









**PIONEERING
CIRCULAR ECONOMIES**

Collaborative Circular Economy Model with Vendor Park for Waste Reduction

Tata Motors Limited, Pantnagar

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1

Company Group Profile



PART OF MULTI-NATIONAL CONGLOMERATE, TATA GROUP

Founded by Jamsetji Tata in 1868,
the Tata group is a global enterprise, headquartered in India, comprising 30 companies across ten verticals.
Tata Motors, the group's flagship automotive company, manufactures and markets automobiles for every need and segment.

In a Nutshell Tata Group

- > \$165 billion**
Combined Group Revenue
- 100+**
Countries across 6 continents
- > \$365 billion**
Combined Market Cap of
26 publicly listed Tata enterprises
as on March 31, 2024
- 1million+**
Collective Workforce Strength

Key Group Companies

TECHNOLOGY     	MATERIALS 	AUTOMOTIVE   	TOURISM AND TRAVEL    
CONSUMER AND RETAIL      	INFRASTRUCTURE     	FINANCIAL SERVICES   	
TELECOM AND MEDIA    	TRADING AND INVESTMENTS  	AEROSPACE AND DEFENSE 	

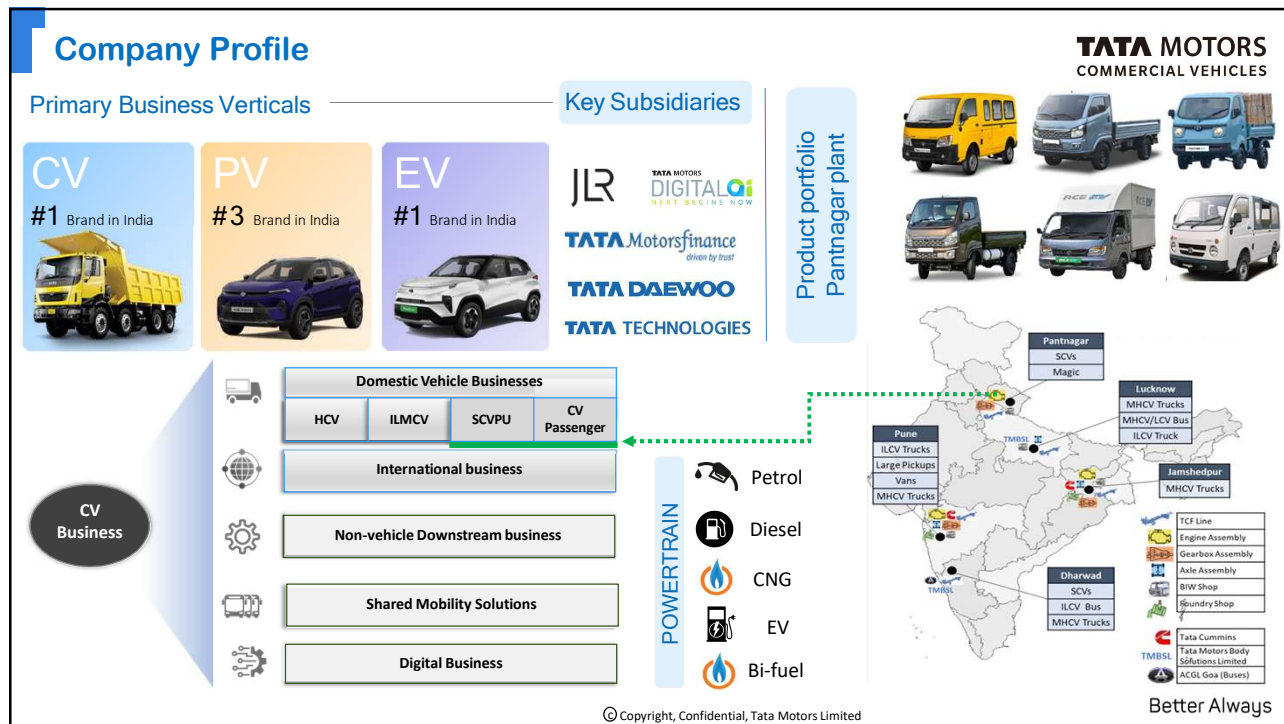
Note: Figures as of FY24 | *Source: Brand Finance India 2024 report

In a Nutshell Tata Motors

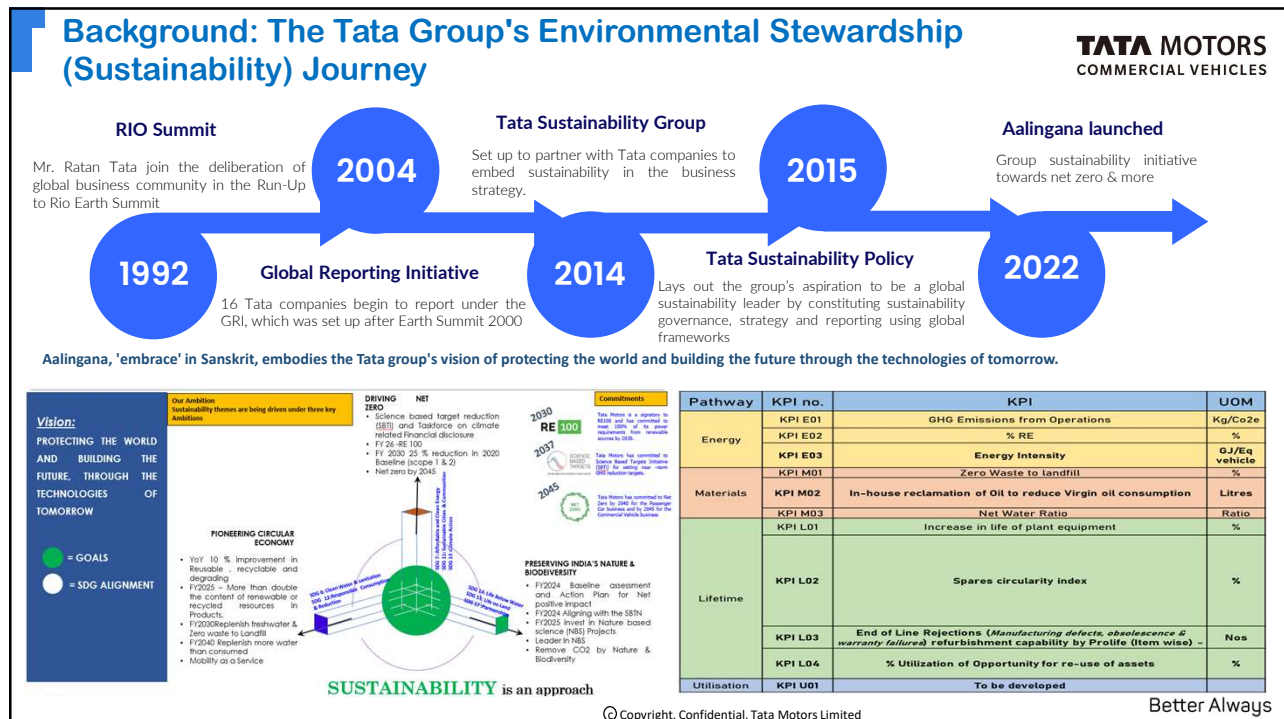
- Flagship**
Company of the Tata Group
- ~125**
Countries
- Home to iconic brands**
'Jaguar' and 'Land Rover'
- 13,41,969**
Sales Volume (excluding CJLR)
- ₹4,396 billion (~\$ 50 billion)**
Group Revenue
- 91,000+**
Collective Workforce Strength

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2



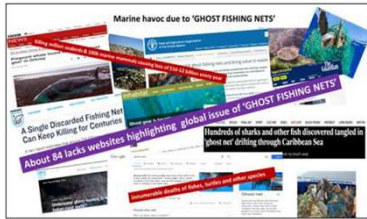
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4

Trigger for the Project

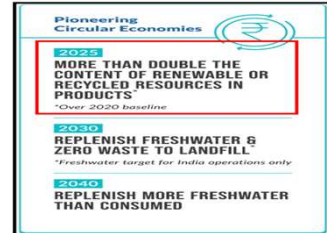
14 million tons of plastic end up in the Ocean every year



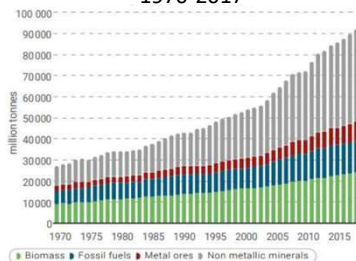
Regulatory Alignment: Minimizing Hazardous Waste- Resource Recovery & Co-processing."



Project Aalingana & its targets



Global Material Extraction from 1970-2017



Regulatory Alignment: EPR Packaging Guidelines

***SCHEDULE-I**
[See Rule 9 (1)]

Guidelines on Extended Producer Responsibility for Plastic Packaging

1. Background:

(1.1) The Ministry of Environment, Forest and Climate Change (MoEFCC), (hereinafter referred to as 'The Ministry'), notified the Plastic Waste Management Rules, 2016 on 18th March, 2016. The Ministry also notified the Solid Waste Management Rules, 2016 on 8th April, 2016. As plastic waste is part of solid waste, therefore, both the rules apply to managing plastic waste in the country.

(1.2) The Plastic Waste Management Rules, 2016, mandate the generators of plastic waste to take steps to minimize generation of plastic waste, not to litter the plastic waste, ensure segregated storage of waste at source and hand over segregated waste in accordance with rules. The rules also mandate the responsibilities of local bodies, gram panchayats, waste generators, retailers and street vendors to manage plastic waste. (1.3) The Plastic Waste Management Rules, 2016 cast Extended Producer Responsibility on Producer, Importer, and Brand Owner. Extended Producer Responsibility shall be applicable to both pre-consumer and post-consumer plastic packaging waste. (1.4) These guidelines provide framework for implementation of Extended Producer Responsibility. The Guidelines provide the roles and responsibilities of Producers, Importers, Brand Owners, Central Pollution Control Board, State Pollution Control Board or Pollution Control Committees, recyclers and waste processors for effective implementation of Extended Producer Responsibility. The definitions given in Plastic Waste Management Rules, 2016, apply until, specifically mentioned in these guidelines;

Net Zero Target till 2045

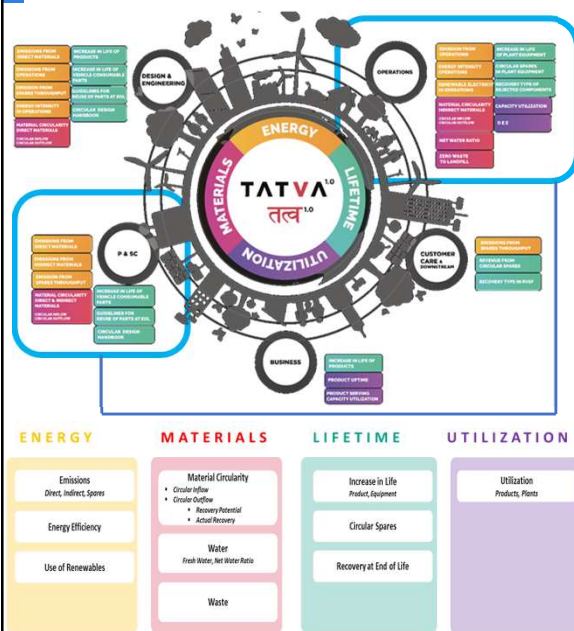


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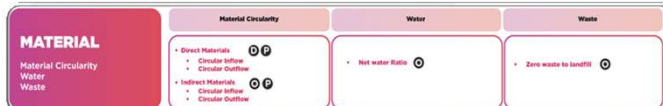
5

Project Journey - TATVA - (तत्व)



INDEX

D DESIGN & ENGINEERING C CUSTOMER CARE & DOWNSTREAM
P PURCHASE & SUPPLY CHAIN B BUSINESS O OPERATIONS



- Packaging Waste Elimination
- Hazardous Waste: Refurbishing, Recycling & Co-processing
- Material Recycling & Reuse
- CII Certified - Zero Waste to Landfill
- CII Certified – Water Positive



- Shift from Diesel to CNG Vehicles
- Sealer Oven – Explored benchmarking with other OEM and collaborated with multiple vendors to introduce new technologies aimed at reducing propane consumption and hazardous waste Sealer recycling in the Paint Shop.

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6

Background: Circular Economy implementation and Vendor Park

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Driving Net-Zero
Developing a sustainable, circular economy approach to reduce resource use and value chain.

Pioneering Circular Economies
Applying a systemic, circular economy approach to reduce resource use and value chain.

Preserving Nature & Biodiversity
Ensuring all rights related to nature are fully respected, and the threat of one right negatively impacting others is avoided.

Environmental Procurement Policy
Tata Motors shall ensure a holistic approach to the procurement process by...

- 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.

CONCLAVE The Green Packaging Meet

Topics:-

- Returnable Packaging Solution
- Bio-degradable Plastic Solution
- Alternates for Plastic Packaging Material
- Removal of Plastic Tapes
- Removal of Wooden Pallets and packaging
- Use of more recycled content
- Design for recyclability

Enhance Your Supply Chain Profits With Returnable Industrial Packaging Solutions

- Heavy machinery packaging
- Green Solutions
- Industrial components packaging

MASTER PLAN PANTHAGAR PLANT, UTTARAKHAND

TML Premise

Vendor Park 361 Acres

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7

Material Circularity Sustainable Transportation

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• Packaging Waste Elimination

1. Identify Top 10 Suppliers – Based on Waste Volume
List suppliers with waste volume (In Kg/Year)

2. Identify inconsistency in packaging strategy
Inconsistency in packaging:
• Same part - different packaging
• Same supplier with different packaging

3. Prioritization Matrix
Prioritize suppliers based on Volume of waste and inconsistency in packaging based on distance

4. Action planning
Level 1: Optimization
Level 2: Horizontal deployment
Level 3: Innovation

5. Trial and cost analysis
Trial with top 10 suppliers and analyze cost benefit

6. Implementation
Implementation of Ideas and Realisation

Before Localization

After – Returnable Trolley

From: Diesel Vehicle

To: CNG Vehicle

Part Name: Gear Box
Supplier: The Supreme
Model: 1000
Problem: Part supply in polythene and carton box packaging.
Action Taken: Supplier started supply in returnable bins.

Part Name: Catalytic Converter
Supplier: Catalytic
Model: 1000
Problem: Carbon supply in non returnable packaging.
Action Taken: Supplier started supply the Catalytic in returnable packaging.

Part Name: COIL LOCKER KEY WITH CASHES
Supplier: Pika
Model: 1000
Problem: Part supplied in polythene and corrugated box.
Action Taken: Supplier will start supply in returnable bins.

Part Name: Brake Hose
Supplier: Brake India
Model: 1000
Problem: Corrugated & Polythene Packaging.
Action Taken: Returnable packaging implemented, Polythene Eliminated from primary packaging.

8

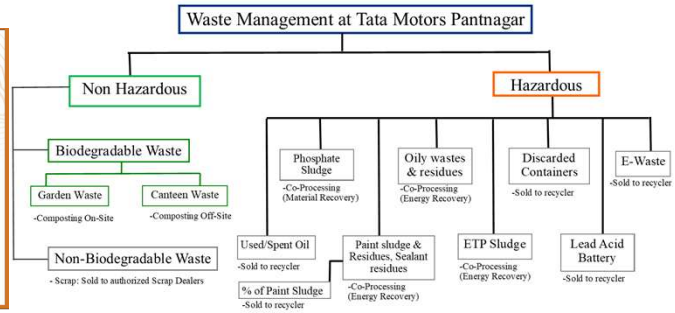
Zero Waste to Landfill and Water Positive - Vendor Participation

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Offset Water Recharge Project Outside Fence (Pan Himalayan Grassroots)
Infiltration Wells in Hilly region- 205 nos.

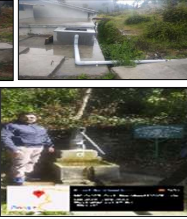
Roof top Rain Water Harvesting in Government School (due to High Water table level / tarai region recharge is not allowed in Pantnagar Region)



Roof Top Rainwater Harvesting



Piped Water Supply



Infiltration wells verified by CGWA & CII-GreenCO

Linear Economy Model (Gloves)



Circular Economy Model



Tonnes CO2e **1997.87** ↓

- Oil-soaked gloves washed & reused
- Reduction in hazardous waste generation
- Cost & GHG reduction by minimizing new glove procurement

ETP & Paint Sludge sent for co-processing in cement kilns

Phosphate Sludge diverted for material recovery

Refurbished paint reused

Tonnes CO2e **1140.37** ↓

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9

Case Study → Pioneering Circular Economy : Hazardous waste sealer reduction by 3R (Recycling, Reuse and Reduce)

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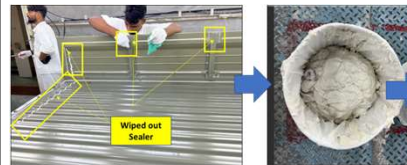
Objective

To strengthen vendor collaboration for innovative waste management solutions aligned to Circulatory Economy, Zero waste to landfill.

In Tatva Project Journey: Under Zero Waste to Landfill guideline Project is being taken

Situation Analysis

Earlier Sealer wiping at critical locations a product & process necessity resulted in ~200 g of hazardous waste per vehicle.



Root Causes Identified:

- Wiping of sealer is Product and process requirement.
- Recycling of waste sealer provision was not available for reuse the waste sealer, resulting to waste disposal.

Improvements Implemented:

Exploring the technology with Vendor TML Planned new Sealer filtration unit Sealer recycling system, installed in Paint Shop with 6 drop point at Sealer and PVC line for reuse on product. **This was the first in kind initiative in across TML.**



Outcome:

- Recycling-** of Waste sealer ~99%
- Reuse-** of Waste sealer achieved 95%
- Reduce-** Of Hazards waste sealer disposal 95%.
- 5% Hazardous waste disposal of total generation
- Waste Disposal Cost per year save 26 lacs
- Recurring DMC Cost reduction of Rs. 44 lacs Year
- Horizontal Deployment has potential of 3.5 Crs Yearly

Standardization & Deployment:

- SOPs revised for operation and preventive maintenance.
- Learnings to be horizontally deployed across other TML locations to reduce waste sealer disposal.

Contribution to Sustainability Goals:

- Zero waste to landfill
- Aligns with circular economy principles.
- Enhances plant's overall environmental sustainability index.



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10

Case Study → Pioneering Circular Economy : Scope -1 & 2 Propane & Power Consumption reduction

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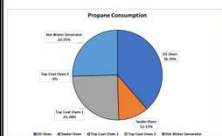
Objective

Scope -1 & 2 Propane & Power Consumption reduction by elimination of Sealer Oven in Paint Shop

Under Alingana: Goals and associated milestones, project taken for Propane and fuel reduction

Situation Analysis

Explored benchmarking with other OEM and collaborated with multiple vendors to introduce new technologies aimed at reducing propane consumption in the paint Shop.



S/N	Oven	Elimination Feasibility
1	ED Oven	Not Feasible
2	Sealer Oven	Feasible
3	Top Coat Oven	Not Feasible
4	WMS	Not Feasible

Sealer Oven – 12-15% Contribution for Propane Consumption in Paint Shop – Can be plan for Elimination

Root Causes Identified:

Problem statement: Sealer Oven is used for Sealer baking however technology is available which does not required baking



Process modification and validation:

New Technology Validation : No Bake Seam Sealant Lab testing Quality results



Changes Required as per New Technology in Paint Shop Process



Outcome:

- Power Saving **Power consumption : 98KWH.**
- Fuel Savings (propane) **34 kg/hr (Avg.)**
- Operational Cost saving/Yr
- GHG Emission : Co2 emission avoidance Power-333MT Propane-486 MT**
- Equiv. to **36400 Tree** consumes Co2 per year
- Horizontal Deployment has potential of **8.75 Crs.**

Total Recurrence Saving/Yr. 1.75 Crs.

Intangible Benefits:-

- Oven Cleaning activity will be Eliminated
- Paint Shop Process time will reduce by 30mins

Standardization & Deployment:

- PFD, PFMEA revised for operation.
- Learnings to be horizontally deployed across other TML locations to reduce waste sealer disposal.

Contribution to Sustainability Goals:

- GHG emission reduction
- Aligns with circular economy principles.
- Enhances plant's overall environmental sustainability index.

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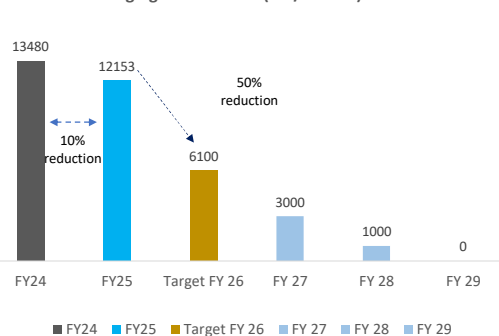
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11

Tangible Benefits: Waste and Emission Reduction

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Packaging Waste Trend (MT/Annum)



GHG Emission Reduced in Total

Tonnes CO2e **3956 ↓**

GHG Emission Reduced by Hazardous Waste Management

Tonnes CO2e **2337 ↓**

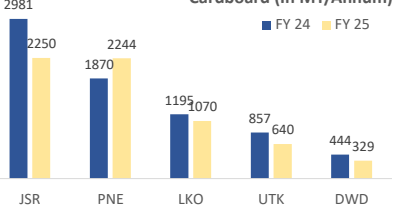
GHG Emission Reduced by Sealer Oven Elimination

Tonnes CO2e **819 ↓**

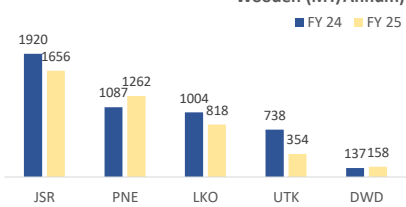
Sealant & Sealer Oven Elimination

- Fuel Savings (propane) **34 kg/hr (Avg.)**
- Reduction of Hazardous waste sealer disposal around 95% i.e 5% of Total Hazardous Waste generation

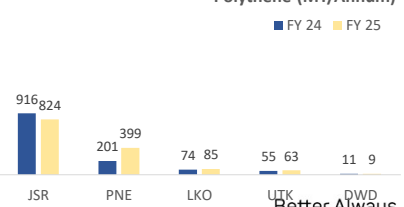
Cardboard (In MT/Annum)



Wooden (MT/Annum)



Polythene (MT/Annum)



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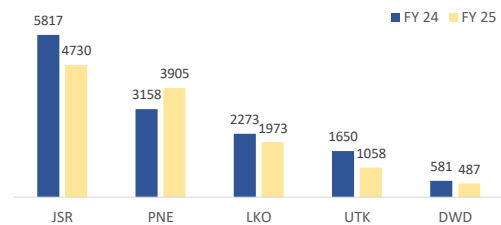
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12

Replication potential

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Plant Wise Total Waste Generation



- Target: Zero packaging waste by FY 2029
- Hazardous Waste Management model implemented across Tata Motors
- Sealant Oven Elimination: Learnings to be shared for Horizontal Deployment
- Learnings to be horizontally deployed across other TML locations to reduce waste sealer disposal

JSR				LKO				DWD				UTK				PUN			
Supplier Name	Polythene	Wooden	Cardboard	Supplier	Polythene	Wooden	Cardboard	Supplier	Polythene	Wooden	Cardboard	Supplier	Polythene	Wooden	Cardboard	Supplier	Polythene	Wooden	Cardboard
Bhavani Ind	353.4	0.0	49.8	TML JSR	0.0	112.8	8.2	Imperial Auto	0.0	0.0	28.8	Gabriel India	0.0	0.0	38.3	Right Tight Fasteners	13.5	0.0	98.8
Kumar Exports	4.9	0.0	138.1	TML PUNE	0.0	35.4	0.0	Ravikas Auto	0.0	0.0	24.8	Fortuna Engg	2.3	0.0	32.8	Sundaram fasteners	5.1	0.9	52.9
GNA	0.0	83.8	0.0	GNA	0.2	20.4	0.0	EMDET	0.0	0.0	15.2	Brakes India	5.3	0.0	25.8	SKS fasteners	3.7	0.0	32.7
Dawn	1.5	31.8	3.2	JMP Industries	0.8	0.0	16.7	Knorr Bremse	0.0	0.0	14.4	William Controls	1.6	0.0	9.2	Vinman Industries	1.2	0.0	32.1
IPH	0.7	20.8	13.8	ZF INDIA	0.0	15.5	1.5	Jayashree Polymer	3.6	0.0	7.3	AMJ Corp	0.1	0.0	9.0	Shigan quantum technologies	0.3	8.0	16.4
Indication Instruments	3.7	0.0	19.5	SKF INDIA	0.0	7.4	8.3	VOSS Automotive	0.0	0.0	6.0	Rane Engine Vale	4.8	0.0	3.3	KSP Auto and Forge	0.6	0.2	22.9
Electrica Engineers	12.2	0.0	10.4	Singhbhum techno	0.0	7.4	5.5	Premier Seals	0.0	0.0	3.9	KSPG Auto	5.4	0.0	2.0	New Allenberry	0.0	22.1	0.2
Natesan	2.1	0.0	19.1	Tenneco	0.0	3.7	3.9	AMKEIS	0.3	0.0	3.1	ADM Joinflex	0.4	0.0	5.0	SPG Auto	2.5	0.0	19.7
Supreme industries	0.0	0.0	10.8	Siddhi Ferrous	0.0	0.0	7.2	UNO Mindarika	0.2	0.0	2.2	Fourfront	0.0	0.0	4.1	Exide Industries	0.4	16.4	4.8
Sona Blw	0.5	0.0	9.7	EMDET	0.0	0.0	5.7	ZF Steering	0.0	0.0	1.9	Anandji Haridas	0.4	0.0	2.5	Schaeffler India	0.6	4.1	16.7
FOURFRONT PVT LTD	2.0	0.0	4.0																

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13

Intangible Benefits

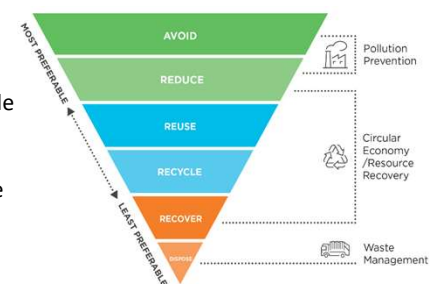
- Enhanced brand reputation
- Regulatory compliance & risk mitigation
- Industry recognition & certifications (CII Zero Waste to Landfill, Water Positive)
- Aligned with Tata Group Aalingana Targets.
- Contribution to national & global sustainability goals (SDGs, Net Zero roadmap)
- Sealer Oven Cleaning activity will be eliminated and Paint Shop Process time will reduce by 30mins

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Major Learnings:

- Utilizing Waste as a Resource
- Collaboration is Key – Vendor partnerships and cement industry tie-ups enable scalable sustainability solutions.
- Decarbonisation through Innovation
- Closed-Loop Systems Work – Reusable packaging and co-processing eliminate single-use waste and landfill dependency.
- Replicability Across Sectors – Models can be adopted in automotive, FMCG, pharma, chemical, and municipal waste management.



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14

Best Practices

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- **Vendor Park with Reusable Packaging** – Colocation of key suppliers within 2–3 km enabling Just-in-Time (JIT) delivery, supported by closed-loop trays, trolleys, and metal racks, eliminating single-use plastics, corrugated boxes, and thermocol.
- **Shift to Clean Fuel Logistics** - Transition from diesel to CNG/electric vehicles for intra-park transport, reducing GHG emissions and localized air pollution.
- **Hazardous Waste Circular Utilization** – Co-processing of ETP sludge, paint sludge, sealant waste, and oily residues in cement kilns for energy/material recovery, along with recycling of paint sludge for inner-body components, reducing virgin paint use, waste generation, and costs.

Internal Benchmarking

- First Tata Motors plant to achieve CII Zero Waste to Landfill Certification
- Pioneer in implementing Vendor Park model with reusable packaging
- Sealer Oven elimination – first among Tata Motors plants, reducing propane & power consumption resulting in GHG reduction.

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