PLASTIC WASTE PLASTIC WASTE PLASTIC WASTE PLASTIC WASTE PLASTIC WASTE PLASTIC WASTE WASTE WASTE WASTE WASTE WASTE PLASICWASTE



Turning waste to value





Scenario on Plastic Waste Management

It is estimated that approximately 70 percent of plastic packaging products are converted into plastic waste in a short period

9.4 million

tonnes per annum plastic waste is generated in the country



3.8 million

5.6 million tonnes per annum plastic waste is recycled

tonnes per annum plastic waste is left uncollected or littered

India has a better recycle rate considerably higher than the global average of 20 percent



0%

is recycled, most of it by the informal sector



the time

Plastic credit





- **Plastic waste Management Policies over**
- **Understanding plastics**
- **Government Roles**
- **EPR Policy and compliances**
- **Best Industrial practices**
- **Recycling techniques and Disposal**
- The policy update
- **Plastic and carbon neutrality?**

Uderstanding Plastics

Thermoplastics:

Thermoplastics or Thermo-softening plastics are the plastics which soften on heating and can be molded into desired shape

Thermosets:

Thermoset or thermosetting plastics strengthen on heating, but cannot be remolded or recycled



THERMOPLASTICS ARE CATEGORIZED MORE INTO 7 CATEGORIES

THE CHALLENGE OF RECYCLING

Globally, 18 percent of plastic is recycled, up from nearly zero in 1980. Plastic bottles are one of the most widely recycled products. But other items, such as drinking straws, are harder to recycle and often discarded.



PET Polyethylene terephthalate

Beverage bottles, food jars, clothing and carpet fiber, some shampoo and mouthwash bottles

11%



HDPE High-density polyethylene

Detergent and bleach bottles, snack boxes, milk jugs, toys, buckets, crates, plant pots, garden furniture, trash bins

14%



PVC Polyvinyl chloride

Credit cards, window and doorframes. gutters, pipes and fittings, wire and cable sheathing, synthetic leather

5%



LDPE Low-density polyethylene

Packaging film, shopping bags, bubble wrap, flexible bottles, wire and cable insulation





Bottle tops, drinking straws, lunch boxes, insulated coolers, fabric and carpet fiber, tarps, diapers





Ease of recycling by type"

▲ Easy △ Manageable ∆ Difficult ∆ Very difficult

PP Polypropylene





Plastic-foam cups, egg boxes, meat trays, packing peanuts, coat hangers, yogurt containers, insulation, toys

6%





Nylon fabrics, baby bottles, compact disks, medical storage containers, car parts, watercooler bottles

24%

Policies over the time

1998

IS 14534 (1998): Guidelines for recycling of plastics 2000

Solid waste management rules 2011

<u>Plastic Waste</u> (Management & <u>Handling) Rules,</u> <u>2011</u>







Plastic waste management rules 2016



Framework for Extended Producer Responsibilities and SUPban



Recycling/Disposal

A number of factors can complicate the practice of plastics recycling, such as the collection of the plastics waste, separation of different types of plastics, cleaning of the waste and possible pollution of the plastics. A further complicating factor is the lowvalue nature of most of the products that can be manufactured from recycled plastics.







Mechanical Recycling

Landfilled & Incineration

Chemical Recyling

9%

Waste to Energy

Co-processing



Latest Recycling Technologies

Patent Application No: 201921018722













Plastic to Pavement Blocks

Plastics as a 'binder'

Depolymerisation Plasma Pyrolytic technologies





Near Infrared (NIR) Extrusion & Palletisation

Mechanical Recycling

Technologies for Recycling Plastic Waste

Collection and Sorting

- **Cleaning and Drying**
- Agglomeration
- Grinding
- Extrusion
- Tertiary Recycling Quaternary Recycling





Float and Sink Separator Sorting



Figure 5 - Sink and Float Separator (Source - B+B Anlagenbau)

Type of Polymer	Density (g/m3)
РР	0.89 – 0.91
LDPE	0.91 – 0.93
HDPE	0.94 – 0.96
PS	1.04 – 1.11
PVC	1.20 - 1.55
PET	1.38 – 1.40



Al Powered Robotic Sorting

Advanced machine vision systems deploy robotic arms to sort various types of plastic. Once a particular type of plastic has been identified by the machine vision system, it directs a robotic arm, which picks up the plastic material from the conveyor belt and drops it into the respective container.



Optical Sorting Systems

Optical Sorting methods are usually non-destructive, contactless and use lowenergy excitation sources. Spectroscopes can reliably identify molecular identity of the waste material (spectral signature). Different type of spectroscopes like, Raman spectroscope (RS), near-infrared spectroscope (NIRS); Fourier-transform infrared spectroscope (FTIR); and terahertz spectroscope (THz) maybe used in such systems.^{xvii}



Electrostatic Sorting

PET and PVC can be sorted based on electrostatic charge difference between the two polymer types. Hamos has developed a sorting system based on this technology. On passing through a charging unit, the PET particles get positively charged and PVC particles get negatively charged. The mixture is the moved to a high voltage field where PET and PVC pieces separate from each other due to difference in charge.^{xx}

Human Eye

High-Resolution Camera

Digital watermarks are subtle marks printed all over packaging but are invisible to the human eye.



These watermarks can be detected by high-resolution cameras on a conveyor belt at a **rate of 3m/s**.

They carry information—like material type and use—that greatly increases the accuracy and speed of sorting plastic packaging.

HolyGrail

Today, only about 10% of plastic is recycled. Digital watermarks—imperceptible postage stamp-sized codes printed on plastic packaging—can help bridge this gap by carrying information about the packaging material. As plastic waste enters a recycling centre, high-resolution cameras installed at sorting units can easily detect and decode this information and thereby sort the plastic waste more accurately.





PRISM

PRISM is a process for rapidly automatically sorting packaging based on intelligent labels with invisible markers. Codes are written using luminescent materials, typically inorganic phosphors. At the recycling facility the articles are subject to excitation radiation of a specific wavelength and a few seconds/milliseconds later are subject to infra-red detection as currently. This 2-step process can identify articles according to the codes and sort them as specified. The benefits include increased recycling rates, the ability to sort articles by their end use (food, non-food) and composition increasing the value of such plastic. Incorporation into existing recycling facilities is easy and cost-effective with a limited need for capital investment.





PET to Yarn







Demetallizing of Film

GMS has developed a demetallizing technology under the brand name of PLAST CLEAN. This involves high friction washing system deployed in combination with



a specialised detergent for removal of metallized coating from films. The system is capable of handling metallized films in rolls or pre-ground flake form made from any type of polymer. The specialised detergent is non-hazardous, recyclable and can be re-used in the same process. The semi-automatic process is energy efficient and ensures complete (100%) removal of metallized coating.



Tertiary or Chemical Recycling



Fewer raw materials are used

Improved, cost-efficient collection and treatment systems will lead to fewer and fewer materials ending up in landfill and support the economics of circular design

RECYCLE

DESIGN

Producers are fully responsible for recovering materials from their products and packaging throughout their lifecycle

REUSE/ REPAIR

CIRCULAR ECONOMY

Government leadership, producer responsibility, and consumer education and awareness will enable market mechanisms that drive higher resource productivity, innovation and economic growth

There are many ways consumers can contribute to a circular economy, like making greener buying choices, sharing assets (e.g., cars, tools) and repairing them or offering them to others for reuse and refurbishing

CONSUMER USE



Products and packaging are designed to last longer and be more durable, using more sustainable materials that can be easily recycled at end-of-life

PRODUCE

Businesses collaborate and coordinate across sectors to reduce greenhouse gas production and fossil fuel use

DISTRIBUTE

Retailers offer products that can be easily reused and refurbished, offer end-of-life take back or maintenance and repair services, and support producers in providing education and awareness to consumers

Digital Ecosystem based on Web3 and Blockchain Technology

We provide transparency at every step in the process of plastic waste management

Our process prevents any duplicity in the system and maintains traceability throughout.

Our digital platform helps our clients to access documents anywhere & anytime.

Based on Blockchain Technology (powered by Polygon) which includes NFT Minting, Blockchain, Plastic Credit, and Carbon Credits...

This innovative platform helps us achieve our mission of a clean and sustainable future for all.



- •

- 24x7 online



Blockchain Enabled Protected online payments 100% paperless payment Reports at you fingertips Request pickup in just few clicks Immediate payouts



Post-Consumer Multilayered & Non-Multilayered Plastic Waste Converted into Beautiful Products Supporting Circular Economy



Product of The Day
Carbon Negative Stiles

Each Tiles Recycles 1 kg of Multilayered Plastic waste and offsets approximately 2.5 kg of co2



Sustainable Products
 MLP Recycled Products
 www.shaktiplasticinds.com

SHAKT

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YOU CAN RECYCLE ALMOST ANYTHING, SERIOUSLY, YOU CAN

MAKING A DIFFERENCE TO THE WORLD WE LIVE IN.

Reduce the amount of the earth's resources that we use. Reuse don't just bin it, someone else can make use of it. Recycle plastic materials to be made into something new. Recycling gives new life to the things we use. Recycling means taking a product or material at the end of its useful life and turning it into a usable raw material to make another product. WASTE MEIN SE BEST. KACHARE SE CASH TAK

KEEP CALM AND RECYCLE









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