



# No to Plastic Waste

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Solutions for a Better World

# CONTENTS

	<b>Pg. No.</b>
I. President’s Message.....	2
II. Executive Summary.....	4
III. Reducing the Demand for Plastics by Propagation of Reuse/Substitution.....	8
IV. Interception of Waste through Material, Form, Structure Redesign.....	12
V. Downstream Waste Management through Strategic Recycling Models.....	13
VI. Conclusion.....	20
VII. Annexure.....	22
VIII. End Notes.....	23

## President's Message

Plastic waste is a serious problem and needs to be solved expeditiously. However, the use of plastics in several applications is desirable as it not only helps to improve safety, convenience etc., but also helps to reduce the demand for fossil fuels and thereby helps to save the environment. We need a solution that harnesses the benefits of plastics while at the same time, also deals effectively with the huge environmental damage that is being caused to the environment which is different from the compromise solution which short-term thinkers hanker for.

High Performance Plastics and Engineering Polymers on the one extreme to plastic tarpaulins call for a rational view of plastics. It is however, nobody's case that indiscriminate usage and disposal of plastic packaging can be justified. Just as the production of guns and knives should not be banned because there is misuse too, suitable laws and rules are required to curb the environmental damage being caused by plastic use. Just as nuclear power production should be permitted provided extremely strict waste disposal methods are implemented, legitimate use of plastics along with implementation of those laws governing their use need to be tightened. This report purports to find a way to get the benefits of plastics usage that the world is familiar with and at the same time get rid of the huge damage that has been done (and being done) to the environment by irresponsible disposal of plastics. The objective is not to find a balance or compromise but to extinguish the latter and retain the good aspects of the former. It is hoped that this report will provoke new policies and laws as well as practices that will save planet earth from the callousness of humans.

In Maharashtra and in most parts of India as well as the rest of the world, the level of environmental damage due to plastic waste has reached dangerous levels. India as the host for the World Environment Day 2018 has pledged to eliminate all single-use plastic in the country by the year 2022. True to its word, States across the country have

resorted to the ban of single-use plastic carry bags. However, almost all of them have failed to make it a success. A similar ban but a wider one in Maharashtra, also bringing into its purview plastic packaging, has fulfilled one major objective-changing the mindset of the middle class towards carry bags. Whilst there is a discernible shift in urban areas towards use of cloth and paper bags, many larger shops have indeed stopped using single use plastic bags, there are many who violate the ban with impunity and some who have no choice. Moreover, the manner in which the ban has been implemented, has adversely impacted different business segments which are far removed from plastic carry bag production; thus, hampering the business environment in the state. In July, reacting to legitimate demands from the business community, concessions were made, e.g., for e-commerce companies, a temporary relief was provided for 3 months, beverages above 200 ml. (which in effect almost excludes anything) were permitted in plastic bottles, wrapping of industrial products with recyclable plastics above 50 microns thick was permitted. There is a danger that over a period of time, the rules will be diluted to the extent that environmental damage will continue unchecked whilst some legitimate usage will be denied.

This report therefore, suggests a three-point framework to prevent environment damage by plastics in a manner that is implementable, long-lasting and has sustainable action mechanisms to curb the indiscriminate use of plastic without preventing the use of plastics. The objective of this report is to create a blueprint for a more comprehensive action plan for plastic waste management that can be practiced not just in Maharashtra but also in any other States in India. The building blocks for this detailed blueprint are technology for product redesign, logistics and optimum collection, sorting and recycling practices and innovative business models.

Analysing the approach taken by some of the countries across the world like Sweden, Italy to tackle plastic

pollution, observing and understanding the mechanism of some of the successful models in India like Kannur, Mysore and Indore has helped lay the groundwork for this report. Secondary research was conducted to assess global and domestic market scenarios. Interview with the district collector of Kannur, discussion with plastic manufacturing associations has helped bring a pragmatic view to the solutions proposed in the report.

This White Paper has been researched and prepared for IMC Chamber of Commerce and Industry by Avalon Consulting, a strategy consulting firm operating in India, Asia Pacific, Middle East, Europe and the Americas. It suggests a three point framework.

In order to include the practical experience of a wide swathe of businesses which deal with plastics either as a raw material or for packing or packaging, while diagnosing the current situation in Maharashtra and for identification of feasible solutions, we engaged with key functionaries in the following industry & business associations:

- ◆ All India MSME Association
- ◆ Bharat Merchants' Chambers
- ◆ Bombay Industries Association
- ◆ Bombay Mudibazar Kariana Merchants' Association
- ◆ Express Industry Council of India
- ◆ Flexible Packaging Industries and Traders Association
- ◆ The Air Cargo Agents Association of India
- ◆ The All India Plastic Manufacturers Association
- ◆ Electric Merchants' Association

We also waited for four months to observe the good and adverse effects of the ban in Maharashtra before publishing the report. The underlying vision is to transform the waste of today into resources of tomorrow by creating opportunities for value creation through the action-oriented approach outlined in the report, while attempting to save the planet.

With regards,



Raj Nair



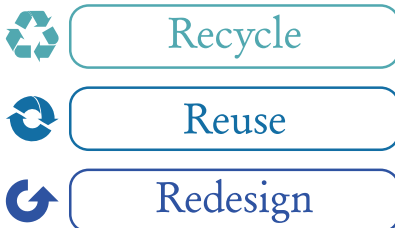
## Executive Summary

The global production of plastic today is more than 335 million tonnes which is equivalent to the weight of the entire human population.<sup>[1]</sup>

Since its discovery in the early 1950s, more than 6.3 billion tonnes of plastic waste has been generated globally and till date only 9 per cent of this staggering amount has been recycled. While a small proportion of it is incinerated, about 79 per cent ends up in landfills, dump sites or leaks out into the natural environment.<sup>[2]</sup> With the surge in population and the consumption associated with economic growth, the level of plastic waste generated will only continue to rise. Persistence of current trends will result in our oceans containing more plastic than fish by 2050,<sup>[3]</sup> thus causing irreparable damage to our marine environment.

These figures indicate that the planetary crisis created by the use of plastics is very much real. However, a complete elimination of plastic from the economy will not resolve this crisis. If anything, it will add to the damage as a complete replacement of plastics with its alternatives would increase the environmental costs from the present \$ 139 billion to \$ 533 billion.<sup>[4]</sup>

This report proposes a feasible alternative to the blanket ban on plastics. The crux of the solution lies in harnessing the benefits of plastic while dealing with its shortcomings by means of a paradigm shift from a linear (take-make-dispose) to a circular economy. This transition will only be possible if the future of the plastics industry is characterised by the principles of recycle, reuse, and redesign



Based on the analysis of the current plastics economy, innovative methods employed by countries across the world, and successful implementation by some of the cities in India we have suggested solutions under each of the three segments thus enveloping the entire plastics market.

### 1. Reducing the demand for plastics by propagation of reuse/substitution

A reduction in demand serves the dual purpose of saving the energy resources that go into the making of virgin plastic and reducing the waste generated to drive our society towards achieving the goal of zero waste.

The current plastics economy is based on the cradle-to-grave pattern of take-make-dispose. Moving away from the present disposable culture by means of reuse would significantly help reduce the demand for virgin plastics. By capitalising on the functional properties of plastic like its durability and ensuring its reuse, the shelf life of the commodities can be increased. Presently, packaging accounts for about 40% of the total use of plastic. Ensuring that this significant fraction of plastic generated, is made reusable can significantly lower the scaling demand. Simultaneous efforts to make the packaging recyclable helps us close the loop and paves our way towards a more circular economy.

The key innovations that show potential in tackling the environmental crisis by significantly reducing the demand for plastics are:

- ◆ **Reusable delivery models**  
Use of refillable technology results in 25%-50% packaging cost savings for businesses in the home care products market. Its implementation also leads to 80%-90% saving of packaging material thus significantly reducing the plastic demand.
- ◆ **Transit Packaging Solutions**  
Pooled rental services for large rigid packaging offered

to various businesses allows for efficient, sustainable, and low-cost transport of goods. This sustainable business model also provides a new avenue for businesses to develop resulting in increased job opportunities.

Replacing pallet wraps (shrink wraps, stretch hoods, etc.), which are non-reusable by design, with more durable and reusable and long-lasting alternatives will help reduce its production which currently stands at 5-6 million tonnes per year.

#### ◆ **Business-to-Business models**

Buy-back mechanisms have proven to be the most efficient way for retrieval and recycling of beverage bottles. Through this mechanism, companies like Coca-Cola have been able to recover more than 60% of the bottles introduced in the market and convert them to food-grade bottles to be used for the packaging of their soft drinks.

Traditionally used only for the recovery of beverage bottles, this mechanism today is also being used by the e-commerce industry. Their model entails retrieval of delivery packaging through postal services by incentivising the customers through vouchers and discounts. There is no reason for beverage manufacturers to resist this solution in India given that they have been party to this solution in many parts of the world.

#### ◆ **Complete substitution of single-use carrier bags with alternatives**

Many countries have imposed a ban on single-use carry bags to get rid of the plastic menace. Besides Maharashtra, many other States in India are pushing in that direction. The district of Kannur in Kerala has been singularly successful in a similar attempt through proper planning, regulation, involving the people with bottom up initiatives and innovative ideas, thus witnessing commendable results in a short span of six months. In addition to this, economically viable and sustainable alternatives have also been developed in our country.

The report has identified companies that have successfully incorporated each of these ideas into their business models thereby making their businesses more cost efficient and environment-friendly while setting an example for others to follow.

#### **The key features of these sustainable strategies are:**

- ◆ It puts forth an effective alternative to the blanket ban which adversely affects the logistics and the air freight industry.
- ◆ Development of the above mentioned sustainable and economically feasible business models would help create a better after-use economy.
- ◆ Scaling up of the packaging solutions would translate into reduced product costs, reduced cost of transportation and increased levels of employment generation.
- ◆ It will attract participation from industries due to the lucrative nature of these business models.

#### **2. Interception of Waste through Material, Form and Structure Redesign**

The underlying vision of the circular economy is to transform the goods of today into the resources of tomorrow. Presently however, 20% of the total plastic used in packaging cannot be recycled. This can be attributed to the basic design of these products. The idea therefore is to intercept this unrecyclable waste through product redesign before it ends up in landfills or enter the water bodies and other natural ecosystems, e.g.

- ◆ Small format packaging (caps, tear-off tabs, lids, etc.) currently not captured by the collection and sorting mechanisms can be made a part of the main packaging to facilitate its recyclability. Further, examples of the simple yet novel techniques of disappearing packaging can reap huge environmental and economic benefits.
- ◆ Multi-layer packaging which is currently difficult to recycle should be replaced with mono-layer plastic packaging which renders the same functionalities and is yet recyclable.

The key feature of these redesign solutions is that it paves the way for the harmonious functioning of the economic system and the ecological system that today are mutually exclusive.

### 3. Downstream Waste Management through Strategic Recycling Models

The principal barrier that stands between India and its vision to end the plastic pollution is the poor waste management infrastructure. 85% of the waste generated in the country is mismanaged. The goal is to develop an economically viable and realistically feasible cleaning, sorting and recycling mechanism.

Analysis of waste management practices in Sweden and Italy was done to better understand what makes them zero waste regions of Europe. Some of their strategies that help create a blueprint for successful management of waste are:

- ◆ Curbside collection to achieve optimum levels of source separation.
- ◆ PAYT (Pay-As-You-Throw) fee applicable to both the public and the businesses in Italy and fees paid by manufacturers and producers of packaging in Sweden
- ◆ Acts as the funding source for the deployment of collection and segregation facilities.
- ◆ Data on household waste generation as well as analysis of public sentiment helps evaluate each aspect of the recovery chain and helps identify potential for improvement.
- ◆ Modern machinery and technology to boost recycling rates.

Each of these points have been further elaborated in the report while also portraying their effect on the environment.

Some may argue that their models are difficult to replicate in our country because of the lack of scalable advanced technology and proper funding sources, population size,

strong environmental governance, and unorganised waste disposal system.

However, based on these very elements that form the blueprint for effective waste management, certain organisations and governments have been triumphant in dealing with their waste.

- ◆ The city of Indore through its dry and wet waste source segregation has managed to completely stop their plastic waste from going to the landfills within a span of just nine months since its implementation.
- ◆ Banyan Nation, a Hyderabad based organisation, has been able to organise the recycling sector while ensuring that the quality of their recycled plastics can be rivalled to that of virgin plastic.
- ◆ Mysore has not only achieved optimum levels of waste collection and segregation but has also devised a mechanism that allows the city corporation to earn revenue out of its waste.

In addition to this, measures to curb food and textile waste through reuse models have also been analysed in the report.

#### ◆ Industry Sentiments

The current ban affects all the industries who use plastic either for their products or for the packaging of their products. Following are the problems faced by some of the key market segments struggling to cope with the ban.

#### ◆ Express Logistics Industry

In context of the ban in Maharashtra, this sector would have to develop separate packaging infrastructure to comply with regional and international regulations, which assuredly is not a feasible solution. Biodegradable plastic in export packaging that is required by the State fails to meet international benchmarks. At the same time asking foreign countries to use alternative packaging material while sending goods into Maharashtra is not a viable option.

### ◆ **Electricals Industry**

The State ban on plastics forbids enterprises in this sector to use plastic packaging for the manufactured material. Primary advantage of plastic packaging for electrical products is to prevent damage of the goods due to moisture since these products are mostly retailed in conditions that can seriously damage critical contacts. Sale of loose commodities (once unwrapped from their packaging) is neither appreciated nor is it accepted by the consumers.

### ◆ **Textile Industry**

Once again for this industry, the ban raises the problem of damage to goods during transportation and the sale of loose commodities.

Efforts have been made to address some of these problems in the three-point framework outlined at the outset. These problems once again reflect and justify as

to why a complete elimination of plastic from our lives may not provide the best approach to curb the menace of plastics pollution.

Further, some of the suggestions put forth during a collective discussion with all the associations affected by the ban are:

- ◆ The need for a common law across the nation to create a conducive environment for inter-State trade.
- ◆ Reorientation of business models towards recycling.
- ◆ Need for a baseline assessment of the plastics economy in Maharashtra to efficiently manage the plastics waste generated.

The willingness of each of these associations to work in collaboration with the Government and formulate collection and recycling mechanisms for their plastics packaging resonated throughout the discussion.



## Reducing the Demand for Plastics by Propagation of Reuse/Substitution

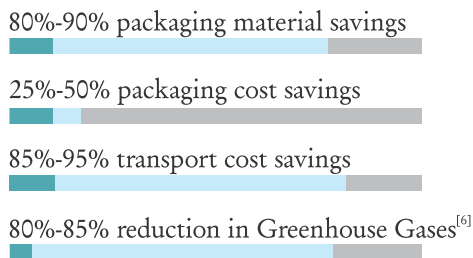
Our society is becoming increasingly acceptance of the fact that there is a need to redevelop the frameworks of consumption and utilisation in order to restore the balance in the environment. This societal acceptance is embodied in the many business models, being used across varied market sections which have been successful in significantly reducing the demand for plastics. Innovative ways to reduce demand exist and can be encouraged not only in Maharashtra but also the whole of India.

### Reusable Delivery Models

A majority of products in the homecare segment (cleaners, handwash, etc.), are composed of about 90% water and 10% active ingredients or concentrate.<sup>[5]</sup>

Working with this knowledge, 'Replenish' has successfully created a refill model wherein reusable bottles with replaceable pods are manufactured. These refill pods contain the active ingredient and each refill pod can be used to make up to 4 bottles of cleaner or other products. The novel design of their reusable bottle facilitates not only the use of concentrated solutions but also its addition to water.

Incorporation of this technology drastically brings down the cost associated with the creation and shipment of water-based formulation. It results in



In addition to reducing costs across the entire supply chain, this innovation also greatly benefits the consumers as it

reduces their purchase costs, results in lighter shopping bags, and saves storage space at home. Walmart, by ensuring this product's availability across its stores, has helped scale up this technology at a reasonable cost thus make this packaging idea a profitable one. The Government of Maharashtra should push for such solutions by convening a meeting with FMCG companies to encourage them to come up with similar innovations.

### Transit Packaging Solutions

A pooling model for large rigid packaging entails shared usage of reusable pallets, crates and containers by customers across different industries. It allows for tracking of the goods as it travels through the supply chain while also maximising vehicle utilisation. Brambles is one such company that has incorporated this model and has able to reap great returns through it.

Employing this model, Brambles has been able to eliminate 2.5 million tonnes of carbon emissions and 1.4 million tonnes of solid waste across its global supply chain. 98% of Brambles' operating sites have achieved the goal of zero waste to landfills. The plastic used for their packaging are reused or recycled into new RPCs (Reusable Plastic Containers).<sup>[7]</sup> Operating across 60 countries and providing pooling services to customers in the FMCG, fresh produce, beverage, retail and general manufacturing industries, this company exemplifies the idea of circularity at scale.

Dialogue between the industry and the Government of Maharashtra can be impactful in incorporating similar models in the State.

Pallet wraps (shrink wraps, stretch hoods, etc.), used by businesses to stabilise their goods during transport, often loses its material value after a single use. Lack of recycling facilities available for stretch wraps results in their disposal at landfills. With a view to address this problem, companies like Reusa Wraps and Envirowrapper have

created a reusable variety of packaging wraps that can be used for more than 4 years.<sup>[8]</sup> Companies like Budweiser, Coca-Cola, PepsiCo are actively making use of this innovation in their supply chain practices in some countries, thus making it more cost-efficient and sustainable. Why should this not be encouraged in India?

The Government of Maharashtra/India should explore how to encourage the use of securable and sustainable wraps by getting all the companies in this segment to agree to a mutual solution to be developed in a pre-defined time frame.

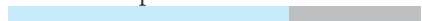
### Business-to-Business Models

There are some B2B solutions in Europe that can inspire innovation in India. Greater recovery for recycling of PET bottles has been made possible through DRS (Deposit Refund Schemes). However, the most recent innovative application of this mechanism has been in the e-commerce industry by a Finnish start-up called RePack. Their packaging material is made of recycled polypropylene and has been designed for at least 20 usage cycles. After retrieval of the ordered item, these packages can be folded into letter sizes and deposited in the nearest post box with no additional charge. The return of every RePack packaging is associated with a reward in terms of vouchers which can be redeemed on the next purchase. An analysis done by the company revealed that-

75% of their packaging had been returned




60% of vouchers distributed were used on the next purchase



Net Promoter Score was 82%



Average order value of RePack users was 25% higher than average customers



Reduced carbon emissions by 80%<sup>[9]</sup>



This simple yet smart and sustainable solution has helped enhance the online experience for consumers while also

increasing brand loyalty, as can be seen by the net promoter score. At present this mechanism is used largely by fashion retailers. However, RePack is slowly venturing into food, furniture and electronics markets as well.

Another successful application of the business-to-business model for creation of a sustainable enterprise is by a Swiss start-up called Recircle. With a view to replace the disposable takeaway boxes, Recircle has developed a range of reusable lunch boxes that can be collected by the restaurants through the buy-back mechanism. These takeaway containers are designed in such a way that they can be reused over 100 times. Thus, effectively saving 100 disposable containers with each reusable container used. Each restaurant can analyse the functioning mechanism and the customer acceptance of these Recircle boxes through a three-month test phase. An additional deposit of 10 francs is collected from the customers while giving out the takeaway in Recircle boxes. This deposit can be redeemed by the customers on return of these containers to any restaurant working in collaboration with Recircle. Paying 10 francs on each order may prove to be a psychological hindrance for customers. Therefore, member cards worth 10 francs which can be used instead of paying the deposit at each purchase have been introduced to encourage customer participation. This scheme presently runs in parallel to the single-use disposable containers and has been employed by more than 412 restaurants in Switzerland and in Stuttgart, Germany.

### Complete substitution of single-use carrier bags with alternatives

The feasibility of sorting of plastic is highly dependent on the volume of the material. These single-use disposable bags that have a shelf life of not more than a couple of hours, cannot be feasibly procured for waste sorting because of the time required to amass a significant volume. 5 trillion single-use plastic bags are consumed worldwide annually. Lack of feasibility in recycling has led to a large number of countries across the world to impose a ban on its usage.<sup>[10]</sup>

A successful example of such a ban in India has been in the Kannur district of Kerala. The initiative to completely phase out plastic bags started jointly by the district administration and the district panchayats achieved its target within the first five months of introduction. This successful shift from the use of plastic bags to ones made of cloth was followed up with measures like extensive inspection of retail outlets and manufacturing units to ensure compliance to the ban. Over the last two years, this ban which has now been extended to plastic disposables has been rather successful in its objective of making Kannur plastic-free.

A report written by Kannur’s district collector, Mr. Mir Mohammed Ali, elucidates the strategy adopted by the district for a plastics-disposable free society. In the first phase, all the supermarkets and the big retail outlets were restricted from giving out plastic carry bags. It was made known to the public that they were to use their own bags from home or buy cloth bags from these retailers for ₹ 20. The idea was not only to eliminate use of plastic carry bags but also to reduce unnecessary consumption. It was observed that initially the sale of cloth bags was high but eventually there was a decline in its sales as people started reusing these bags. Following supermarkets, the smaller retailers were targeted and witnessing the positive change brought by this initiative, these retailers willingly complied to the norms. Owing to this initiative, usage of plastic carry bags has dropped by 9.5 lakh every month.

Alongside the carry bag initiative, a “Waste-free Wedding” campaign was launched. Working in collaboration with the auditorium owners and catering businesses, the administration was able to eliminate 20 million non-biodegradable disposable items.

With a view to sensitising people about plastic waste and to create awareness about the same, the administration worked with scrap dealers’ associations and more than 500 schools. Under this project the students would collect dry

plastic waste from their school and the neighbouring areas which would then be given to the partnering scrap dealers. Through this the district administration was able to educate over 30,000 kids and their families about segregation and recycling of waste.

Discovery of alternatives plays an integral role in ensuring the success of these bans. In face of the ban in the State of Maharashtra, a company called Envigreen managed to develop an innovative alternative to the conventional single-use plastic bags.




**Company Footprint**



Source: <http://envigreen.in/>

Company Overview	
Year of Incorporation	2016
About the company	Successfully created India's first 100% biodegradable substitute to plastic

Technology
Products are made of natural starch, vegetable oil derivations and vegetable waste

Features		
		
100% Organic	100% Biodegradable	100% Eco-friendly

Product Offerings
Edible Carry Bags Trash Bags Packaging Films, etc.



# Interception of Waste through Material, Form, Structure Redesign

Because of a fundamental flaw in design, a significant proportion of plastic packaging in use today cannot be captured by the existing collection and sorting mechanisms. 8 million tonnes of plastic waste ends up in the world’s oceans. Almost 0.6 million tonnes of India’s unrecycled plastic waste is disposed of in its water bodies. Reinventing these flawed packaging materials can significantly decrease the waste entering the natural environment.

The components of this uncaptured segment that require fundamental redesigning and innovation are:

- ◆ Small Format Packaging (lids, tear-offs, caps, sachets etc.)
- ◆ Multi-Layer Packaging
- ◆ Nutrient Contaminated Packaging (coffee capsules, takeaway food packaging)

## Small Format Packaging

### Challenges

- ◆ Difficult to capture during the sorting process
- ◆ Low after-use market value
- ◆ Zero effective recycling potential

## Solutions

- ◆ Make it a part of the main packaging of the product
  - Stay-on tabs for beverage cans that were introduced in the 1970s
  - Flip-flop caps for ketchup or shampoo bottles
  - Nepenthes Bottle Concept (Packaging System that makes use of a single flexible and recyclable plastic)<sup>[11]</sup>
- ◆ Replacement of sachets with dispenser mechanisms in the organised sector (fast food joints, restaurants)
- ◆ Disappearing Packaging

## Multi-Layer Packaging

### Challenges

- ◆ Economically and technologically unrecyclable

## Solutions

- ◆ Replacement of multiple layers of packaging with a mono layer that renders the same functionalities
- ◆ Stand Up Pouches (SUP) by Dow Chemicals makes use of a mono layer of Polyethylene which has recycling technologies available<sup>[12]</sup>

## Some examples of disappearing packaging are given below

Company	Product	Actual Process / Technology	Impact Generated
Nivea	Milk Soap Bars	Water Soluble soap boxes	Saves 79 lbs. packaging waste per pallet and 3,950 lbs. packaging waste per truck
Glad Trash Bags	Trash Bags / Kitchen Rolls	Rolling the bags into a self contained tube	Saves 68 lbs. packaging waste per pallet & 3,334 lbs. packaging waste per truck
OXO Pop Containers	Plastic Containers	Removing the marketing material off the containers and inscribing them directly onto the container	Saves 10 lbs. packaging waste per pallet and 500 lbs. packaging waste per truck
Twinings of London	Tea Bags	Individually sealed bags are perforated together & impermanently glued like a book	Saves 54 lbs. packaging waste per pallet and 2,646 lbs. packaging waste per truck
Tide	Tide Pods	Individual pods are perforated together & printed on directly with soap soluble ink	Saves 29 lbs. packaging waste per pallet and 1,450 lbs. packaging per truck

Source: <https://disappearingpackage.com/>

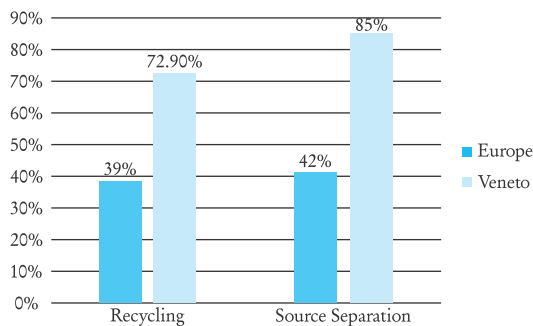
## Downstream Waste Management through Strategic Recycling Models

India generates 1,880 tonnes of plastic waste per day, of which only a meager 15% is properly handled. 2010 figures indicate that 5,99,819 tonnes of plastic waste was mismanaged. If these trends persist, the amount of mismanaged waste would reach a level of 28,81,295 tonnes by the year 2025. Such a scenario must be avoided by significantly improving our waste management infrastructure.<sup>[13]</sup>

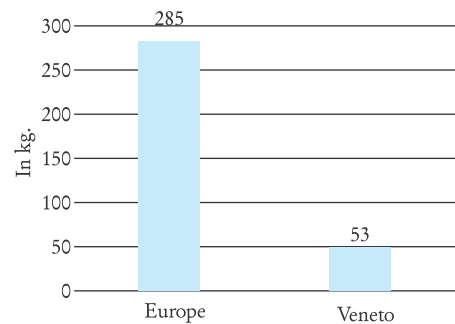
Mindful of the ongoing environmental crisis due to the plastic waste generated, nations across the world have been trying to develop sustainable frameworks for waste management and recycling. Some successful examples of such efforts can be seen in the waste management practices of Veneto in Italy and Sweden. Evaluating their models will give us an understanding of what goes into the making of a sustainable waste management infrastructure.

### VENETO, ITALY

While most European countries have been struggling to meet the recycling, targets set by the EU, this north-eastern region of Italy has managed to achieve a recycling rate that is twice the European average and a waste generation level that is approximately five times lower than Europe.



Residual Waste Generation per capita



Established in the year 1989 as a public-private partnership company, Contarina is responsible for the collection, segregation and treatment of waste in this Italian region. Presently a 100% public enterprise, this company has been working towards improving its source separation rates, reducing the proportion of non-recyclable waste produced and enhancing the quality of recycled materials.

### Curbside Collection

In order to achieve optimum levels of source separation, each household in the region has been provided a standard kit consisting of five differently coloured waste disposal bins. The frequency of collection of this categorised waste depends on landscape of the area.

This source separation mechanism is further facilitated by Eco-centres which allows for collection of bulky waste, electronic waste and other types of waste that are left out of the door-to-door collection. Bag vending machines strategically placed across the region allow for free distribution of differentiated waste bags. These machines operate like an ATM machine where users can collect these biodegradable and compostable waste bags using a card which is made available to each household.

Waste Type	Urban Areas	Historical Centres	Rural Areas
Residual	2/week	1/week	1 every 2 weeks
Organic	3/week	3/week	2/week
Paper	2/week	1/week	1 every 2 weeks
Glass, Plastic, Cans	3/week	2/week	1/week
Yard	1/week	1/week	1/week

Source: [http://www.contarina.it/files/en/presentazione\\_cn\\_per\\_sito\\_agg\\_giugno\\_2018.pdf](http://www.contarina.it/files/en/presentazione_cn_per_sito_agg_giugno_2018.pdf)

### PAYT (Pay-As-You-Throw) Fee

Based on the principle of “pay as much as you produce”, Contarina’s domestic user tariff is composed of two parts.

#### Fixed fee

It accounts for 60% of the total tariff and is calculated on the basis of number of members in each household. The revenue collected from the fixed proportion of the fee is used to cover the infrastructure, human resources and technology costs. The money generated is also used to fund for public services like street sweeping, land cleaning, etc.

#### Variable Fee

It accounts for 40% of the total tariff and is only charged on residual/non-recyclable waste. It is calculated as follows.

Cost of one emptying \* Number of times the residual bin is emptied + Fixed quota for organic waste

A 30% reduction of the variable fee is provided to users composting their waste at home. The revenue generated covers the collection costs and costs for the treatment of waste.

A similar tariff structure is applied to commercial entities. The only difference being that the fixed proportion of the fee is calculated on the basis of scale of the commercial enterprise and the volume of the supplied bins.

#### Technology

Contarina’s database makes it possible to analyse, regulate and optimise the entire waste management mechanism and allows for the creation of a transparent and efficient system. This database enables users to view information regarding their waste production levels, tariffs and the

individual services provided to them by Contarina. It also allows for regulation of collection related activities.

#### Treatment of Residual Waste

A Mechanical Biological Treatment (MBT) plant made it possible to convert 33% of the residual waste into Refused Derived Fuel (RDF) which was then burnt for recovery of energy and the rest was sent to the landfills.

With a view to reduce the quantity of waste sent to the landfills, these MBT plants were replaced with Material Recovery and Biological Treatment (MRBT) plants which made recovery of materials from the residual waste more efficient.

85% of the total waste generated is processed and brought back into the loop. With the help of these MRBT plants, presently only 46.5% of the remaining 15% of waste is sent to the landfills, thus reducing the residual waste generated per capita from 53 kg. to 24 kg.<sup>[14]</sup>

### SWEDEN

FTI (Packaging and Newspaper Collection) is a non-profit organisation responsible for the operation, regulation and development of Sweden’s collection and recycling system. It is jointly owned by five of Sweden’s material companies namely

- ◆ Plastkretsen (plastic)
- ◆ Pressretur (waste paper)
- ◆ MetallKretsen (metals)
- ◆ Returkartong (packaging)
- ◆ Swedish Glass Recycling (glass)

Further, each material company is owned by individual businesses or trade association from the relevant sector.

In keeping with the principles of a circular economy, FTI has developed a 7-point programme which acts as the blueprint for the country’s pathway towards a zero-waste society.

1. Recycling Stations
2. Door-to-door Collection
3. Co-operation with Municipalities
4. Quality Controls
5. Awareness Initiatives
6. Recyclable Packaging
7. Material Recycling

### Recycling Stations

The aim is to enhance and optimise the working and structure of the recycling stations so as to achieve the Swedish plastic recycling target of 50% by the year 2025.

In 2016, FTI had already managed to recycle 42.2% of the total plastic waste generated. The recycling process developed by the FTI has been explained below.<sup>[15]</sup>

The plastic waste collected from the recycling stations and through the curbside collection mechanism first goes through the process of coarse sorting in the balancing plants. This sorted material is pressed together in bales which are then sent to various recycling plants. At the recycling plants, the plastics from the opened bales are subject to a strong current of air on the conveyor belts. This is done, so as to separate the soft plastic packaging like polythene bags and plastic films from hard plastic materials like HD polyethylene or polypropylene.

The sorted soft plastic packaging then goes through a machine that is able to distinguish colourless packaging from coloured packaging. The separated soft plastic material is then transitioned into granules through the process of grinding and melting. The soft plastic granules are then used to make bags, sacks, and cables.

The hard-plastic packaging waste is composed of different types of polymers. Therefore, to distinguish between multiple polymer types the plastic waste is subject to infrared light. Through the coordination between the infrared reader and a mechanical separator these different polymers are sent to their respective pathways for their conversion into pellets. The categorised pellets are then sent to producers in the automotive, construction industry, manufacturers of furniture, flower pots, etc.

### Door-to-Door Collection

Until a few years back, most of the packaging and paper waste in Sweden was collected through unmanned recycling stations. However, with a view to increasing collection rates there has been a gradual increase in the number of municipalities implementing door-to-door collection mechanisms/FNI.

Some of the FNI sorting solutions are:

#### 1. Fireboxes



#### 2. Optic Bags for Colour Sorting





## Co-operation with Municipalities

Working with 95 of the municipalities in Sweden, FTI through their co-operation agreements provide advanced collection and recycling facilities to 41% of the Swedish population. The co-operation agreements clearly outline the framework for the collection system, the distribution of responsibility and the role of each entity in the functioning of the system, and the quality of service to be delivered to the public.

## Quality Controls

Each step of the recovery chain is evaluated to identify potential areas of improvement. The household ratings are indicative of the performance of the recovery chain. User sentiment is analysed through a survey conducted across various municipalities. These surveys provide the basis for improving on increasing user accessibility to recycling facilities, increasing awareness about the end-of-life of products and creating sustainable solutions.

## Awareness Initiatives

In an effort to encourage recycling and source sorting, FTI has recently started the “Let Old be New” campaign. One segment of this campaign involves collaboration with three music artists who by recycling their art, in particular their music, are trying to get more people to recycle their waste. It also focuses on sending out messages on proper sorting of packaging waste and clearly showcases what happens to the collected packaging waste after its disposal.

## Recyclable Packaging

The target for the year 2020 is to make all packaging used in the Swedish retail sector completely recyclable. Inching closer to this target, an organic grocery store called Ekoplaza has launched a plastic free aisle where more than 700 different food products are packaged in glass, cardboard or compostable plastic.

Another tool for inspiring sustainable production and consumption is the “Milojnar” label <sup>[16]</sup> developed by the Swedish Waste Management organisation. The label helps identify and promote businesses and ideas that make it possible for people to repair, borrow or reuse, and reduce

the waste. The underlying objective is to bring about a behavioural change by making the people more conscious of their actions and helping them make sustainable choices.

## Material Recycling

The recycling process of the waste collected from Swedish households is presently executed at one plant in Sweden and three plants in Germany. With a view to increase Sweden’s recycling capacity and making it self-sufficient in this regard, FTI has developed a new recycling facility at Motola which is considered to be northern Europe’s most modern.

Fees paid by producers for manufacture-packaging and produce packaging acts as the source of funding for collection and recycling operations of the FTI. Since it is a non-profit organisation, the profits earned are put back into the business.

Closer to home, cities like Hyderabad, Mysore and Indore have redefined their approach to waste and have created sustainable waste models, thus efficiently dealing with the problem.

### INDORE

The city of Indore tops the chart in being the cleanest city in the country. Indore generates 1,100 tonnes of solid waste per day of which about 400 tonnes accounts for plastic waste.<sup>[17]</sup> This quantity of plastic waste was previously either incinerated or sent to the landfills. However, since the revamp of the waste management system this city has been able to completely put a stop to the flow of plastic waste into the landfills. This was achieved within 9 months since the implementation.

## Its key features are

### Source Segregation

The new mechanism was put into effect since June 2017 and it focused on the source separation of dry and wet waste. Over one lakh bins have been given out to the poorer sections of the society at subsidised rates. The rationale behind charging a nominal amount for the bins

as opposed to distributing them for free is that things provided free of charge are often taken for granted.

The garbage pick-up trucks make two rounds for collection of waste on a daily basis. These pick-up trucks are designed to have separate containers for collection of dry and wet waste and are also fitted with GPS tracking devices to help the city corporation with route optimisation.

With a view to ensure and encourage participation of the people and the local bodies, ward wise competitions were conducted. Alongside deployment of collection services, with the help of the press, entertainment industry, NGO co-operation the city corporation has launched multiple initiatives to raise awareness about better handling of waste.

### Solutions for Littering

On one hand the collection and segregation infrastructure has been scaled up in the city, while on the other, public dustbins across the city have been removed. This removal leaves the citizens with no other alternative but to segregate their waste thus enhancing source collection.

Although public bins have been eliminated, the government has increased the number of litter bins across the city. Indore has also managed to remove 850 garbage spots across 85 wards through phase-wise removal.

Optimal condition of roads in the city is achieved through sweeping of roads thrice a day and their cleaning with the help of mechanical trucks every night. In addition to cleanliness of roads, it is also ensured that the litter bins and pick-up trucks are washed regularly.

Fines are imposed on people caught littering. Within the first 18 months the government collected approximately ₹ 80 lakh through fines. In addition, to these measures a ban has been imposed on the use and sale of plastic carry bags less than 50 microns.

### Plastic Waste Handling

Plastic waste that can be recycled and for which recycling infrastructure exists is collected by the ragpickers and sold

to the concerned dealers. Plastic Collection Centres (PCC) deals with the shredding and purification of the remaining plastic waste. The shredded waste is compressed into bales, each weighing 100 kilos which is then put to use in cement kilns or in road construction.

### Finances

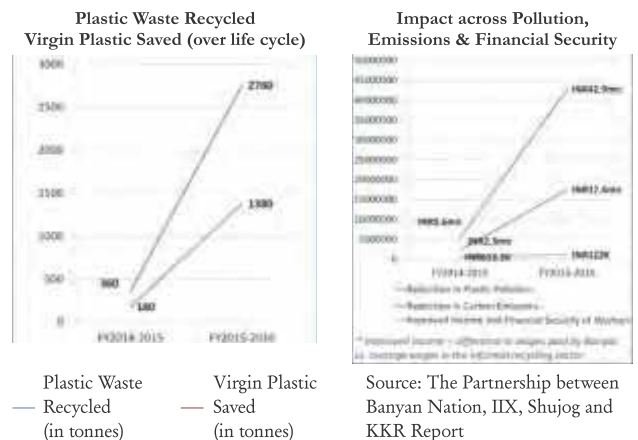
Approximately ₹ 60 crore has been spent on the entire drive. A user fee of ₹ 60 per month is collected from each household which goes into providing for the collection and cleaning services.

#### HYDERABAD

Banyan Nation, a start-up based in Hyderabad has set out to organise the recycling sector while ensuring that the quality of recycled plastics can be rivaled to that of virgin plastic. A highlight of this organisation is the use of technology to achieve their objectives.

At the onset they created a simple app that could map 1,500 stationary recyclers in Hyderabad.<sup>[18]</sup> The data generated provided information about the amount of waste generated from households and the local efficiencies of collection and transportation of waste. Thus, enabling the creation of a well-monitored process. The collected and sorted plastic then goes through their recycling plants which employs mechanical and thermal testing process, thus producing quality recyclates.

The impact of their efforts to reduce pollution and boost recycling of plastic is illustrated in the graphs below.



## MYSORE

Another model that Maharashtra could take a cue from is that of yet another clean city of India, which a few years back was grappling with a similar problem of mismanagement of waste. The city of Mysore under the governance of the Mysore City Corporation (MCC) has been able to achieve a 95% door-to-door collection and 35% segregation at source.

With initiatives to privatise the waste management activities in the city, campaigns to promote awareness among the masses and incorporation of modern technology, the city has not only organised the waste management sector but has also developed an ingenious system to earn revenue out of it.

The revenue is generated through user charges payable by households and commercial enterprises. In addition to the user charges, lease rent and royalty are paid by the companies operating the composting plants in the city. This income is used to provide subsidy for the city's recycling programme.

## OTHER FORMS OF WASTE CALLING FOR INTERVENTION

There are several other forms of waste that should concern Society and the Government. A lot has already been written about the need for better Solid Waste Management but much needs to be done on the ground. In this report we cite three examples to illustrate the point.

### Food Waste

The world today is not just grappling with the problem of plastic waste but also that of food waste. 50% of the total food produced in the world goes to waste. Plaguing India as well, this food wastage costs the Indian economy approximately ₹ 50,000 crores every year. 194 million Indians go hungry daily while 40% of the total food produced in the country goes to waste.<sup>[19]</sup>

With a mission to bridge this gap between the people who go hungry and people with excess quantities of food, the

Roti bank, an initiative by the dabbawallas of Mumbai has been able to reach out to 75,000 needy people so far. Working in collaboration with numerous restaurants, food joints and individuals who wish to donate their excess food, these dabbawallas distribute the collected food to nearly 300-400 people each day. A similar initiative called No Food Waste (NFW) in Coimbatore has managed to save more than 140 tonnes of food from being wasted while providing a wholesome meal to more than 4,23,700 people. The FSSAI (Food Safety and Security Association of India) has given a boost to the efforts of this initiative in Coimbatore by helping them significantly scale up their operations.

Another solution to map excess food to the needy is that of a community fridge set up by a restaurant in Cochin. The restaurant ensures that the fridge is stocked with a minimum of 50 packets of food each day. Individuals and households are also encouraged to contribute to this effort.

Drawing inspiration from the contribution of FSSAI in Coimbatore, the Government of Maharashtra could pitch in to the initiative by the MDA (Mumbai Dabbawalla Association), thus helping them scale up their efforts to alleviate hunger while significantly reducing food waste and leaving behind a positive imprint on the economy.

### Textile Waste

Over 1 million tonnes textile waste ends up in the landfills in India every year. Textile waste is one of the top five sources of waste in the country. The rapidly accelerating and everchanging fashion trends do little to reduce the quantum of textiles waste generated. A Finnish company, Pure Waste Textiles, located in Coimbatore has been working towards dealing with this problem while also having developed a profitable business out of it. According to the creators of Pure Waste Textiles, approximately 10%-15% of the fabrics used in textile industries goes into the bin.<sup>[20]</sup> These textile fibres can very well be recycled and is in reality cheaper than primary fabrics. Working with this principle, this company collects textile waste from CMT (Cut-Make-Trim) factories and yarn waste from weaving mills and converts it into fresh yarns. These yarns are then

used to make t-shirts and other items of clothing for their partnering brands. Through their efficient recycling process for fabrics they have been able to save more than 1,320 million litres of water till date.<sup>[21]</sup>

### **Cigarette Waste**

Code Enterprises, a Noida based start-up, is India's first cigarette waste recycling company. Under their business model, they offered cigarette vendors ₹ 250 for each kilo of cigarette waste. A special kind of waste collection bin was provided to these vendors and each vendor was charged a

nominal sum of ₹ 99 for three months of service. The recycled plastic obtained from the cellulose acetate polymer found in cigarette butts is currently used to make cushions, stuffed toys, accessories, etc. Remnants of the waste are also used to produce organic compost powder. The company aims at scaling its operations by the year 2020 by finding new avenues for the recycled polymer based on its many functionalities like its use in air purification systems due to its properties of filtering and resistance to heat.



## Conclusion

In order to work our way towards a zero waste society while simultaneously trying to untangle the problems created by the extemporary ban on plastic, we propose a sustainable framework that has been developed following a comprehensive global and domestic market analysis. The framework outlines the steps to be taken by the Government of Maharashtra to create a sustainable plastics economy by successfully engaging the three key stakeholders in the plastic ecosystem namely the users, the manufacturers, and the local governing bodies. IMC Chamber of Commerce and Industry will be happy to assist the Government of Maharashtra in creating a game plan for getting consumers and businesses aligned with the Government, for agreeing on solutions that will have impact and in creating a time-bound implementation plan which will drive Maharashtra closer each day to the dream of a zero waste State. Some solutions that merit urgent action are:

### **The end-users (Packaging for logistics, e-commerce, food delivery, etc.)**

- ◆ Creation of an action group that comprises of the industry representatives, the Government officials and business associations. The objective of doing so is to allow for seamless dialogue between these entities that translates into a mutually accepted action plan.

### **Manufacturers / FMCG companies**

- ◆ Innovation is key to changing the image of plastic from an incumbent threat to a potential resource. This innovation can be fostered by harnessing the creativity of the younger generation through concepts similar to that of hackathons in the IT industry. Such a two or three-day event either sponsored by the Government or the FMCG company would bring together people with a solution-oriented mindset who are driven by strong desire to curb plastic pollution through a change in the existing systems.
- ◆ Collection of taxes from the FMCG companies which are to be used for ensuring proper end-of-life of plastic

products through proper collection and sorting infrastructure. This producer fee should be calculated based on the number of plastic packaged products that are placed on the market every year. This fee structure borrows from the French EPR organisation called CITEO. (Detailed explanation of the French fee structure can be found in the annexure).

- ◆ Manufacturers of plastic that are bearing maximum brunt of the ban should be allowed incentives in the form of tax holidays to facilitate their shift to sustainable packaging. These incentives should be proportional to the profits earned from the sale of sustainable packaging.

### **Governing Bodies**

- ◆ Immediate actions that need to be taken on the latest version of the ban:
  - Retaining the ban on disposable cutlery, non-recyclable multi-layer packaging and PET bottles because of the belief that these products cause more harm than good and that economically viable alternatives exist for them.
  - Reinstating the ban on plastic less than 50 microns for grocery retailers. Based on analysis of not just cities internationally but also ones in India we believe that the elimination of carry bags is possible through a complete ban. The reinstatement should however be practised in parallel to a phase-wise implementation characterised by a steady transition from the big retail outlets to the small street vendors. Successful implementation of the ban across big retail chains will allow the smaller vendors to follow their lead without disruption of their day-to-day business.
  - Reports suggest that there were about 25 collection centres in Mumbai in the month of April. Through comparison of Mumbai with Sweden, which has roughly 6,000 collection centres for its 1 crore

inhabitants we can state that Mumbai with a population of approximately 2 crore would require about 12,000 collection centres. Based on these figures, although they indicate a number 500 times bigger, the Government can at the outset try to scale up these centre by at least 50 times the current number so that some impact is felt on the ground. This scaling up problem could be solved innovatively by getting the private sector to establish plants in Mumbai (and other cities in Maharashtra) to reuse plastic waste along with bitumen to surface roads. Technologies exist for this even India. It will not only increase the life of roads, thereby saving crores of Rupees being spent each year on resurfacing roads after each monsoon, but also pass on the role of collection of waste plastic to the plant operator. There is already an unorganised supply chain for plastics starting with rag pickers which can get organised if there is a strong demand point. This has worked very well in the case of used tyres which get collected, sorted, recycled and used in new tyres along with virgin rubber. The Government need not invest but it will have to eliminate the vested interests that prevent the use of recycled plastics in road surfacing bitumen mix.

- Specific aspects of the ban like temporary and permanent fractions, deadlines of the ban in each market segment and permissible alternatives need to be communicated effectively to all the three stakeholders. This communication could be propagated through social media streams, news

media channels and various advertisement campaigns.

- ◆ Deposit schemes for cloth bags or other plastic alternatives can be deployed in all the retail outlets across the states to ensure customer convenience.
- ◆ Redesigning the waste management infrastructure in the state.
  - Initial implementation of the downstream waste management practices mentioned in the report can be carried out through a pilot phase in a chosen region for a pre-defined time frame. For e.g., if this pilot phase is attempted and monitored in the district of Thane, the differentiated requirements for the success of the project can be analysed across the rural, semi-urban and urban areas of the district. The findings pertaining to the improvements, functionalities of the waste management strategy can then be extrapolated to the entire State.
  - Formation of clusters based on the housing societies and schools across the State. Each cluster headed by a society member or representative would shoulder the responsibility of ensuring efficient functioning of the waste management system inside its periphery. The city of Mumbai alone has about 50,000 housing societies and 2,000 schools. These numbers would translate into regions of public participation, co-operation and engagement with the Government.

## Annexure

### Tariff system followed by the French CITEO

Bonus		
Awareness Bonus	<b>On-Pack Bonus<sup>1</sup></b>	
	8%	Sorting instruction on packaging
	5%	Triman logo on packaging
	4%	QR code that links to a validated sorting instruction
	<b>Off-Pack Bonus<sup>2</sup></b>	
4%	Off-pack awareness actions (e.g., TV/radio, advertisement, press)	
Reduction Bonus	<b>Reduction and Recyclability Bonus<sup>3</sup></b>	
	8%	1 action(s) for reduction of packaging or improvement of recyclability
	+ 4%	Additional bonus if the action is documented and published in the catalogue of good practices of CITEO
	<b>Bonus for sortable plastic packaging that can join existing recycling channels</b>	
	8%	Hard packaging that is made out of PET, HDPE or PP (besides bottles)
<b>Total Bonus = awareness bonus + reduction bonus = min. 0% - max. 24%</b>		

MALUS <sup>4</sup>	
Malus for packaging included in sorting instructions, but without a recycling channel	100%
Malus for packaging with mineral opacifiers	100%
Malus for disruptive packaging (damage to recyclability)	50%
Malus for paper and cardboard with mineral oil-based ink	10%

1. On-pack bonuses cannot be cumulated.
2. Off-Pack bonus can be cumulated with on-pack bonus; the maximum awareness bonus is thus 12%.
3. This bonus can only be applied the first year the packaging is brought on the market.
4. Packaging that is subject to a malus cannot form a bonus.

## End Notes

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