

# A study of Industrial Waste and Recycle Management: Case study of Tata Motors Ltd.

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## Abstract

*Industrial waste is the waste produced by industrial activity which includes any material that is rendered useless during a manufacturing process such as that of factories, mills and mining operations or excavation. It has existed since the outset of the industrial revolution. Recycling plays vital role in the industry because it helps to minimize the waste and reduction in the pollution. The present case pertaining to the industrial waste and recycle Management of Tata Motors Ltd., Pune. In the case study, an attempt has been made to provide a comprehensive review of industrial waste and recycling management practices at Tata Motors Ltd. , Pune. The study has been carried out to evaluate the current status and identify the major problems related to waste and recycle Management. Various adopted treatment technologies for Tata Motors is critically reviewed, along with their advantages and limitations. The study is concluded with a few fruitful suggestions, which may be beneficial to encourage the competent authorities to work towards further improvement of the present system.*

## Introduction

Today India's growth story, especially in the last few decades has resulted in a rapid increase in both domestic and industrial waste. The main driver for domestic waste is the rapid urbanization that is slated to change India from a largely rural to a majority urban country in the next decade (2020). In contrast rural waste is largely agricultural in nature and is dispersed over half-a-million habitations making them 'manageable'. The rapid growth of the Indian industry has led to increased industrial waste generation. There are different types of waste generated from automotive industry. The Classification of waste according to origin and nature as flows:

The present study focus on Industry waste from automotive industry and conversion of waste into reuse or recycle for the manufacturing purpose with the help of case study of Tata Motors.

Sr.No.	Origin of waste	Nature of waste	Type of waste
1	Nuclear Ractoe	Beta and Gama rays	Nuclear waste
2	Fertilizres like DDT	Phenyl and Hydroxyl organic group	Agricultural waste
3	Plastic Made of polymer	Polythene	Plastic waste
4	Structure of iron and fiber	(Isomeric Polymer) Ferro magnetic and good conductor of heat	Electronic waste
5	Medicine and medical accessories	Contain preservatives and drug injections	Bio-medical waste
6	Waste water Thermal industries	Contain nitrogen and Ammonia	Domestic Waste
7	Machines	Exothermic reaction in nature	Thermal Waste

Tata Motors, Pune had planned for environment protection even before its manufacturing facilities were completely set up. The approximately 800 acres of land, procured by Tata Motors (then-Tata Engineering & Locomotive Company Ltd – TELCO), in 1965, was a barren landscape of hard basalt rock, which is typical of Deccan Trap with practically no soil cover. The hot arid climate of the region and the rocky terrain could support only a few wild shrubs. This type of geological terrain was seen as fit only for use as stone quarries, and the rocks / murrum mined from Chinchwad region acquired a name for itself over the

Years. Many abandoned basalt quarries are still a prominent feature of the Pimpri-Chinchwad industrial area

### **Objectives of the Study**

1. To study the waste management system in Tata Motors.
2. To study recycling / reuse of waste for manufacturing in automotive industry.
3. To study different steps taken by Tata Motors for environmental sustainability.

### **Research Methodology**

Data was collected by primary as well as secondary method. Primary data was collected through Personnel interview and discussions with the people from the company. Secondary data were collected from the research papers, articles, internet search e.g. annual reports of the company.

### **Case Study: Tata Motors**

#### **Introduction of Company**

The foundation of the Company's growth over the last 68 years is a deep understanding of economic stimuli and customer needs, and the ability to translate them into customer-desired offerings through leading-edge R&D. With over 4,500 engineers, scientists and technicians the company's Engineering Research Centre, established in 1966, and has enabled pioneering technologies and products. The Company today has R&D centres in Pune, Jamshedpur, Lucknow, Dharwad in India, and in South Korea, Italy, and the UK.

Tata Motors Limited is India's largest automobile company, with consolidated total revenues of ` 2,33,662 Crores(USD 38.6 billion) in 2013-14. It is a leader in Commercial Vehicles in each segment, and among the top players in Passenger Vehicles with winning products in the compact, midsize car and utility vehicle segments with a presence across 175 countries. Tata cars, buses and trucks are marketed in several countries in Europe, Africa, the Middle East, South Asia, South East Asia, South America, CIS and Russia.

The Company's manufacturing base in India is spread across Jamshedpur (Jharkhand), Pune (Maharashtra), Lucknow (Uttar Pradesh), Pantnagar (Uttarakhand), Sanand (Gujarat) and Dharwad (Karnataka). The Company's dealership, sales, services and spare parts network comprises over 6,600 touch points. Through subsidiaries and associate companies, Tata Motors has operations in the UK, South Korea, Thailand, South Africa and Indonesia.

#### **Recent few Achievements:**

- Tata Motors is having top ranking in Best Investor Relations in Institutional Investor's 2013 according to All-Asia Executive Team Survey.
- Tata Motors, Jamshedpur got Six Awards at the 29th INVEST International Conference.
- According to The Brand Trust Report, India Study – 2013 & 2014, Tata Nano has been named the Most Trusted and attractive Brand in India.
- Tata Motors was conferred the prestigious Indian Multinational of the Year Award at the AIMA Managing India Awards 2013. company bagged the 'Innovative, Advanced & Highly Impactful' Award (Runner up) at the International Automotive Engineering Show 2013 Awards.
- Tata Nano CNG won the prestigious 'Green Vehicle of The Year' at the 2013 Vicky in People's Choice Car and Bike Awards. 'Brave the Storme' brings home Silver at Indian Digital Media Awards 2013 for Best Campaign on Social Network.

- CVBU bags two awards at Stevie Awards 2014 - 1st place in 'Favorite Customer Service Category', 3rd in 'Customer Service Department of the Year' Featured in "Best 10 Companies in India to Work For" survey conducted by Business Today and People Strong HR Services – Business Performance.

### Performance of the Company:

#### Production performance for the year 2013-14

Domestic & international	Units Produced	Units sold
Commercial Vehicles	4,43,202	4,32,600
Passenger Vehicles	5,62,224	5,87,946

Market Capitalization	Rs.118,777 crores
total revenue	Rs.233,662 crores
Consolidated Profit Before Tax	Rs. 18,869 crores
EBITDA Margin	16.1%.
Sales and service touch points, globally	6,600
Employee Strength	66,593

### Sustainability Development Investing in Green Buildings:

- Company realize the importance of reducing the energy and environmental impact of on factory Buildings and began Green Factory Building journey from the Pimpri Plant in Pune by voluntarily registering for the IGBC Green Factory Rating System.
- In 2010 the Pimpri Plant received an 'IGBC Gold' rating in the category of existing Factory Building. This recognition provided the impetus to seek higher targets when construction began in most recent Plant at Dharwad (commissioned in April 2012).
- The twin advantages of learning's from Pimpri and the availability of contemporary materials and technologies made it possible to build 'environment and energy features' into the 'greenfield' project at Dharwad from the planning stage itself.
- The Dharwad plant was awarded the 'IGBC Platinum' rating in July 2012. The journey continued at Pantnagar Plant where IGBC awarded the new Administration Building with the 'IGBC Gold' rating in the new construction category in December 2012.

### Environmental Stewardship

- Responsible use and protection of the natural environment through conservation and sustainable practices have been the primary areas of Tata Motors Ltd.'s environmental stewardship.
- Tata Motors has always endeavoured to minimize its environmental impacts. They have laid emphasis on conservation initiatives, especially energy, waste and effluent management and water conservation.
- The climate change and environment policies adopted at Tata Motors Ltd helps take a precautionary approach against all the environmental impacts made.
- Green building policy and environmental procurement policy focus to develop an efficient supply chain. They have a Safety, Health & Environment (SHE) committee at the Board level which also reviews environmental performance. This committee consists of independent as well as executive directors. At the Business level, they have a SHE council which reviews the environmental performance at the individual business levels.

- All our manufacturing locations are certified for ISO 14001:2004 – Environmental Management System Standard. Details of the environmental expenditures given below which shows that amount has been decreased in the year 2013-14.

Year	2011-12	2012-13	2013-14
<b>Environmental Expenditures (INR Million)</b>	<b>370.71</b>	<b>362.17</b>	<b>232.16</b>

- Break up of environmental expenditures given below which shows environmental expenditures has been classified in different parts , which includes , waste disposal, emissions treatment , depreciation cost and maintenance of equipment used in pollution control, external services for environmental management, external certification of management systems , personnel for environmental management activities, extra expenditure for installing cleaner technologies and other environmental cost.

<b>Environmental expenditures</b>	<b>%</b>
<b>Waste disposal, emissions treatment</b>	<b>33</b>
<b>Depreciation cost and maintenance of equipment used in pollution control</b>	<b>38</b>
<b>External services for environmental management</b>	<b>5</b>
<b>External certification of management systems</b>	<b>1</b>
<b>Personnel for general environmental management activities</b>	<b>4</b>
<b>Extra expenditure for installing cleaner technologies</b>	<b>7</b>
<b>Other environmental cost.</b>	<b>12</b>

**Materials** The Company is spending more in depreciation cost and maintenance of equipment used in pollution control and Waste disposal, emissions treatment i.e. 38% and 33 % respectively. It shows that the company is concern with pollution and waste.

## 1. Management

- The company taking efforts from the design stage to production and sales are directed towards consuming fewer resources through product innovation and process optimization which contributes to lesser environmental impact.
- They primarily use steel sheets and plates, castings, forgings, tyres, fuel injection equipment, batteries, electrical items, rubber and plastic parts, paints and thinners for manufacturing the vehicles. Aggregates such as axles, engines, gear boxes and cabs are either manufactured by company or procured from our subsidiaries, affiliates or strategic suppliers. They also require consumables such as lubricants, welding consumables etc., for production processes.
- Research team of the company is constantly working on alternate and composite materials. Eliminating or reducing use of hazardous substances in vehicles continues to remain one of focus areas for product innovation and development.
- Use of jute and polypropylene based composite have been successfully implemented for headlining application in some of the vehicles such as Tata Nano. They also require less energy to manufacture compared to conventional glass fibers and are readily available in India, making it viable to replace glass fibres.
- ‘Recon’ (reconditioning) business was conceptualized to cater to the need of CVBU customers whose vehicles require overhauling to extend the life of aggregates. The used aggregates are reconditioned at a dedicated facility at our Lucknow plant. The revenue from our ‘Recon’ business in the 2013-14 was INR 1.30 billion, reconditioning 8,944 long blocks and 23 NPI (New Product Introduction) items.

- The Company also recycled 41,149.8 tonnes of metal scrap and forgings at Jamshedpur, Sanand, Pantnagar and Pune plant.
- Company took concerted efforts to reduce packaging footprint. They continue to increase the use of sustainable packaging (replacing wood with metal and plastic) and reuse existing packaging (recycling wood).
- Awareness on reduction of fresh packaging material is created among the suppliers and they are encouraged to innovate on use of packaging material with lesser environmental impact.
- They also collaborated with our strategic suppliers and developed custom-built collapsible polypropylene (PP) boxes for components that are difficult to handle (e.g.dashboards). These custom-built reusable packaging solutions have significantly reduced packaging material requirement.
- At Jamshedpur plant, they were able to avoid use of wood as packaging materials by using corrugated fiber boxes instead of wooden boxes. Pune plant is closely working with numerous vendors to shift from conventional non-reusable packaging to returnable and reusable packaging solutions. Components, which earlier were procured in cardboard packaging, are now procured in recyclable containers. They were able to eliminate the need for packaging Air Brake Tubes at the Pune plant by shifting from PP boxes to returnable steel trolleys.
- Below table shows that material consumed for the year 2011-12, 2012-13,2013-14.

Material consumed	Units	FY 2011-12	FY 2012-13	FY 2013-14
Steel	Tonnes	258,980	135,873	114,185
Steel Tubes	Tonnes	43	19	3
Non-Ferrous Alloys	Tonnes	5,181	3,577	3,838
Ferrous Alloys	Tonnes	3,097	733	2,740
Steel Melting Scrap	Tonnes	95,993	68,422	50,456
Paints, Oils & Lubricants	Tonnes	14,457	10,840	2,680
	Kilo Liters	16,717	12,455	9,140
Tyres, tubes & flaps	Numbers	8,497,702	5,282,763	3,102,908
Engines	Numbers	152,785	100,737	81,644
Sand	Tonnes	78,522	52,634	20,161

## 2. Waste Management

- Waste management practices place emphasis on reducing waste generation, reusing/recycling waste generated and disposing waste in an environmentally sound manner. Paint sludge is one of significant hazardous waste generated in automobile industry.
- Company took significant efforts to reduce and reuse/recycle paint sludge which is being recycled through an authorized Re-cycler into recycled primer paint and is re-used in-house as well as at vendors end for application on castings. At some Plant locations, paint sludge is being diverted to cement industry as a waste derived fuel. During the year 2013-14, 43.2 tonnes of paint sludge from Pune plant and 28.32 MT of paint sludge from Pantnagar plant were converted to usable primer through an authorized recycler.
- Apart from recycling and reusing the paint sludge, Jamshedpur plant manufactures pavement bricks from incineration ash generated due to incineration of wastes.

- Jamshedpur plant utilizes incineration ash and ETP sludge for making pavement bricks. During the year 2013-14 Pantnagar plant utilized 219 MT of ETP sludge for making pavement bricks. They are also working with cement companies to explore the opportunities for co-processing of various types of wastes including plastics. They are partnering with the cement industries in the vicinity of the locations where they operate for co-processing of hazardous and non-hazardous waste.
- The other hazardous and non-hazardous waste generated at plants is segregated at source through the use of standardized colour coded bins. The hazardous waste is disposed off in an environmentally sound manner adhering to pollution control board norms. The non-hazardous waste, primarily wood and metallic scrap is sold to recyclers.
- The organic waste generated from canteen facilities at Jamshedpur and Lucknow plants is converted to manure through organic waste convertors. The biogas generated by canteen waste is recovered and used through biogas plants planned at Pune, Jamshedpur and Lucknow plants.
- **Below table shows Recon Business Turnover which is decreasing in the year 2013-14.**

2011-12	2012-13	2013-14
Rs.1.01 Billion	Rs.1.33 Billion	Rs.1.30 Billion

- **Below table shows recycle Metal scrap and forgings in Tonnes which is decreasing trend:**

2011-12	2012-13	2013-14
31,140	44,452	41,150

- Below table shows Material used per vehicle produced (Tonnes per vehicle produced )

2011-12	2012-13	2013-14
0.035	0.058	0.074

- **Below table shows Hazardous and non Hazardous waste disposed.**

Hazardous waste disposed	FY 2011-12	FY 2012-13	FY 2013-14
Sludge <sup>11</sup> (tonnes)	5,763.35	5,281.62	3584.60
Used Batteries (tonnes)	164.44	187.59	158.88
Used oil (tonnes) <sup>12</sup>	510.36	212.67	238.44
Oil contaminated materials (tonnes) <sup>13</sup>	230.49	155.75	72.5
Other hazardous waste (tonnes) <sup>14</sup>	1,495.33	2,296.76	433.38
Other hazardous waste (KL) <sup>15</sup>	441.07	739.80	189.19

Non-Hazardous waste disposed	FY 2011-12	FY 2012-13	FY 2013-14
Plastic waste (tonnes)	246.44	284.19	107.12
Metallic scrap (tonnes)	25,601.96	37,991.19	3957.31
Other non-hazardous waste (tonnes) <sup>16</sup>	99,128.31	50,902.75	45993.48

<sup>11</sup> Sludge includes paint sludge, phosphating sludge, grinding sludge,alk bath sludge,etp sludge,chromium hydroxide sludge

<sup>12</sup> Note: density of used oil assumed to be 0.9

<sup>13</sup> Includes cotton rags, scrap oil filters, oil soaked saw dust

<sup>14</sup> Includes solid hazardous waste like containers of acid, scrap asbestos, glasswool etc.

<sup>15</sup> Includes liquid hazardous waste like spent coolants, waste thinner etc.

<sup>16</sup> Includes cartons, jute bags, wood waste, rubber waste, canteen waste, sand etc

\* Intensity ratios have been worked out on basis of vehicles produced from Tata Motors manufacturing locations.

### 3. Water Management

- Company's aim to reduce water footprint, through the implementation of water recycle and reuse systems and checking the leakages in processes.
- They have also implemented rain water harvesting systems in our plants, which has proven beneficial in reducing water usage costs and as back up water supply in times of water shortages.
- Plants of the company recycled 3,396,796 KL of water, representing 48% of water withdrawn.
- Pune PVBU recycled 2,245,00 KL of treated effluent back to process in 2013-14. A full-fledged RO Plant is being used which has increased the quantum of effluent recycling.
- Below table shows water withdrawn per vehicle produced ( KL per vehicle produced)

2011-12	2012-13	2013-14
9.87	12.48	12.67

- Below table shows sources of water withdrawn in FY 2013-14

Municipal water	74%
Ground water	19%
Rain water	7%

#### 4. Water Footprint Initiative

- As a part of the Tata-IFC Corporate Water Partnership, Tata Motors along with Water Footprint Network (WFN) and International Finance Corporation (IFC) completed a Water Footprinting exercise for company's manufacturing locations in India.
- They have taken this initiative forward by working with selected vendors to compute their water footprint. Going forward, they intend to increase coverage of vendors across our locations.
- Below tables shows total water recycled or reuse per vehicle produced(KL per vehicle Produced) which is increasing trend.

2011-12	2012-13	2013-14
1.63	1.66	6.11

- Below tables shows total water recycled or reuse KL which is increasing trend.

2011-12	2012-13	2013-14
1450140	1267682	3396796

- Below tables shows percentage of water withdrawn that is recycled or reuse which is increasing trend.

2011-12	2012-13	2013-14
16.49	13.29	47.87

- All manufacturing plants make optimum use of waste water by re-using it in-house for maintenance of garden and landscaped areas as well as to sustain the "green belt" developed around the plant premises.
- Treated effluent is also used for secondary purposes within the plant and in some plants company has reverse osmosis technology in place for re-cycling the treated effluent back to process water quality for re-use in the process.

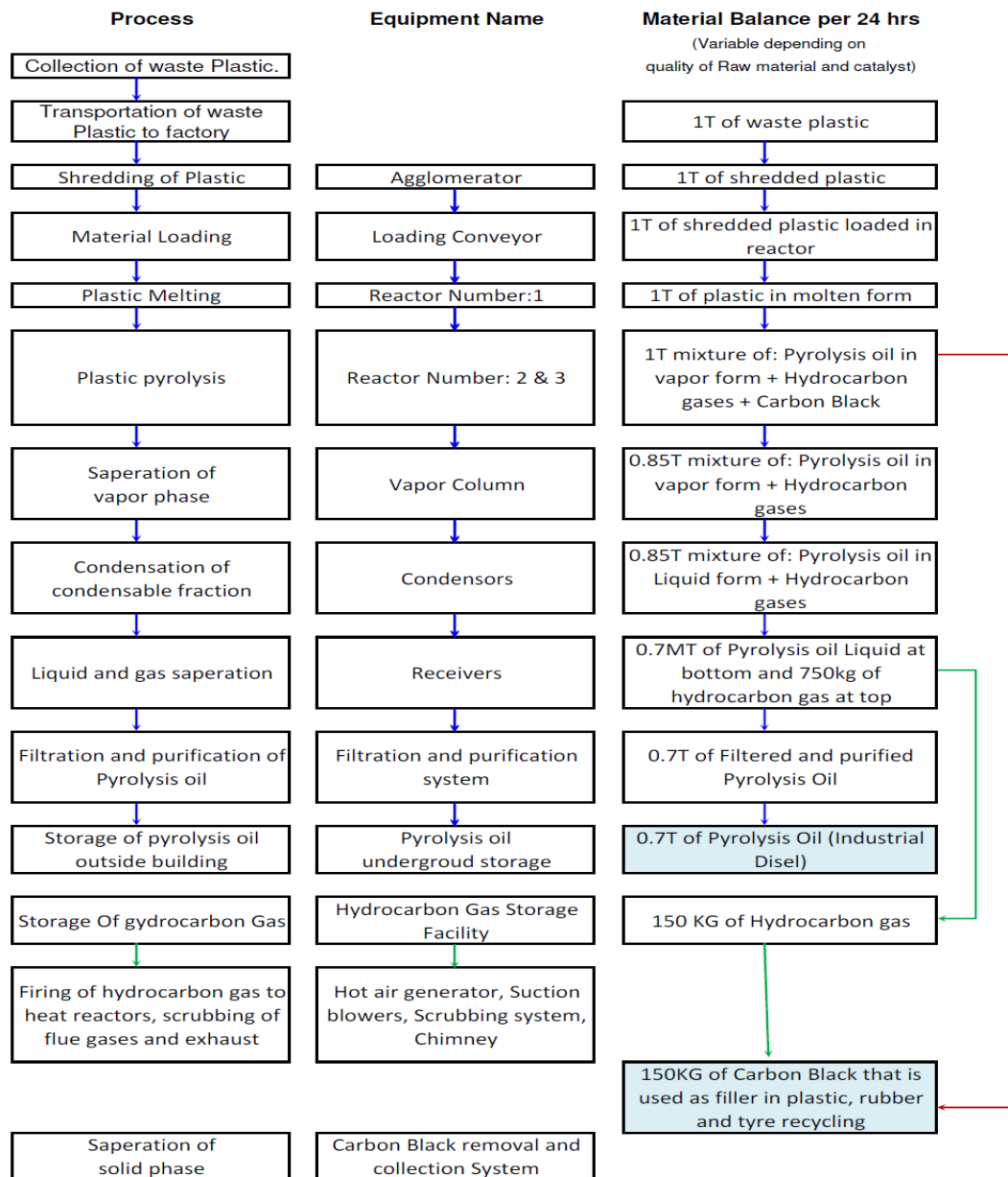
#### 5. Biodiversity Management

- All plants stand testimony to our commitment to enhance the biodiversity value of the area where company operates. They have established environmental cells at each of the manufacturing locations, which ensure that the biodiversity value of the areas in which they operate is maintained and enhanced by their presence.
- No significant impact has been assessed during the Environmental Impact assessment of any of company plants and they are not located within a 10 Km range of any biodiversity hotspots or protected water bodies. Company's plants are located in industrial areas.
- Pune plant has since its inception, taken a number of steps to preserve the ecological value of in our immediate vicinity. This includes the creation of water bodies and 245 acres of green belt. Marshy /swampy areas have been developed all along the margin of the water bodies, with the specific intention of creating nesting and feeding habitats. Below flowchart shows conversion process of waste Tyre into industrial fuel.

## Findings

1. Tata follow a system of waste segregation at source through standardized color coded bins. They also installed secondary containment measures to manage spills on the shop floor. At Pune PCBU, an innovative methodology of recycling the paint thinner has been adopted in partnership with an authorized service provider. The waste thinner from the top coat is collected from the paint shop and stored in a temporary yard from where it is transported to the recycling unit of the service provider. The recovered thinner forms almost 80percent of the waste thinner processed, while the remaining part is Discarded safely as sludge.
2. Across the organization, company has taken measures to reduce packaging footprint by either using sustainable packaging (replacing wood with metal) or reusing existing packaging (recycling wood). Approximately recycle close to 69 percent of the wood packaging thus eliminating use of fresh wood.They have developed collapsible custom-built polypropylene (PP) boxes for components that are unwieldy to handle (e.g. dashboards) and bought from external vendors. With a cycle time of more than 150 trips, these polypropylene boxes have resulted in significant savings on component packaging.
3. Company has adopted a climate change policy which draws from the Tata Group's Policy on Climate Change. This policy addresses key issues relating to products, processes and services. They are continually working to develop low carbon, fuel saving technologies which will help reduce greenhouse gas emissions. Development of CNG vehicles, electric vehicles and hybrids are at the forefront of our efforts towards this end.
4. PCBU business has developed its own climate change strategy which details both short term and long term goals for managing climate change. In Pune PCBU, for the first time, climate change CFTs were formed and were assigned targets for reduction. With the help of numerous energy saving initiatives across all our plants, they have been able to reduce specific GHG emissions over the last year<sup>13</sup>.Some of the major initiatives undertaken across the organization include:





- A. Installing turbo ventilators and variable frequency drives
- B. Shifting in paint lighting to energy rfficient and lower wattage lamps.
- C. Utilizing solar water heaters for canteens and hostels
- D. Shifting to high pressure cold wash from hot wash
- E. Switching over from manual painting to robotic painting
- F. Eliminating hot water generators and using direct fired burners
- G. Optimizing shop floor heat load through reflective coating of the roof
- H. Minimizing compressed air leakages
- I. Installing efficient weishaupt burners in plant and waste heat recovery from furnace flue gases to heat water for process.

Pune plant has set up a volatile organic compound (VOC) emission reduction roadmap at the paint shop to significantly mitigate harmful effects. They have installed an automatic thinner collection system and optimized the paint flow rate and air pressure, in order to reduce VOC emissions. Other initiatives like reduction of thinner pressure during the flushing cycle and sequencing of paint cycles have been incorporated.

Switching over from LDO to propane in some of the operations has further helped in reducing the overall air emissions. Company use R134a which has zero ozone depleting potential as a refrigerant in the products.

### Strategy - To Reduce Environmental Footprint

<p><b>Infrastructure</b></p> <p>Actions :</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> To reduce 30% Steel for building structure</li> <li><input type="checkbox"/> Modular concept</li> <li><input type="checkbox"/> To reduce heat load on ventilation by installing Double insulated side and roof walls .</li> <li><input type="checkbox"/> To reduce illumination load by installing Sky light sheets</li> <li><input type="checkbox"/> To install energy efficient motors for blowers, conveyors</li> <li><input type="checkbox"/> To install Screw chillers for AC system</li> <li><input type="checkbox"/> VFD for Compressor and all High powered motors</li> <li><input type="checkbox"/> Servo controller for Compressed Air Supply .</li> <li><input type="checkbox"/> Fan less cooling towers for compressor</li> <li><input type="checkbox"/> Propane for process heating, instead of conventional fuel e.g. HSD/LDO/FO</li> <li><input type="checkbox"/> Use of natural resource Artisan wells</li> <li><input type="checkbox"/> CFL Lamps, Solar Lamps, Wind Ventilators</li> <li><input type="checkbox"/> Lakes &amp; Rain water harvesting</li> </ul>	<p><b>Manufacturing</b></p> <p>Actions :</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Efficient Washing Machines</li> <li><input type="checkbox"/> Inter Shop Conveyor</li> <li><input type="checkbox"/> Friction roller conveyor</li> <li><input type="checkbox"/> "Wet on Wet" Painting process</li> <li><input type="checkbox"/> Process Optimization</li> <li><input type="checkbox"/> Power &amp; Free Conveyor</li> <li><input type="checkbox"/> Electrified Monorail System</li> <li><input type="checkbox"/> CNC Machines</li> <li><input type="checkbox"/> Reuse, Recycle, Reduce process waste</li> </ul>
<p><b>Logistics</b></p> <p>Actions :</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Vendor park near the mother plant to reduce inbound transportation</li> <li><input type="checkbox"/> Out bound Transportation</li> <li><input type="checkbox"/> Transportation internal &amp; employee transport</li> </ul>	<p><b>New Product Introduction</b></p> <p>Actions :</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> CNG Vehicle</li> <li><input type="checkbox"/> Fuel Efficient Vehicle – with Start-Stop arrangement</li> <li><input type="checkbox"/> Adherence to emission norms</li> </ul> <p style="text-align: right;">9</p>

5. Tata Motors has participated in the Sustainable development (S-DEV) exhibition in Geneva through TERI showcasing the company's contribution for sustainable development. Tata Motors is working with the steering committee of National Hydrogen Energy board to find the ways where India may harness hydrogen potential energy of future. The company is represented on several National Committees working for improvement of environment throughout the country.
  - a. Technical committee for "Air quality monitoring, emission inventory and source apportionment studies for Indian cities" constituted by Central pollution control board, Delhi
  - b. Group on "Technical evaluation of ARAI reports on development of emission factors" constituted by Central pollution control board, Delhi
  - c. Technical committee for "Heavy-duty Diesel retrofit demonstration project" constituted by National environmental engineering research institute, Mumbai
  - d. Multi stakeholder committee to "Develop Better environmental sustainability targets for lead battery manufacturers" constituted by development alternatives, Delhi in collaboration occupational knowledge international, UK and national referral center for lead poisoning, India
  - e. Steering committee for "Mobile Air conditioning Assessment project" constituted by TERI, Delhi
6. Energy Conservation measures have been implemented at all the plants and offices .Company has started Energy Accounting & Energy conservation programmes. Tata Motors Ltd. considers energy conservation critical to the operation of its Plant. Apart from reducing operational costs, the energy saved amounts to environment protection by way of avoiding pollution due to power generation processes. Energy conservation is driven throughout the organization, by way of setting Division wise targets and monitoring performance on everyday basis for optimizing energy consumption.

- a) Introducing FRP blades for man-coolers
  - b) Installing variable speed drive for flow control and energy saving
  - c) Introduction of fuel additives in Furnace Oil to improve the combustion efficiency of the fuel
  - d) Soft-start energy savers for hydraulic press motors
  - e) Sheds designed for efficient natural lighting
  - f) Use of CFL sodium vapor lamps to minimize energy consumption
  - g) Installing portable compressors for isolated running to save compressed air.
  - h) Harnessing natural daylight by installing translucent roof sheets in workshops
  - i) Use of LPG in place of LDO & Electricity for heating, wherever applicable
  - j) Installation of Turbo Ventilators in forge & Foundry to extract fumes which do not require energy to operate
7. The wastes are disposed by various pathways depending on their hazard characteristics. These disposal pathways include - direct incineration, direct landfill and landfill after treatment. All hazardous wastes are disposed through an Authorised Common Hazardous Waste Treatment Storage and Disposal Facility (CHWTSDF).
  8. Tata Motors does not import or export hazardous wastes. However, Scrap Material generated in various production processes like waste or used/waste oil, non-ferrous metal and scrap lead acidbatteries defined as "hazardous" in Schedule-4 of Hazardous Wastes (Management & Handling) Amendment Rules 2003 are sold to the MoEF/CPCB Registered Re-cyclers/ Re-refiners/ Reprocessors only.
  9. The Company's products do not require any external packaging. Wood used in packing crates of spare parts is re-cycled from wooden scrap packaging of received material. Heavy bought out components, which were received in wooden crates, are now changed over to returnable pallets. Collapsible custom-built polypropylene (PP) boxes have been developed for bought out components that are bulky and light (e.g.: dashboards). These PP boxes can be dismantled, flattened and returned to vendors for re-use, eliminating the use of virgin packaging material each time. With a cycle time of more than 150 trips these polypropylene boxes have resulted in significant savings on component packaging.
  10. End-of-Life (ELV) Vehicle and Re-cyclability of products: To address the environmental impacts during disposal of vehicles at the end of its life, recyclability and irreclaimability has been defined as one of the design objectives. Tata Motors is also working with the Society of Indian Automobile Manufacturers (SIAM) as a member of the task force on Recyclability to study and develop a policy on Recyclability of vehicles in India.
  11. Re-use of treated effluent: The treated effluent is re-used for various low-end purposes such as toilet flushing, floor washing, chemical solution preparation, gardening, horticulture, fire hydrant line testing and as make up water to various cooling towers.
  12. The first major step towards the transformation of this barren landscape was the construction of a 350-meter long stone masonry dam to impound the rainwater that used to flow through it from the surrounding catchment area. Subsequently the height of the dam was raised and the lake thus created was also deepened, increasing its storage capacity to about 60 million gallons of water. The creation of a perennial water source gave a great boost to tree plantation activities and the raising of nurseries. The lake thus became the nucleus for the transformation of the landscape. The first tree nursery was used to stock tree saplings acquired from local nurseries, and raise them to a good height. Simultaneously several fast growing trees were planted to create natural shade as quickly as possible. The saplings raised in these nurseries were the first step in the greening of the barren landscape.

## **Conclusion**

Tata Motors Ltd, (TML), being one of the pioneers in automobile sector in the country on its path to World Class Manufacturing has incorporated environmentally sound practices as one of its prime objective – in its processes, products and services. All manufacturing facilities at Pune, Jamshedpur and Lucknow have achieved certification to the ISO-14001 Standard. A Tata motor is one of the leading Automotive company who is taking efforts for reduction in pollution and disposal of waste by spending approximately 70 % from environmental expenditure. Simultaneously Tata Motors is taking various steps towards environmental stewardship, water management, and industrial waste management in all the manufacturing plants along with corporate social responsibility activities. Eventually company focusing sustainable development through environmental activities like biodiversity management, waste management, water footprint initiative, green buildings, materials management etc.

## **References**

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