

WASTE MANAGEMENT IN INDIA

- Present scenario and way forward





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Cover image credit:

"The Boy with the Upcycled Hat" by Pritam Pany.

Taken at Martam Landfill, 32 Number, Gangtok, Sikkim, India

EXECUTIVE SUMMARY

Waste generation in India is estimated to reach 165 million tonnes by 2030 that will require landfill area equal to the size of the city of Bengaluru – 741 sq. km.

Safe and effective waste management might not seem to be a priority in India given other seemingly more pressing issues. The latest update to the Municipal Solid Waste (MSW) Rules Act in 2016 includes comprehensive requirements on waste segregation, processing and treatment, specifications for landfills and others. These comprehensive Rules are applicable to every municipal authority.

However, there is a big gap between the requirements and implementation on ground due to various reasons including limited segregation of waste on-site, lack of technical know-how for waste processing, and measures for enforcement among others. Discarding garbage in the open is still a widely prevalent practice. Landfills in large urban centres in the country are also reaching capacity creating pollution and health hazards for people living nearby.

In spite of this, more than 70% of the annual PET Bottle waste and 90% of e-waste is recycled by informal and unorganized sector comprising of scrap collectors and re-processing units. Further, about 50%-60% of waste generated in the country is organic which means it is biodegradable and needs to be composted. Smaller regions such as Budgam district in the state of Jammu & Kashmir is showing the way forward by ensuring waste segregation at source and diverting the organic waste to a central

composting facility thereby reducing the burden on the landfill. Clearly, effective waste management is very much a possibility.

Green building rating systems have requirements for waste segregation in residential and commercial buildings. However, this is a very limited requirement which does not address the entire issue of waste management.

While these measures are essential and quite basic in nature to tackle waste, it is crucial to address the core of the issue – reducing waste generation. This calls for a paradigm shift in how we manage resources so that less waste is generated. Life cycle thinking needs to be integrated to redesign products and restructure systems to allow closed loop material cycles, thereby minimizing waste in a circular economy. Countries like Norway and many members of the EU are showing the way ahead by shifting to circular models, where resources stay in the economy for a longer time. This is the zero-waste philosophy, which seeks to divert 90% or more materials from the landfill.

As India is still developing policies and regulations, it is necessary to leapfrog the conventional methods of waste management and work towards 'Zero Waste' concept for achieving sustainable development. An integrated waste management solution that combines the right policies, industry innovation and community success stories will lead India on the path to sustainable development. While it might sound utopian now, such a progressive vision will actually propel the country on the right path to sustainable development that meets the triple bottom line of people, planet and profit.

BACKGROUND

Waste generation is a by-product of economic development. In 2016, the world generated 2.01 billion tonnes of solid waste and this is expected to escalate 70% by 2050 without any urgent action (World Bank, 2018). At the same time, most waste management systems have high environmental costs. For example, in the United States, about 70% waste is either incinerated or sent to a landfill.

The world urgently needs to implement more sustainable solutions for managing waste. Solutions should address the very source of waste generation to the recovery process. The global economy today consists of largely linear value chains. It means that we discard resources and goods much before the end of their useful lives.

Emerging economies like India have a smaller waste footprint compared to that of developed economies. However, the projected urbanization and economic development would mean an increase in the waste generation as well.

On the other hand, innovative solutions for circular economy are being successfully implemented by various companies and organizations. Further, facilities and even cities aiming for the progressive benchmark of zero-waste are a reality now. A third party verified rating system for

achieving a zero-waste facility is also available now.

In such times, countries like India can leapfrog the inefficient waste management techniques to the zero-waste measures for sustainable development. This article examines the current scenario and initiatives for waste management in India and enumerates the way forward.

WASTE MANAGEMENT IN INDIA

According to a popular estimate, India generates 62 million tonnes of waste per annum out of which only 69% was collected (Down To Earth). Further, of the total waste collected, 72% is sent to landfill while only 27% gets processed. It is estimated that, by 2030, the waste generation will increase to 165 million tonnes and will require landfill area equal to the size of the city of Bengaluru – 741 sq. km. (Manwari, Thakur, Ghosh, & Vijay, June 2018).

The land is the recipient of all municipal, construction and hazardous waste. The primary responsibility of waste management lies with the municipal authorities, who almost always send waste to landfill sites far away from the urban centres. More than three-fourths of the municipal budget on solid waste management goes into collection and

transportation, which leaves very little for processing/resource recovery and disposal¹. In smaller towns, waste is also burnt in the open which releases toxins in the air. Often garbage is also left unclaimed in the open.

One of the barriers for effective waste management in India is the limited segregation of waste at source. It is challenging to recover recyclables from commingled waste.

Despite that, there is a surprisingly high rate of recycling in the country executed by the informal and unorganized sector comprising of scrap collectors and re-processing units. A 2010 report (GIZ.de) pegs the number of people engaged in the informal recycling sector at 1% of the country's urban population. More than 70% of the annual PET Bottle waste and 90% of e-waste is recycled by this informal recycling sector.

While this sector provides employment opportunities to many, the work done by this community is not monitored and often the methods deployed could be in violation of environment, human safety, labour laws, and so on. Further, waste pickers get paid directly based on the scrap weight collected by them and thus,

tend to target high-value scrap materials which offer greater revenue by weight, like cartons for packaging, glass bottles, aluminium, plastic HDPE containers and so on. As a result, materials that are harder to recycle, like multi-layer packaging, are often left behind.



Figure 1: Sorting glass waste at a landfill

Lack of segregation also means that the opportunity to recover the bio-degradable waste is lost. For example, in an average Indian city like Mumbai, about 69% of the total waste generated consists of organic content that is bio-degradable². Thus, there is potential to convert organic waste to energy from about 70% of the waste generated in Mumbai which can be further prevented from reaching the landfill.

¹ <https://indianexpress.com/article/opinion/columns/waste-recycling-organic-energy-garbage-management-disposal-pollution-metro-cities-4402086/>

² <http://blogs.nelson.wisc.edu/es112-304-4/waste/>

Initiatives towards waste management

Municipal Solid Waste (MSW) Rules Act

A series of petitions and citizen movement spearheaded by environmental policy activist Mrs. Alvira Patel, led to the creation of the first Municipal Solid Waste (MSW) Rules Act in 2000. It took many more petitions for the Act to gain teeth and for institutional measures to fall in place. These Rules are applicable to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid.

The latest update, the MSW Rule Act 2016³, is significantly more comprehensive- with an expanded scope that covers many types facilities such as places of pilgrims, airports, special economic zones, ports and harbors, defense establishments and every domestic, institutional, commercial and any other non-residential solid waste generator. There are clear guidelines for waste segregation at source by different waste generators. The criteria for landfills and waste-to-energy plants are also enumerated.

While the Act has been formulated by the Central Government, it is the responsibility of individual State Governments to adopt and mandate it in their respective States.

So far, only the States of Maharashtra and Assam have released these policies. Even though the Act has comprehensive requirements, lack of implementation and measures for compliance check on-site is a key barrier to achieving successful waste management.

Star Rating for cities

In 2014, The Government of India undertook a massive campaign called 'Swachh Bharat Abhiyan' or Clean India Mission. Under its aegis, a 7-star rating system was developed to provide all the cities/towns with clear cut goals for effective waste management resulting in better sanitation and living standards in cities. This rating system would assess the following parameters:

- Door-to-Door Collection
- Segregation at source
- Sweeping of public, commercial and residential areas (no visible eyesores on streets)
- Waste Storage Bins, Litter Bins and material recovery facilities
- Bulk waste generators compliance
- Scientific waste processing, scientific landfilling and construction & demolition waste management
- User fees, penalties for littering and enforcement of the a ban on plastic bags

³ <http://cpcb.nic.in/displaypdf.php?id=aHdtZC9TV01fMjAxNi5wZGY=>

- Citizen grievance redressal and feedback system
- Eradication of crude dumping of garbage and dump remediation
- Cleaning of stormwater drains and surface of water bodies
- Visible beautification in the city

For a 4-star rating, projects must meet 100% scientific processing for waste generated and the final residue is then sent to the landfill. For a 7-Star Rating, the area must demonstrate a quantifiable reduction in waste generation on a per capita basis.

This rating system created a momentum in the country about waste management and helped increase awareness about issues surrounding waste generation. Since it is not mandatory, very few cities have tried to implement it.

Green Building Rating Systems

Most of the municipal solid waste is generated at commercial, residential and institutional facilities. Green buildings are designed to use less energy, water, materials and generate less waste. Thus, waste management strategies at an individual building or a campus level can also contribute to a cleaner city.

The three major green building rating systems in India - LEED, GRIHA and IGBC Rating Systems⁴ address waste management during construction and post-occupancy stages in commercial and residential buildings. Waste segregation at source is mandatory across all three rating systems.

Rating system for industries

A more comprehensive GreenCo Rating System (GreenCo Rating System) specifically targets manufacturing industries. It covers most aspects of zero waste including product stewardship, life cycle assessment with a focus on reduction. It also addresses liquid and gaseous waste management.

Under another effort, the government has mandated all road developers in the country to use waste plastic, along with bituminous mixes, for road construction.

ZERO WASTE BENCHMARK

The current scenario in India may seem far from addressing the seemingly basic requirements of the waste management process. However, there is an opportunity to review the progressive benchmark of 'Zero-Waste' which is already a reality in other regions in the world.

⁴ LEED – Leadership in Energy and Environment Design; GRIHA – Green Rating for Integrated Habitat Assessment; IGBC – Indian Green Building Council

Zero Waste is a philosophy that is gaining traction across many cities, communities and businesses. While conventional waste management systems are oriented towards handling waste after it is generated, the zero waste philosophy guides systems to shift focus upstream; i.e.

reducing waste before it is generated (Figure 2). The fundamental concept is that any product will be termed as “waste” only if there is no utility for it. As long as a product or resource can be reused, recycled, upcycled or reclaimed then it is not “Waste” anymore.

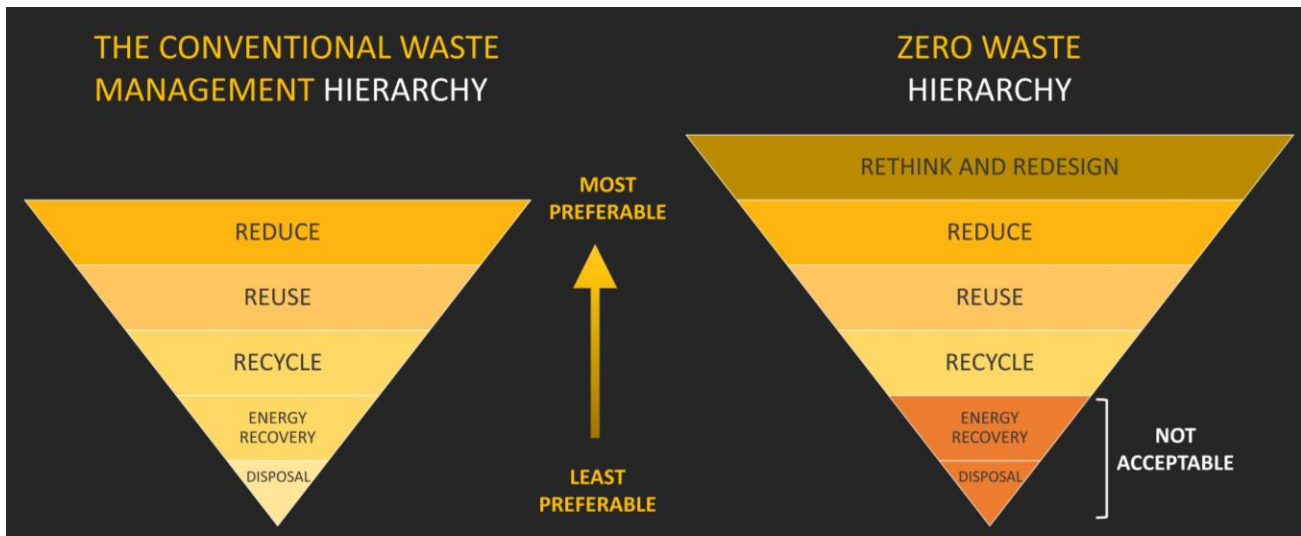


Figure 2: Conventional vs Zero waste hierarchy

As per the Zero Waste International Alliance⁵, the definition of Zero waste means sending only 10% or lesser waste to the landfill, without using incineration or discarding waste into the oceans. Clearly, this calls for a paradigm shift in how we manage resources so that less waste is generated. Just like in nature, resources should flow as a circular economy, adopting a cradle-to-cradle model such that all products can be reused. This means life-cycle thinking should be integrated to redesign products and

restructure systems to allow closed-loop material cycles, thereby minimizing waste.

At the core of zero waste is a commitment to *reducing waste generation*. Nearly 400 cities and municipalities across Europe have set zero waste targets for the next 10-20 years. Under the C40 alliance, 23 cities across the world are targeting at least 70% waste reduction by 2030. These cities are pushing for supply chain reforms, for recycling and composting and active citizen participation.

Can developing economies also aspire towards zero waste goals? Traditionally,

⁵ <http://zwia.org/standards/zw-definition/>

the Indian way of living valued recycling and reusing as a way of life. In fact, even today, used clothes are handed down to different family members and finally repurposed, before being discarded. The need of the hour is to adopt this thinking at different scales and levels- across cities, communities and industries.

THE WAY FORWARD

Presently, the barriers in policy and infrastructure need to be addressed for cities and businesses to aspire for ambitious zero waste targets. In spite of the challenges, some regions in India are emerging as models for best practices. The path to zero waste requires an integrated approach with participation from the government, industry and citizens. Let's discuss this further.

Government

A top-down approach like policies that mandate segregation at source and reduction of waste will be instrumental to see the impact at a large scale.

For example, the city of San Francisco has achieved a landfill diversion rate of 80%, through innovative and strategic policy action. Citizens follow a pay-as-you-throw system. The government has set lower rates for recycling and composting as compared to the rates of collection as an incentive. Over the years, the city has

executed a ban on the use of Styrofoam as well. The city is now targeting 90% diversion to landfill by the year 2030.

As per the National Solid Waste Policy of Brazil manufacturers, stores, supermarkets, distributors, importers and the retail trade are obliged to implement reverse logistics systems. This law has helped cities such as Sao Paulo and Curitiba reduce waste generation and encourage recycling.

While the MSW Rules Act 2016 has been framed, there isn't yet a clear path or benchmarks at national level for waste reduction. A parallel can be drawn with the Energy Conservation Building Code (ECBC) of India which has clear requirements and performance benchmarks to achieve an energy efficient building design. Similarly, a Waste Management Code is required that clearly lists the requirements and measurable benchmarks that can be followed to truly reduce the waste being sent to landfill.

Some smaller towns such as Budgam district in the state of Jammu & Kashmir in India is setting a good example in this direction. The municipal authorities in this district have mandated waste segregation at households resulting in a significant reduction of waste being sent to the landfill. They even provided residences with two waste bins to separate wet and dry waste. The

collection vehicles have separate compartments to collect the segregated waste which is then taken to a central composting facility ensuring the entire process is executed successfully. The authorities now plan to segregate plastic from the dry waste and recycle it, further reducing the burden on landfills.

Market-led initiatives

The industry can be instrumental in influencing the market with innovative solutions and demonstrate leadership in waste management as well. Manufacturing companies can also take the initiative to improve material and resource flow through their supply chain.

An American firm, Lehigh Technologies, turns old tyres and other rubber waste into something called micronized rubber powder, which can then be used in a wide variety of applications from tyres to plastics, asphalt and construction material⁶. BAKEYS Food Pvt Ltd in India makes edible cutlery as an alternative to disposable plastic cutlery. This 100% natural edible cutlery is free from preservatives and 100% degradable (if discarded)⁷. This innovation solves a large problem of waste generated from single-use cheap plastic in the country.

The need for a circular economy for sustainable development is a recognized fact. Several companies through research and innovation have demonstrated how such as process benefits the triple bottom line of sustainability – people, planet and profit. The leading carpet manufacturing company, Interface Flor has set a good example for this case. Over the years, the company transitioned from a 'take-make-waste' conventional model to a circular economy bringing innovation into their product design to reduce the life cycle impact on the environment. Interface Flor uses discarded fishing nets to manufacture new yarn for carpets which otherwise used petroleum as raw material, thus increasing the recycled content upto 49%.

Third-party standardized rating systems have a huge potential to transform the market by gamification, such that others want to implement zero waste systems for themselves. While there are rating systems for green buildings being followed in India, there is no system dedicated to waste management.

The U.S. Zero Waste Business Council's TRUE rating system is one of the most comprehensive systems for achieving a zero-waste facility. TRUE projects commit to a maximum diversion of solid waste

⁶ <https://www.weforum.org/agenda/2019/02/companies-leading-way-to-circular-economy/>

⁷ <http://www.bakeys.com/edible-cutlery/>

from landfill, incinerator and environment. It is an 81 points system that covers solid non-hazardous waste, hazardous waste as per local legislation and liquid waste permitted into landfill (Figure 3). The acceptable forms of diversion include reduction, reuse, composting, recycling, anaerobic digestion and other processing

technologies (excluding waste to energy)-covering all aspects of Zero Waste. Typically, a facility in India will find it difficult to meet TRUE requirements under the business-as-usual scenario. However, in due course of time, this could be achieved.

CREDITS

CERTIFICATION LEVELS

CERTIFIED: 31-37 points **SILVER:** 38-45 points **GOLD:** 46-63 points **PLATINUM:** 64-81 points

OVERVIEW OF CATEGORIES & POINTS

REDESIGN	4	LEADERSHIP	6
REDUCE	7	TRAINING	8
REUSE	7	ZERO WASTE ANALYSIS	5
COMPOST (RE-EARTH)	7	UPSTREAM MANAGEMENT	4
RECYCLE	3	HAZARDOUS WASTE PREVENTION	5
ZERO WASTE REPORTING	4	CLOSED LOOP SYSTEM	4
DIVERSION (MIN 90%)	5	INNOVATION	3
ZERO WASTE PURCHASING	9	TOTAL POINTS	81

Figure 3: The TRUE Credit Scorecard

Unlike the green building rating systems in India, where this is a dedicated Council taking the ownership and working continuously to increase the uptake of green buildings in the country, there is no Council taking the leadership in the area of waste management. Having leadership is essential for implementation and a positive impact.

Community participation

Community-led initiatives are an equally powerful driving force in creating awareness and momentum essential for

maximum participation from people. For example, in Kamikatsu, a ward in Japan with an 81% recycling rate, citizens sort trash into as many as 44 categories and deposit this every day at the town's collection centre. Residents also drop off all kinds of used goods at a second-hand goods store. Volunteers chip in to repair goods and grant them a fresh lease of life.

Gulmeher is a social enterprise in India helping women who were previously working as waste-pickers, with a better livelihood by teaching them to create

useful and artistic products from waste. These women have recycled 7000 kilos of paper and have kept 15 tonnes of discarded flowers out of landfill⁸.

The way forward also requires identifying opportunities and recognizing the barriers to arrive at a solution that is most effective for the country. Given the high percentage of organic waste and the relatively low associated cost of investment, the right strategy would be to prioritize wet-waste management. Innovative solutions that enable on-site composting can be a game changer saving on transportation cost and landfill area.

CONCLUSION

Presently, there is a gap between the magnitude of waste generated in India and the systems required for its effective management. Despite the challenges and barriers, significant waste is being recycled and there are some appreciable industry innovations as well as social enterprise to tackle the issue of waste.

Methods such as waste to energy conversion using incineration, dumping in the oceans and exporting waste to other countries are already being criticised for its negative impact on the environment.

As India is still developing policies and regulations, it is necessary to leapfrog these methods and work towards the 'Zero Waste' concept for achieving sustainable development. While it might sound utopian at the moment, such a progressive vision will actually propel the country on the right path to sustainable development that meets the triple bottom line of people, planet and profit.

The silver lining here is that almost 50%-60% of the waste generated is organic. And the informal recycling sector is already recovering the high-value materials. There are success stories around the world for achieving zero waste goals.

An integrated waste management solution that combines the right policies, industry innovation and community success stories will lead India on the path to sustainable development.

⁸ <https://www.thebetterindia.com/173091/ghazipur-delhi-waste-pickers-garbage-gold-india/>

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