FASHION FOR GOOD
SORTING FOR CIRCULARITY: INDIA

TOOLKIT FOR ORGANISING TEXTILE WASTE IN INDIA

DECEMBER 2023

THE CONTEXT: CHANGING GLOBAL MATERIAL MARKET

There is a rising demand for next-generation materials that are circular and an advent of innovations in textile recycling. Streamlined access to waste is the first step towards tapping into the scaling potential of recycling technologies in order to fulfil the supply-demand rationale. This, coupled with the momentum generated by stringent global legislation that pertains to textile waste, the value of post-consumer textile waste is expected to rise.

THE SORTING FOR CIRCULARITY PROJECT FRAMEWORK

Sorting for Circularity, a framework created by Fashion for Good and Circle Economy, aims to (re)capture textile waste, expedite the implementation of game changing technologies and drive circularity within the fashion value chain. The framework is based on insights from the Fashion for Good and Apparel Impact Institute's collaborative report "Unlocking the Trillion Dollar Fashion Decarbonisation Opportunity", which charts a trajectory for the industry to meet its net-zero ambition by 2050, highlighting the potential and significant impact on carbon emissions in the industry through material efficiency, extended and re- use of waste. Created with scalability in mind, the Project was first initiated in Europe, and has now expanded to include Sorting for Circularity India and the USA.

THE SIGNIFICANCE OF INDIA IN THE GLOBAL CONTEXT: WHAT WE LEARNED FROM WEALTH IN WASTE STUDY

India is among the world's largest textile and apparel sourcing regions and also one of the leading apparel markets globally. With high volumes of production and consumption, comes a significant quantity of textile waste comprising both pre-consumer textile waste and post-consumer textile waste. A radical transition to a sustainable industry, demands that textile waste is looked through the lens of a valuable resource. Textile waste presents opportunities for new revenue streams and next-generation materials, reducing dependence on virgin materials and preventing waste from reaching landfills or undergoing incineration.

Through the Sorting for Circularity India's Wealth in Waste study, approximately 7793 ktonnes, or 8.5% of global textile waste, is accumulated in India every year. 59% of this waste finds its way back into the textile industry through reuse and recycling but only a fraction of this makes it back into the global supply chain due to quality and visibility challenges. The remaining 41% is downcycled (19%), incinerated (5%) or ends up in a landfill (17%). Furthermore, 34% of the total waste is reused directly or repaired and converted into new products, while 25% gets recycled into yarns. India is a global leader in mechanical recycling; however, a significant portion of the recycled yarns are made through a low-grade recycling process.
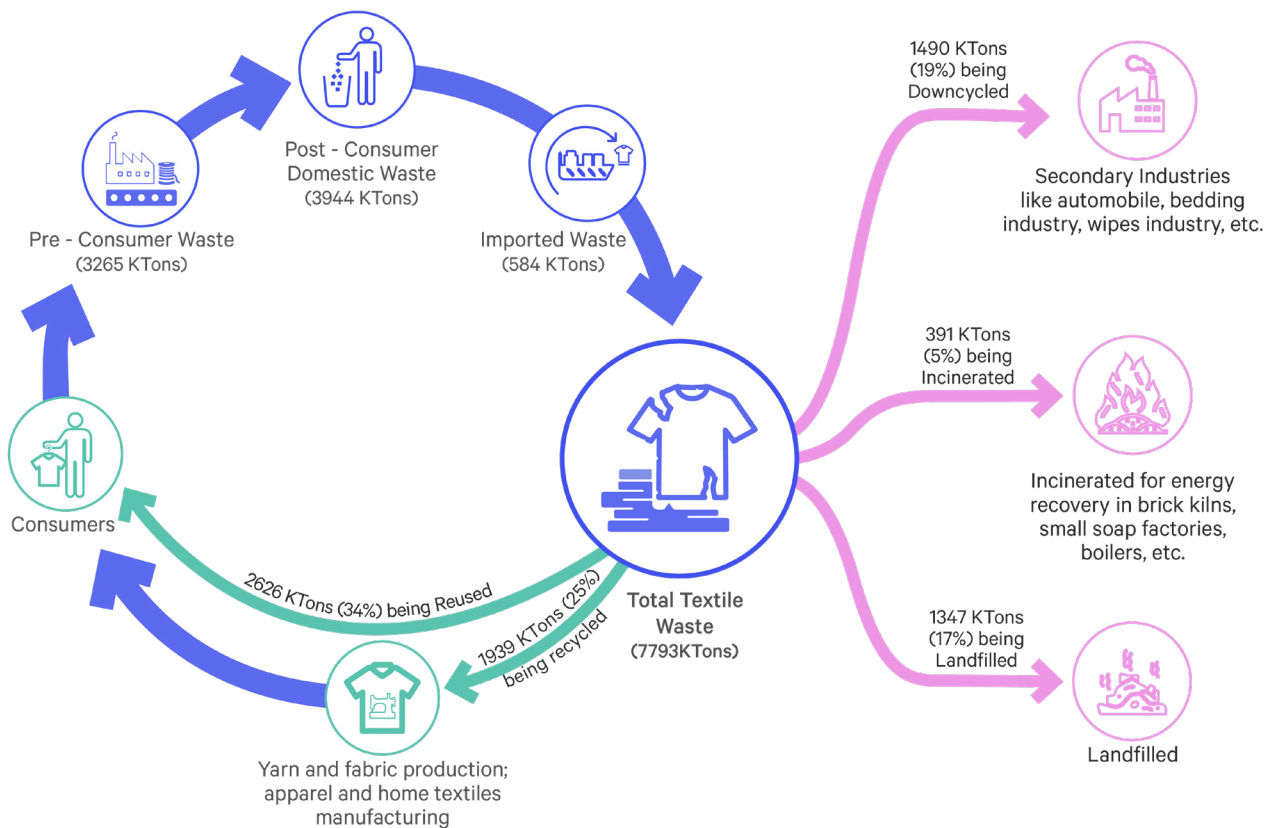
Illustration 1: Total Quantity of Textile waste in India, end-use and destination of textile waste

As per the above data, it can be ascertained that the valorisation of textile waste is crucial for achieving circularity in the Indian textile industry. India is at a crucial juncture in time, with the unique potential to become a leader in textile recycling and promote circularity in the textile industry. Not only are there huge quantities of waste generated in the country, but the recycling infrastructure is currently operating sub-optimally, utilising only imported post-consumer waste or post-industrial textile waste.

India has a well-networked textile waste value chain, though unorganised, enabling the transfer of waste across the country. However, the lack of traceability systems, excessive cost competitiveness, limited infrastructure to process certain waste types, and worker well-being concerns have limited the potential of a circular value chain. While pre-consumer waste already plays an integral part in the current recycling landscape in India, post-consumer waste currently holds a much smaller recycling market share when compared to pre-consumer (or post-industrial). Currently, the majority of post-consumer waste used in the recycling industry has been collected and imported into India. Obtaining high-quality domestic post-consumer waste is challenging due to the lack of proper collection and sorting infrastructures in India, making it complex to access the quality feedstock of post-consumer waste in India.

In India, less than half of the textile waste undergoes reuse, repair, or high-grade recycling. This includes fabric deadstock, re-wearable clothing, overproduced apparel, and white-knitted 100% cotton waste. However, solid-coloured cotton, MMCF blends, and printed textiles, which constitute a significant portion of total waste, encounter underutilisation due to limitations in current recycling technologies. Low-volume waste, such as specific spinning waste and printed materials, currently holds minimal value but presents high-value potential. Heavily contaminated and worn materials, reaching the end of their use, often end up

being incinerated or landfilled. To enhance circularity, efforts should focus on reducing waste generation at both consumer and manufacturer ends, diverting waste from landfills or incineration, and identifying opportunities to reintegrate diverse textile waste types back into the value chain for maximum utilisation.

The global textile industry is moving towards decarbonisation, targeting net-zero within the next three decades. The global textile industry aims for decarbonization, targeting net-zero emissions in the next three decades. In India, achieving this goal involves reducing virgin material use, preventing waste leakage, and promoting circular practices through effective reuse and recycling. This requires the implementation of advanced mechanical and chemical recycling technologies, particularly for cotton and polyester blends. India's substantial volumes of cotton, cotton-rich (~4700 ktons), and polyester waste (~1400 ktonnes) can serve as valuable feedstock for these innovations. However, successful integration demands uncontaminated waste, supply chain transparency, robust collection, sorting, and pre-processing infrastructure, as well as a traceable waste acquisition system.

To read in detail and to understand the comprehensive current scenario of textile waste in India, please read our Wealth in Waste Report. This report not only delves into the existing scenario but also identifies industry bottlenecks, advocates for collaborative action, outlines both short and long-term intervention pathways, and a first look at the established a textile waste value hierarchy.

ASSESSING AND VALIDATING SOLUTIONS: ACTION PLAN TO WEALTH IN WASTE STUDY

PRE-CONSUMER TEXTILE FEEDSTOCK

Objective: Validating a traceable closed-loop system for post-industrial cutting waste from the factory floors to advanced recyclers, increasing the volume and quality of recycled fibres that are at par with virgin fibres for the textile industry.

What & How: The pre-consumer pilot through a multi-stakeholder approach demonstrates a 360-degree closed loop system for post-industrial waste (cutting waste) from the factory floor **(Fig.1).** In the pilot, 84.4 tonnes of cutting waste was segregated at the factory floor, digitally traced and processed by the recyclers/waste handlers and in selected cases, the new traceable recycled fibres were brought back in the production units. The pilot has set out to Demonstrate the impact & identify the challenges of segregation at source and digital traceability in the Indian textile waste supply chain; from the point of generation to recycling. The pilot also helped create brand-level visibility of waste from their production units through the Reverse Resources(RR) platform.
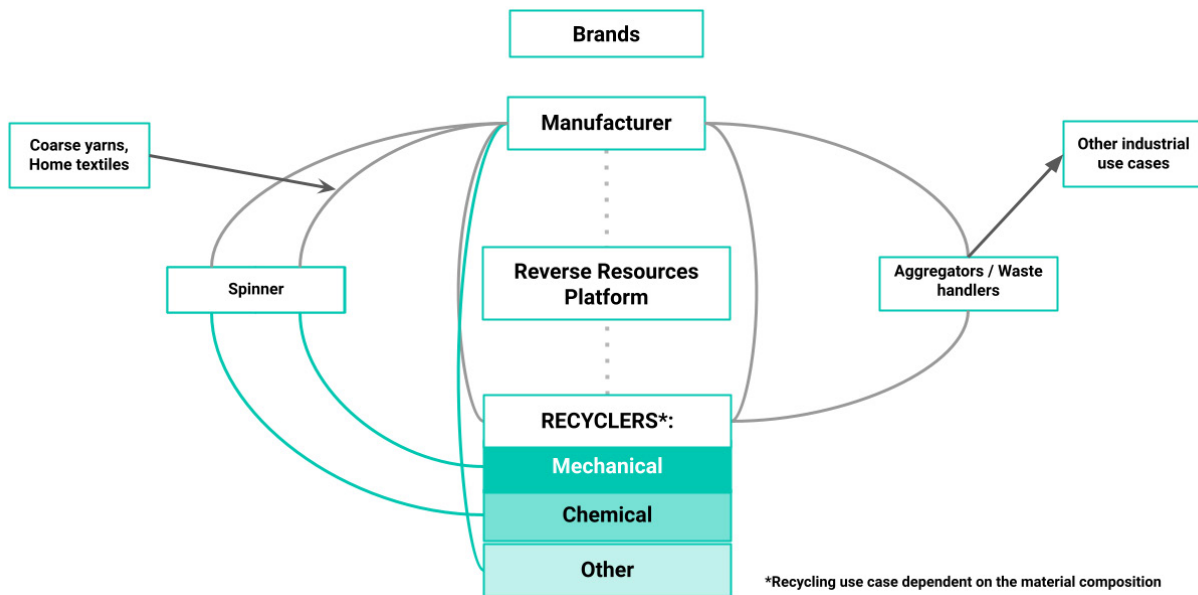
Illustration 2: Pre-consumer pilot with 360-degree approach of bringing factory waste back as new fibres

The primary **learnings** from our pilot are summarised below:

1. **Enhanced Waste Handling Network:** Integration of traceability into existing waste handling networks is crucial for effective management. Also, streamlining waste handling processes at the waste handler level and eliminating middlemen is critical.
2. **Strategic Waste Aggregation:** Establishing waste aggregation points is essential in most waste supply chains, with recyclers having the potential to create them if a robust business case exists.
3. **Industry Collaboration:** Factories/Suppliers require increased benefits and brand support to enhance waste-handling practices. Factories/Suppliers could be incentivised to collaborate with recyclers, offering circular solutions, but brands must signal a willingness to pay a premium for recycled products.
4. **Efficient Supply Chain set up:** Future considerations should include setting up recycling factories closer to the supply chain to minimise transportation costs.
5. **Technology Upgrade:** Ensuring consistency in waste volume commitments, promoting awareness of recycled materials within brands, and upgrading technology for mechanical recyclers are essential steps for a sustainable and circular textile waste management system in India.

To read more about the learnings in detail and the pre-consumer pilot, you can refer to our Sorting for Circularity: Pre-Consumer Pilot Learnings.

POST-CONSUMER TEXTILE FEEDSTOCK

Objective: Validating the need for and business opportunity setting up sorting centres, to collect, sort pre-process and supply specific materials types from post-consumer textile waste to advanced recyclers (high-grade mechanical and chemical) that can be turned into fibre that is at par with virgin fibres for the textile industry.
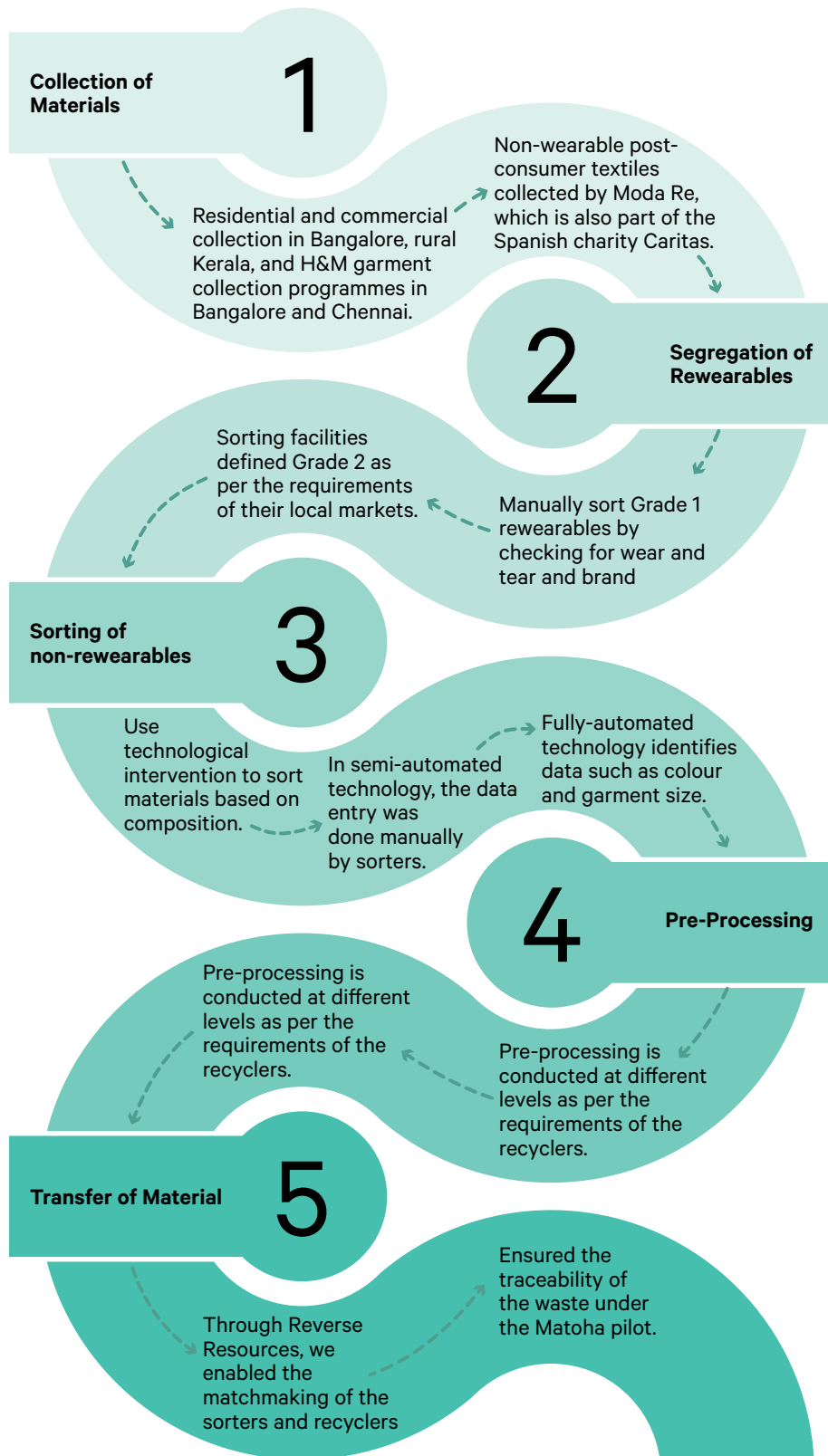
1 Collection of Materials

Residential and commercial collection in Bangalore, rural Kerala, and H&M garment collection programmes in Bangalore and Chennai.

Non-wearable post-consumer textiles collected by Moda Re, which is also part of the Spanish charity Caritas.

2 Segregation of Rewearables

Manually sort Grade 1 rewearables by checking for wear and tear and brand

Sorting facilities defined Grade 2 as per the requirements of their local markets.

3 Sorting of non-rewearables

Use technological intervention to sort materials based on composition.

In semi-automated technology, the data entry was done manually by sorters.

Fully-automated technology identifies data such as colour and garment size.

4 Pre-Processing

Pre-processing is conducted at different levels as per the requirements of the recyclers.

Pre-processing is conducted at different levels as per the requirements of the recyclers.

5 Transfer of Material

Through Reverse Resources, we enabled the matchmaking of the sorters and recyclers

Ensured the traceability of the waste under the Matoha pilot.

Illustration 3: The pilot methodology for the entire post-consumer pilot

What & How: Sorting for Circularity India project conducted a pilot for post-consumer waste collected and sorted domestically using Matoha FabriTell Scanners, and based on its learning, carried out a second pilot to asses the technological feasibility of the fully-automated PICVISA ECOSORT. Both Matoha and Picvisa technologies adopt Near-Infrared Spectroscopy or NIR, however, Matoha Fabritell Devices only assess the composition by scanning, while Picvisa's ECOSORT not only assesses composition by scanning but uses AI for identifying other details such as colour and size. Of the two pilots conducted in the post-consumer pilot program, the pilot with Matoha (for semi-automated sorting) was carried out in southern India, with a total of 35,493 kgs of post-consumer textile waste collected and sorted from the cities of Bangalore, Chennai, and Calicut. The pilot with PICVISA (for fully automated sorting) was executed at its test centre in Spain, with 1,228 kgs of post-consumer textile waste collected and sorted from the European region.

Under the Methodology of the sorting, we were able to assess rewearability, and recyclability and understand the nuances and complexity of post-consumer waste in India. It illuminated the value of post-consumer waste and how cross-industry action needs to be taken in order to valorise this textile waste.
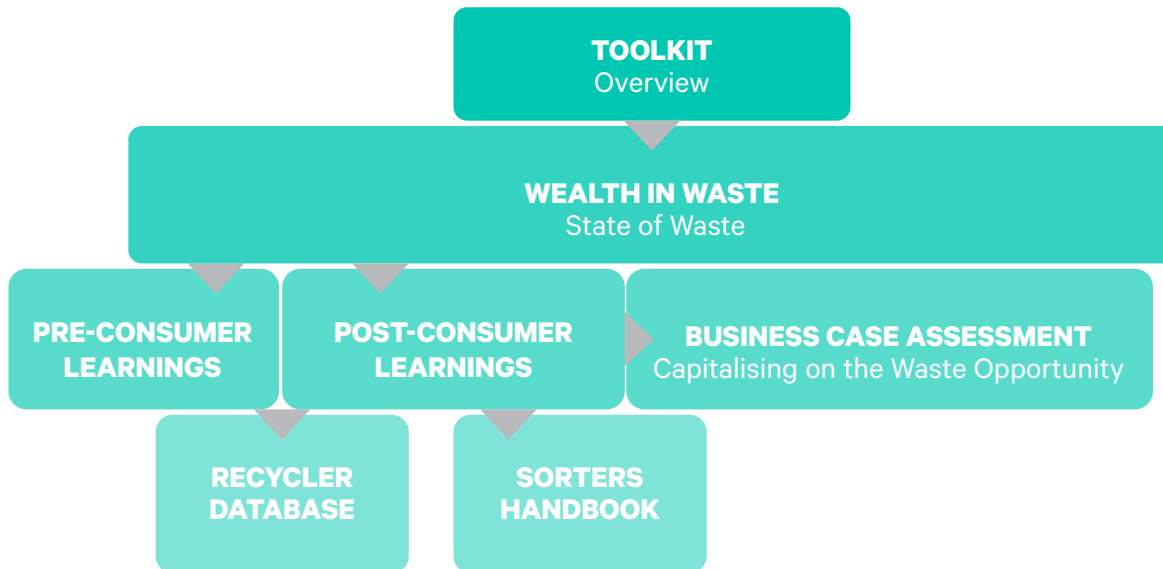
The primary **learnings** from our pilots are summarised below:

1. **Collection systems need to be set up** in order to enable sorting and in turn support recycling. Support for systematic change in collection systems and waste aggregation calls for support from legislators and municipalities
2. **Sorting hubs and Textile Recovery Facilities** need support to set up and build infrastructure to enable an uninterrupted flow of feedstock for recycling. Sorting hubs need consistent demand from resale organisations and advanced recyclers to make a positive business case over a decade. This required the growth of sorting, resale and recyclers to go hand in hand.
3. **Technological interventions are integral** in the scaling of sorting and help fasten the sorting process and increase productivity. These interventions can resolve problems of the current system of manual sorting such as accuracy, data monitoring, and illiteracy issues
4. **The optimisation use of domestic feedstock for recycling** can only be ensured if collection systems and sorting infrastructures are set up in India, and today, not all feedstock is being used to its highest potential
5. **The resale industry needs to scale** and receive support in order to support the collection and sorting infrastructure in India. Resale can also enable sorters and waste aggregators to introduce new streams of revenue

Presently, not all feedstock is ending up in high-grade recycling but in a varied range of products that range from yarn to wipers. In order to valorise this waste, and for the share of recyclable material to increase, technological intervention needs to optimise sorting.

To read more about the learnings in detail and the post-consumer pilots, you can refer to our report, UNLOCKING INDIA'S WASTE OPPORTUNITY: Capitalising on the Untapped Potential of Post-Consumer Waste.

TOOLKIT FOR SCALING UP SOLUTIONS VALIDATED IN SORTING FOR CIRCULARITY PROJECT

TOOLKIT
Overview

WEALTH IN WASTE
State of Waste

PRE-CONSUMER LEARNINGS

POST-CONSUMER LEARNINGS

BUSINESS CASE ASSESSMENT
Capitalising on the Waste Opportunity

RECYCLER DATABASE

SORTERS HANDBOOK

HOW CAN IT BE USED?

This toolkit is an action plan for anyone looking to understand or exploit the opportunity in textile waste

For an individual or business with an interest in waste,
the toolkit lays out the blueprint for setting up infrastructure for textile waste in India and provides an encompassing study of the challenges, limitations and opportunities that have emerged from the Sorting for Circularity project, and how they need to be capitalised on in order to valorise the potential of India's textile waste. The toolkit is a comprehensive study of the current state of textile waste in India and helps understand the solutions that help solve the challenges and the potential business opportunities and risks in each of the solutions.

For policy and development organisations, this toolkit is a 360-degree view on the current gaps that are currently hampering the development of a circular textile waste landscape in India. While the opportunities are vast, the toolkit helps establish areas in need of support and aims to serve as a driving force towards creating and encouraging frameworks to establish India as a leader in textile waste management and valorisation.