TATA MOTORS
Connecting Aspirations

TATA

Tata Motors Limited Dharwad

Team Members
Mr. Sudhir Kadam (DGM)
Mr. Ravi Sharma (Sr. Mgr.)

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Brief introduction : TATA MOTORS LIMITED DHARWAD

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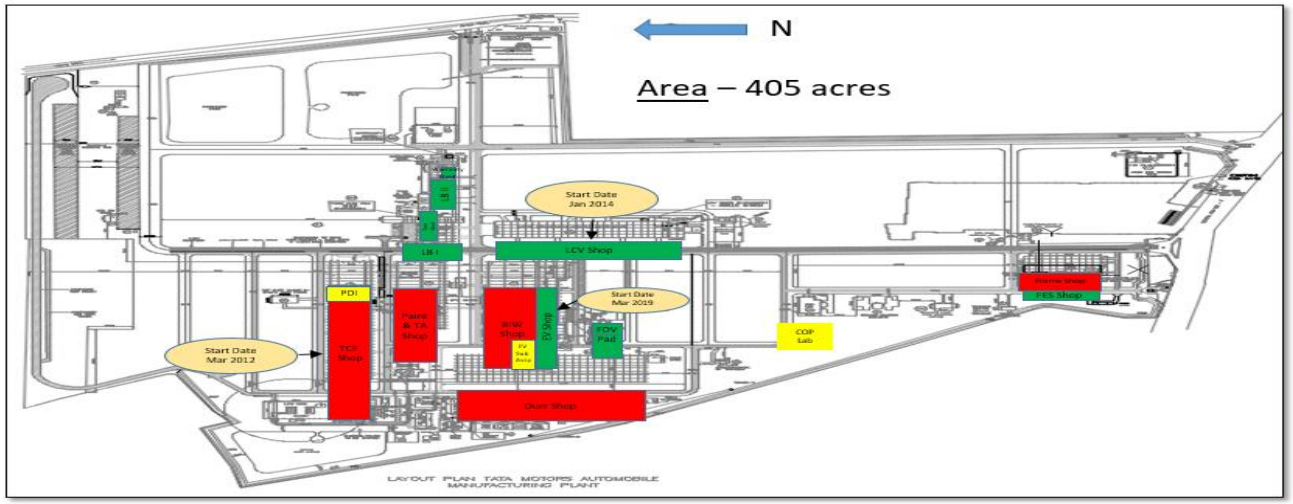
IGBC Platinum Rated plant

RE-100 Plant

GreenCo Gold Rated plant

Net water Positive

Zero Waste to Landfill



LCV Assembly Line

EV Assembly Line

SCV Assembly Line

Shop in operation – ILCV , EV , FES, LB1 & LB2

Shop used for other operations – COP lab for Innovation Lab , Partial :TCF Shop for PDI, BIW shop for EV sub assly

Shop not in operation – SCV (TCF , Durr Paint Shop, Autophoretic paint Shop , TA Shop, BIW , Frame Shop)

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Manufacturing Process: Dharwad Product Portfolio

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LCV Chassis

4SPCR

- 412 4SPCR
- 712 4SPCR
- 812 4SPCR

3.3Ltr

- 1318
- 916
- 11.6

IB

- Maxi cab
- 916 LHD
- BS II & BS III

EV Chassis

9 Meter

- EV 9/9
- EV 6/9

12 Meter

- EV 9/12
- EV 4/12

Total Plant Capacity 120/Day (LCV 100 & EV 20/Day)

Sp.Energy Consumption in last 3 years (FY21-22 to FY23-24)

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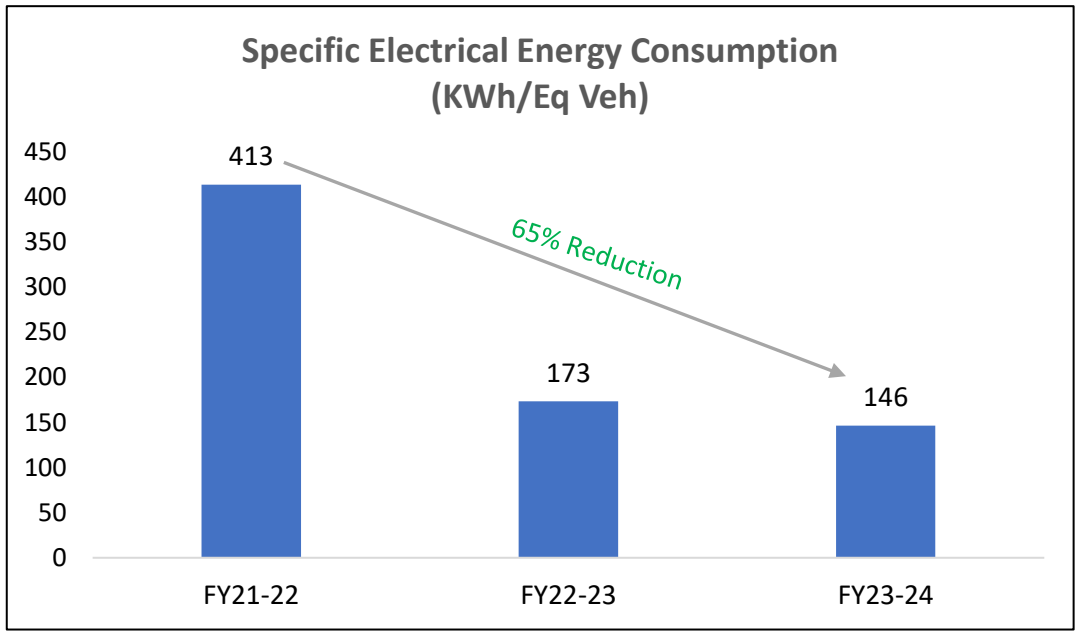
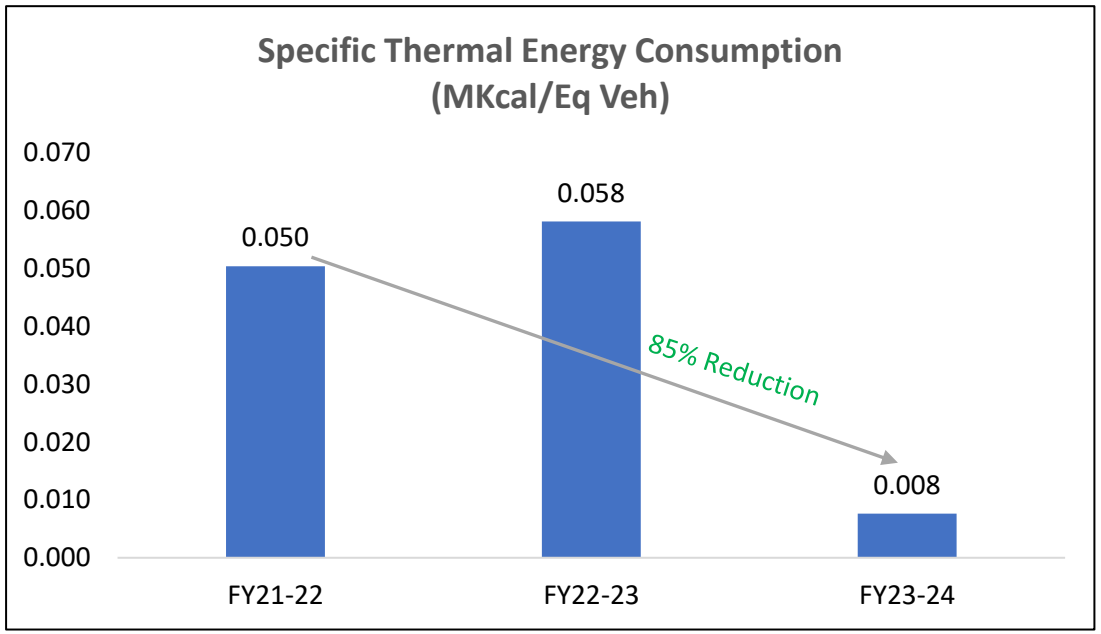
Year	No of Energy Saving Projects	Investments (INR Million)	Electrical Savings (Million kWh)	Savings (INR Million)	Impact on SEC (Electrical, thermal)
FY 2021-22	9	0.03	0.59	4.16	101 kWh/Eq. Veh.
FY 2022-23	17	0.62	0.477	3.5	21 kWh/Eq. Veh.
FY 2023-24	8	0.43	0.198	3.2	10 kWh/Eq. Veh.
	34	1.08	1.265	10.86	26 kWh/Eq. Veh.





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Sp. Energy Consumption in last 3 years (FY21-22 to FY23-24)

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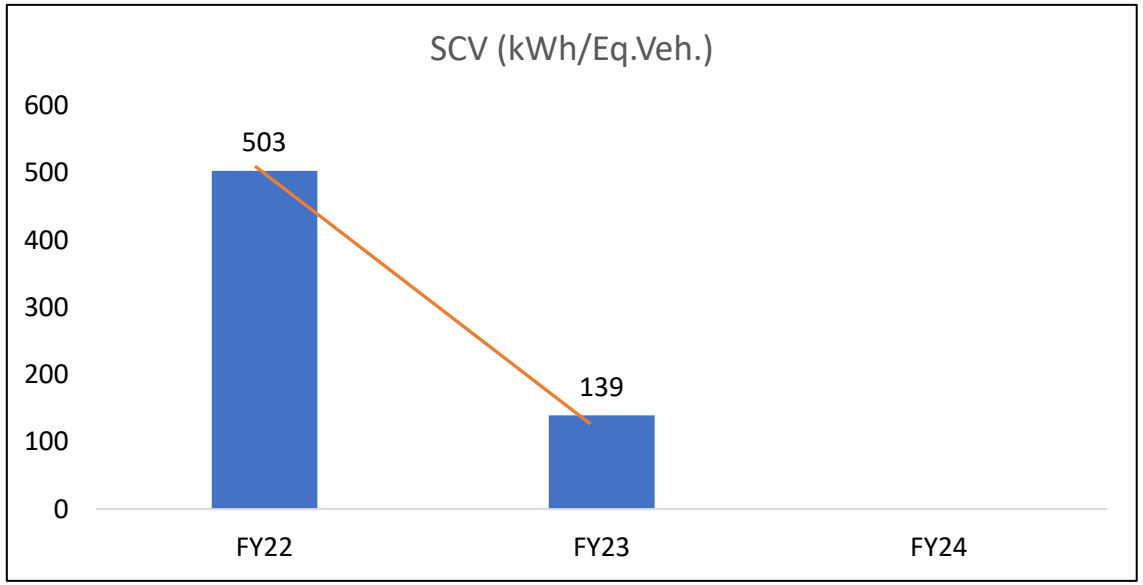

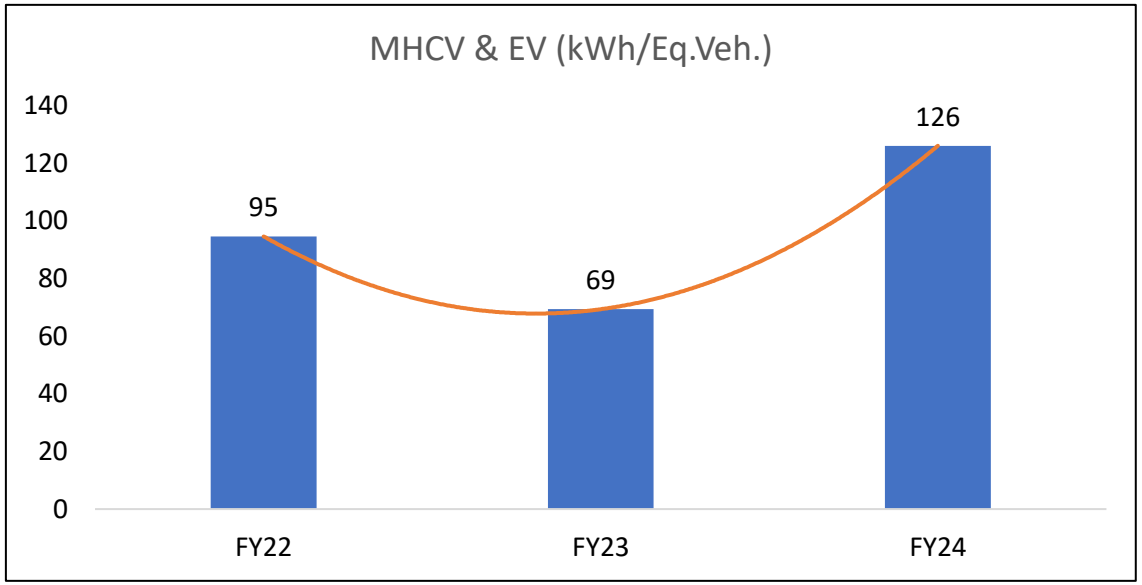

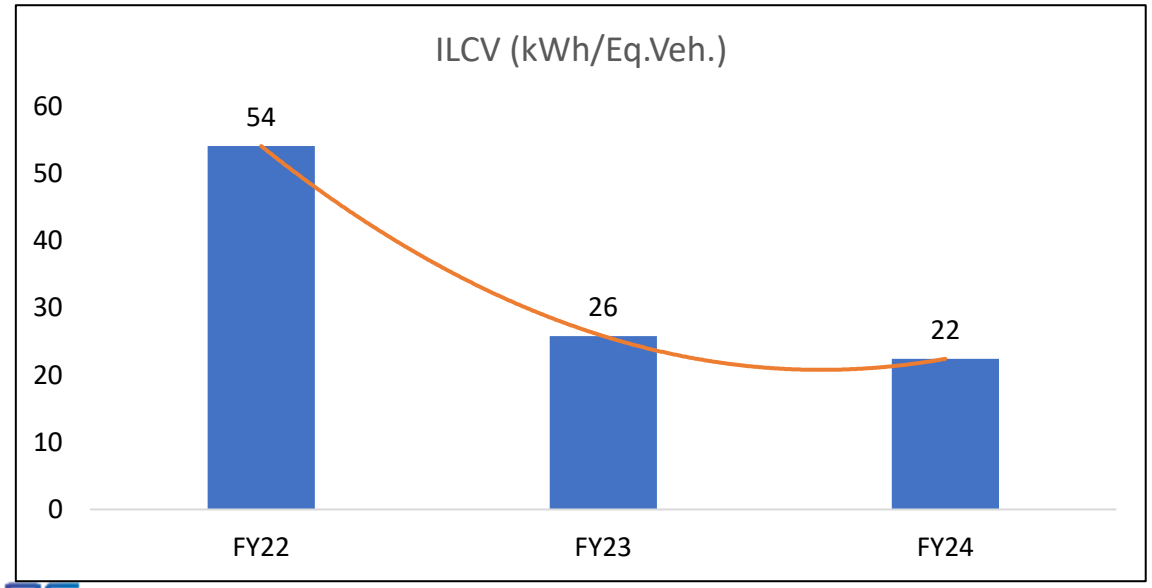

- In FY23, SCV specific electricity consumption decreased by 72%.
- From FY22 to FY24 ILCV specific power consumption decreased by 59%.
- In FY23, MHCV & EV specific power consumption decreased by 27%, but in FY24 the same has increased by 45%. It was due to addition of EV charging, which is around 77% of total power consumption of MHCV & EV.

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Competitors, National & Global benchmark : Internal Benchmarking

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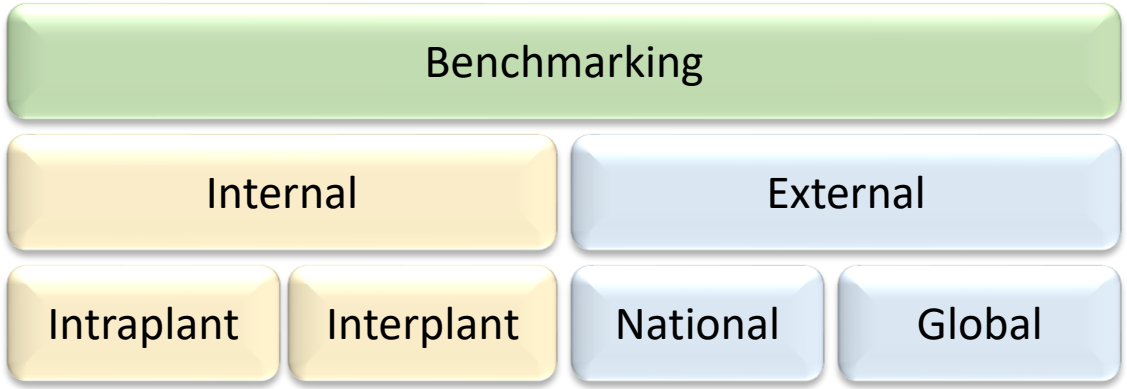
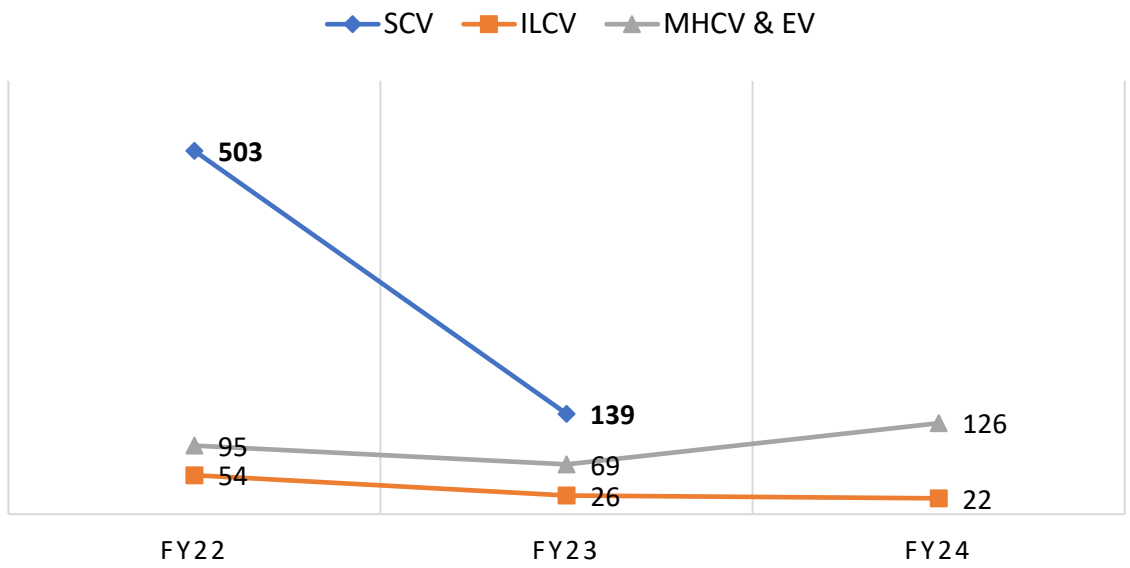
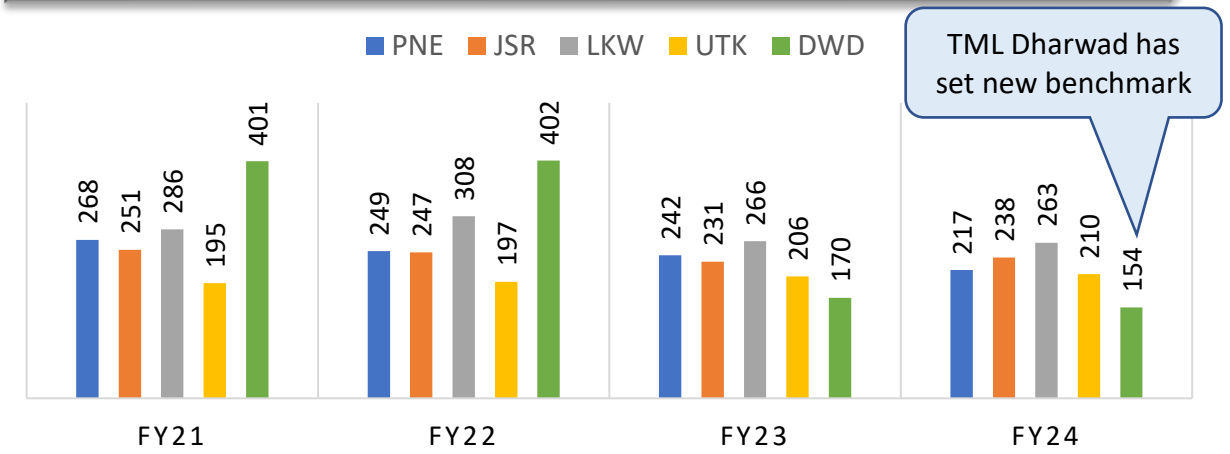


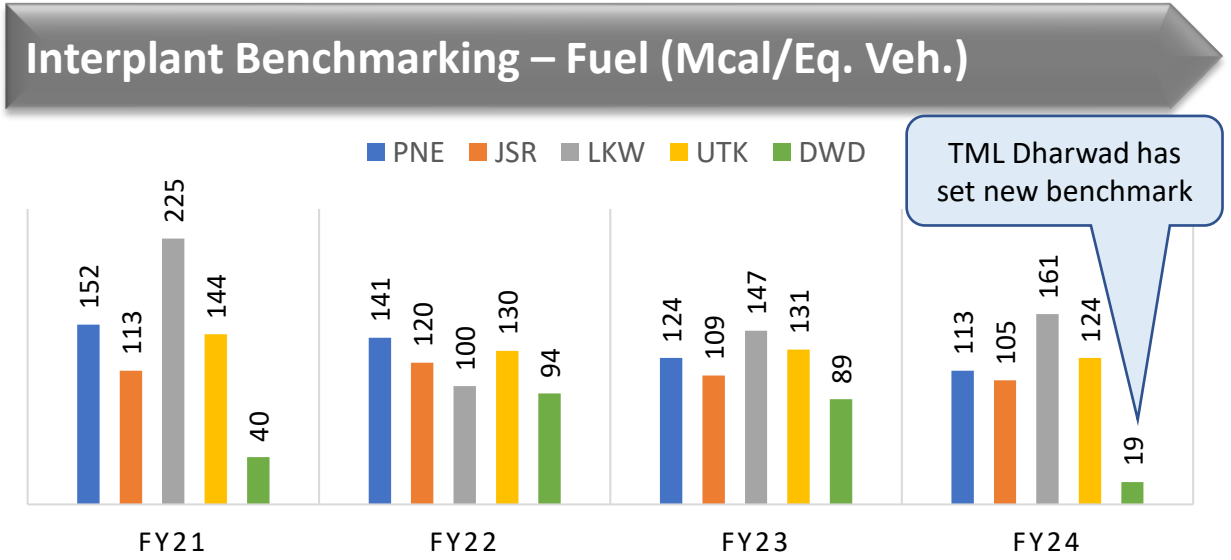
Intraplant Benchmarking (kWh/Eq. Veh.)



Interplant Benchmarking – Power (kWh/Eq. Veh.)



Interplant Benchmarking – Fuel (Mcal/Eq. Veh.)



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Competitors, National & Global benchmark: External Benchmarking

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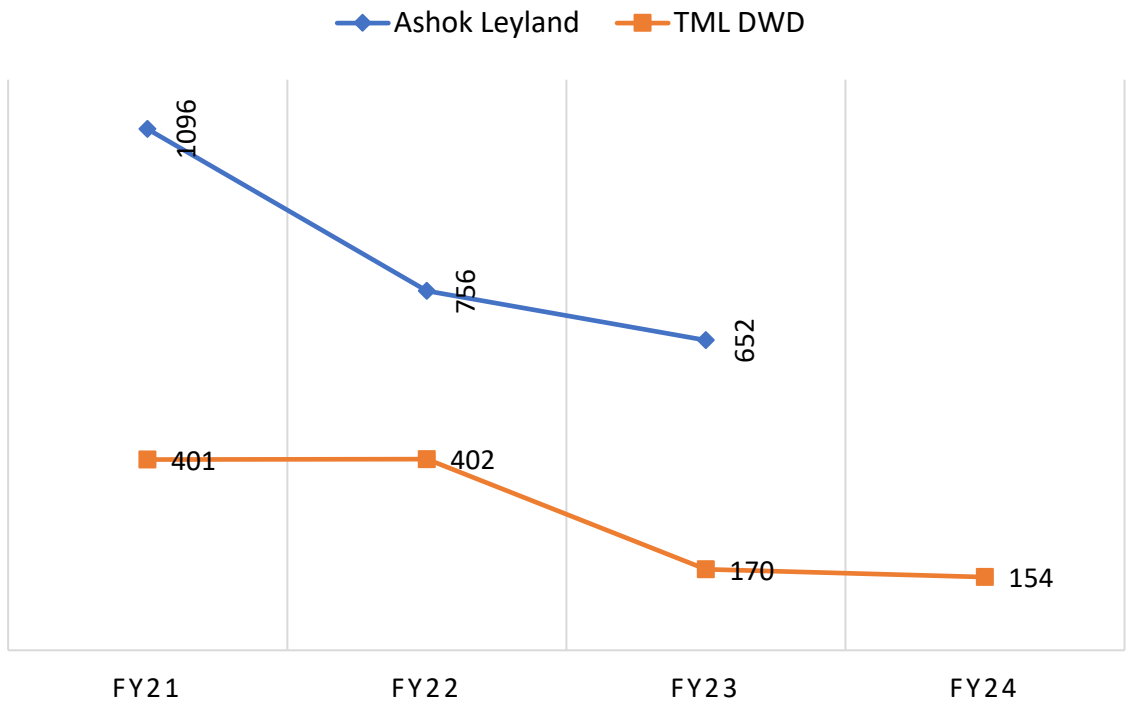
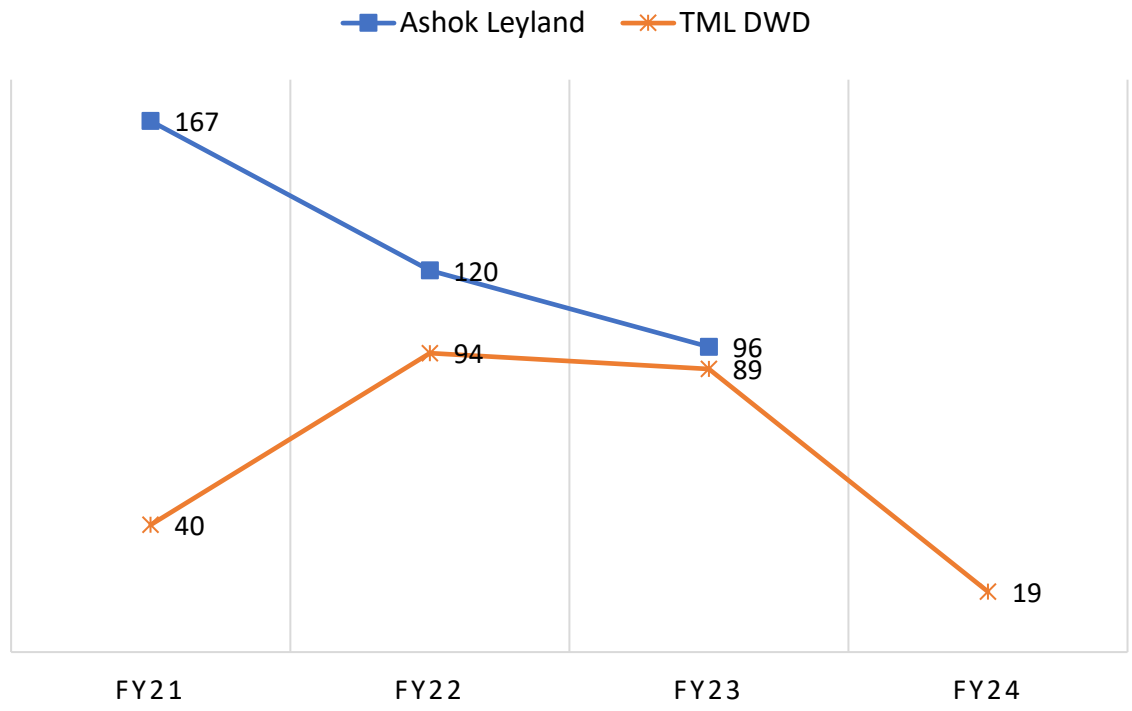
External Benchmarking - Power (kWh/Eq. Veh.)



External Benchmarking – Fuel (Mcal/Eq. Veh.)



- TML Dharwad is the best industry benchmark both in specific power and specific fuel consumption. However, accurate benchmarking can't be done due to different processes & size of product (UVs).
- We are looking for other international competitors who can be benchmarked in future.

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List of Major Encon project planned in FY 2024-25

Major ENCON Projects list for FY 2024-25			
S.No	**Title of Project**	**Annual Electrical Saving (Million kWh)**	**Investment (Rs in Million)**
1	HVLS fan for LCV and FES shop	0.018	3
2	Sustenance of last year EnCON projects : Optimization of high mast lighting	0.0005	0
3	Energy optimization through KT-02 : Real time monitoring of compressed air consumption	0.025	0.5
4	Energy optimization through KT-02: 100% Real time monitoring of power consumption at shop level	0.02	1
5	Sustenance of last year EnCON projects : Main paint shops power optimization	0.02	0
6	Energy optimization through KT-02: 100% Real time monitoring of fuel consumption at shop level		
	Total	0.084	4.5

Energy saving projects implemented in last 3 years

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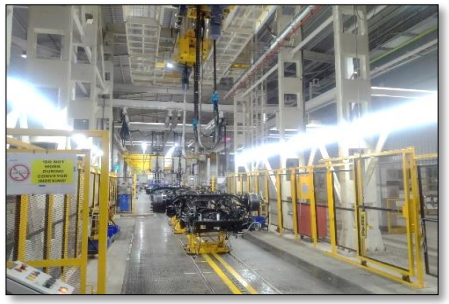
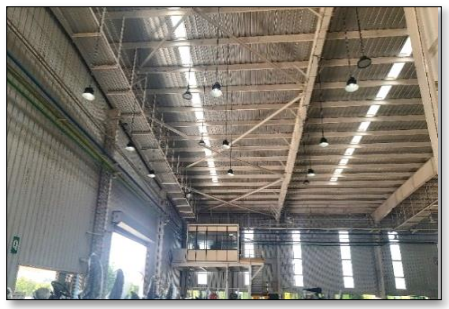
ENCON Projects list FY 2021-22					
Sr. No.	**SHOP**	**Title of Project**	**Annual Electrical Saving (Million kWh)**	**Annual Electrical Cost Saving (Rs million)**	**Investment Made (Rs million)**
1	Paint	Improving cycle time by removing unused skids in the line	0.336	0.235	0.00
2		To turn off the K factor filter during in B and C shift of off days/nonproduction days	0.180	0.126	0.00
3	TCF	Switched off the top side LED lights in EOL area underpit-01	0.024	0.017	0.00
4	LCV	Installation of LED tube lamps for LCV Main Assembly line Station	0.004	0.003	0.002
5		Man cooling Fans are interlocking with LCV Main Line conveyor	0.003	0.002	0.017
6		Installation of LED lamps at smoke pit	0.027	0.019	0.001
7		Motion detector installation for EOL man cooling fan	0.005	0.003	0.002
8		Installation of 5W LED Lamp for all LCV shop safety pits	0.005	0.003	0.002
9		Installation of LED lamps for LCV wheel alignment pit	0.012	0.008	0.004
Total			**0.595**	**0.416**	**0.028**





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Energy saving projects implemented in last 3 years

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ENCON Projects list for FY 2022-23			
Sr. No	**Title of Project**	**Annual Electrical Saving (Million kWh)**	**Investment (Rs in Million)**
1	VFD for Water Pump	0.0249	0.0365
2	VFD for Water Pump	0.0249	0.0365
3	VFD for KOD circulation pump	0.0432	0.0365
4	VFD for Degrese circulation pump	0.0432	0.0365
5	VFD for ACC oven-1 hot air circulation blower-1	0.018	0.0365
6	VFD for ACC oven-1 hot air circulation blower-2	0.018	0.0365
7	VFD for ACC oven-2 hot air circulation blower-1	0.018	0.0365
8	VFD for ACC oven-2 hot air circulation blower-2	0.018	0.0365
9	VFD for ACC oven-2 hot air circulation blower-3	0.018	0.0365
10	VFD for ACC oven-2 hot air circulation blower-4	0.018	0.0365
11	VFD for PCC oven hot air circulation blower-1	0.033	0.0365
12	VFD for PCC oven hot air circulation blower-2	0.033	0.0365
13	VFD for PCC oven hot air circulation blower-3	0.033	0.0365
14	VFD for PCC oven hot air circulation blower-4	0.033	0.0365
15	VFD for ETP & STP Blower No.2	0.0432	0.0365
16	VFD for RO High Pressure Pump	0.0144	0.0365
17	VFD for Raw water transfer pump	0.0432	0.0365
18	Total	0.477	0.6205

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Energy saving projects implemented in last 3 years

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ENCON Projects list for FY 2023-24				
S. No	Year	Title of Project	Annual Electrical Saving (Million kWh)	Investment (Rs in Million)
1	2023-2024	Optimisation of street lighting by identifying non operational area and restrict the movement in night	0.0003	0
2	2023-2024	Optimization of high mast lighting	0.0003	0
3	2023-2024	SCV main paint shops power optimization	0.24	0
4	2023-2024	Optimization of COP lab power supply in line with shop operation hours	0.024	0
5	2023-2024	Relocating of paint shop portable compressor to LCV	0.02	0
6	2023-2024	VFD for ETP air bower motor	0.02	0.40
7	2023-2024	VFD for Compressor House water cooling pump	0.01	0.18
8	2023-2024	Installation of HVLS fan for high efficiency and low power consumption	0.12	1.40
Total			0.436	1.980

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Energy saving projects implemented in last 3 years

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Relocation of 420 CFM compressor from Paint shop to compressor house.

For non working hour production activities the compressed air was supplied by running main compressor
ATLAS COPCO make OIL FREE TWO STAGE SCREW WATER COOLED COMPRESSOR; KW: 250;OUTPUT: 1500 CFM CFT/KWH: 360;TYPE:

Cross functional team evaluated the air requirement for non production hours and un used compressor from Paint shop was shifted and installed at compressor house.
ELGI make SINGLE STAGE AIR COOLED SCREW COMPRESSOR KW: 55; OUTPUT: 385 CFM; CFT/KWH: 420

Savings in Power by 20,000 units/Year.
As small compressor is air cooled and hence water saving is also achieved

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VFD installed in ETP for air blower motor

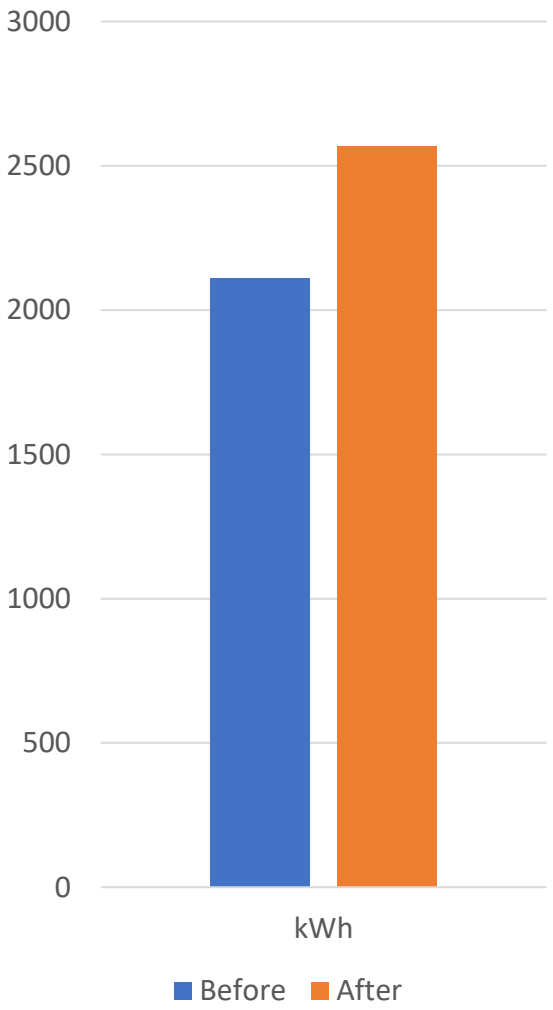
Before: Running on full load controlled through valve.

After: Installed VFD kept the valve fully open and controlling blower speed through VFD.

Savings: 60 KWh/Shift

Blower Energy Consumption Data				Running Hours	Savings
Blower	Energy Meter Reading KWh				
	Initial	Final	Difference		
Without VFD	1301421	1301435	14	10	60 Units/shift
With VFD	1301435	1301444	9	10	

Innovative Projects Implemented



- **On-Site Solar Generation Enhancement**
  (Initiative taken in Dec 2023)

- **Initiative:**
  Charging of EV Buses during day time only.

- **Result:**
  Solar Generation increased by 450 kWh /day (approx.) which is equivalent to a savings in Energy Cost by 1600 INR / day (approx.)

Solar Energy Generation (in kWh)										
Particular	Date								Total	Average per day
	Day-1	Day-2	Day-3	Day-4	Day-5	Day-6	Day-7	Day-8		
Before	2420	1965	2300	825	2440	2145	2305	2490	16890	2111
After	2750	2870	2830	2675	775	3015	2695	2940	20550	2569
Difference	330	905	530	1850	-1665	870	390	450	3660	458

Utilization of Renewable Energy sources (Onsite)

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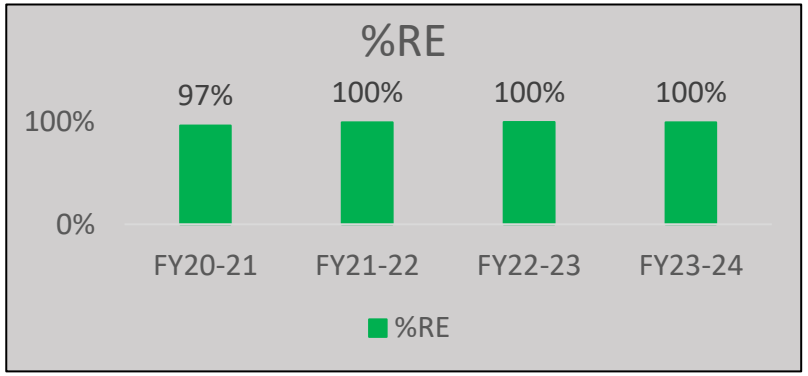
Green Wind Power supply through PPA

990 KWp In-house Solar roof top generation

Green Power supply from HESCOM



Year	Source (Solar, wind) Onsite	Installed capacity (MW)	Capacity addition after 2021 (MW)	Total Generation (million KWh)	Share % wrt to overall energy consumption
FY 2021-22	Solar roof top	0.992	No addition	587979	24.4%
FY 2022-23				934677	24%
Fy 2023-24				779515	26.4%

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Utilization of Renewable Energy sources (Offsite)

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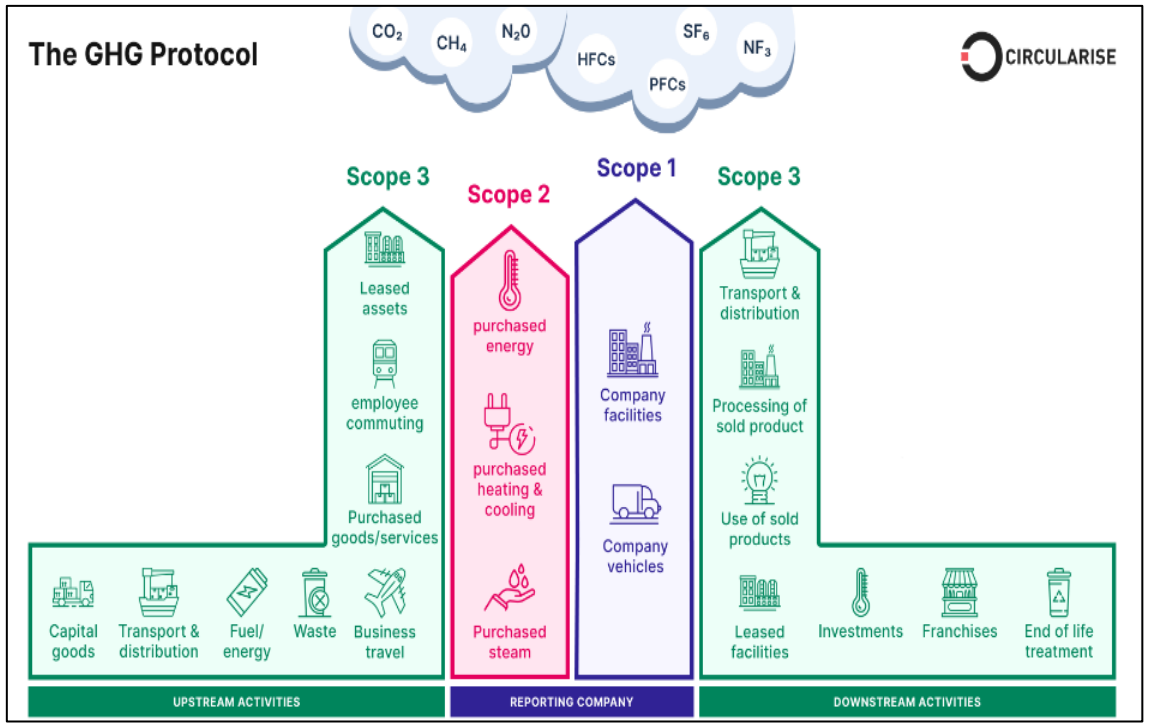
Year	Source (Solar, wind) Onsite	Installed capacity (MW)	Capacity addition after 2021 (MW)	Total Generation (million KWh)	Share % wrt to overall energy consumption
FY 2021-22	Wind + HESCOM	Through PPA	NA	1808700	75%
FY 2022-23				2965500	75.7%
Fy 2023-24				2155200	73%

<u>Key features of RE 100</u>

- At present our plant RE 100 requirements are based on Karnataka state regulations, TML Dharwad plant dynamic power requirement , PPA and low cost power availability.
- We have a 990 KWp solar roof top installed at our plant premises based on our plant fixed & variable consumption pattern, further it is at low cost and attracts no major grid charges
- Further we procure power wind bills through short term PPA which is at lower cost then grid power
- However due to dynamic production condition to achieve our RE 100 we procure a negligible share of green power from HESCOM
- To continue our RE 100 journey we have worked out plans till 2027 and same is reviewed periodically

GHG Inventorisation

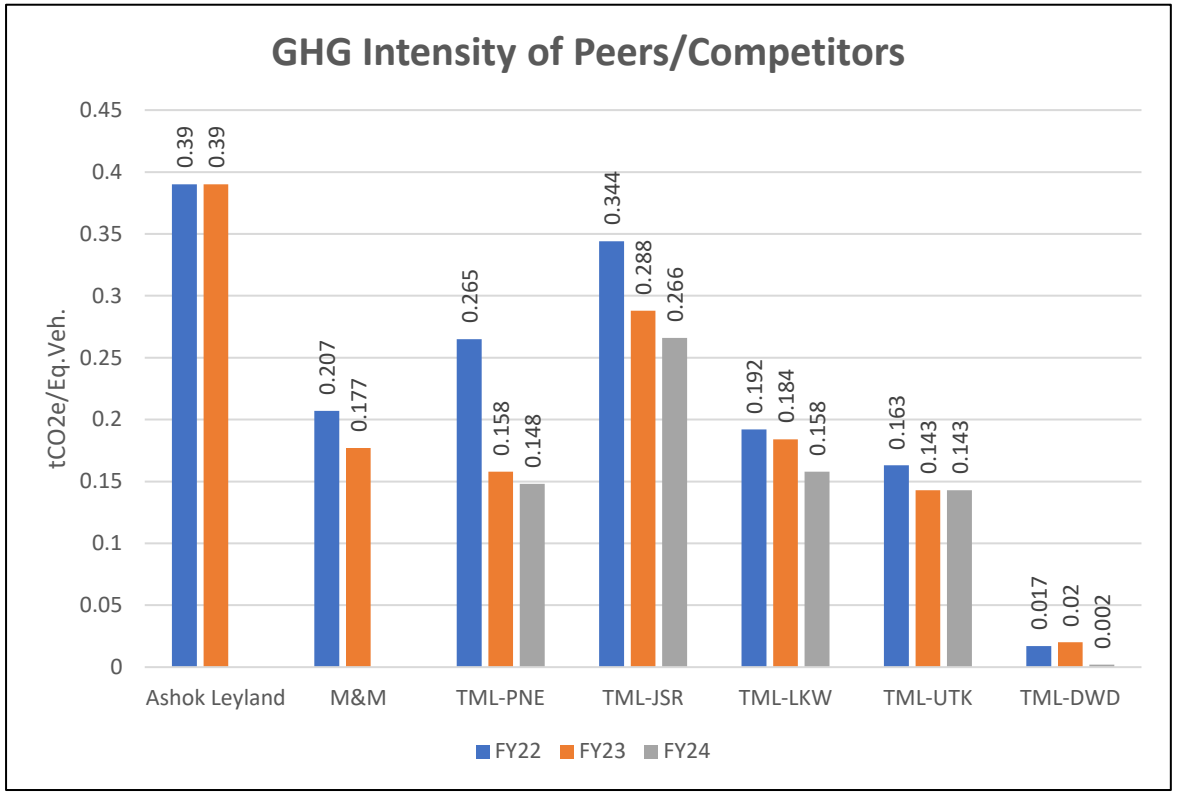


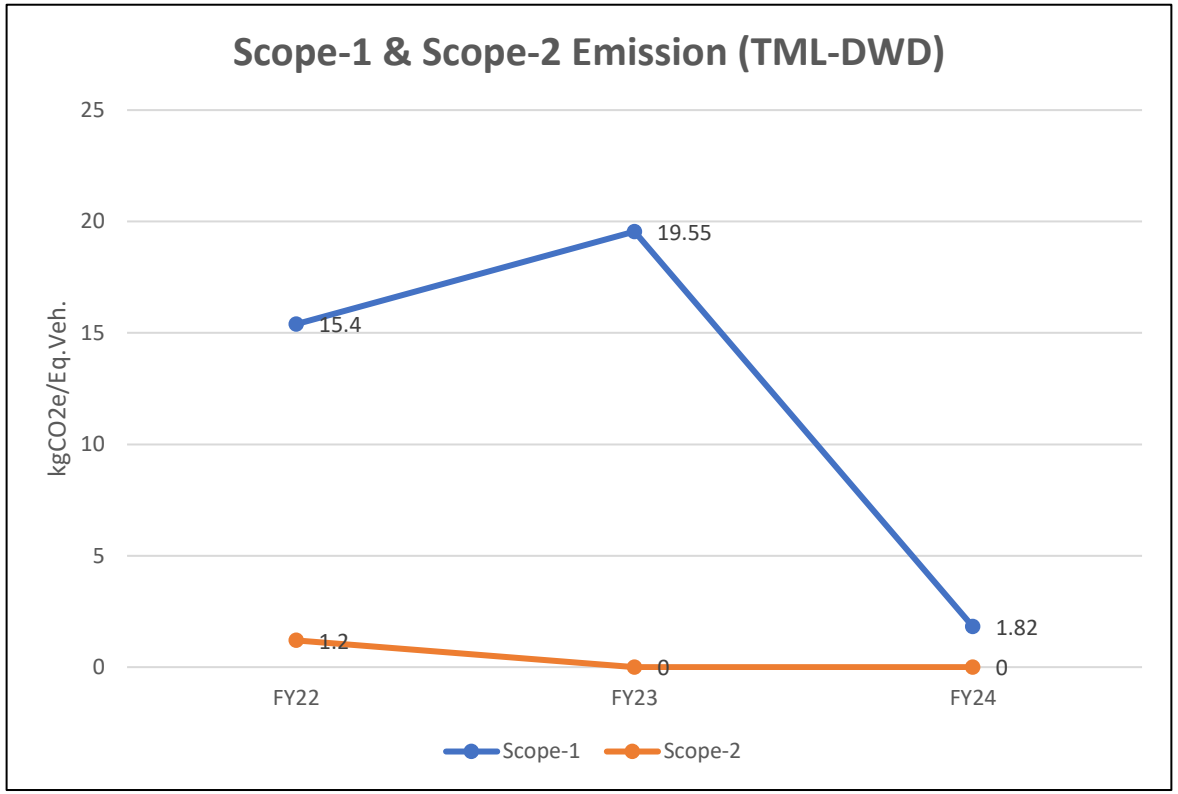
Tata Motors committed to a comprehensive decarbonisation strategy based on Science Based Targets (SBTi). To accomplish this, a robust product strategy has been adopted for transitioning to a greener portfolio.

Our aim is to achieve Net Zero greenhouse gas emissions for commercial vehicles businesses by 2045 respectively.
We are committed to sourcing 100% renewable electricity in our operations by 2030 and setting interim science-based targets, ensuring a sustainable and low-carbon future
Tata Motors has identified following emission categories
Scope 1: Fuel burnt in plant operation
Scope 2: Purchased electricity, steam, heating & cooling
Scope 3:

- Purchased Goods & Services
- Fuel & energy related activities
- Upstream transportation & distribution
- Waste generated in operations
- Business Travel
- Employee Commuting
- Upstream Leased Assets
- Use of sold products
- Franchises emissions.

GHG Inventorisation





- As per available data TML-Dharwad is far ahead of it's competitors and peers.
- We have achieved a reduction in GHG emission by 89% since FY22

- TML-Dharwad has achieved 'ZERO' scope-2 emission in FY23 and sustaining the same.

Waste Utilization management

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We focus on deriving value out of all types of waste and ensuring their safe disposal. We strive to continuously maximize recycling and co-processing to ensure no waste is diverted to landfill or incineration facilities. Our internal Circularity Framework guides us to achieve 'Zero waste to landfill'

SN	Year (2021-23)	Type of waste	Quantity	GCV	Waste as percentage of Total fuel
	Not Applicable as TML will not utilize any waste inside the premises(Under GCV recovery).				

Type of waste generated	Quantity of waste generated (MT/year)			Disposal method
	2021-2022	2022-2023	2023-2024	
Used Oil	0.84	3.95	5.19	Authorised KSPCB recyclers
Oil soaked cotton waste/Oil filter	3.03	6.43	4.63	To Coprocessing units
Waste or residue	7.44	8.67	3.63	
Process waste residues and powder coating waste	2.16	5.79	3.05	
Empty barrels/container /liners contaminated with haz. chemicals /Waste	7.1	20.41	16.49	Authorized KSPCB recyclers
Chemical sludge from waste water treatment	10.29	25.04	8.09	To Coprocessing units

Waste Utilization management

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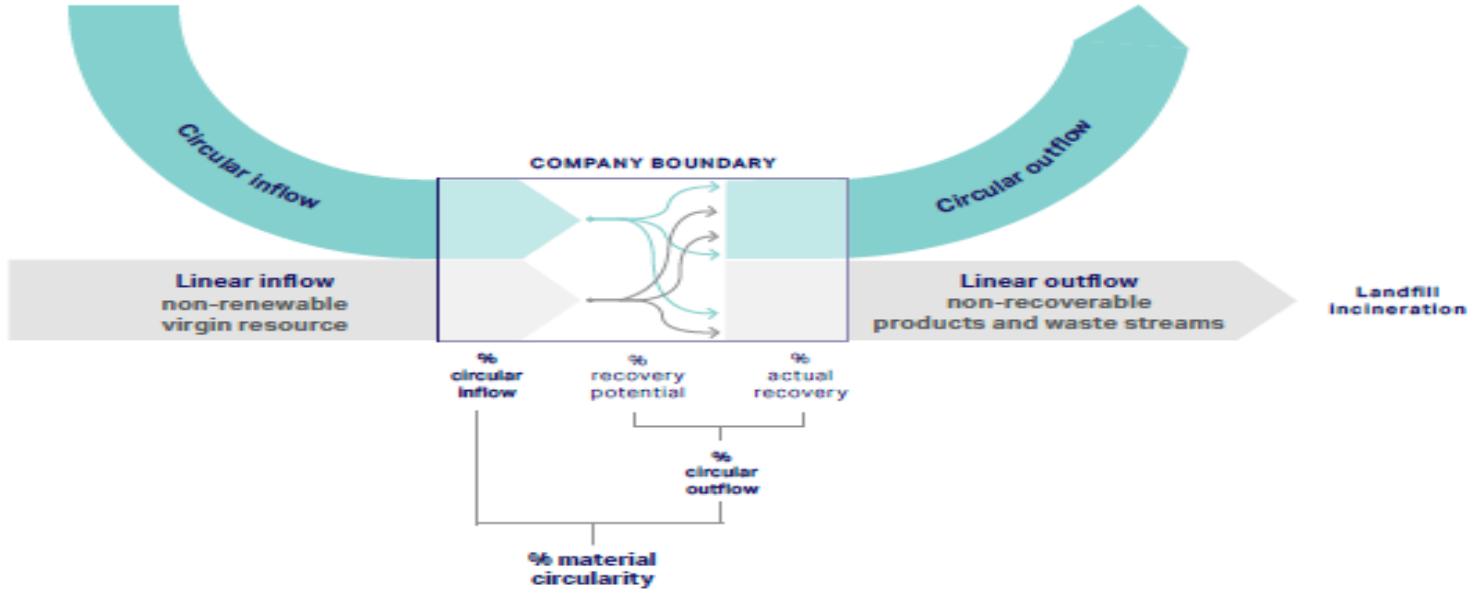
Pathways across different levels and enablers

Levels of circularity	0	1	2	3	4	5
	No circularity Past	Low circularity Today	Moderate circularity 2025	High circularity 2030	Full circularity 2035	Net positivity in system 2040
Materials	Linear value chain	Production scrap looping	Recycled content increased	High-quality recycling loops	Full "at level" recycling and transparency	Upcycling of waste

Figure 2: Illustration of material flows



Material Circularity

Indirect Materials
- Circular Inflow
- Circular Outflow – Recovery Potential
- Circular Outflow - Actual Recovery

Approach

- ✓ To start with select IDM
- ✓ Mature the supplier and internal process and governance
- ✓ Work closely with Purchase
- ✓ Scale Up

Scope

1. Oil
2. Hand Gloves
3. Coolant
4. Sealant
5. Cotton Waste

Oil and Hand gloves are the top 2 items as per purchase value

Material Circularity
=
(Circular Inflow + Circular Outflow)/2

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Green Supply Chain Management

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Environmental Procurement Policy

Tata Motors shall adopt a holistic approach to the procurement process by ...

- Expanding awareness of Tata Motors' 'Environmental Policy', and 'Code of Conduct' amongst Vendors, Contractors and Service Providers through various means;
- Evaluating 'environmental performance' of Vendors, Contractors and Service Providers along with quality and cost and giving priority to 'green' Vendors/Contractors and Service Providers and 'green' Products;
- Involving Vendors, Contractors and Service Providers to improve their environmental performance by establishing an Environment Management System;
- Educating Vendors, Contractors and Service Providers to improve their manufacturing process to reduce their carbon footprint and use of hazardous chemicals;
- Encouraging Vendors, Contractors and Service Providers to minimize logistics and packaging material, and maximize reuse and recycling of packaging material and use of recycled materials.

March 18, 2016

Guenter Butschek
Chief Executive Officer and Managing Director

Green Supply Chain Initiative:

- We have adapted a holistic approach by rolling out environmental procurement policy.
- To assess the environmental impact of our supply chain analysis of energy and environment data are carried out by sharing an ONLINE questionnaire with all our suppliers & vendors.
- Received Vendor responses were then analyzed in terms of GHG emissions, water consumption, and waste generation.
- Process of identifying topics for further engagement with Vendors is on.

Plant Initiative:

At plant level below initiatives are carried out

- Use of long trailers in place of small trucks to reduce no incoming trucks
- Optimization of returnable packaging
- Replacement of one-time packaging with returnable packaging



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EMS system and other requirements

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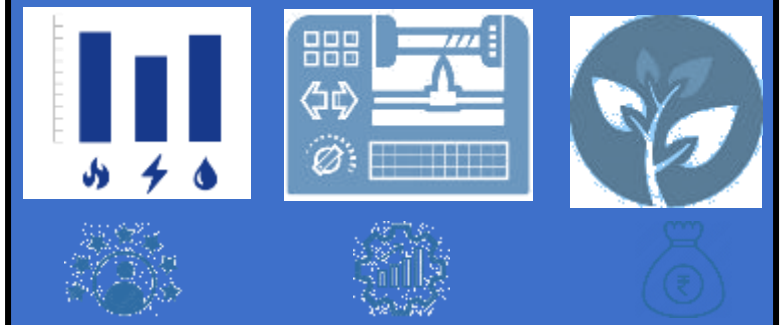
KT2 : Real-time Equipment Monitoring

- **Digital analytics for Cost Optimization and Reduction in GHG Emissions (Scope 1 & 2)**
- **OEE improvement through Health Monitoring & Prescriptive Maintenance**



Customer

- **Reduction in variable conversion cost leading to reduction in operational cost**

Efficiency

- **High Equipment Availability**
- **Improve Line/Equipment Efficiency**

Cost

- **Positive contribution to EBIDTA**

List of Project undertaken KT2

Plant Level Real time power consumption monitoring and Dashboard development.

Real time power consumption monitoring @ Paint shop & LCV Shop.

Real time Fuel consumption monitoring @ Paint shop & LCV

Under Implementation

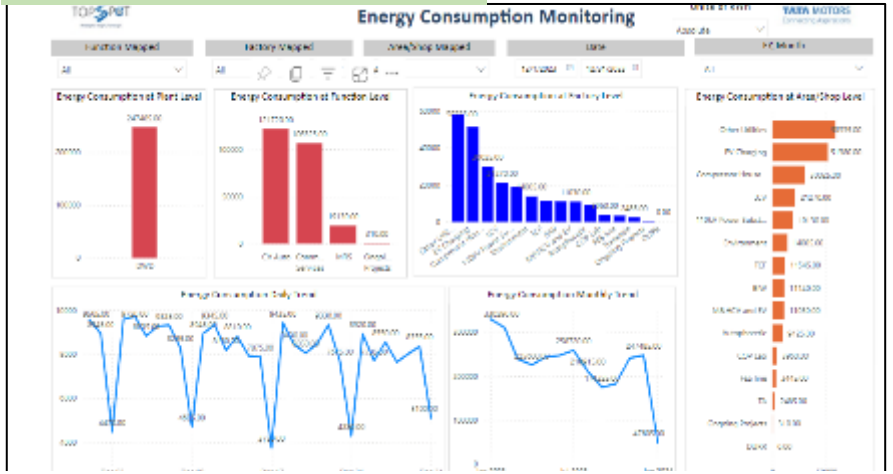
Real time Water consumption monitoring

Real time Compressed air monitoring

Machine health monitoring - RBT

Optimization of Solar Power Generation & consumption

Plant level Dashboards



Shop & Equipment level Dashboards

ISO 50001/IGBC rating

- Air leakage audit is conducted on monthly basis for all shops.
- Average air leakage for the plant is 1.9%.
- TML Dharwad is IGBC platinum rated plant since 2012
- In line with IGBC requirements we are having translucent poly carbonate sheets at shop floor walls and ceiling for day light panel provisions, day light pipe system at admin canteen, 3 number lakes for rain water harvesting (1.8 lakh cubic meter), low water flow taps, APFC for PF improvement, light density 11 watts/sqmt.

Fri 11/17/2023 9:08 AM

MAHANTESH BHAVI [TMCV, Operations, Dharwad]

Air leakage audit report for the month of Nov-2023

SHRIPAD ASUKAR [TMCV, Operations, Dharwad]; PAVAN KULKARNI [TMCV, Operations, Dharwad]; SURESH UMESHGOUDA PATIL [TMCV, Operations, Dharwad]; BASAVARAJ JAVALI [TMCV, Operations, Dharwad]; R

SUDHIR KADAM [TMCV, Operations, Dharwad]; JAGADISH KULKARNI [TMCV, Operations, Dharwad]; AMITA VINAYAK PATIL [TMCV, Operations, Dharwad]; MAXIM QUADRAS [TMCV, Operations, Dharwad]; PRADEEP SOMANNA HEGADE [TMCV, Operations, Dharwad]; ADITYA JAGIRDAR [TMCV, Operations, Dharwad]; SAID MAHANTESH GHIVARI [TMCV, Operations, Dharwad]; ARUN BHAT [TMCV, SHE & Sustainability, Dharwad];

Air_Leak_Audit_TCF_Shop_Nov 23.pptm 143 KB

Air_Leak_Audit_M & HCV_Shop_ Nov 23 194 KB

Please find attached shop wise air leakage audit report for the month of Nov-2023. L

Please share the leakages arrested report which is required during audits.

Air Leak Audit Report For The Month Of Nov-2023			
S N	Shop	Leakages in CFM	Leakage Percentage (%)
1	TCF Shop	0.34	0.54
2	M & HCV Shop	1.31	1.55
3	LCV Shop	5.57	3.09
4	FES Shop	1.9	1.72

EMS system and other requirements

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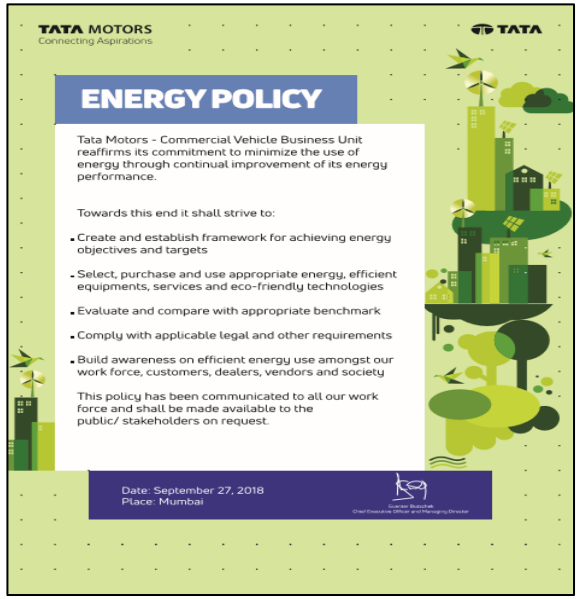
- Pumping of treated effluent by **hydro-pneumatic system** to save water and electricity.
- **Low flow water fixtures** for the domestic use.
- **Treated water** is used **for gardening purpose** through separate irrigation system.
- **Drip and pop-up sprinkler** for Horticulture Purposes.
- **Separate water lines** for process, domestic, drinking and flushing water requirements.

MORE WHEN ONE

EMS system and other requirements



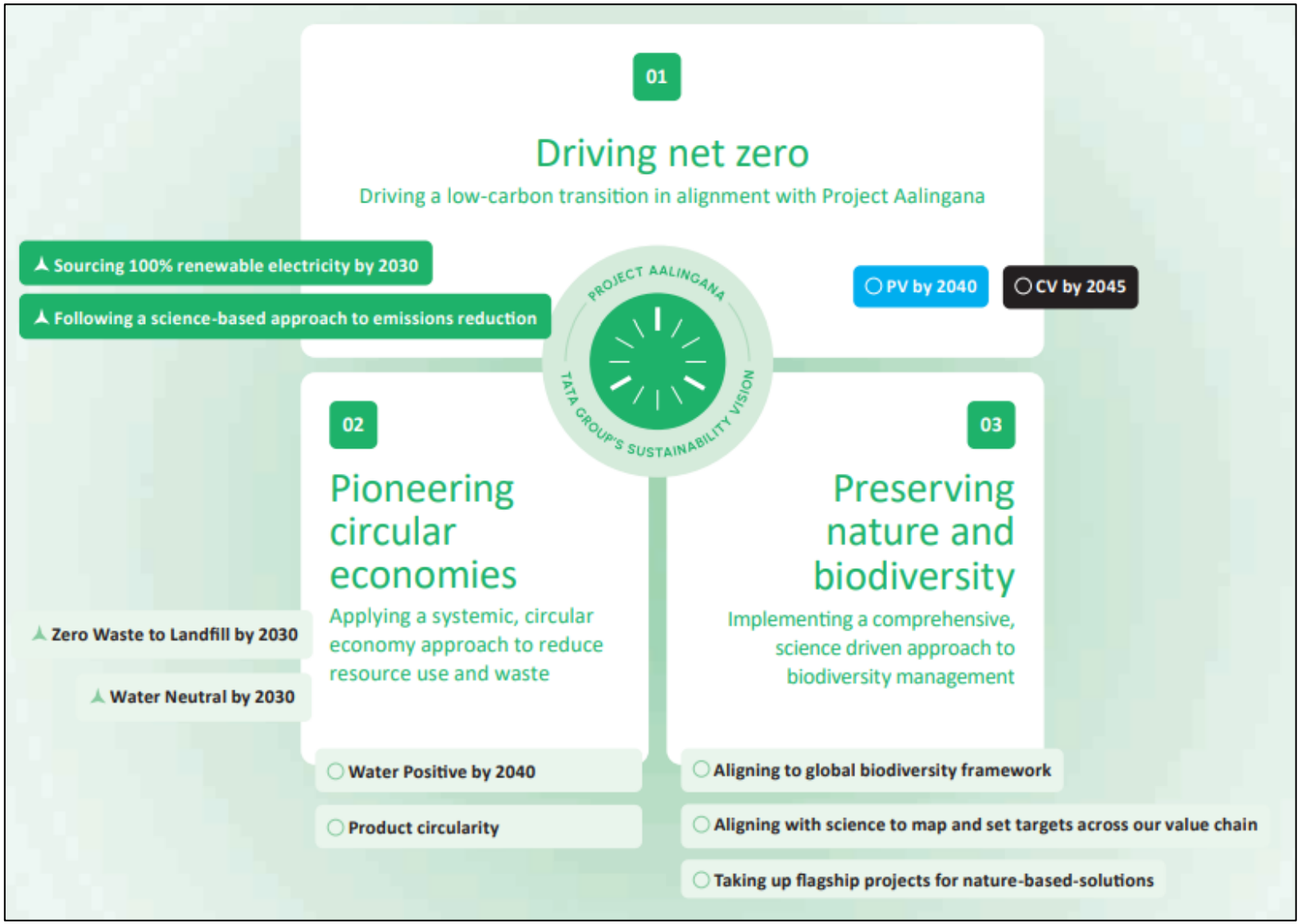
Energy Policy of Tata Motors is defined and documented as per the requirements of the Energy Management System Standard
The energy policy plays a crucial role in aligning the organizations energy management efforts with its overall strategic dimensions.

TML Dharwad is ISO 50001 certified since 2012 by Bureau Veritas

- It provides a framework for setting and reviewing objectives and energy targets.
- Commitment to satisfy applicable legal requirements related to energy efficiency, energy use and energy consumption
- Build awareness among employees and stake holders
- Commitment to continual improvement of Energy performance and EnMS.

TML-Dharwad has bagged Silver Award at 9th CII National Competition on Low Cost Automation.
The Project was related with ensuring human safety and the award was conferred on 11 March 2024

NET ZERO commitment



With an unwavering vision, we dedicate ourselves to achieving holistic decarbonisation across our business, encompassing Scope 1, Scope 2, and Scope 3 emissions.

Our aim is to achieve Net Zero greenhouse gas emissions for commercial vehicles businesses by 2045 respectively.

We are committed to sourcing 100% renewable electricity in our operations by 2030 and setting interim science-based targets, ensuring a sustainable and low-carbon future

Sustainability at a Glance:

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RE-100 Plant

Green Wind Power supply through PPA

Green Power supply from HESCOM

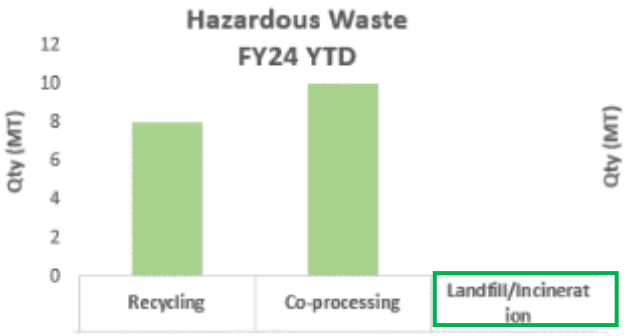
Green Power from 990 KWp Solar roof top generation

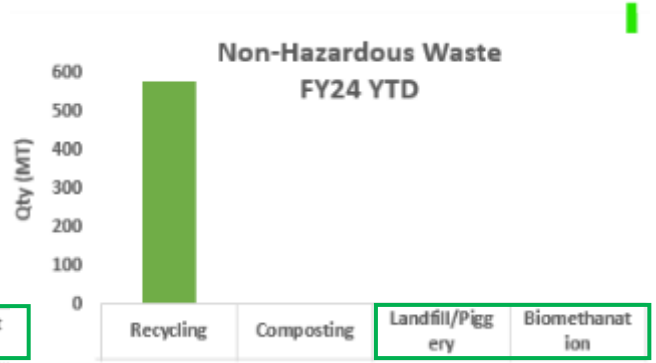
Net water Positive

- Rain Water Harvesting
- Zero Liquid Discharge
- Hydrogeological Survey
- Real time Groundwater Table Monitoring
- 100 % Metering of Water Consumption
- 100 % Compliance to Legal Requirements

TML-Dharwad has been certified as a Water positive plant by CII – GreenCo .

The certificate has been conferred on 22nd Nov'23 and will be valid till 21st Nov '26 .





Dharwad is RE100, Net water positive and a ZWTL plant

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Key Milestones of TMCV Dharwad till FY23

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2012 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023

March 2012
TML Dharwad began operations

June 2012
IGBC-Platinum Rating

August 2012
ISO 14001:2004 Certified

February 2013
ISO 50001: 2011 certified

January 2014
Started LCV chassis Production

May 2014
TS 16949 : 2009 Certified

May 2014
World Class Quality Level 1

July 2014
Golden Peacock Environment Management Award

February 2015
1st Prize for Improvement in Productivity by IIE

February 2015
1Lakh Ace Zip Roll Out

May 2015
OHSAS Certified

November 2016
1 Lakh ACE Zip Key Handover

January 2016
World Class Quality Level II

February 2017
World Class Quality Level -III

Feb'19
Ace Gold CKD

Sept 2018
MD Cup – TA Shop Best Productivity

April 2019
MD Cup
TA Shop Best Productivity

Mar'19
Electric Vehicle Roll Out 9X9

May'19
M&HCV New line operation began

Jun'19
Electric Vehicle Chassis Roll Out 9X12

Mar'20
LCV BS VI Chassis roll out

Oct 20'
BEST 200
9/9 order delivered under fame II

Jan 21
6413 ACE Gold delivered under MDU Project

Jan 21
MHCV BS VI Rolled out

Nov22 –
40 EV Gen4 Buses delivered to Nagpur Muncipal Corporation

Jun23
Gen 5 EV Bus, Jammu & Srinagar

BMTC Order
Bengaluru Oct23

Nov'23
Water Positive Certification from CII-Greenco

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Important Milestone

Key Milestones of FY 23-24 TMCV Dharwad

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Jun23
Gen 5 EV Bus, Jammu & Srinagar

Sept 23 Digital Transformation (DX) Awards 2023 and received Innovative best practice award .

Oct23
Gen 5 EV Bus, Jammu & Srinagar

Nov22 – 40 EV Gen4 Buses delivered to Nagpur Municipal Corporation

Recertified for WCQ level 1 with 87 % score

Mar'23- OCT 23
58 models of BSVI phase II manufactured in LCV line

Roll out and dispatch of BMTC Order of 920 started Bengaluru Oct23

Nov'23
Water Positive Certification **from CII-Greenco**

ED's DWM ED's DWM Cup II DWM Promising Team-EV Assembly II Cup II DWM Promising Team-EV Assembly II

Learning from CII Initiatives

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TML Dharwad participation in CII Awards has led to learning and development in field of energy conservation, low cost automation, innovation, safety, power quality , power reliability.

It is a prime platform were competitors from all industries are exhibiting their best practices and procedures which are inspiring us to learn and adopt.

The Jury members have always inspired us, motivated and guided us to perform and achieve organizational goals and sustain.

Few outcomes to share from CII learning area in past we are able to reduce our Specific energy consumption, enhance our RE share to 100%, Zero waste landfill, Net water positive, enhancement of safety system, improvement of operation through kaizens, low cost automation implementation and adopting to new innovative technologies.

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Thank You

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