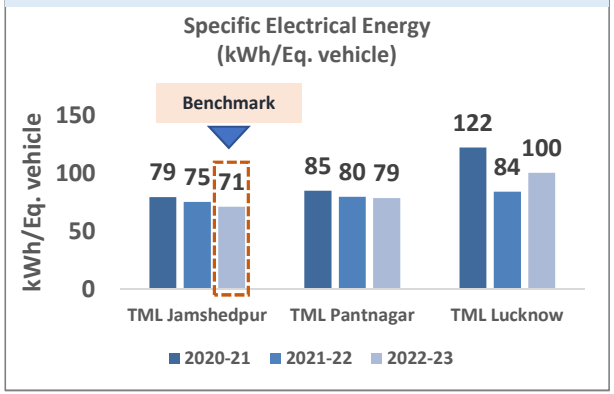
Connecting Aspirations

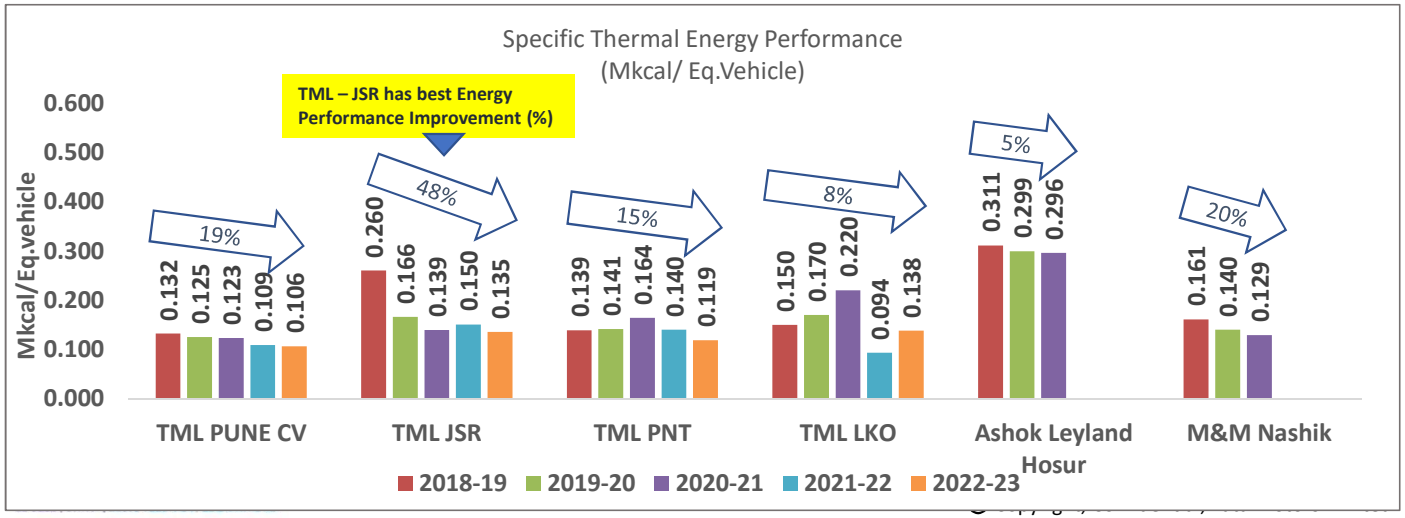
Internal / External Benchmarking – Specific Electrical Energy Performance (Auto Mfg.)



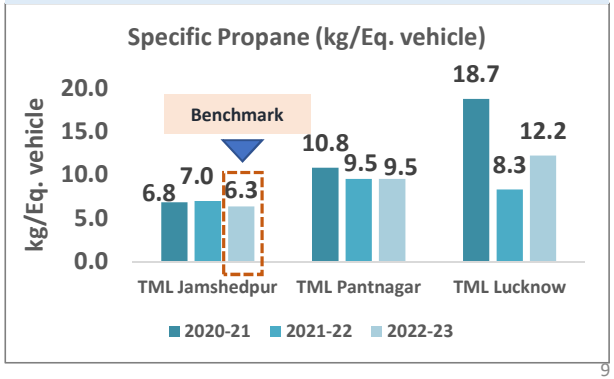
Internal Benchmarking of Paint Shop (Significant Process)



Internal / External Benchmarking – Specific Thermal Energy Performance (Auto Mfg.)



Internal Benchmarking of Paint Shop (Significant Process)



Energy Action Plans

01 SHORT TERM & LONG-TERM ENERGY TARGETS & ROADMAP

02 ENERGY SAVING PROJECTS IMPLEMENTED IN FY21, FY22 & FY23

03 BENCHMARKING ENERGY PERFORMANCE

4b & c. SHORT TERM / LONG TERM ENERGY TARGETS AND ROADMAP TO ACHIEVE THEM

TATA MOTORS
Connecting Aspirations

SHORT TERM

LONG TERM

2023-24

- ❑ Insulation refurbishment of Loop-1 ovens (3, 4 & 5) in Paint Shop.
- ❑ Low bake sealant introduction in Paint Shop.
- ❑ HVLS fans in Transmission Shop
- ❑ Replacement of old cooling tower in Engine Factory.
- ❑ Digitalization - Online dashboard for energy monitoring of all manufacturing areas.
- ❑ Flux Maxiox for ATH in CPS
- ❑ Timer-based control of HVLS Fans in New Trim Line

Electrical: 219 kWh/Eq. veh.
Thermal: 0.128 Mkcal/Eq. veh.

2024-25

- ❑ Fitch Fuel Catalyst for ED oven in Paint Shop
- ❑ Heat Pump for Hot Water Generator in Paint Shop
- ❑ HVLS Fans in HT-Axle
- ❑ 7th Generation CED system in Paint Shop
- ❑ Cold Washing in washing machines at Engine Factory
- ❑ Digitalization - AI/ML based analytics
- ❑ Waste Heat Recovery for CCHF Furnace in Axle
- ❑ VFDs for Frame Line-3 FDV motors

Electrical: 208 kWh/Eq. veh.
Thermal: 0.124 Mkcal/Eq. veh.

2025-26

- ❑ HVLS Fans in HT-Transmission
- ❑ Energy efficient motors for Line-3 FDVs.
- ❑ Insulation refurbishment of ED oven in Paint Shop.
- ❑ Hydroxy generator for Topcoat Oven in Paint Shop
- ❑ Energy efficient IE4 motors for ASUs in Paint Shop
- ❑ Waste Heat Recovery system for:
  - Topcoat Oven in Paint Shop
  - Compressors
  - Engine Test Bed

Electrical: 202 kWh/Eq. veh.
Thermal: 0.120 Mkcal/Eq. veh.

2026-27

- ❑ Frigi-Tech lubricant for improving chiller plant efficiency in Paint Shop
- ❑ Energy Efficient IE4 Motors for rating 30 kW and above
- ❑ Insulation refurbishment of Sealant oven in Paint Shop.
- ❑ Heat Pump for Hot Water Generator in Frame Factory.
- ❑ Concentrated Solar Thermal (CST) system for Hot Water Generator in Paint Shop

Electrical: 196 kWh/Eq. veh.
Thermal: 0.115 Mkcal/Eq. veh.

2027-28

- ❑ High efficiency Chiller Plant for: CED system in Frame Factory CED system in Paint Shop
- ❑ EC Fans for remaining ASUs in Paint Shop
- ❑ Elimination of fuel usage for Heating Bath in Paint Shop by using room temperature chemical/Solar Thermal/Waste Heat Recovery application
- ❑ Migration to 8th Generation CED in Paint Shop

Electrical: 190 kWh/Eq. veh.
Thermal: 0.112 Mkcal/Eq. veh.

MOREWHEN ONE

4d. LIST OF MAJOR ENCON PROJECTS PLANNED IN FY2023-24

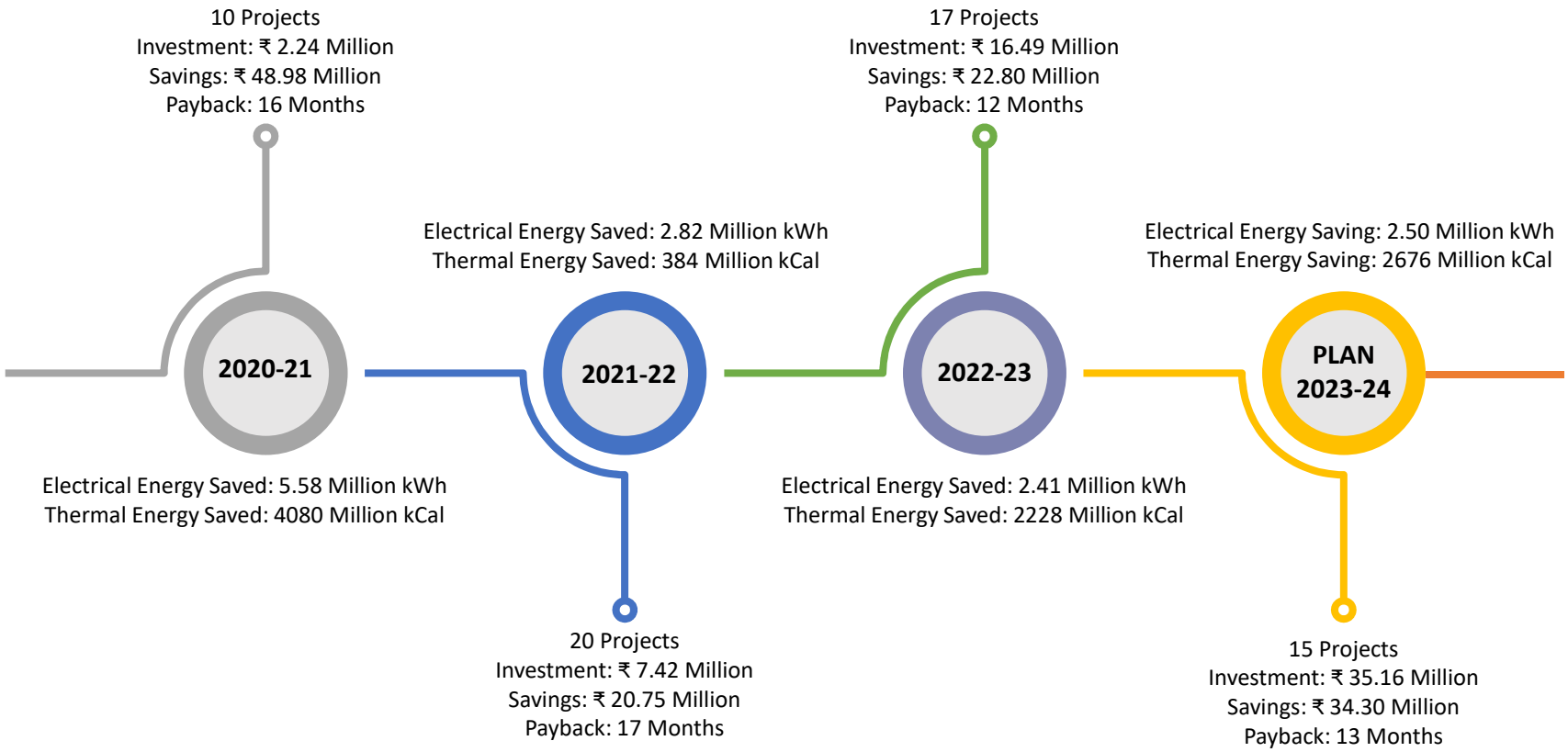
TATA MOTORS
Connecting Aspirations

Title of the Project	Annual Electrical Saving (Million kWh)	Annual Thermal Saving (Million kcal)	Investment (Rs. Million)
Refurbishment of insulation of Loop-1 ovens (3, 4 & 5) in Paint Factory to reduce heat loss	--	2489	17.5
Installation of Flux Maxiox magnetic resonator in propane line in ATH	--	187	0.35
Waste Heat Recovery system for Air Preheater of CCHF Furnace in Axle-Heat Treatment	0.207	--	0.6
Load optimization of cooling tower of Old Test Bed in Engine Factory	0.22	--	2.7
Auto control of VFD-based FDV units through temperature controller	0.16	--	0.01
Energy saving through Aichelin furnace OEE improvement from 91% to 96%	0.171	--	2
Optimized running of FDV motors (4 nos. x 22 kW motors) using VFDs in Frame Line-3	0.167	--	0.5
PTCED Oven blower frequency regulation to 30 Hz by interlocking with temperature of oven	0.046	--	--
Shopfloor ventilation load optimization using low wattage Air Circulators in Trim Factory	0.059	--	0.12
Using Aichelin Furnace waste heat in Washing Machine in Transmission-Heat Treatment	0.27	--	--
Power saving mode for Shotblasting machine-elevator motor for auto cut off after 10 min. of idle time	0.025	--	--
Optimized operation of all Quench Presses as per 50 kg furnace hydraulic motor running cycle	0.016	--	--
Main ID fan running interlock with 1st chamber in 5 chamber shot blasting machine	0.031	--	--
Operation of Heat Pumps for Washing Machines in Axle and Transmission Factories	1.02	--	10.35
Optimization of shopfloor ventilation load through HVLS Fans in Transmission Factory	0.105	--	1.03
Total	2.50	2676	35.16

MORE WHEN ONE

5a. SUMMARY OF ENERGY SAVING PROJECTS IMPLEMENTED IN LAST THREE YEARS

TATA MOTORS
Connecting Aspirations



MORE WHEN ONE

5b. ENERGY SAVING PROJECTS IMPLEMENTED IN LAST THREE YEARS

TATA MOTORS
Connecting Aspirations

Major Projects Implemented In FY20-21

Sr. No.	Description of Energy Saving Projects	Investment (INR Million)	Electrical Saving (Million kWh)	Thermal Savings (Million kcal)	Total Savings (INR Million)
1	Introduction of 3 mode operation in CED circulation system (Production, Idle & Non-production time) to reduce fixed energy consumption in Paint Shop	--	0.134		0.86
2	Optimizing the Fuel consumption of ovens in Auto Divisions by : (a) Altering the mode of production from continuous to batch production (b) Controlling Heat Loss from shell temperature (c) Operating ovens in lower mode during non-production hours (d) Optimizing the air to fuel ratio of Ovens by Flue Gas Analysis	--	--	4080	13.31
3	Installation of 02 no's of Super Premium Efficiency Motors (3.8 kW) in PTCED process of Frame Factory	0.06	0.01	--	0.03
4	Optimizing the energy consumption of compressed air system by : (a) Maximizing the use of portable air compressor (b) Reducing the compressor air pressure from 90 to 85 Bar (c) Stringent control on compressor air wastages by Energy Audits	--	1.97	--	12.60
5	Optimizing the energy consumption of Forced Draft Ventilation Units (FDV) in Vehicle, Frame, Paint, BIW, Trim & Engine Divisions through timer-based controls	--	2.15	--	13.74
6	Optimized energy consumption of AC Plants in Non-manufacturing areas through modified office occupancy protocols	--	0.60	--	3.80
7	Installation of 15 nos. Air Circulators (250 W) in place of man-coolers (1.1 kW)	0.11	0.040	--	0.25
8	Installation of Variable Frequency Drive (VFD) for 30 kW vertical pump	0.10	0.06	--	0.37
9	Energy saving in Air Conditioning Plants at Auto Materials bldg., Engine Assembly shop & Production Engineering shop by following measures: (a) Optimizing the operating hours (b) Optimizing operation of chiller units (c) Installation of VFDs in chiller & condenser pumps	--	0.47	--	2.98
10	Installation of LED Lights in place of conventional luminaire across Factories: Vehicle Factory I & II: 715 Nos Vehicle Factory III: 100 Nos Frame Factory: 31 Nos Trim Factory: 12 Nos. BIW Factory: 345 Nos.	1.96	0.16	--	1.03
	Total	**2.24**	**5.58**	**4080**	**48.98**

5b. ENERGY SAVING PROJECTS IMPLEMENTED IN LAST THREE YEARS

TATA MOTORS
Connecting Aspirations

Major Projects Implemented In FY21-22

Sr. No.	Description of Energy Saving Project	Investment (INR Million)	Electrical Savings (Million KWh)	Thermal Savings (Million kcal)	Total Saving (INR Million)
1	Installation of 150W and 90W LED highbays in place of 250W and 150W HPSV luminaires in Vehicle Factory (I, II and III)	2.90	0.15	--	0.96
2	Installation of 2 nos. of 18.5 kW super premium efficiency IE4 motors in CED Circulation system at Frame Factory	0.53	0.05	--	0.34
3	Replacement of 250W Metal Halide luminaires with 150W LED highbays in Frame Factory	0.56	0.03	--	0.23
4	Introduction of 3 mode operation in RCDI Pump – Production, Idle & Holiday mode having frequency 50 Hz, 30 Hz and complete switching off during in respective modes in Frame Factory	0.00	0.05	--	0.35
5	Optimization of process time of PTCED Line by modification of carrier movement in Paint Factory	0.00	1.59	384	12.61
6	Optimization of ventilation loads by conversion of 1.5 kW Man-coolers to 250 W Air Circulators in BIW shop	0.15	0.02	--	0.13
7	Optimization of tubelights, highbay lights, emergency lights and floodlights using LED lights in BIW shop	0.48	0.04	--	0.28
8	Elimination of Idle running of Grinding Machines by implementation of Power Saving mode in Transmission Factory	0.00	0.08	--	0.52
9	Redistribution of power supply for fire extinguishing unit in Liebherr and Reishauer Profile grinding machines leading to Idle running elimination on Off days in Transmission Factory	0.00	0.01	--	0.06
10	Temperature optimization of air conditioning unit from 23°C to 25°C in profile grinding room in Transmission Factory	0.00	0.05	--	0.36
11	Introduction of P3 Neutrapon5013 chemical to convert Hot Washing to Cold Washing process in Axle machine shop	0.02	0.44	--	2.90
12	Optimization of shopfloor ventilation load by introducing HVLS fans in 1516 Trim Line	2.63	0.03	--	0.17
13	Design improvement in Drive system of EOT crane by installation of Twin LT Drive system (2 x 0.55 kW motor) in place of single LT Drive system (1 x 7.5 kW motor) in 10 T EOT crane in Bay-3 in PE Shop	0.14	0.02	--	0.13
14	Engg. control implementation using Timer circuit for auto ON/OFF control of two 1.5 TR window ACs to run for only 12 hours alternatively instead of 24 hours each in UPS Room in PE Shop	0.00	0.01	--	0.07
15	Optimization of lighting system using LED Downlighters in PE Shop Canteen	0.01	0.00	--	0.01
16	Improvement in heat transfer rate by overhauling of CED Heat Exchanger in Paint Factory leading to energy saving	0.00	0.05	--	0.36
17	Use of portable compressor during Block Closure & when more than 2 days of consecutive OFF days in Paint Factory	0.00	0.10	--	0.66
18	Auto switching off of lights at shift changeover time in Paint booth, Touch up, Joint sealant through PLC in Paint Factory	0.00	0.02	--	0.14
19	Interlocking Tempering Furnace Exhaust Blower & Blast Cooler running with Furnace Cycle in Axle-Heat Treatment	0.00	0.01	--	0.08
20	Optimized running of all Chips Conveyor with cutting cycle by logic modification in BFW machines in Axle Factory	0.00	0.06	--	0.38
	Total	**7.42**	**2.82**	**384**	**20.75**

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5b. ENERGY SAVING PROJECTS IMPLEMENTED IN LAST THREE YEARS

TATA MOTORS
Connecting Aspirations

Major Projects Implemented In FY22-23

Sr. No.	Description of Energy Saving Project	Investment (INR Million)	Electrical Savings (Million kWh)	Thermal Savings (Million kcal)	Total Saving (INR Million)
1	Elimination of Topcoat Baking Oven by development & use of Quick Air-Drying Paint in Frame Factory	5.32	0.33	2228	8.02
2	Installation of 8 nos. Heat Pumps in Washing Machines at Axle and Transmission Factories	10.35	1.02		7.26
3	Optimized operation of Cooling Tower pump motor in CCHF Furnace using VFD in Heat Treatment-Transmission	0.00	0.06		0.43
4	Lighting load optimization using LED lights in Vehicle Factory	0.71	0.15		1.05
5	Refurbishment of Paint Booths leading to reduction in connected load by 10.8 kW at Frame Line-2 & 3	0.00	0.15		1.06
6	Energy optimization of task lights through timers in Vehicle Factory	0.00	0.02		0.12
7	Interlocking of conveyor pit lights with pit entry gates in Vehicle Factory	0.00	0.00		0.02
8	Installation of Timer-based controls in Air circulators energy during non-production periods in Vehicle Factory	0.00	0.01		0.09
9	Automated operation of sealant oven forced cooler (interlock with ambient temperature) leading to reduction in its running hours during low ambient temperature	0.00	0.05		0.33
10	Cycle time reduction by implementation of automatic carrier transfer operation from Pre-ED to UF in Paint Shop leading to energy saving	0.00	0.05		0.36
11	Optimization of ARP blower & Exhaust fan loads by modification in ARP plenum duct of Loop-1 Paint booth in Paint Shop	0.00	0.36		2.55
12	Air pre-heat zone temperature optimization from 500 °C to 400 °C in CCHF furnace in Axle-Heat Treatment	0.00	0.03		0.24
13	Startup loss reduction by reducing number of ON/OFF cycles in Furnaces at Axle-Heat Treatment shop through improved production planning	0.00	0.05		0.32
14	Installation of 150W LED highbays in place of 250W HPSV luminaires in Frame Factory	0.11	0.01		0.10
15	Eliminate idle running of hydraulic motors in Loramendi Oven by interlocking with machine running cycle	0.00	0.02		0.11
16	Idle running elimination of Span motors by interlocking with machine operation in Foundry	0.00	0.09		0.64
17	Logic modification of Loramendi Oven blower motors operation in Foundry Factory leading to energy saving	0.00	0.02		0.11
	Total	**16.49**	**2.41**	**2228**	**22.80**

MORE WHEN ONE

Innovative Energy Saving Projects

01 DEVELOP & USE NEW ACRYLIC RESIN BASED QUICK AIR-DRYING PAINT FOR FRAME PAINTING

02 INNOVATIVE DESIGN MODIFICATION IN CCHF FURNACE FOR ENERGY SAVING THROUGH OEE IMPROVEMENT

03 USE OF DIGITAL TWIN AND PROCESS SIMULATION TO FOR ENERGY SAVING IN PTCED PROCESS AT PAINT SHOP

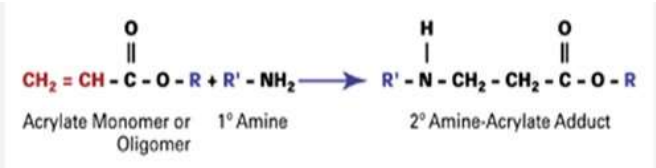
6. INNOVATIVE PROJECT-1: DEVELOP & USE NEW ACRYLIC RESIN BASED QUICK AIR-DRYING PAINT FOR FRAME PAINTING

TATA MOTORS
Connecting Aspirations

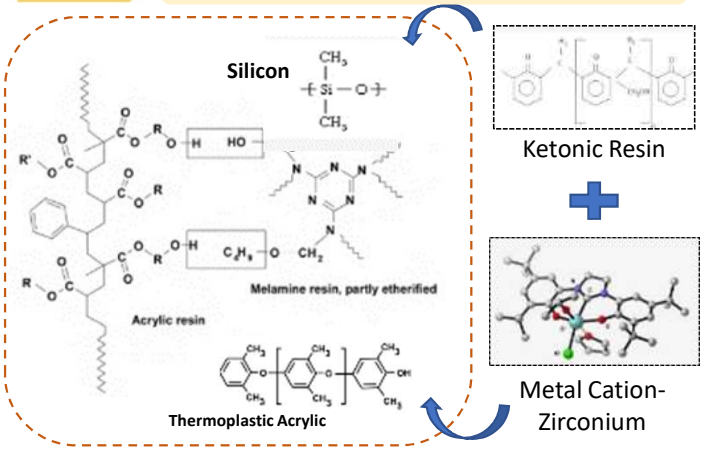
Project

In close collaboration with Paint manufacturers, our team developed a new acrylic resin-based paint with **Air drying** properties, for Topcoat application in Chassis Frames. This new paint sets in ambient air conditions, thereby eliminating the need for baking, previously used for drying after application of thermo-setting acrylic paint.

Before — **Pure Paint Chemistry**



After — **Hybrid Paint Chemistry (Quick Air-Drying Paint)**



MORE WHEN ONE

'Hybrid Paint Chemistry' using additives like Thermoplastic Acrylics, Ketonic resin, silicon resin and Zirconium metal, in the paint

1st time implementation of Quick Drying Chassis Frame painting process across Tata Motors CV Plants and Competitors

Patent filed for this project vide **Patent No. 1887**

Process Parameter Validation

Test	Specification	Result (After 1032 Hrs.)
Salt Spray Life Test (CED coated sheet, size 6 x 4 inch)	After Exposure of 1000 Hrs. Rust creepage < 1.5 mm on either side of cross line. Blister size max. 8F. Secondary adhesion should pass	3-4 tiny blisters along one cross line (< 8F) Rust creepage < 1 mm. Remarks: PASSED
Ultraviolet Resistance Test (CED coated sheet, size 6 x 4 inch)	After Exposure of 500 Hrs. Gloss Retention > 85% No Chalking of paint film	Gloss Retention 85-87% (Initial Gloss 15-16 unit Final Gloss 13-14 unit) Chalking not formed. Remarks: PASSED

Project Outcome:

Before — Use of acrylic thermo-setting paint: PT → CED → Baking → Frame Assembly → Topcoat Painting → Baking

After — Use of acrylic resin-based Quick Air-Drying paint: PT → CED → Baking → Frame Assembly → Topcoat Painting → Baking Eliminated

Impact/Benefits:

- **Propane Saving in FY22-23: 188 MT**
- **Electrical Saving in FY22-23: 3.27 Lakh kWh**
- **793 Ton of CO_2e saved in FY22-23**

6. INNOVATIVE PROJECT-2: INNOVATIVE DESIGN MODIFICATION IN CCHF FURNACE FOR ENERGY SAVING THROUGH OEE IMPROVEMENT

TATA MOTORS
Connecting Aspirations

Project Brief:

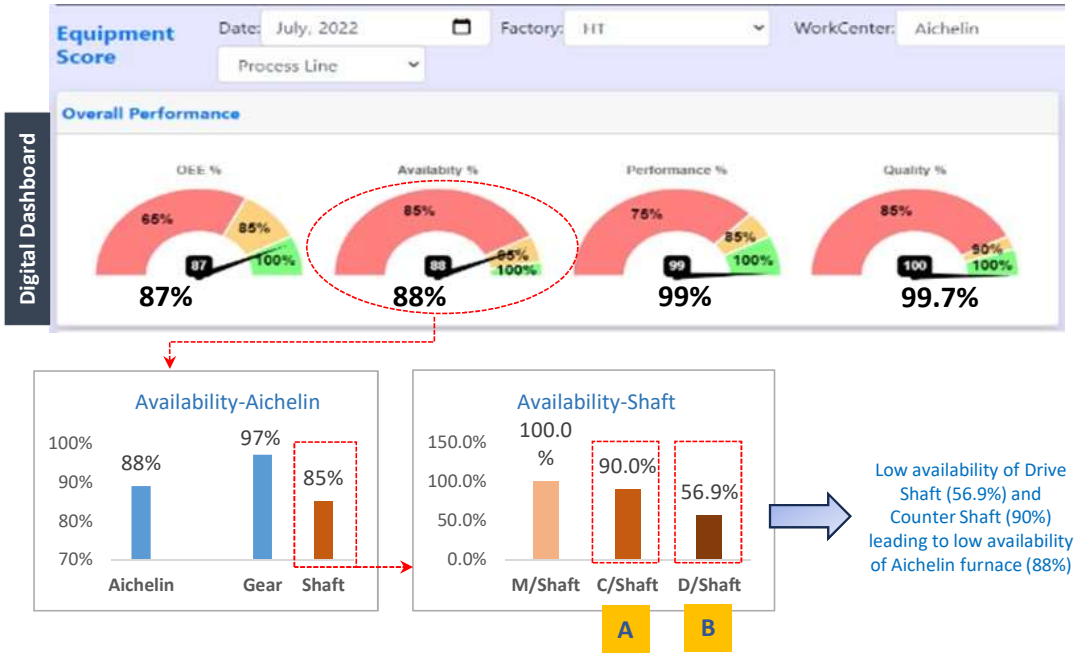
Innovative design modification of OEM's component fixtures for Counter Shaft (G1150) and Drive Shaft (G600/750/950) in Continuous Carburizing and Hardening Furnace (CCHF – Aichelin) in Transmission Heat Treatment shop to improve OEE thereby leading to energy saving.

OEE (%) = Availability (%) x Performance (%) x Quality Rate (%)

Replication Potential: Replicable in Tata Motors-Pune as well as competitors

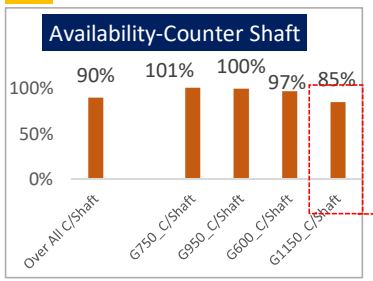
Problem Identification: Low OEE of Aichelin Furnace (87%) due to Low Availability of 88%

Digital Dashboard



Low availability of Drive Shaft (56.9%) and Counter Shaft (90%) leading to low availability of Aichelin furnace (88%)

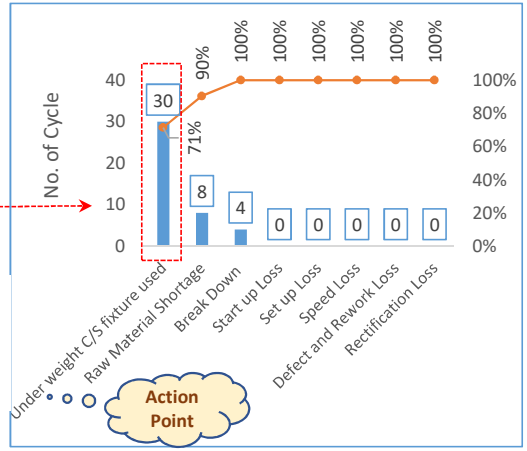
A



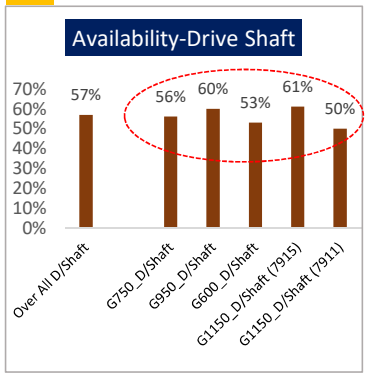
%Utilization- C/Shaft

1) G750 C/Shaft- 101%....OK
2) G950 C/Shaft-100%.....OK
3) G600 C/Shaft-97%.... Ok
4) G1150 C/Shaft- 85%- NOT OK

Availability Loss Analysis of G1150 Counter Shaft



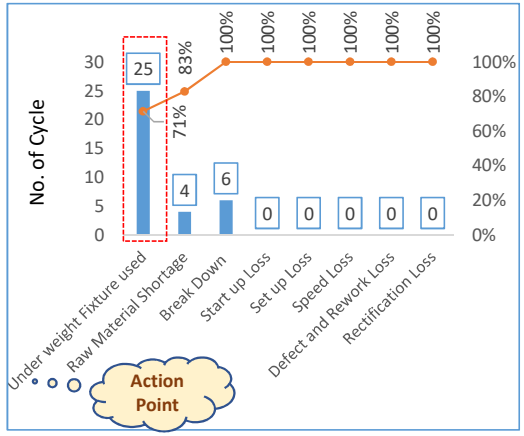
B



%Utilization- D/Shaft

1) All D/Shaft -53% to 61%- NOT OK

Availability Loss Analysis of all types of Drive Shafts



6. INNOVATIVE PROJECT-2: INNOVATIVE DESIGN MODIFICATION IN CCHF FURNACE FOR ENERGY SAVING THROUGH OEE IMPROVEMENT

TATA MOTORS
Connecting Aspirations

A — G1150 Counter shaft Fixture Improvement

Before — Old Fixture Pattern

G1150 C/Shaft

Old Fixture Pattern- 5 grids in row having 4 Nos. holes. **C/Shaft resting on bottom**

Total Nos- 4X5=20 Nos G1150 C/Shaft
Total Weight per Fixture- 159 kg against Target 232 kg

After — New Fixture Pattern

New Grid Developed for G1150 C/Shaft

New Fixture Pattern- 5 grids in row having 6 Nos. holes. **C/Shaft resting on grid**

Fixture utilization increased from 68% to 100%

Total Nos- 6X5=30 Nos G1150 C/Shaft
Total Weight per Fixture- 238 kg against Target 232 kg

B — G1150 Drive shaft Fixture Improvement

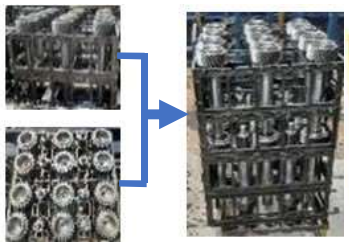
Before — Old Fixture Pattern

Total Nos- 20 Nos. G1150 D/Shaft
Total Weight per Fixture- 142 kg against Target 232 kg

After — New Fixture Pattern

Top Fixture

Bottom Fixture

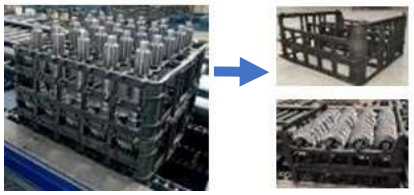


Fixture utilization increased from 61% to 98%

Total Nos- Bottom Fixture- 20 Nos. and Top Fixture- 12 Nos.
Total Weight per Fixture- 228 kg against Target 232 kg

B — G750/950/600 Drive shaft Fixture Improvement

Before — Old Fixture Pattern / New Gear Fixture Developed



Total Nos- 25 Nos. G750/950/600 D/Shaft
Total Weight per Fixture- 140 kg against Target 232 kg

After — New Fixture Pattern

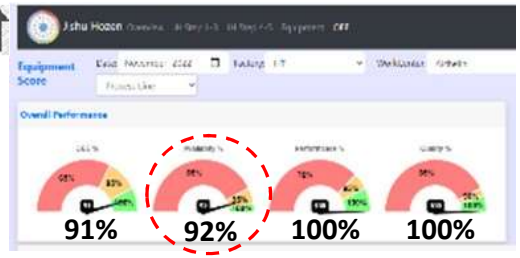
New Gear Fixture over Drive Shaft Fixture

Drive Shaft Fixture

Fixture utilization increased from 60% to 99%

Total Nos- Top Gear fixture with 40 Nos. Gears weighing 90 kg, and Bottom fixture with 25 Nos. D/Shaft.
Total Weight per Fixture- 230 kg against Target 232 kg

Result



- **Furnace Availability increased from 88% to 92%**
- **Furnace OEE increased from 87% to 91%**

Innovative Aspect:

New design of the fixtures developed in-house, challenging the OEM's original fixture design.

Unique double decker fixture designed, combining one fixture over another, in contrast to conventional single fixture pattern

Impact/Benefits:

Annual Electrical Energy Saving 1.71 Lakh kWh

Annual GHG Reduction 121 t CO_2e

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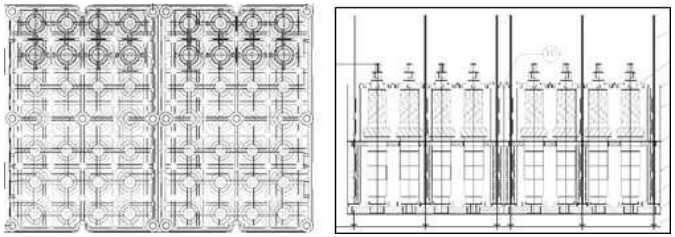
6. INNOVATIVE PROJECT-2: ENERGY SAVING THROUGH OEE IMPROVEMENT OF AICHELIN FURNACE

TATA MOTORS
Connecting Aspirations

Horizontal Deployment of innovative fixture modification of Aichelin Furnace in Sealed Quench Furnace (SQF)

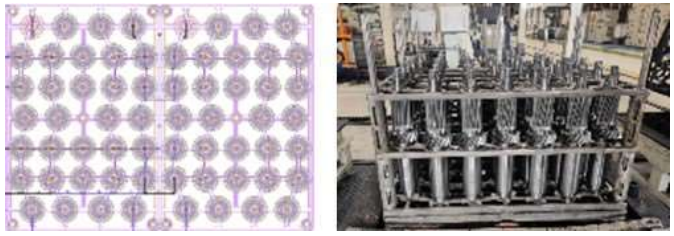
G950 Counter Shaft Fixture Improvement

Before



In SQF furnace while charging, **52 nos.** of G950 Counter Shafts used to be loaded in existing fixture.

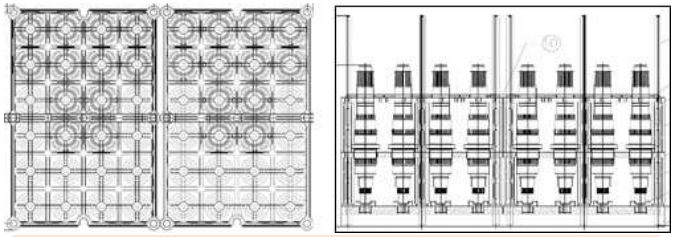
After



Modified fixture for increased loading quantity from **52 nos. to 62 nos.** of G950 Counter Shafts per fixture.

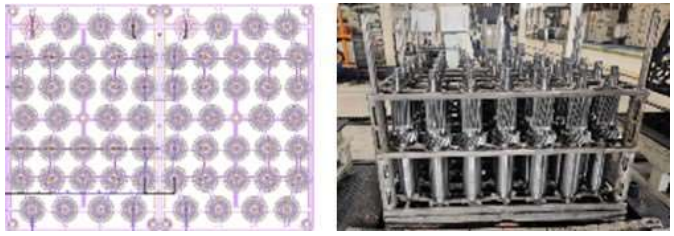
G950 Main Shaft Fixture Improvement

Before



In SQF furnace while charging, **48 nos.** of G950 Main Shafts used to be loaded in existing fixture.

After



Modified fixture for increased loading quantity from **48 nos. to 64 nos.** of G950 Main Shafts per fixture.

Impact/Benefits:

- Increased Availability of SQF furnace by maximizing utilization of furnace capacity
- Improved OEE of SQF furnace
- Optimized specific energy consumption of SQF furnace

ENERGY SAVING

Annual Electrical Energy Saving
0.86 Lakh kWh

CO_2

Annual GHG Reduction
61 t CO_2e

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6. INNOVATIVE PROJECT-3: USE OF DIGITAL TWIN AND PROCESS SIMULATION TO IMPROVE CYCLE TIME LEADING TO PRODUCTIVITY IMPROVEMENT AND ENERGY SAVING IN PTCED PROCESS AT PAINT SHOP

TATA MOTORS Connecting Aspirations

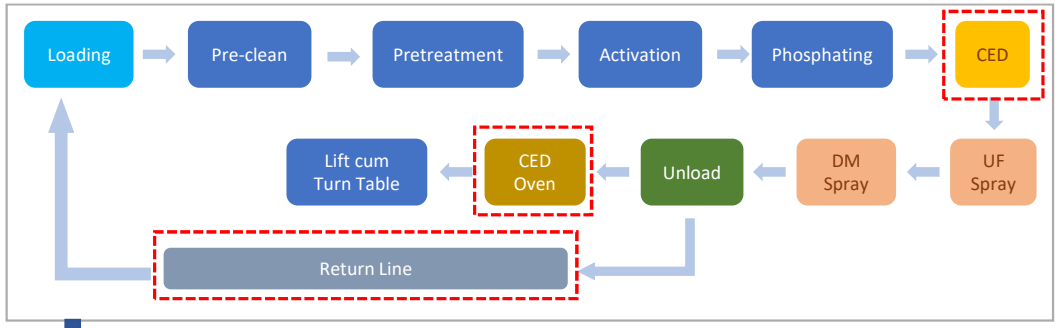
Project Brief

Pre-treatment Cathodic Electro Deposition (PTCED), is one of the major energy intensive processes in Paint Factory. While Pre-treatment involves degreasing, phosphating, CED is an electro-coating technique used for achieving corrosion resistance and prepare surface for high quality topcoat painting of Cabs and Cowls.

This project deals with use of digital twin and process simulation to improve cycle time leading to productivity improvement from 83 to 86 cycles/shift to a level of 94 to 98 cycles/shift, thus resulting in energy saving

Replication Potential: Replicable in other Tata Motors Plants as well as competitors

Pretreatment Cathodic Electro Deposition (PTCED) Process in Paint Shop



Developed Digital simulation model to study process bottlenecks

Digital Process Simulation Model

High Process Time in 3 Process Stages

Process Stage	Process time	
CED	Process time: 5 min. (High)	A
CED Oven	Process time: 5 min. (High)	B
Return Line	Travel time: 5 min. (High)	C

* Process time of other 9 stages < 5 min.

A CED SYSTEM

Actions taken to reduce CED process time

- Voltage increased up to 362V from 340V
- Rocking reduced to 5 from initial 7 rocking
- CED bath process time reduced by 3.5 sec.

Results of Quality trials found OK

Initial zone of Carrier at Pre-ED Deck

Span of ED zone reduced

After Shifting of CED zone

A Actions taken to reduce Carrier movement time in CED

- Light curtain position shifted.
- Reduction in cycle time by 3 sec in ED zone & delay at station reduced by 4 sec.
- Hoisting down and up at tripod reference point shifted, leading to reduction of 8 sec.
- Delay after operator acknowledgement reduced by 5 sec.
- Eliminated operator movement by shifting the location of dispatch command switch from pre-ED to ED

CED Process Time reduced by 30 Sec.

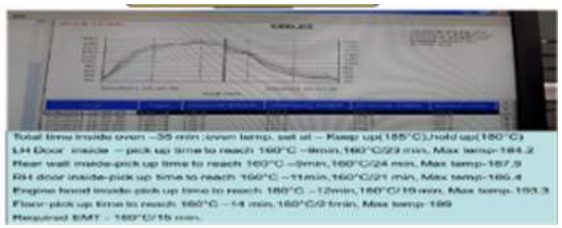
6. INNOVATIVE PROJECT-3: USE OF DIGITAL TWIN AND PROCESS SIMULATION TO IMPROVE CYCLE TIME LEADING TO PRODUCTIVITY IMPROVEMENT & ENERGY SAVING IN PTCED PROCESS IN PAINT SHOP

TATA MOTORS Connecting Aspirations

Identified High Process Time in 3 Process Stages

Process Stage	Process time	
CED	Process time: 5 min. (High)	A
CED Oven	Process time: 5 min. (High)	B
Return Line	Travel time: 5 min. (High)	C

B **CED OVEN**



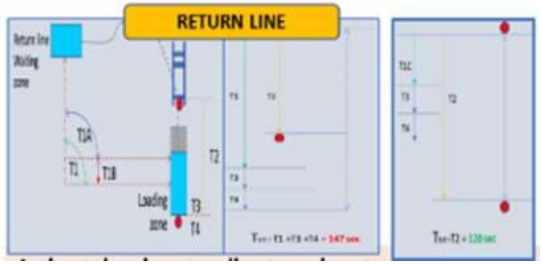
Actions taken to reduce CED oven process time

- CED oven temperature increased to 190 °C in both heat up & hold up zone. Validation for EMT done for new baking schedule.
- EMT trial taken to validate and found OK.

** EMT – Effective Metal Temperature (160 °C for 15 min.)*

CED Oven Process Time reduced by 30 Sec.

C **RETURN LINE**



Actions taken in return line to reduce travel time

- New waiting zone creation after return line
- Logic modified to carrier wait till first drop position
- Sequencing logic modified to accommodate spare part skid reverse movement

Return Line Travel Time reduced by 30 Sec.

Result

98 cycles/shift

94 cycles/shift

95 cycles/shift

- Increased productivity - 94 to 98 cycles/shift from 83 to 86 cycles/shift
- Ensured increased cycles monitoring through shift logbook
- Ensured sustenance of improved process time through PLC logic modification

Innovative Aspect:

Modifications done by challenging the OEM's standard process design

Developed unique digital simulation model to have a bird's eye view and worm eye view of every step and sequence in the PTCED Line.

Impact/Benefits:

ENERGY SAVING

Annual Electrical Energy Saving 15.94 Lakh kWh

CO_2

Annual GHG Reduction 1259 t CO_2e

Renewable Energy

01 CURRENT APPROACH & CHALLENGES

02 UTILIZATION OF RENEWABLE ENERGY

7. UTILIZATION OF RENEWABLE ENERGY SOURCES

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CURRENT APPROACH:

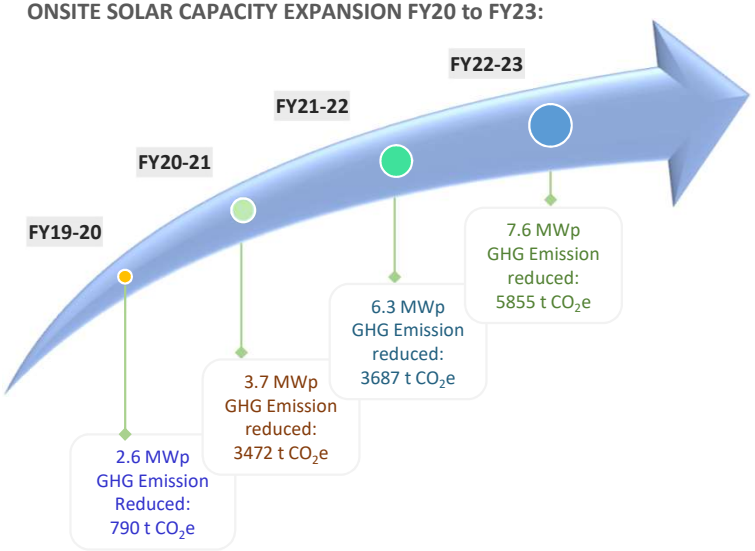
- ❑ Tata Motors – Jamshedpur has Onsite Renewable Energy generation through Solar Power Plant
- ❑ Solar Plants installed through Opex (PPA Mode) - No investment by TML
- ❑ No RPO Obligations

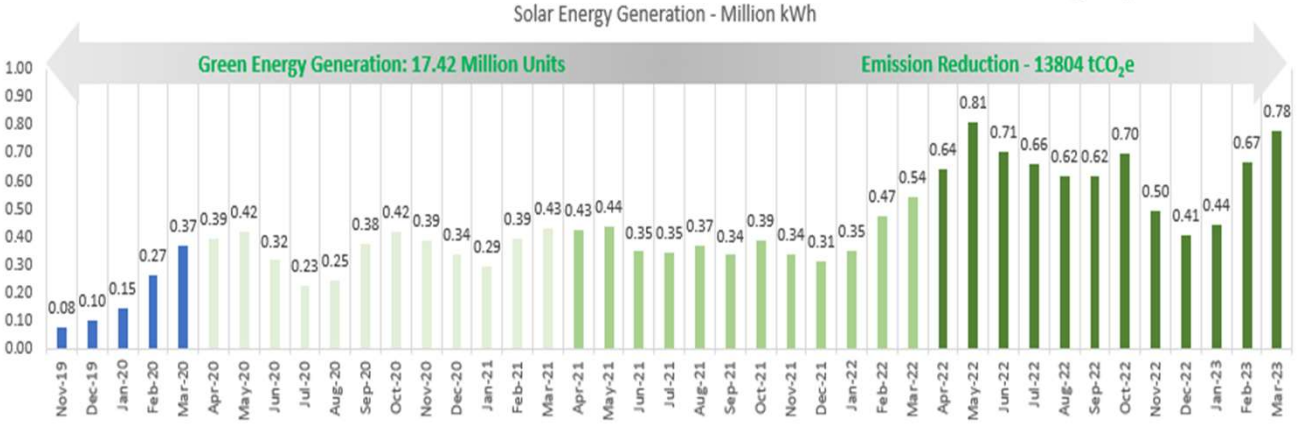
CHALLENGES IN MAXIMIZING RE UTILIZATION:

1) Absence of established and approved process from Regulator for enabling purchase of Open Access Renewable Energy through:
   - Inter-State Transmission System (ISTS)
   - Short / Long Term PPAs (Intra / Inter State)
   - Group Captive RE Installation (Intra / Inter State)

2) JSERC's Notification on Green Tariff - Not Available

ONSITE SOLAR CAPACITY EXPANSION FY20 to FY23:

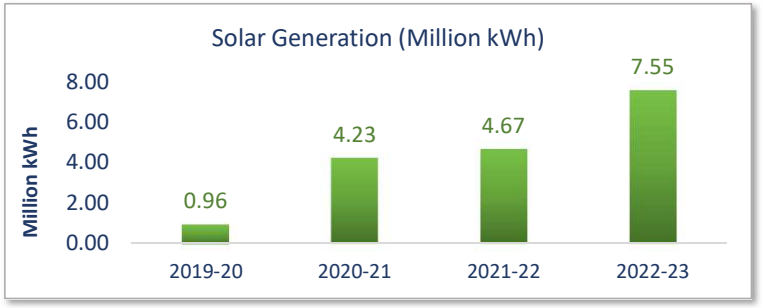




Solar Carport 0.64 MWp at Auto General Office

Solar Plant 0.86 MWp - Engine Office

Solar Plant 0.59 MWp on RBT Shed



Year	Technology	Installed Capacity (MWp)	Consumption (Million kWh)	% of Overall Electrical Energy Consumption
FY 2019-20	Solar PV	2.6	0.96	0.77%
FY 2020-21	Solar PV	3.7	4.23	4.11%
FY 2021-22	Solar PV	6.3	4.67	3.20%
FY 2022-23	Solar PV	7.6	7.55	4.68%

Waste Management & Utilization

01 WASTE MANAGEMENT APPROACH

02 WASTE UTILIZATION FOR CO-PROCESSING

03 KEY ACTIONS FOR WASTE UTILIZATION

8. WASTE UTILIZATION AND MANAGEMENT

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Waste Management Approach

REDUCE
To reduce the amount of waste generation by optimizing conuumption of resources.

REUSE
To seek alternate uses of the waste that has been generated or of discarded items or their parts.

RECOVER
To recover the embedded energy in the waste material

RECYCLE
To convert waste into new and usable products or items.

MORE WHEN ONE

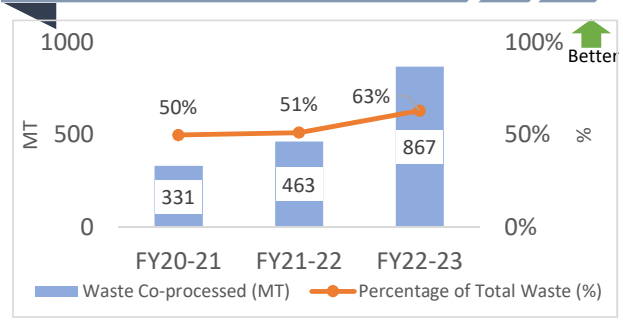
Waste - Quantity and Disposal Pathway

Sl. No.	Type of Waste Generated	Quantity (MT)			Disposal Method
		FY20-21	FY21-22	FY22-23	
1	Paint Sludge	197.44	265.58	526.26	Co-processing
2	Phosphating Sludge	7.67	18.14	31.86	Co-processing
3	CETP Sludge	12.07	5.12	31.87	Co-processing
4	Oil/Paint soaked Jute/gloves	39.63	39.99	88.91	Co-processing
5	Grinding Sludge	74.12	134.41	188.44	Co-processing
6	Oil/Paint soaked Jute/gloves	25.9	40.3	49.93	Incineration
7	Paint Sludge	9	19.9	0.5	Incineration
8	Electronic Waste	22.96	21.79	5.58	Recycling
9	Lead acid Batteries	50.05	27.88	30.32	Recycling
10	Flush Thinner	20.48	16.64	18.92	Recycling
11	Waste / Used Oil (5.1)	92.8	25.48	38.24	Recycling
12	Discarded containers of Hazardous Wastes	85.29	169.3	218.98	Recycling
13	Copper Harness Cable	25.14	24.57	40.16	Recycling
14	Glass Wool	1.6	0	2.46	Secured Landfill
15	Resin/Alumina	0.14	0	0	Secured Landfill
16	Nickel Catalyst	0	0	2.24	Secured Landfill
17	Waste Cutting Oil	0	97.76	102.08	Recycling
	Total	**664.29**	**906.86**	**1376.75**	

Waste Utilized as Fuel Through Co-processing

Year	Type of Waste	Quantity (MT)	GCV (kcal/kg)	Energy Recovered (Million kcal)	Waste as %age of Total Fuel
FY20-21	Paint Sludge	197.44	6700	1323	4%
FY20-21	Oil/Paint soaked Jute/gloves	39.63	3590	142	0.5%
FY21-22	Paint Sludge	265.58	6700	1779	3%
FY21-22	Oil/Paint soaked Jute/gloves	39.99	3590	144	0.3%
FY22-23	Paint Sludge	526.26	6700	3526	6%
FY22-23	Oil/Paint soaked Jute/gloves	88.91	3590	319	0.6%

Waste Co-processed



Key Actions for Waste Utilization

- Re-use of incineration ash and waste Foundry sand to manufacture Paver Blocks: 30600 nos. in FY23

Incineration Ash — Paver Blocks

- Reclamation of waste Core and Mold sand for re-use in Foundry: 1167 MT in FY23

Waste Core sand — Sand Reclamation Plant — Re-usable sand

- Upgradation of 8 nos. painting Robots to improve paint transfer efficiency in Paint Shop. Annual Propane reduction of 30 MT.
- Re-use of canteen food waste (480 MT per year) as manure through Organic Waste Converter.
- Reduction of Paint Sludge by migration to 7th generation CED paint – By Mar '24

GHG Inventorization

01 GHG INVENTORIZATION APPROACH

02 KEY LEVERS & ACTIONS FOR GHG EMISSION REDUCTION

03 GHG INTENSITY TREND : FY18 to FY23

04 GHG EMISSION REDUCTION ROADMAP & TARGETS

05 GHG EMISSION INTENSITY COMPARISION WITH PEERS

9. GHG INVENTORIZATION

TATA MOTORS
Connecting Aspirations

Scopes Included

GHG inventorisation at Tata Motors – Jamshedpur Plant includes **Scope-1** and **Scope-2** emissions

- HSD (Internal Transport)
- HSD (Engine Testing)
- HSD (R&D)
- LDO (Works Incinerator)
- LDO (DG House)
- LDO (Foundry)
- Propane (Axle)
- Propane (Transmission)
- Propane (Paint Shop)
- Propane (Foundry)
- Propane (Frame Factory)
- Propane (Canteen)

→ **Scope-1 Emission**

- Purchased Electricity (Black Power, Fossil Fuel-based)

→ **Scope-2 Emission**

→ **Total GHG Emission**

KEY LEVERS & ACTIONS FOR GHG EMISSION REDUCTION

1 ENERGY COST REDUCTION
- CD Reduction / Optimization
- PF Rebate Maximization
- Maximization of Load Factor

2 OPERATIONAL EFFICIENCY
- Compressor operation optimization
- Reduce auxiliary energy
- Air pressure redn. : 90 psi to 80-84 psi
- Use of VFDs & Portable Compressors
- Time based Switching
- AC Chiller temperature rationalization
- Timer control in FDVs & Lighting Circuits
- Paint booth balancing & freq. optimization of paint booth exhausters
- Fixed Load Reduction

3 NEW TECHNOLOGY
- LED Lights
- Heat pumps
- HVLS- High volume low speed fans
- Star rated equipment
- BLDC Fans / Motors
- Waste Heat Recovery & Reuse
- **Flux Maxiox on Propane Pipeline**
- Energy Efficient Motors

4 DIGITIZATION / INDUSTRY 4.0
- Real time energy monitoring and feedback
- Energy metering for significant energy uses
- Accurate energy accounting & reporting
- Automated alarms /triggers

CO_2 Reduction

5 RENEWABLE ENERGY
- Solar PV on rooftops – 6.3 MWp
- Solar Thermal for Washing Machine
- Light Pipes – Use of Natural Daylight

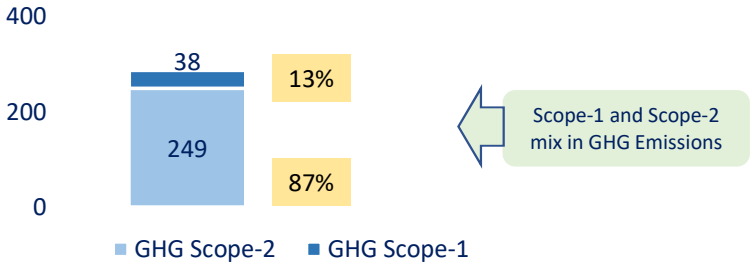
6 BENCHMARKING
- Inter Plant Benchmarking
- Process level : Painting / Foundry / Assembly
- External Benchmarking

7 CAPABILITY BUILDING
- EnMS Internal Auditors
- EnMS Lead Auditors
- BEE Certified Energy Manager
- BEE Certified Energy Auditor

9. GHG INVENTORIZATION

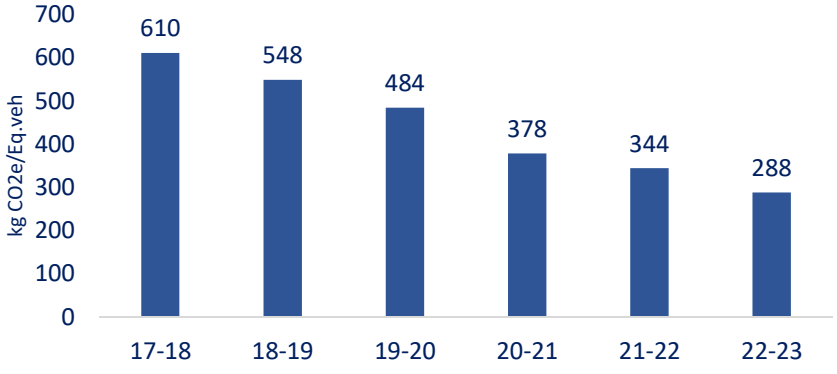
TATA MOTORS
Connecting Aspirations

Sp. GHG FY23 (kg CO_2e/Eq. Veh)



*Scope-1 includes emission due to fuel consumption in internal processes
*Scope-2 includes emission due to purchased electricity from fossil fuels

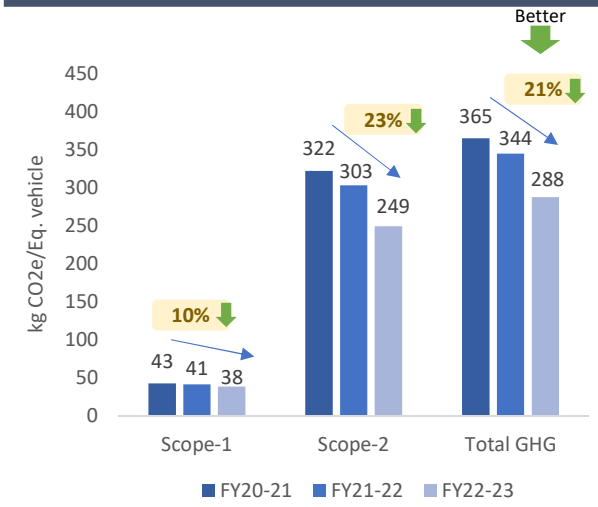
Sp. GHG Emission (kg CO_2e/Eq. Veh)



Specific GHG Emission reduction by 52.8% over 5 years

MORE WHEN ONE

GHG Intensity (kg CO_2e/Eq. Vehicle)



Scope-1 Reduction: Key Actions

- Eliminated Baking Oven operation through Quick Dry Paint usage in Frame Factory
- Insulation refurbishment of Paint Booth Ovens in Paint Shop
- Batch production in Frame Factory PTCED Oven and Top Coat Baking Ovens
- Use of Flux Maxiox magnetic resonators for propane burners
- Replaced pilot burners by glow plugs in Furnaces

Scope-2 Reduction: Key Actions

- Capacity enhancement of on-site Solar Power Plant to 7.6 MWp
- Heat Pumps for Washing Machines
- Holiday mode in PTED process in Paint & Frame to reduce fixed energy consumption
- Cold Washing in Washing Machines
- HVLS fans in shop floors
- Optimized temp. & cycle time in HT Furnaces
- VFDs in pumps and blowers

Public Disclosures - ESG Disclosure Ratings

*Public Disclosures are done at Corporate level

- **Business Responsibility and Sustainability Report (BRSR)** – Published BRSR in Annual Report 22-23 in compliance to ESG Guidelines of SEBI.

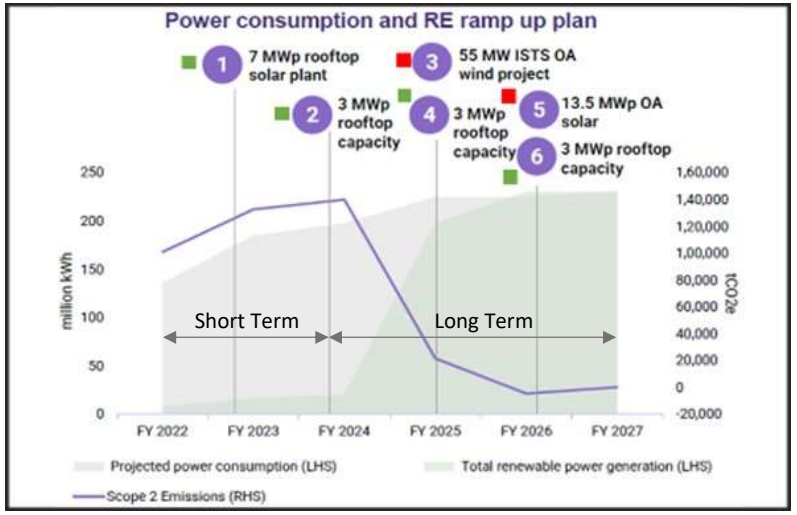
- **Dow Jones Sustainability Index (DJSI)** - Entry into the prestigious DJSI Emerging Markets Index.
- Tata Motors is 1 of 3 Indian Automobile companies and 1 of 8 global automobile companies on the 2022 Index.

CDP
B
CDP SCORE CLIMATE CHANGE 2022

- **CDP** - Two level jump in CDP ratings with 'B rating' in 2022.

TATA MOTORS
Connecting Aspirations

GHG Emission Reduction Roadmap – CV JSR Plant



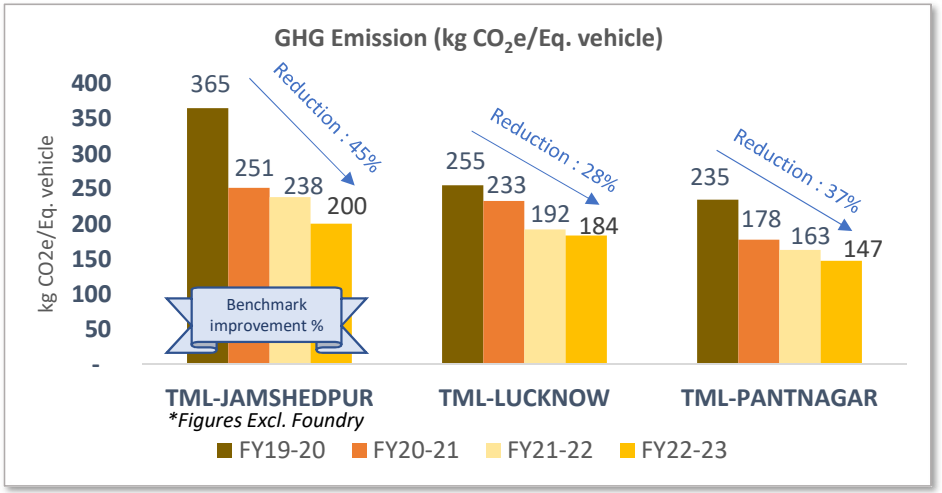
WIP or Will be Executed | Regulatory Roadblock

Plan for Achieving GHG Emission Reduction by Maximizing RE

Plant	FY2023	FY2024	FY2025	FY2026
Tata Motors -Jamshedpur	[1] Planned 7 MWp Rooftop Solar -- **1.6 MWp Installed** **5.5 MWp Installation WIP**	[2] 3 MWp Rooftop Solar	[3] 55 MW ISTS Open Access Wind [4] 3 MWp Rooftop Solar	[5] 13.5 MWp Open Access Solar [6] 3 MWp Rooftop Solar

GHG Intensity - Comparison with Other Tata Motors Plants

Comparison with TML Plants excluding Foundry



Short Term Target

To reduce annual Scope-2 emission to 20,000 t CO2e by FY24-25

Long Term Target

To achieve Net Zero Scope-2 emission by FY29-30 (Internal Target by FY26-27)

MORE WHEN ONE

Green Supply Chain Management

01 APPROACH TO GREEN SUPPLY CHAIN

02 PROJECTS IMPLEMENTED BY SUPPLY CHAIN PARTNERS

03 OUTCOMES OF SUPPLIERS' GREEN INITIATIVES

10. GREEN SUPPLY CHAIN MANAGEMENT

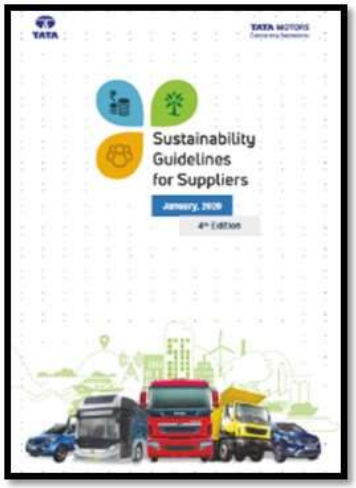
TATA MOTORS
Connecting Aspirations

Tata Motors – Environmental Procurement Policy

Key Aspects of Policy

- Evaluation of vendors/ supply chain partners to improve their environmental performance.
- Prioritizing vendors based on "Green Vendors and Green Product" concept.
- Encouraging vendors to adopt & establish "Environment Management System"
- Reduction in carbon footprint and use of hazardous chemicals by vendors by imparting adequate training and awareness programmes

Sustainability Guidelines for Suppliers



- Governance
- Legal Compliance
- Tata Code of Conduct
- Management System Certifications
- Environment & Climate Change
- Health & Safety
- Labour & Human Rights
- Transparency & Reporting

Strategy for Expanding the Green Supply Chain

Supplier Evaluation Process

TML-Jamshedpur has systematic approach for evaluation of suppliers before onboarding them as supply chain partner. The suppliers must comply with required criteria as a part of environment management system:

1.3	*	Does the organization follow EMS standard, environmental statutory and regulatory norms? Does the organization have responsibility defined internally?	- Organization follows EMS related regulatory norms and requirements. - Organization has valid consent to establish and operate from Pollution control authority. -Organization has defined responsibility for EMS requirements, waste management and statutory compliance.	*Valid 'Consents to Establish and Operate' from SPCB/PCC *Membership Certificate or payment receipts of CETP for effluent treatment & CHWTSDF for hazardous waste disposal * Records of effluent / sewage disposal to CETP / Local Body STP, etc. * Records of hazardous waste disposal to Common Facility / Regd. Scrap Dealer * 3rd Party Environmental Monitoring Reports (treated effluent/sewage, stack emissions, ambient air quality, ambient noise, etc.) * ISO-14001 (EMS) certificate * Display of compliance to 'Consent' conditions at Main Gate * Legal Notice from SPCB/PCC, Local Bodies, etc. and response
1.3a	*	Does the Organization follows statutory and regulatory norms related to IMDS, Conflict of Mineral and Persistent Organic Pollutant (POP) requirements?	-Organization defined and identified all materials in the product (with Component and Sub components wise) supplied to TML for IMDS submission -Organization listed out the usage & smelters of 3TG (Tin, Tungsten, Tantelum and Gold), described as Conflict Material in the components supplied to TML -Organization listed the Persistent Organic Substance (POP) used in the components supplied to TML (C DecaBDE (FLAME RETARDANT AND ADDITIVE),PFOA - PER FLORO OCTANIC ACID,(SURFACTANT, EMULSIFIER, DISPERSING AGENT),HCBD -HEXA CHLORO BUTADIENE,(DEGREASER, SOLVENT AND CLEANER),SCCP (PLASTICISER, ADDITIVES AND FLAME RETARDANT))	-Submission in IMDS -Declaration of 3TG material and submission -Declaration of POP on SRM portal with part number and the POP used.

Sustainable Supply Chain – Phase wise Supplier Coverage for Site assessments

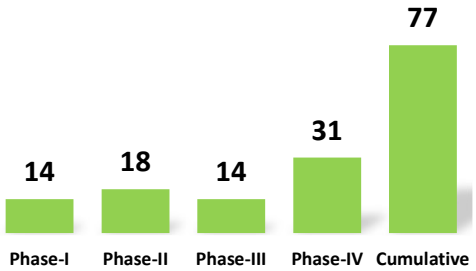
Supplier Awareness

Awareness sessions on **Sustainability** were conducted for suppliers

- Environmental Procurement Policy
- Management Systems: ISO 14001, ISO 50001, ISO 45001
- Energy Conservation
- Environment Protection
- Water Conservation
- Rainwater Harvesting
- Climate Change



Phase - wise Supplier Site Assessments Completed at Jamshedpur (Nos.)



TATA MOTORS
Connecting Aspirations

Key Projects Implemented by Supply Chain Vendors (FY20-21 to FY22-23)

Sl. No.	Vendor Name	Project Implemented	Investment made (Rs. Million)	Benefits Achieved
1	ZF India Ltd.	Idle running elimination of 1.5 kW power pack motor of Bush Press through PLC logic modification	--	Energy saving of 9450 kWh per year
2	ZF India Ltd.	Circuit modification and removal of 0.75 kW coolant motor in 2 nos. VMC 400 machines	--	Energy saving of 6390 kWh per year
3	ZF India Ltd.	Idle running elimination of coolant pump motor by ON/OFF push button in VMC 400 machines	--	Energy saving of 3900 kWh per year
4	ZF India Ltd.	Replacement of 2.2 kW power pack motor of Feeler machine by 1.5 kW motor from old unused machine	--	Energy saving of 3360 kWh per year
5	ZF India Ltd.	Logic modification of panel fan for 10 min. intermittent ON/OFF operation cycle in Assembly Station Panel	--	Energy saving of 1980 kWh per year
6	ZF India Ltd.	Installed Automatic ON/OFF controller for Street lights	0.008	Energy saving of 1588 kWh per year
7	ZF India Ltd.	Installed 15 kWp roof-top solar power plant	0.80	GHG emission reduction of 2.85 t CO2e till Mar'23
8	FFPL	Introduced returnable packaging containers	0.17	Reduce packaging waste generation
9	FFPL	Installed solar street lights	0.29	GHG emission reduction by 0.51 t CO2e per year
10	FFPL	Installed sensor-based water taps and urinals in washrooms	0.03	Reduced water and energy consumption
11	BAPL Rototech	Implemented Rain Water Harvesting sytem	1.6	Increased ground water recharge
12	Metalsa	Replacement of conventional CFL lights by LEDs	0.9	Energy saving and GHG emission reduction
13	Jost India	Replacement of conventional lights by LEDs and replacement of thyristor-based welding machines by inverter-based welding machines	2.37	Reduced GHG emission in FY22-23 by 8% w.r.t. 21-22
14	Timken India	Installed 1.267 MWp roof-top solar power plant	53	GHG emission reduction by 1036 t CO2e per year
15	Timken India	Installed Bio Gas Plant of capacity 250 kg/day of organic waste, generating 20 Cu. Mtr. of Bio Gas/day	0.9	GHG emission reduced by 6 t CO2e per year

Sustainability Initiatives at Supplier's Plants


Solar Plant 1.3 MWp at M/s Timken


Solar Plant 15 kWp at M/s ZF India


Bio-Gas Plant, 250 kg/day at M/s Timken


Solar Street Lights at M/s FFPL


Rain Water Harvesting at M/s FFPL


LED Lights at M/s Jost India


Sensor-based taps at M/s FFPL


Solar Street Light at M/s Jamna Auto

Outcomes of Suppliers' Green Initiatives

Energy Consumption reduced 27932 GJ (8%)

Reduced 2466 t CO2e (5%)

Achieved by Top 8 suppliers

Fresh water consumption reduced 23605 kL (28%)

MOREWHEN ONE

EMS & Other Requirements

01 ENERGY MANAGEMENT SYSTEM

02 CHALLENGES & APPROACH TO ENERGY MANAGEMENT

03 LEVERAGING DIGITAL & CAPABILITY BUILDING

04 NET ZERO COMMITTMENT

MORE WHEN ONE

11. EMS SYSTEM AND OTHER REQUIREMENTS

TATA MOTORS
Connecting Aspirations

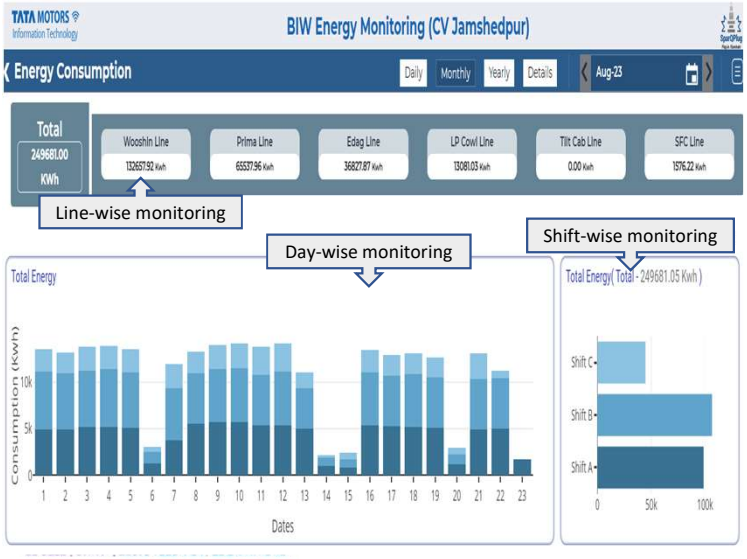
ISO 50001 – Energy Management System

- Standard: ISO 50001 : 2018
- Scope: Manufacturing of M&HCV
- Physical Boundary: TML-Jamshedpur Works
- Continued certification since 2013
- Currently Certified for 2018 version

Digitization Challenges

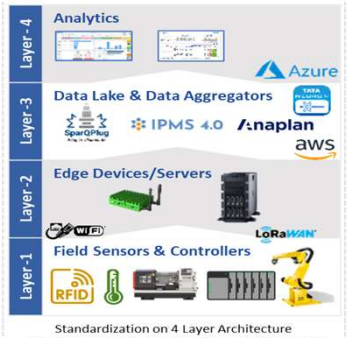
1) Many equipment, by design, did not have the feasibility of energy measurement.
2) High requirement of meters and field devices
3) Moderate level of digitization / industry 4.0 deployment before FY20
4) Development of algorithms for predictive models to establish empirical correlation between energy consumption and the relevant variables

Energy Monitoring Through Online Digital Dashboard



Other Management Systems

4-Layered Digital Architecture

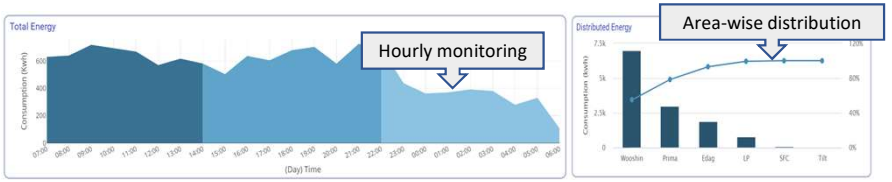


Standardization on 4 Layer Architecture
Leverage cloud infrastructure for agile deployment

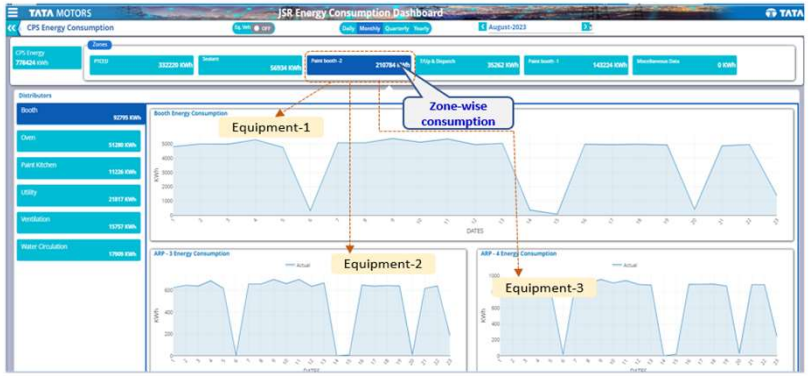
Capability Building Programs (No. of Employees Trained)

Program	FY21 to FY23
Digital Champion	28
Digital Mentor	28
Quality 4.0	10
M.E. 4.0	12
Industry 4.0 Awareness Training	1857
Total	1935

Energy Monitoring Through Online Digital Dashboard



Zone-wise and Equipment Level Energy Monitoring Through Digital Dashboard



Learnings from CII and Other Award Programs

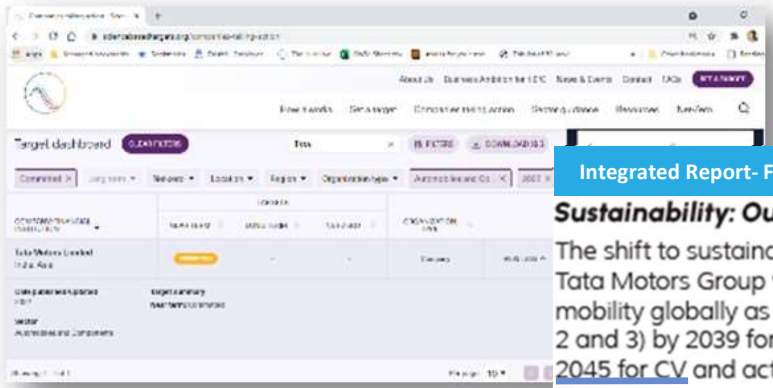
12. NET ZERO COMMITMENT

TATA MOTORS
Connecting Aspirations

Net Zero Target Year

2030	2037	2045 (Target Year)
RE 100 Tata Motors is a signatory to RE100 and has committed to meet 100% of its power requirements from renewable sources by 2030.	SCIENCE BASED TARGETS Tata Motors has committed to Science Based Targets Initiative (SBTi) for setting near–term GHG reduction targets.	NET ZERO Tata Motors has committed to Net Zero by 2040 for the Passenger Car business and by 2045 for the Commercial Vehicle business

TML has committed to setting Science based Targets for GHG reduction



Integrated Report- FY22

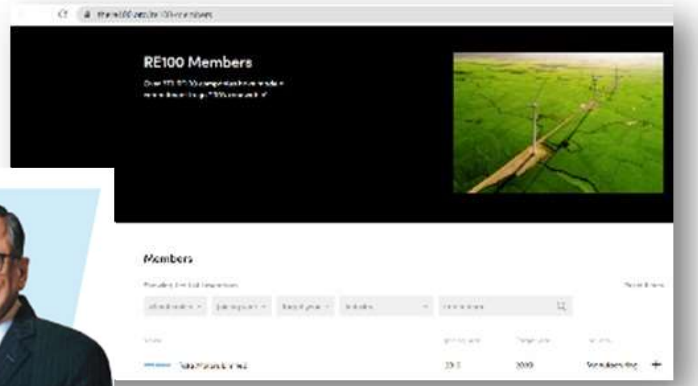
Chairman's Message

Sustainability: Our roadmap to Net Zero

The shift to sustainable mobility is irreversible and the Tata Motors Group will be amongst the leaders of green mobility globally as we target Net Zero emissions (Scope 1, 2 and 3) by 2039 for Jaguar Land Rover 2040 for PVs and 2045 for CV and actions are already underway to deliver the same.

Mr. N Chandrasekaran, Chairman and Non-Executive Director

Tata Motors is part of the RE-100 committed organisations



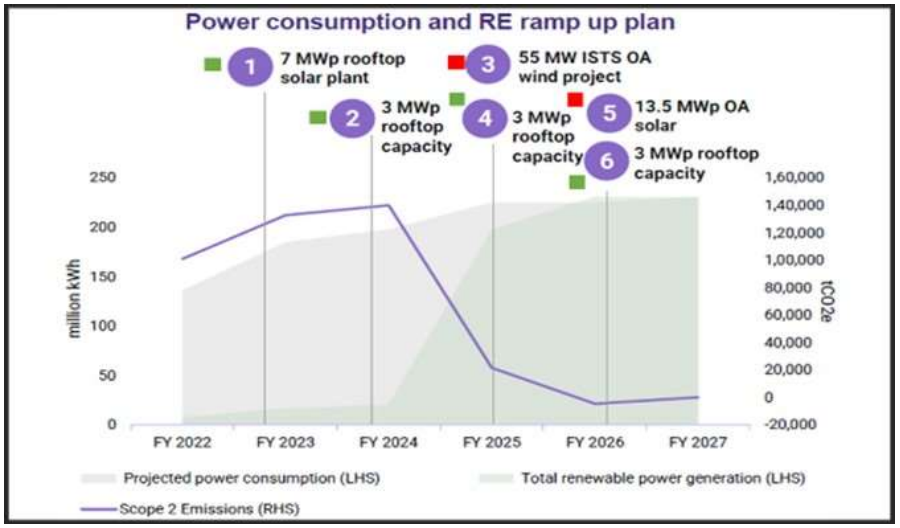
12. NET ZERO COMMITMENT

TATA MOTORS
Connecting Aspirations

Roadmap for Achieving Net Zero Target

Plant	FY2023	FY2024	FY2025	FY2026
Jamshedpur	[1] Planned 7 MWp Rooftop Solar -- 1.6 MWp Installed 5.5 MWp Installation WIP	[2] 3 MWp Rooftop Solar	[3] 55 MW ISTS Open Access Wind [4] 3 MWp Rooftop Solar	[5] 13.5 MWp Open Access Solar [6] 3 MWp Rooftop Solar

RE Capacity Enhancement Plan



WIP or Will be Executed Regulatory Roadblock

Encons/Energy Efficiency/New Technology Measures to Support Net Zero Target

2023-24
- Insulation refurbishment of Loop-1 ovens (3, 4 & 5) in Paint Shop.
- Low bake sealant introduction in Paint Shop.
- HVLS fans in Transmission Shop
- Replacement of old cooling tower in Engine Factory.
- Digitalization - Online dashboard for energy monitoring
- Flux Maxiox for ATH in CPS
- Timer-based control of HVLS Fans in New Trim Line

2024-25
- Fitch Fuel Catalyst for ED oven in Paint Shop
- Heat Pump for Hot Water Generator in Paint Shop
- HVLS Fans in HT-Axle
- 7th Generation CED system in Paint Shop
- Cold Washing at Engine Factory
- Digitalization - AI/ML based analytics
- Waste Heat Recovery for CCHF Furnace in Axle
- VFDs for Frame Line-3 FDV motors

2025-26
- HVLS Fans in HT-Transmission
- Energy efficient motors for Line-3 FDVs.
- Insulation refurbishment of ED oven in Paint Shop.
- Hydroxy generator for Topcoat Oven in Paint Shop
- Energy efficient IE4 motors for ASUs in Paint Shop
- Waste Heat Recovery system for Topcoat Oven in Paint Shop, Compressors, Engine Test Bed

2026-27
- Frigi-Tech lubricant for improving chiller plant efficiency in Paint Shop
- Energy Efficient IE4 Motors for rating 30 kW and above
- Insulation refurbishment of Sealant oven in Paint Shop.
- Heat Pump for Hot Water Generator in Frame Factory.
- Concentrated Solar Thermal (CST) system for Hot Water Generator in Paint Shop

MORE WHEN ONE

AWARDS & ACKNOWLEDGEMENTS

AWARDS AND ACKNOWLEDGEMENTS

TATA MOTORS
Connecting Aspirations

CII – Eastern Region Encon Award 2022

Tata Motors – Jamshedpur bagged the 'WINNER' Award in the Energy Intensive Group category at the CII – Eastern Region ENCON Awards 2022.

CII – National Award for Excellence in Energy Management 2021

Tata Motors-Jamshedpur won the Excellent Energy Efficient Unit Award 2021 at the CII-Energy Efficiency Summit organized through virtual platform

30th NATIONAL ENERGY CONSERVATION AWARD – 2020 CONDUCTED BY BEE - INDIA

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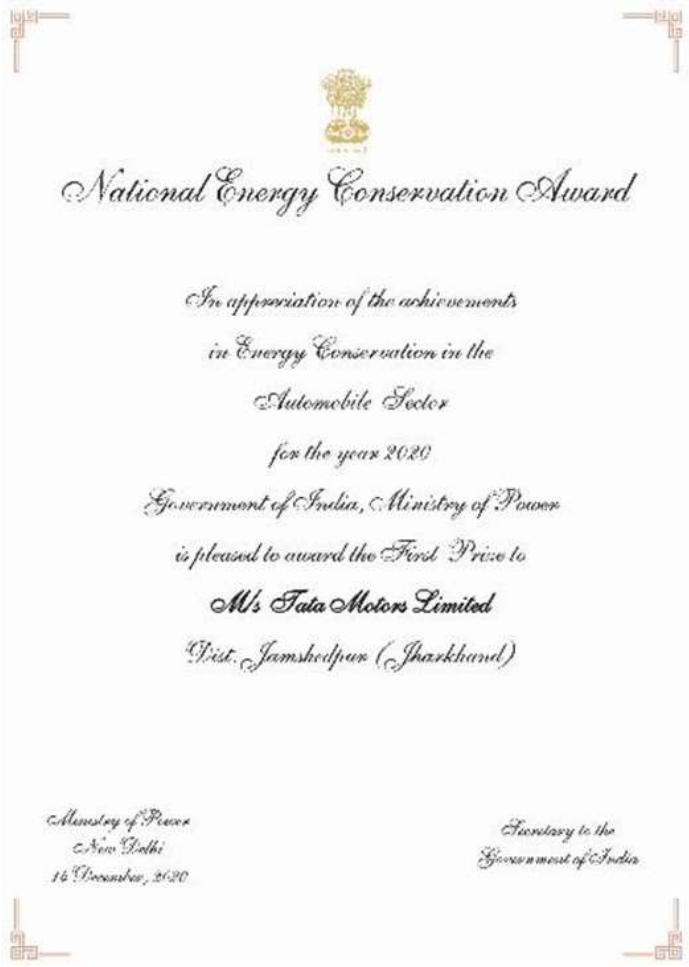
राष्ट्रीय ऊर्जा संरक्षण पुरस्कार


National Energy Conservation Award

In appreciation of the achievements
in Energy Conservation in the
Automobile Sector
for the year 2020
Government of India, Ministry of Power
is pleased to award the First Prize to
M/s Tata Motors Limited
Dist. Jamshedpur (Jharkhand)

Ministry of Power
New Delhi
16 December, 2020

Secretary to the
Government of India

FIRST PRIZE

TATA MOTORS LIMITED

JAMSHEDPUR (JHARKHAND)

Shri Vishal Badshah
Head - Jamshedpur Plant

Shri Deepak Kumar
Head – CCE (Utilities)

Tata Motors Limited
Jamshedpur (Jharkhand)

MOREWHEN ONE
BE BOLD | OWN IT | SOLVE TOGETHER | BE SMARTHETIC

CERTIFICATION AND RECOGNITION

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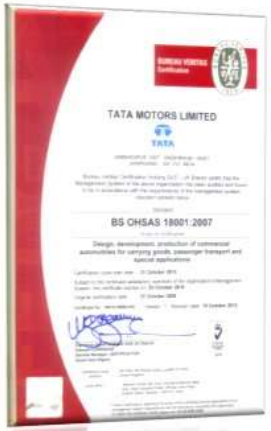
ISO 50001

ISO 14001

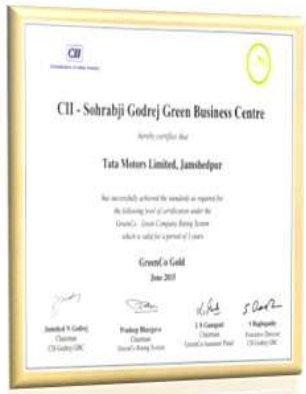
ISO 45001



IATF 16949

SA 8000

GREEN CO - GOLD



WINNER CII-EAST REGION: 2022

INSAAN – PAR EXCELLENCE AWARD FOR ENVIRONMENTAL INITIATIVES : 2022

CII-ENERGY EFFICIENT UNIT : 2019

CII-EAST REGION 4.75 / 5 STAR RATING : 2019

CII-ENERGY EFFICIENT UNIT : 2018

AWARDS RECEIVED BY TATA MOTORS - JAMSHEDPUR

TATA MOTORS
Connecting Aspirations

CII-National Award for Excellence in Energy Management

2021 - **Excellent Energy Efficient Unit** Award
2020 - **Energy Efficient Unit** Award
2019 - **Energy Efficient Unit** Award
2018 - **Energy Efficient Unit** Award
2016 - **Excellent Energy Efficient Unit** Award
2015 - **Excellent Energy Efficient Unit** Award
2014 - **Energy Efficient Unit** Award
2012 - **Energy Efficient Unit** Award

BEE-National Energy Conservation Award

2020 – **'1st Prize'** in Automobile Manufacturing Category
2017 – **'1st Prize'** in Automobile Manufacturing Category

Jharkhand State Pollution Control Board (JSPCB) Award

2018 – **'1st Prize'** for Best Environmental Initiatives
2017 – **'2nd Prize'** for Best Environmental Initiatives
2016 – **'1st Prize'** for Best Environmental Initiatives

CII-Eastern Region : ENCON Award

2022 – **Winner** Award in Energy Intensive Group, 5/5 Star
2020 – **4.75/5 Energy Star** Award
2019 – **4.75/5 Energy Star** Award
2018 – **4.5/5 Energy Star** Award
2015 – **Winner** Award in Energy Intensive Group, 5/5 Star
2013 – **1st Prize** in Energy Efficiency

Shrishti – Good Green Governance Award

2017 – **Winner** in Manufacturing Non-process category
2016 – **Winner** in Manufacturing Non-process category
2015 – **Winner** in Manufacturing Non-process category
2014 – **Winner** in Manufacturing Non-process category
2013 – **Winner** in Manufacturing Non-process category
2012 – **Winner** in Manufacturing Non-process category
2011 – **Winner** in Manufacturing Non-process category

GreenCo Award

2016 – **GreenCo Best Practices** Award for innovative project on Water Conservation
2015 – **GreenCo 'Gold'** Rating

MORE WHEN ONE

TATA MOTORS
Connecting Aspirations

Thank You

To know more, please contact: Mr. Ramit Dutt (9794052516)
ramit.dutt@tatamotors.com

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