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Bridging the hiatus



INDIA IS GROWING rapidly in every facet and its trade, manufacturing and management activities at the highest levels have a noticeable effect on the world economy. The increasing economic activities, rapid urbanisation and development in almost every sphere have increased generation of a varied range of waste—bio-medical waste, e-waste, industrial waste, construction waste, etc.

And, the country has not yet implemented an effective and infallible mechanism to handle it.

Either the stakeholders in waste management that include waste generators, collectors and managers are not well aware about the ideal modus operandi of 'how to handle waste' or they are not complying with the set regulations for whatsoever reasons.

Waste Monitor intends to kill two birds with a single stone—spread awareness about right practices by bridging the critical information gap in the waste management sector and assist industries, municipalities, NGOs and

others by providing professional guidance from experts.

It is true that we are practically drowning in information in the form of newspapers, electronic media and the biggest ever happening, the World Wide Web. Information is available in abundance. The magazine will sieve out the information for the stakeholders in waste management sector.

We will bring news, analyses of current events, and success stories not just from India but also from world wide that could be of interest to our readers. In this way, the monthly magazine will have an International outlook but with its concerns focusing on Indian reality.

This issue itself reflects the Indian concerns in implementing foolproof waste management system, sanitation and health concerns borne out of mismanagement of waste. Correcting the situation on ground is not an easy task. But, as the old adage goes, we can do anything together. ■

Dr Amiya K Sahu

Notice to Garbage plants who do not adhere

The Pune Municipal Corporation (PMC) has given a notice threatening terminate the contract to the garbage processing plants, if they do not operate at full capacity within a month

PUNE: The PMC has informed the garbage processing plants to operate at full capacity or there contract will be terminated — for the first time, such a notice has been slapped on the garbage processing plants in the city by the civic agency Solid Waste Management department.

Hanjar, Rokem, Disha, and Ajinkya are four major solid waste plants in the city. However, these plants are not being utilised to the hilt to process garbage. Earlier, the PMC had warned that a penalty would be charged in case the utilisation is not up to the mark.

“We have been told to run the plants in two shifts to increase the processing capacity. Correct precautions regarding hygiene have also been ordered. In our contract, it is specified that in case of failure to process garbage, the PMC has the authority to terminate contracts. We have sent a notice to

respective plants,” said Suresh Jagtap, head of Solid Waste Management department.

The notice also states that, according to the contract, Hanjar should give a performance bank guarantee of Rs 2 crore to the PMC when the contract is renewed. Many times, a processing plant shuts down due to a technical problem. In case of any technical problem, the repair work should be done within two days.

Currently, the city generates around 1,700 metric tonnes of garbage everyday. According to information provided by PMC, the processing capacity of Hanjar plant is 1,000 metric tonnes and Rokem — 750 metric tonnes. Ajinkya and Disha process 100 metric tonnes each day.

As of today, Hanjar and Rokem are processing 450 and 250 metric tonnes respectively, whereas Disha and Ajinkya process around 50 percent of its full capacity. The unprocessed garbage is dumped in open spaces which creates several problems for the villagers of Urali Devachi.

The PMC claims that the garbage disposal issue has been a big pain for the corporation since many years.

In March, local residents of Urali Devachi and Phursungi prevented the PMC from ferrying waste to the processing plant as a result of which the civic administration stopped collecting the waste from the city.

Garbage containers across the city were overflowing with garbage. Talking about the action plan in case plants fail to meet the one month deadline, Jagtap said, “We have sent strict notice and expect the plants to react immediately. Apart from that, we have started finalising optional lands for garbage depots.

The civic body will conduct an audit of all solid waste depots and bio gas plants in the city by specially appointed third party committee which is also in the process.” ■

“ We have been told to run the plants in two shifts to increase the processing capacity. Correct precautions regarding hygiene have also been ordered. In our contract, it is specified that in case of failure to process garbage, the PMC has the authority to terminate contracts. We have sent a notice to respective plants.

Suresh Jagtap, Head of Solid Waste Management Department



Green building features in DDA plots

NEW DELHI: The Delhi government has asked the DDA incorporate green building features like rain water harvesting and recycling of treated waste water to be adopted in layout plans of plots of the size of 3,000 sq.m. and above. The direction was given by Delhi Lt. Governor Najeeb Jung after a meeting with The Energy and Resource Initiative (TERI) officials. The Delhi Development Authority (DDA) has been directed to finalise the draft regulations for approval by the central government. The agency has been asked to incorporate green building concepts like promoting optimal utilisation of water and energy, effluent treatment plants, waste management, ground water recharge through rain water harvesting etc, which aimed at zero effluent discharge. Provision of cavity walls, atriums, shading devices in buildings will be encouraged to make them energy efficient. "These incentives shall be based on the rating criteria prescribed by 'Green Rating for Integrated Habitat Assessment' (GRIHA) for green buildings," a statement said. ■

India to handle n-waste

CHENNAI: India proposed solutions to meet the challenge of radioactive waste in the coming years at the International Atomic Energy Agency Scientific Forum recently. It drew a robust roadmap for its global partners in the field of nuclear energy on how to minimise high level radioactive wastes that could be hazardous in the future. Closed fuel cycle, Thorium fuel cycle, minor actinide partition and recovery of fission products-- are some of the ingredients of the path. Piaray Kishan Wattal, director of the nuclear recycle group at the BARC said "The Indian policy of using a closed nuclear fuel cycle ascertains better utilisation of nuclear resources and minimises the quantity of nuclear waste." ■

Global medical waste mgmt grows

DUBAI: The global medical waste management market is expected to grow at a CAGR of 4.8 percent between 2013 and 2019, said a report by Transparency Market Research. This puts the market that was valued at USD 14 billion in 2012, to a value of USD 20.13 billion in 2019. The report titled "Medical Waste Management Market: Global Industry Analysis, Size, Share, Growth, Trends and Forecast, 2013-2019" explains the current market's position and its relative scope in the near future. The report categorizes the medical waste management market into the three divisions of collection, processing, and disposal. ■

Now, recover fuel from trash

WASHINGTON: In the world of inflation, attaining the sustainable methods to conserve natural fuels is very crucial. One of the world's largest tyre companies, Goodyear, has come up with an innovation that uses ash left over from the burning of rice husks to produce electricity as an environmentally friendly source of silica for its tyres. Once destined for landfills,

rice husk is now helping The Goodyear Tyre & Rubber Company produce fuel-efficient tyres. "The use of rice husk ash will provide Goodyear an alternative source of silica while helping reduce the amount of rice husk waste being landfilled," said Joseph Zekoski, Interim Chief Technical Officer. "This illustrates Goodyear's commitment to innovation and to the environment,"

he said. In their statement, the company added that according to the Food and Agricultural Organization of the United Nations, each year, more than 700 million tons of rice is harvested worldwide and disposing of the rice husks is an environmental challenge. As a result, husks often are burned to generate electricity and reduce the amount of waste shipped to landfills. ■

Litter pivot now a garden

BHUBANESWAR: To procure an open space in the booming populace in cities in itself not short of an achievement. It is in lieu of this, a group of plant lovers in the city revamped a dumping ground into a garden.

Saheed Nagar, used over the years as a garbage dumping point, is now producing vegetables.

Credits must be mentioned to Kitchen Gardens' Association for turning the spot into a beautiful vegetable garden.

The association, which formed by a group of plant lovers, has created a stir in providing awareness on having kitchen gardens in limited space and growing vegetables there. "We named it Amrut Vatika, an example how we can make effective use of open spaces in community partnership. We are not only growing plants here but also started a demonstration-cum-training and input supply centre," said a member of the association B M Patnaik.

In the vegetable garden, the association has been preparing an organically treated soil and various types of quality planting materials. "Over 50 residents of our locality have started kitchen garden on their terrace, rooftops, balconies and backyards. We have urged the horticulture department to support our movement," said convener of the association Maheswar Khillar.



Railways' Delhi Division to spend ten lakhs for clean-up

NEW DELHI: Nearly ten lakhs rupees was spent by the Delhi Division of Railways for organising cleanliness exercise across 213 railway station. Under its control, the eight hours clean up on October 2 was part of the massive campaign of Swachh Bharat Mission.

"All 213 stations of the division will be covered by the cleanliness drive. While 50 stations have been identified for the involvement of senior officials, the rest will be taken up at the Assistant Station Master-level," Divisional Railway Manager (DRM), Anurag Sachan said.

Delhi Division covers parts of Punjab, Haryana and Uttar Pradesh, has a total of 213 stations of which 50 have been earmarked to host ministers, senior officials and MPs for the clean-up exercise.

Railway Minister Sadananda Gowda will lead the clean-up drive at New Delhi station. Minister of State for Railways Manoj Sinha is expected to clean the platform at Ghazipur station in Uttar Pradesh.

Ten thousand brooms has been collected by the Delhi Division of Railways for the use of volunteers, including schoolchildren, top officials and lawmakers, they are said to clear garbage in various railway stations.

The volunteer cleared garbage from platforms, tracks, circulating areas, waiting rooms and entry and exit gates at the New Delhi, Old Delhi, Nizamuddin, Sarai Rohilla and Anand Vihar stations.

Delhi Division has also bought about 500 dustbins, large polythene bags and wheelbarrows for garbage collection. He said that the cleaning work on October 2 will continue for eight hours.

According to a Railway Ministry directive, all its 16 zones and 70 divisions took part in the cleanliness drive. As a whole Railways is spending about Rs.2 crore for the cleanliness drive in the country.

‘Wastetech’ brings advanced solution for waste management

To keep pace with the changing responsible waste management strategies in industrial, hospital and municipal sector, Waste Tech, organised at Pragati Maidan recently, brought forward advanced solutions to handle and dispose different kinds of wastes effectively and efficiently.

NEW DELHI: Wastetech India 2014 brought together technology and solution providers in solid waste management recycling, infrastructure and resource efficiency services recently. Technology providers across from the world flew in to showcase a varied range of products such as advance liners for land fill, composters, green toilets, toxic analyzer, water treatment solutions, advanced air filters, etc. Several issues pertaining to practical solutions and alternate systems in recycling and solid waste management, sewage network, transportation of garbage, plant containment and handling equipments were deliberated upon.

Sanjiv Kumar, Secretary (Environment & Forest) Govt. Of Delhi pointed out that: “Sewage continues to be one of the major concerns that most cities face today and this difficulty has further expanded with the emergence of unauthorized settlements. Given the overlapping problems with the industrial sector, it is essential to implement sewage treatment technologies at generation level rather than setting up large scale treatment plants. The Okhla waste management plant, the largest integrated waste to power project in India, is now online and is one of the many steps undertaken by

the government to address this important issue. Dr Sunita Narain, Director General, Centre for Science and Environment stated that: “The country needs to look at building an efficient sewage network and think of waste as a resource. Re-invention of flush toilet can be the key to sanitize waste and use minimal water. A report across 72 cities pointed out that most citizens today are unaware of where water comes from and where does your waste go. A systemic shift is needed to create awareness among citizens.”

She further emphasised that “Water sanitation not only presents a huge challenge but also an opportunity for the green industry players and encouraged players to bring forward solutions that are not capital intensive but resource efficient to suit the framework of Indian industries.”

According to research firm, Frost & Sullivan, the Indian water and wastewater treatment market earned revenue of Rs 6300 crore (USD 1.03 billion) and is estimated to reach Rs 10,230 crore (USD 1.68 billion) by 2016 with the industrial sector expected to show a higher adaption rate than the municipal sector. Raj Manek, Executive Director of Messe Frankfurt Asia Holding Limited, said: “India is looking at ways and means to address issues with water quality and availability. Efficient water management across industries at the production level and on the city on a collective level are crucial for the progress of the economy. This in turn has created huge opportunities for the water and wastewater management and treatment industry’s player targeting the Indian market.” Marc Krieger, Aqwise, Director of Business Development (Asia Pacific) said that our company is providing advanced water and waste water treatment solutions in many countries such as Israel, Mexico, Spain, Portugal and Italy. ■



Ghaziabad civic body lists areas full of waste, concrete as green

GHAZIABAD: No vegetation, just heaps of



solid waste are strewn around and the land encroached upon by locals yet such stretches are identified as green belt by the Ghaziabad Development Authority (GDA) and GNN.

Recently National Green Tribunal (NGT) queried about the status of the green belts in Ghaziabad city, the civic agency has submitted the list of green belts before the tribunal.

The GNN in the affidavit said that it is the duty of the GDA to develop green belt surrounding the residence areas and the roads which are then handed over to the Nigam for maintenance.

It said that GDA handed over 28 greenbelts and the Nigam is maintaining them properly. The Nigam “takes all necessary steps for planting trees in its areas and also maintaining trees in parks, road sides and outside residences.”

The NGT hearing a petition filed by an environmentalist, Akash Vashishtha claimed that the civic agencies are going to the extent of uprooting the vegetation, grass cover and plants on the roadside and outside houses which are being maintained by the residents. ■

Shopping malls do not segregate waste

KOCHI: Shopping malls and commercial establishments in the city do not comply the rules of the civic agency; they don't have waste treatment facilities within the premises to treat biodegradable or wet waste.

The Kochi corporation and the nearby Kalamassery municipality confirmed that malls, which have come up within their respective areas, do not have waste segregating or processing facilities. Malls dump both wet as well as plastic waste generated from food courts and other establishments at dumpyards of local bodies.

“Though it is mandatory for high rise buildings to set up waste treatment facilities, none of the malls segregate waste or have facilities to treat biodegradable substances. We dispose their waste at Brahmapuram solid waste treatment plant,” said Kochi corporation health standing committee

chairman T K Ashraf.

Agencies involved in waste treatment say that though local bodies charge a “fee” to collect and dispose waste from shopping malls, they are not supposed to use “biodegradable waste for land filling purpose”.

There are four large malls within corporation limits, two are located along the national highway stretch, and the other two are on MG Road and Thoppumpady.

The Kalamassery municipality said that they charge Rs 4.5 lakh per month from a mall for disposing waste.

“The permit for constructing the mall was given before 2008. It was in 2008 that the government made waste treatment facilities at high rises and commercial establishments mandatory. So, we cannot insist that they set up the facility as permission for construction was already issued,” an official said. ■

‘India’s SWM vehicles market to grow at CAGR of about 8 %’

BURNABY (CANADA): India is often seen as a country that needs to tackle its impending garbage menace plunging in its cities. But, now the tables have turned it seems. According to a research paper the country is supposed to have forecasted a growth in solid waste management vehicle market upto eight percent.

According to a recently published report by TechSci Research, “India Solid Waste Management Vehicles Market Forecast and Opportunities, 2019, the market for solid waste management vehicles in India is projected to grow at a CAGR of 7.6%, in value terms, during 2014-19.

It is forecasted that the auto tippers, used to collect the garbage, would continue dominating the India SWM vehicles market by the end of the forecast period, as these

vehicles are still preferred by municipalities for door-to-door collection of solid waste India on an average generates around 135,000 MT daily in the urban regions.

The municipalities are the governing bodies that handle and regulate solid waste management in a particular city. They are involved in the entire process of solid waste collection, transportation and disposal.

The use of compaction hydraulic technology is gaining rapid popularity among municipal corporations in India. In the year 2000, the Government of India legislated the Solid Waste Management (SWM) Act and in order to comply with the strict government guidelines, several municipal corporations have started using hydraulics enabled vehicles that are useful for compacting large solid waste in a small area. ■



NGO, people keep ghaats clean during puja

PUNE: To keep the ghaats of Pune and Pimpri Chindwad clean, hundreds of volunteers of SWaCH pitched in during Ganeshotsav in Pune and Pimpri Chinwad to collect puja



offerings such as flowers, coconut, and waste.

The non-government organisation, SWaCH, has been carrying out the Nirmalya campaign during Ganeshotsav in selected cities of Maharashtra for last six years. The NGO brings together waste pickers, volunteers to collect offerings discarded during visarjan. Coconuts, fruits and other edible items were distributed amongst the family members of the waste collectors, and all the other food waste was composted.

In 2013, 90 SWaCH waste pickers and 450 volunteers collected 97 tonnes of waste from 15 ghaats in the Pune Municipal Corporation (PMC) and Pimpri Chinchwad Municipal Corporation (PCMC). Around 97 tonne of waste was diverted from entering into the rivers.

“This year, more than 100 SWaCH members and volunteers were trained at volunteer orientation meeting. Volunteers not only participated in collection of offerings but also persuaded devotees not to immerse nirmalya in the river. They asked volunteers to recover dry waste such as paper, plastic and thermocol, which will then be recycled. The campaign targets to keep rivers free from further contamination,” Aparna Susarla, data manager of SWaCH said.

The organisation had appealed to citizens to join the campaign and witnessed a good response from people; especially from college students. ■

Punjab braces up for clean, green schools

CHANDIGARH: They say charity begins from home and it has been quite true for the city whose denizens will be made aware to inculcate clean environment through a month-long campaign on making government schools green.

The state education department has started the campaign from September 27.

The decision was taken during a high-level meeting held under the chairmanship of education minister Daljit Singh Cheema, an official spokesperson said. The ‘Sohna School Campaign’ started from Government Senior Secondary School Mothawal



in Kapurthala district where a state-level function held by the education department.

To motivate people on sanitation, Cheema and renowned environmentalist Sant Baba Balbir Singh Seechewal clean the toilets themselves during this state-level function. The state education minister and senior department officials visited different schools and would personally supervised cleanliness of schools. During the campaign, competitions related to cleanliness, environment, painting and essay was organised. Each school was be directed to clean the toilets in their premises regularly and repair the non-functional ones. The campaign lasted till October 31. ■

Plastic pollution indicates threat to Sydney harbour

In Sydney researchers have found that plastic pollution has reached to an alarming level, particularly in harbour. Thin plastic fibres, which come from clothes, were the most commonly found particles.

SYDNEY: In a more startling study researchers have found levels of plastic pollution to be enormous and reached at an 'alarming level' at Sydney.

According to scientists, the fibres from clothing and toiletries are causing a major impact upon the marine ecosystem.

The ongoing Sydney Harbour Research Program revealed that small pieces of plastic measuring under 5mm have been found in each of the harbour's 27 surveyed sites.

The sediment samples from harbour's bed were taken by the scientists from the Sydney Institute of Marine Science and they separated the plastic from it by using a high salinity concentration. The researchers found 60 to 100 plastic particles per 100ml of wet harbour sediment, which is much more than overseas sites, state media reports.

Thin plastic fibres, which come from clothes, were the most commonly found particles. "The focus has previously been on larger pieces of plastic which injure turtles and birds, but it's possible that microplastics are doing the most damage," professor Emma Johnston, director of the research said.

"These plastics are small enough to be ingested by 96% of the world's animals, invertebrates, which are then transferred to fish and larger animals," she added.

The tiny plastic fibres are dangerous for marine ecosystem as they can block the gut within fish. Underwater clean-up group Eco Divers founder Dave Thomas said the microplastics were a major concern for local residents. "That area is home to sea dragons, as well as a diverse range of juvenile fish," Thomas said.

"All these small creatures will be ingesting microplastics and the problem is, it stays in them forever, so once it's in the food chain with these small fish, it will work its way up.



"It's a concern for people who eat fish."

Thomas said he was part of a Two Hands Project exercise where a bottle of exfoliating face wash was dried to determine the amount of plastic particles. "It's unbelievable how much plastic comes out of just one bottle," Thomas said. "It's easily avoided too." While the NSW Food Authority does not track levels of microplastics in seafood, it does make recommendations based on dioxins. The authority recommends fish caught west of the Harbour Bridge not to be eaten, and a limited amount be consumed from south of the bridge. Plastic pollution travels easily from land to sea. It blows in from bins and garbage dumps, or flows through stormwater drains into our waterways and eventually the sea. Once in the ocean, it slowly breaks down into smaller and smaller pieces which are eaten by animals at the bottom of our food chains.

Larger pieces of plastic floating at the surface are readily mistaken for food by seabirds and turtles, while plastic bags and fishing lines can wrap around marine life and kill them. Throughout the world, around one million seabirds and 100,000 marine mammals are killed every year by plastics, either entangled and strangled or choked and starved. ■

Indian wins global citizen award for sanitation

NEW YORK: For his commitment to build community sanitation facilities and to end open defecation, Anoop Jain, a young Indian was given the prestigious global citizen award and \$100,000 cash prize, organisers of the award said.

Anoop Jain, founder of Humanure Power, which fights to end open defecation and builds community sanitation facilities in Bihar was named recipient of the 2014 Waislitz Global Citizen Award for his 'exemplified values of a Global Citizen'.

The Waislitz Foundation said Jain's work through Humanure Power aligns with Modi's commitment to put a toilet in every household and school in India by 2019 — a commitment he iterated in his remarks on stage at the citizen festival.

Humanure Power has already seen over 17,000 users, while hygienically disposing of eight tonnes of human excreta.

Such effort would help prevent disease and improve productivity as toilets prevent water-borne diseases caused by faecal contamination, which affects broader health, social, and economic change desperately needed in India, the organisers said.

"Ending extreme poverty is not a choice it's an obligation. Although there can only be one winner of this award each year, my hope

is that it will inspire many thousands of people like Anoop Jain around the world to do what they can to improve the living standards of those in dire need," Chairman and Founder of the Melbourne-based Waislitz Foundation, Alex Waislitz said.

Jains would use the \$100,000 to advance its mission of improving access to toilets for thousands of people living in rural India by building more community sanitation facilities. In addition, the money would go towards formalising their monitoring and evaluation methods.

Jain was among the four finalists for the award, which is based on individual merit in four key areas of global citizenship, impact, innovation, and potential.

He was chosen the winner after getting the maximum votes by people from across the world.

Another young Indian Swapnil Chaturvedi was also one of the finalists, he founded the 'Samagra Sanitation', which is focussed on providing 'awesome sanitation services to the urban poor' in India. ■



AAP submits photos of garbage to MCD



NEW DELHI: Nearly 2,500 photographs of garbage-strewn places across capital were submitted by the Aam Aadmi Party (AAP) to the three mayors of the East, North and South Municipal Corporations of Delhi, were asked to take action against those who litter.

The move by AAP came five days after the Swachh Bharat Mission (Clean India campaign) launched by Prime Minister Narendra Modi.

The Aam Aadmi Party leaders asked them to adopt "zero tolerance" against those who litter.

"They submitted around 2,500 photographs received on its WhatsApp helpline number showing the garbage

lying at different places across the national capital, which requires to be cleared," a statement said.

The AAP also told the mayors that the party supported Modi's project and its volunteers and leaders actively took part in it, but the final responsibility of the day-to-day work for keeping Delhi clean rests with the civic bodies. During the launch of the mission Modi had said the mission was beyond politics. "I do not make any claim that only the newly elected government has done everything. All governments have done something or the other to achieve cleanliness in the country; I greet all of them for this. It is inspired by patriotism and not politics." the statement added. ■

Manual scavengers earn less than Rs 2000 a month

NEW DELHI: Carrying and cleaning the human waste, performing one of the most dehumanising job for a living the manual scavengers in cities are paid less than Rs 2000 a month, a study has revealed.

The study by Jansahas Social Development Society (JSDS) in collaboration with the UN Women gives an insight about the social economic condition of manual scavengers, their participation in local governance and political process. It also highlights how they lack social protection, access to services and schemes.

As per the Census 2011 statistics there are around seven lakhs manual scavengers in the country, who are engaged in the task of removing and transporting night soil. Out of them 5,86,067 lakhs are in rural areas of the country and 208,323 in urban areas.

The report by JSDS says 50 percent of manual scavenging families had no other source of income. The situation was worst in Uttar Pradesh where 83 percent of families relied on manual scavenging for income while in Madhya Pradesh and Bihar 32 percent and 37 percent of families respectively relied on manual scavenging. Only two percent of total manual scavenging families surveyed had land holdings or their own houses. "Women represent 95 per cent of scavengers who remove the human and animal excreta and waste using their hands and simple tools which they carry on their head. Their most basic rights are shunned, be it labour or basic human rights," says Dr Rebecca Reichmann Tavares, representative, UN Women's Office for India.

According to the report, 43 percent manual scavengers earn up to Rs 1000 a month and others earn anything between Rs 1000 and 2000. Only one percent receives more than Rs. 2000.

Their access to health and other services is also poor as only 25 percent of total respondents had access to hospitals and 50 percent were sending their children to schools. The study was carried out in 54 areas of nine districts in three States namely Uttar

Pradesh, Bihar and Madhya Pradesh.

To ban this inhuman practice in 1993, the government enacted the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act providing imprisonment up to one year and a fine of Rs.2,000 or both, which failed after 19 years after its enactment. ■



The broom is out IS INDIA ON CLEANING SPREE?

Shredding out the slothful attitude, the officials along with union ministers were seen sweeping heaps of waste to make Prime Minister Narendra Modi's call for Swachh Bharat Mission, a success. But, the scores of garbage strewn soon after the mission inauguration raises a doubt that will it remain just a photo-op for leaders or bring in a sea change.



It is not uncommon to see streets and lanes filled with mounds of putrefying garbage, stinking drains, open defecation and unbearable stench. It seems as though Indian cities are polluting, manipulating environment and drowning in its own excreta.

In a new push for change the centre's Swachh Bharat Mission, a two lakh crore project, intends to reach out to all sections of the society. The objective is to make their environs clean and inculcate a feeling of hygiene and cleanliness, so cities are rejuvenated into an urban centre.

The mammoth clean drive will span for five years ending in October 2019, coinciding with the 150th birth anniversary of Mahatma

Gandhi. "Urban Development Ministry will spend Rs 62,009 crore for the Swachh Bharat Mission. The states will share 25 percent cost of this while Jammu and Kashmir and North East states will bear 10 percent of the amount. Rural development ministry will contribute Rs 1,34,000 crore," Union Urban Development minister M Venkaiah Naidu said.

Meanwhile, the centre's share of expenditure would be Rs.14,623 crore and the rest would be mobilised through Public Private Partnership (PPP) by states and urban local bodies; from private sector, levy of user charges, Corporate Social Responsibility, Swachh Bharat Kosh and other innovative measures.

The campaign focus would be on elimination



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MSW in India

42

mn tons/annum
Total municipal solid waste production

200-600

gm/day
Per capita generation of waste

5.0

percent /annum
Total waste generation increase rate

1.3

percent /annum
Per capita waste generation increase rate

50-90

percent
Collection efficiency for generated waste



I feel pained to see mothers and daughters have to go in the open to relieve themselves. More than 60 percent people defecate in the open.

Constructing more toilets is extremely important and we can at least do this to respect them.

Narendra Modi, Prime Minister

“We can’t let India remain unclean any longer. I have set out with a broom to contribute towards this pious task. Cleanliness is not just the job of sanitation workers. Be it temples, mosques, gurudwaras or any place, we should make efforts to keep our surroundings clean and litter free. Clean India is the responsibility of 125 crore Indians. If Indians can reach Mars at a cheap cost, can we not clean our neighbourhoods?” Modi said.

Taking pledge with hundreds of volunteers, said, “*na main gandagi karoonga, na main gandagi karne doonga*” (I would not litter and won’t allow anyone to do so)

“I feel pained to see mothers and daughters have to go in the open to relieve themselves. More than 60 percent people defecate in the open. Constructing more toilets is extremely important and we can at least do this to respect them. Don’t trust my government, but trust Mahatma Gandhi’s devotion to cleanliness,” he added. As per Census 2011, only 32.70 percent of rural households had access to toilets. According to a UN report released this year, India continues to have the largest number of people in the world defecating in the open.

Modi said that clean India is a work to be done by all Indians. “This campaign is for 1.2 billion people and I repeat it 1.2 billion times. This work is not only about a *prachar abhiyan*. It is a big effort but we have a lot of time.” Inadequate sanitation causes India

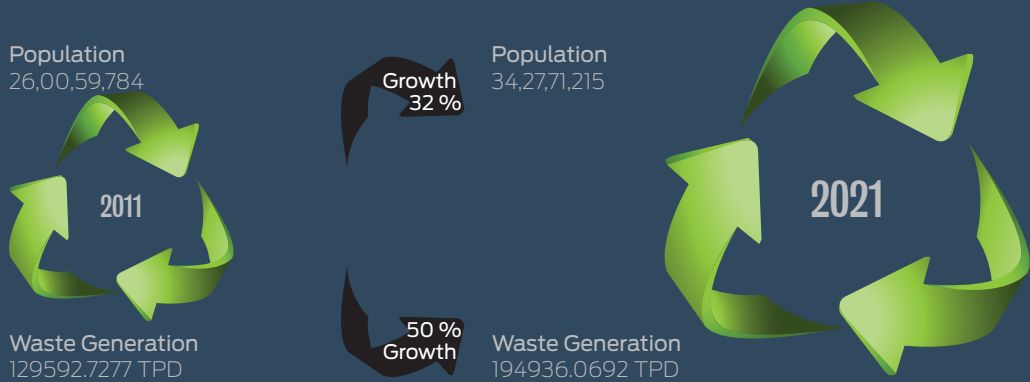
of open defecation, conversion of insanitary latrines into pour flush toilets, eradication of manual scavenging, prevention of pollution of water sources, ensuring cleanliness and hygiene in public areas, awareness generation and capacity building.

“Over 104 lakh household toilets would be constructed besides 2.52 lakh seats as community toilets and 2.56 lakh seats as public toilets. Over 30 crore people would be helped in solid waste management,” Naidu said.

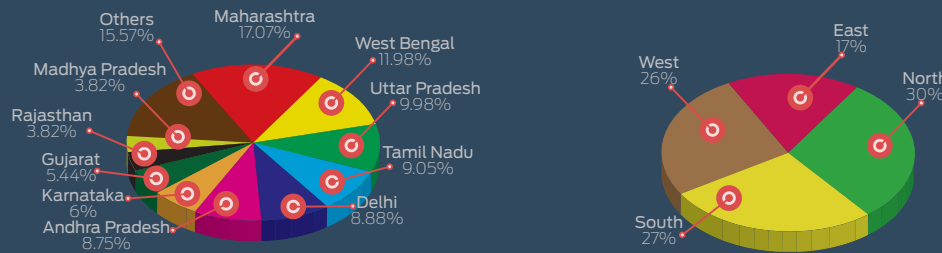
Clean India - responsibility of all

Setting out with a broom, showing that he is the *Pradhan Sevak* (chief servant) of the country, Prime Minister Narendra Modi inaugurated the campaign and said that every citizen should devote atleast 100 hours every year, two hours a week towards cleanliness.

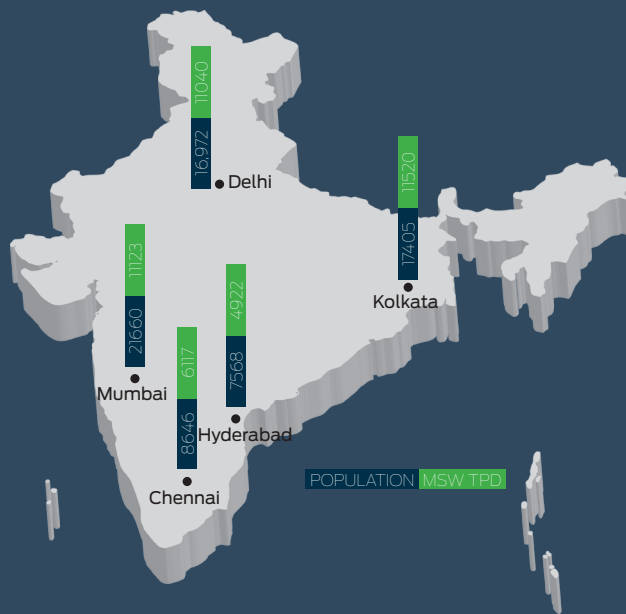
Genesis of Urban Waste



THE MISMATCH: The growth of waste generation is much higher than that of the population



STATEWISE: Maharashtra generates 17 percent of total waste volume, while West India generates nearly one fourth of waste volume



CONTRIBUTION: Metropolitan cities are the largest waste generators in the country

Status of SWM in India

- » Storage of waste at source is lacking
- » Segregation of recyclable waste is not done at source
- » Primary collection of waste is not done at place of generation
- » Design & location of municipal waste storage depots are inappropriate, resulting in littering of garbage
- » Street sweeping is not done everyday
- » Waste processing is partially practised in 35 ULBs areas only
- » Final disposal is done by crude dumping
- » Rag-pickers collect recyclables from municipal bins/dumpsites and litter the waste causing insanitary conditions

Why Improper Mgmt?

- » Lack of the following leads to improper management:
 1. Planning for waste management while planning townships
 2. Proper institutional set-up for waste management, planning and designing in urban local bodies
 3. Technically trained manpower
 4. Community involvement
 5. Expertise and exposure to city waste management using modern techniques/best practices
 6. Awareness generation
 7. Management Information
 8. Funds with Urban Local Bodies
 9. Indifferent attitude of ULBs to levy user charges and sustainability

The Imperatives

- » Outsourcing of all activities under Solid Waste Management Services recommended by 12th Finance Commission for using grants
- » ULBs should concentrate on segregation of waste at source
- » Waste processing like composting, bio-methanation be done through PPP
- » Final disposal, viz. sanitary landfilling, be done under PPP
- » Bio-medical waste be managed by central bio-medical waste management facilities

considerable economic losses, equivalent to 6.4 per cent of India's GDP in 2006 at USD 53.8 billion (Rs 2.4 trillion), The Economic Impacts of Inadequate Sanitation in India, a new report from Water and Sanitation Program (WSP), stated.

Urging people to "re-dedicate" themselves to Gandhi's ideals of truth and all-round development, President Pranab Mukherjee said that convert cleanliness into a national passion.

"Gandhiji believed that cleanliness is next only to godliness. Every road, every path, every office, every home, every hut, every stream and every particle in the air around us can and must be kept clean," he said. President asked everyone to work hard to achieve the goal of building toilets in every home by 2019.

Wielding a broom not enough

Many union ministers like Smriti Irani (Human Resource Development), Shripad Yesso Naik (Culture) and Ravi Shankar Prasad (Law and Justice) wielded a broom, and launched the drive. Gandhians claim that the government is not that serious about the Mahatma's vision on cleanliness.

"Modi's initiative should be heartily welcomed by the people and it should not be confined to a one day programme, rather this should be a 365 days programme, where every individual is giving optimum time to the drive. I feel even though the start is good, the political environment is such that this drive will not be taken seriously unless we are assertive on it," Sriram Jhadav, secretary of the Sewa Gram Ashram, Vardha told Waste Monitor.

He added that Clean India was the vision of Mahatma Gandhi as he wanted a casteless society. He believed that each individual should clean and contribute in making society casteless and equal.

Comparing the earlier scheme Nirmal Bharat Abhiyan, Dr Bindeshwar Pathak, Sulabh Founder, informed that the new program the Swachh Bharat Mission deals with the gamut issue of sanitation.

Pathak said, "The cleanliness drive with a deadline of five years is definitely workable. We will be able to see a visible change. He also informed that the NGOs and civil society organisations should be given some remission for carrying toilet construction across the country," he told Waste Monitor.

"To spread the mission and create awareness on sanitation, we will train 50,000

volunteers in rural areas, who will visit 6, 40,000 villages in the country, one will visit 13 villages. We have 9,735 towns and cities put together, the Urban Local Bodies (ULB) should try to construct toilets in slum areas to stop open defecation in urban areas,” Pathak said.

Talking about initiatives taken by the civic agencies, Yogender Chandolia, north Delhi Mayor informed that it is imperative for the authorities to not just click pictures with broom, but to implement the cleanliness drive in every block.

“The ULBs have been taking initiatives to keep their constituencies clean. We have 750 schools in north Delhi; out of which 600 are under our jurisdiction and all have toilets, girls have separate ones too. We are expediting the cleanliness drive through involvement of Resident Welfare Association (RWA) and officials to clean atleast 100 metres of the area designated,” Chandolia told Waste Monitor.

He also added that atleast 300 mt waste is been cleared every day from the locality.

Meanwhile, Amar Nath, Delhi Urban Shelter Improvement Board's (DUSIB) Chief Executive Officer (CEO) informed that a database has been prepared of toilet blocks available in JJ clusters. The DUSIB is now planning to build toilets at these places at the earliest, he said.

“As part of the campaign, DUSIB has already carried out a massive cleanliness drive in 185 night shelters in different parts of the national capital,” Nath's statement read.

Under the drive, officials and volunteers from various NGOs cleaned the night shelters “by removing unwanted material,

malba (construction debris) and garbage, and ensuring that area surrounding the shelters also remains clean,” he said.

The DUSIB has also set up a centralised control room at its headquarters to monitor the cleanliness drive, which has spanned various offices of the board as well as night shelters and slum clusters.

Swachh requires focus

Many social activist and experts feel that the mission needs to be more focused and systematic.

“Rag pickers, who are the real ground managers of waste, have not been included in such a huge campaign. They are the ones who perform the basic task of taking garbage from people's houses to dumpyards in most parts of the city. Roughly, there are close to 300,000 rag pickers in the city. Everyday they



Even though the mission and its start is good, the political environment is such that this drive will not be taken seriously unless we are assertive on it.

Sriram Jhadav, Secretary of the Sewa Gram Ashram, Vardha

Government Initiatives

- » Bio-medical Waste Handling Rules, 1998 notified
- » Municipal Solid Waste Management Rules, 2000 notified
- » Reforms Agenda (fiscal, institutional, legal) cleared
- » Technical Manual on Municipal Solid Waste Management released
- » Technology Advisory Group on Municipal Solid Waste Management formed
- » Inter-Ministerial Task Force on Integrated Plant Nutrient Management from city compost formed
- » Tax-free bonds by ULBs permitted by government
- » Income-tax relief granted to waste management agencies
- » Public-private partnership in SWM initiated
- » Capacity building brought in focus
- » Urban Reforms Incentive Fund formed
- » Guidelines for PSP and setting up of regulatory authority finalised
- » Commercial accounting system in ULBs & other Sector Reforms introduced
- » Model municipal by-laws framed/ circulated for benefit of ULBs
- » Financial Assistance by 12th Finance Commission granted

sift through tonnes of trash and they have a major role in garbage management right from collecting, segregating to recycling waste, particularly in urban areas. The government should recognise their potential; if they can provide basic remuneration they could be a good garbage task managers,” said Sanjay Gupta, member of Chetna, an NGO.

Taking an oath on cleanliness or just clearing litters in and around the premises will just create a visual clean city, the country needs a proper segregation of waste, from the generators—the public, the mission should stress on proper waste segregation, said Shyamala Mani, professor, National Institute of Urban Affairs (NIUA).

“Though Swachh Bharat Mission is a well thought pan India cleanliness drive, it can just bring about visible cleanliness. To attain real Swachh Bharat the common man, who are the



“The cleanliness drive with a dead line of five years is definitely workable. We will be able to see a visible change. NGOs and civil society organisations should be given some remission for carrying toilet construction across the country.

Dr Bindeshwar Pathak, Sulabh Founder

Waste Processing/ Disposal Methods

- » Wealth from waste (processing of organic waste)
- Waste to compost:
 1. Aerobic/anaerobic composting
 2. Vermi-composting
- Waste to energy:
 1. Refuse derived fuel (RDF)
 2. Bio-methanation
- » Recycling of waste
- » Sanitary landfilling
- » Treatment of bio-medical waste separately

Suggested Approaches

- » Waste management options:
 1. Waste minimisation
 2. Material recycling
 3. Waste processing
 4. Waste transformation
 5. Sanitary landfilling
- » Processing / treatment should be
 1. Technically sound
 2. Financially viable
 3. Environment-friendly
 4. Easy to operate & maintain by local community
 5. Sustainable in long run

main generators of waste should be asked to reduce it and start segregation from home. If the municipality gets a segregate waste it will be easy for them to do a scientific and proper recycle,” she said.

With increasing hazardous waste right from plastic bottles, bags to the growing electronic waste like used cell phones should be constrained.

“May be in 10 years down the line we might find that underground water, even the soil is contaminated, this is an alarming issue. Parallel to Swachh Bharat Mission a campaign on plastic ban, awareness on hazardous waste and recycling and it uses should be run,” Mani told Waste Monitor.

Soon after the mission inauguration, heaps of garbage were strewn across the venue, where the Prime Minister addressed, showing utter disregard to the appeals made.

Informing that awareness and a change in attitude among the masses and instilling the basic cleanliness is need of the hour, Shankar Aggarwal, secretary, Ministry of Urban Development told Waste Monitor. “First we need to spread awareness and instill in the mind of every citizen that cleanliness is most important. We will start with cleanliness drive and change the mind set of people. Segregation of waste, banning plastic would be done in due course. It is a big challenge but we are sure that in five years we will able to achieve a clean India,” Aggarwal stressed. ■

PROJECT PROPOSE PANACEA

Country is grappling with the waste management in terms of land space, suitable technology for segregating waste, what is really required is bridging the gap of the private players and the municipalities to combat the impending menace of garbage.



In India, the nature of waste management is very non defined because the authority lies with Urban Local Bodies (ULBs) due to the public and local nature of the service. The municipal solid waste (MSW) is interlinked to urbanisation and economic development, therefore its structure and constitution in India differs greatly, compared to the developed countries.

With most cities and towns urbanising rapidly there has been a marked shift in the quantities and quality of waste generated across the country, in turn contributing to a rising deficit between the demand for MSW services and the current capacities among the ULBs to deliver the same.

In order to overcome the technical and financial deficiencies, the state and local governments are increasingly resorting to the use of private contractors for collection, transportation and disposal and private capital to supplement the mechanisation and improvisation process.

Segregate at source

We lack segregation and storage of MSW at source is lacking and the decomposable and non-decomposable wastes are often disposed off at a common communal disposal centre.

As Sandeep Chhamunya of Ramky group told Waste Monitor: "The major problem is funding as municipalities sees the PPP concessionaire as contractors and do not fund the projects which leads to delay."

The waste should be segregated first for incineration as direct dumping creates ripple effects while setting up waste to energy methods. Also, the arena should be an industrial place, to protect the urban populace being exposed to toxins generated from waste, he added.

To segregate, there is an ardent need of suitable technology so that the waste is sorted in accordance to its recycling ability.

Rakesh Kumar, Director, NEERI said: "Technology can be brought, but it has to be adapted in Indian requirements and customised according to the areas characteristics in terms of environment, land among others."

The collection efficiencies are also seen to be poor, at around 70% in most Indian cities and continue to be predominantly manual in nature.

Collection and transportation activities constitute approximately 80-95% of the total budget of MSWM; hence, it forms a key component in determining the economics of the entire MSWM system.

Structure of MSW vital

The presence of a large informal sector that remains un-integrated into the formal waste management system coupled by inadequate mechanisation owing to the poor financial health of the ULBs has made the management and delivery of a well structured MSW system a herculean task.



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As Kumar expressed: “The judiciary has been reacting in frustration to the scenario, even though there are rules, there is no structuring in projects. We see water supply projects are regularised and structured in view as to what is the nature of water meters, what is the supply chain and so on, we should have a regular structure for waste management, else the role of PPP will be a struggle.”

In fact, private participation in the provision of MSW services is not new, several corporation, municipalities have employed private contractors for secondary transportation from the communal bins or collection points to the disposal sites since 1985.

However, despite the rising popularity of Public Private Partnerships (PPP) in the management and delivery of MSW services, the institutional setting, governance and regulatory structures and market linkages (for recyclables/compost) are at a nascent stage, making the successful implementation of PPPs a challenging task. This is further complicated by the presence of a large informal sector (mainly consisting of rag pickers) that pre-dominantly remains outside the PPP framework.

“ULBs require optimum guidance, they are dependant on the vendors. There should be stringent guidelines that are outlined by the government,” Kumar told Waste Monitor.

Irfan Hanjerwala, founder, Hanjer Biotech feels that there should be standard emission norms for burning waste.

“Incineration is followed in metros globally but there is no prescribed emission standards followed by India till now. There is a need to consult ULBs as they are responsible to implement the rules,” he told Waste Monitor.

Technologies deriving fuel

Creating fuels out of trash could significantly reduce the amount of trash that goes into landfills and could offset fossil fuel use.

As Sandeep opined: “The MSW are put in dumpsites , many of the non-agro land and cultivable ones. These should actually be put in sanitary landfills, where there are treatments



The core issue is that there is no awareness and efficiency in transportation, collection of waste. Habits like segregation at source, not littering is ignored.

Rahul Chahbra, CEO, Proton Environ Solutions



“We generate so much of waste that we cannot keep track of the figures. There is utility in the malba or construction building materials. Rather than throwing them away and choking the rivers, we can reuse them as they are in demand...”

Avikal Somvanshi, Senior Researcher, Centre for Science and Environment

done -lchette, landscaping.”

“Garbage has a lot of biodegradable and organic-inorganic components which can be segregated at source and can be used to make compost or as reduced derived fuel (RDF).”

Recovering energy from waste is only appropriate for waste that cannot be prevented, reused or recycled with less greenhouse gas emitted. Energy recovery can be a sustainable option for waste that would otherwise go to landfill and create landfill methane emissions.

Giving the breakup of the waste Sandeep said: “There is no market of RDF in India, it has less calorific value and no buyers. There is 10-15 percent of compost available in wastes segregated, 20-25 percent is landfillable material and majority 50-60 percent can be converted to RDF and used as fuel.”

On W2E

The Planning Commission’s taskforce

on waste to energy (W2E) has recently recommended a PPP model for a combination of waste management technologies, including W2E plants, bio-methanation and composting, that can be integrated to reduce the load on landfills.

For larger cities like Delhi, it mainly recommends W2E plants that generate power through gasification, incineration and other methods. The taskforce headed by K Kasturirangan is pushing for W2E plants in large cities across the country. It suggests tax incentives to make them financially viable and a “target of setting up 215 W2E plants by 2031 to generate 1075MW power”.

The report recommends segregation at source and separation of waste into several streams, like construction and demolition, street sweepings and silt from drains, wet, biodegradable and recyclables, single-source bulk waste collected from market yards, restaurants etc. It advises minimising of waste by implementing the ‘5R’ concept: reduce, reuse, recover, recycle and remanufacture, and suggests recognising the role of kabadiwalas in sorting recyclable materials.

But it is not a smooth ride as it seems, feels Rahul Chhabra, CEO, Proton Enviro Solutions Pvt Ltd. “W2E is only possible in bigger cities like in Delhi, Mumbai, where waste is generated in huge amounts. The core issue is that there is no awareness and efficiency in transportation, collection of waste. Habits like segregation at source, not littering is not practiced,” he told Waste Monitor.

Chhabra said: “There is need of set guidelines in W2E. While it is the next big thing it is a far fledged dream as potential tariff for electricity is vague. The cost of capital is very high to building waste to energy plants, which India cannot afford as the municipal bodies are cash strapped. W2E investment is 50 times than a regular compost plant. The environmental factors are also involved as a

Advantages of PPP

- » More flexibility in management
- » Access to technology and expertise
- » Higher level of efficiency and accountability
- » Focus on customer satisfaction
- » Low cost of service because of competition
- » Access to finances for new investments

Disadvantages

- » Risk of commercial failure, resulting in breakdown of essential public services
- » Private sector may pay very low salaries to the workers causing social distress and labour problems
- » Require close collaboration between public and private stakeholders
- » Requires management and monitoring skills of the public authority

W2E plant generates emissions and to get technologies to filter them will take time. There is a requirement to understand the dynamics of the concept before implementation,” he added. The separate collection and transportation of domestic, C and D waste, silt from surface drains would be made to collect waste from the doorstep and delivered directly to processing plants. According to the Ministry of New and Renewable Energy (MNRE), there exists a potential of about 1700 MW from urban waste (1500 from MSW and 225 MW from sewage) and about 1300 MW from industrial waste.

Indian Renewable Energy Development Agency (IREDA) estimates indicate that India has so far realised only about two percent of its waste-to-energy potential. A market analysis from Frost and Sullivan predicts that the Indian municipal solid waste to energy market could stand at a compound annual growth rate of 9.7 percent till 2013.

C&D – untapped market

Over 30,000 tonnes of Construction and Demolition (C&D) waste is generated daily in India and relative to other sources, it is a promising option because it can generate natural sand and aggregate from river basins and recycle.

Avikal Somvanshi, senior researcher, Centre for Science and Environment told Waste Monitor: “ We generate so much of waste that we cannot keep track of the figures. There is utility in the malba or construction building materials. Rather than throwing them away and choking the rivers, we can reuse them as they are in demand in the construction industry.”

“This will save the natural resources, which are running out, reduce need of landfill and manufacturer,” he added.

“Cities are not able to manage the urban solid waste. There is an issue right from collection, segregation to disposal. For example Delhi alone generates about 7000 tonnes of waste

per day, but only a portion of it is collected, out of which very less waste is disposed in a scientific manner,” he added.

The first pilot plant for processing C&D waste in India was set up at Burari, Delhi, which has been scaled upto 1000 tons per day capacity, N B Mazumdar, senior technical advisor of IL&FS Environmental Infrastructure & Services Ltd. (IEISL) told Waste Monitor.

“The different recycled products have been developed according to needs of the Indian market. These would result in substantial savings in natural resources, such as sand, stones etc. Availability of sand is a crucial issue now... and private sector participation is an interesting option to boost the performance of public services like solid waste management,” he said. The untapped market of C & D could be explored more as it provides a way of dealing with inert material that is otherwise



Incineration is followed in metros globally but there is no prescribed emission standards followed by India till now.

Irfan Hanjerwala, Founder, Hanjer Biotech

not reusable. The C&D can be used for superior compaction and constructability in building roads, embankments and affordable housing. It reduces cost of bulk transportation if recycled close to source, says Avikal.

While the municipal authority focuses its activity on planning and management, a private company takes over the day to day operation of a service in an area. With the launch of the Clean India Mission which aims to mobilise masses and seeks to create a clean India, it is underlined on the urgent need of improving waste management scenario. This may lead to more opportunities for stakeholders in this market to tackle the problem. ■

There is Potential

- » Indian Renewable Energy Development Agency estimates indicate that India has so far realized only about 2% of its W2E potential
- » A market analysis from Frost and Sullivan predicts that the Indian municipal SW to energy market could stand at a compound annual growth rate of 9.7 % till 2013

Flushing open defecation

Building toilets for every household would not ensure an end to open defecation in India. The country needs to confront social-cultural reasons to get over this 'sanitation crisis'. A well-thought of awareness campaign alongside constructing toilets for every community and household is needed to bring about a change and improve condition on ground



In the pitch darkness of mid-night, thousands of women still set out for an open field to relieve themselves, as there is no access to toilets at home or nearby vicinity in many human settlements. Promising to change the saddening state of affairs in the next five years, the NDA government has initiated nationwide mission on cleanliness and ensuring availability of toilets to every household by 2019.

Around 130 million households in India do not have access to toilets. And, over 50 percent of India's population attends nature's call in fields, along railway tracks, behind bushes, or by roadsides. Of the one billion people in the world who have no toilet, India accounts for nearly 600 million. The situation in Indian villages is worse as more than 68 percent villagers defecate in open.

India is far behind from its neighbours in making efforts to end open defecation. At present, less than three per cent of Bangladesh, 23 percent of Pakistan, and one percent of China, defecate in the open.

Perils of open defecation

India is plaguing with various health issues because of prevalence of large scale open defecation in the country as it is in not merely a sanitation issue but it's in the core of healthcare. A United Nations (UN) report on sanitation says: "Open defecation perpetuates the vicious cycle of disease and poverty and is an affront to personal dignity."

"Open defecation becomes disastrous when practiced by groups in close contact with each other. As India's population is huge, growing rapidly and densely settled, it is impossible even in rural areas to keep human faeces from crops, wells, food and children's hands. Ingested bacteria and worms spread diseases, especially of the intestine.

They cause enteropathy, a chronic illness that prevents the body from absorbing calories and nutrients. That helps to explain why, in spite of rising incomes and better diets, rates of child malnourishment in India do not improve faster," the report says.

According to the Unicef, the UN's agency for children, nearly 50 percent Indian children remain malnourished and open defecation is one of the major causes.

It is linked to a numerous health problems such as stunting in children, diarrhoea, cholera, typhoid, hepatitis, polio, worm infestation, reduced physical growth, impaired cognitive function, and lowered IQs. It is to be noted that diarrhoea is still the biggest cause of child deaths around the world and 25 percent of deaths occur in India.

Unavailability of toilets for girls and women has various other social consequences. Many teenage girls in India leave school when they start menstruating because they have no privacy.

Around 42 percent schools in India do not have toilets for girls.

The situation is alarming in North Eastern states and Jammu & Kashmir, where toilets for girls are available in only 22 to 30 percent schools. Rajasthan and Punjab are best of the lot having toilet facilities for girls in their 90 percent of schools.

Sexual violence is another threat that women face in day to day life when they venture out to attend nature's call.

Recent incidents in Western Uttar Pradesh, in which two girls were raped and killed, have highlighted the ground-reality.

Ending open defecation will bring immense benefits by helping India in improving health standards, and in turn show affirmative progress on health indicators such as Infant



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Mortality Rate (IMR), malnutrition among children and women among others.

Bill Gates, Founder of Microsoft, said during his recent visit to India, “Making toilets either at the community or household-level and having them affordable and attractive—which in the case of toilets implies that they don’t smell badly—that’s a tough challenge. If you were to go to every city in India and get piped clean water for every toilet in every home and a pipeline that treat the water, you’re talking about literally hundreds of billions of dollars.”

According to a World Health Organization (WHO) report, an average of Rs 6,500 per person is lost in India due to lack of cleanliness and hygiene.

The report also suggests that a nine times return for every rupee spent on sanitation is possible. These returns are in the form of improved health, lowered mortality rates, higher school attendance rates, and disease control.

Indian government initiated Total Sanitation Campaign (TSC) in 1999 that was later named Nirmal Bharat Abhiyan. Under the scheme, the government spends over Rs 7000 crore every year to subsidise rural toilet construction in the country.

The per-toilet subsidy is currently around Rs 5000 under the scheme. But the scheme did not pick up as the poor could not afford to construct and maintain the toilets and it is evident by government records.

Ministry of Rural Development reports that 78 million toilets were constructed under the TSC until March 2011, but the Census (2011) shows only 51 million households as owning working toilets.

Socio-cultural barrier

Open defecation is not only linked with non-existence of toilets in every household but it is a social-cultural habit in rural India. People in rural India are of the view that they should not defecate in the house where they live, eat and worship.

Even many Hindu scriptures including Manu Smriti encourage defecation in the open, far from home, to avoid ritual impurity. Many people, especially in the villages of North and Eastern India, still prefer attending nature’s call in open—even if they have toilets at home.

Achieving better sanitation is not an easy task there are behavioural aspects that prevent people from adopting improved sanitation.

Yamini Aiyar, Director of Accountability



More needs to be done by government and private agencies to build national awareness of the dangers of poor sanitation. The fact that India’s health administrators failed to spread mass awareness on diarrhoea management speaks volumes of the inefficiency of previous programmes.

Harsh Vardhan, Union Health Minister



1000

young lives are lost everyday due to diarrhoea

About 22

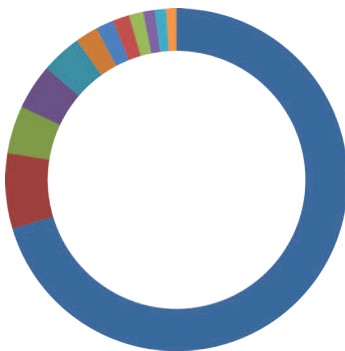
million girls do not have access to separate toilet facility in school

40%

of children suffer from the stunting

50%

of malnutrition is attributable to water, sanitation and hygiene



Country	People defecate in open (in million)
India	626
Indonesia	63
Pakistan	40
Ethiopia	38
Nigeria	34
Sudan	19
Nepal	15
China	14
Nigeria	12
Burkina Faso	9.7



“Targets for construction of toilets are somewhat irrelevant to resolving the sanitation problem. Building toilets does not mean that people will use them. People need to be taught the value of sanitation”

Yamini Aiyar, Director, Accountability Initiative, Policy Research Group

State	Schools having girls' toilets (%)
Andhra Pradesh	55.3
Arunachal Pradesh	28.6
Assam	38.9
Bihar	37.6
Chhattisgarh	34.0
Delhi	80.4
Goa	66.9
Gujarat	71.5
Haryana	85.2
Himachal Pradesh	65.9
Jammu & Kashmir	22.4
Jharkhand	59.8
Karnataka	73.4
Kerala	77.5
Madhya Pradesh	34.8
Maharashtra	68.9
Manipur	23.2
Meghalaya	22.8
Mizoram	58.3
Nagaland	67.2
Odisha	38.1
Punjab	90.2
Rajasthan	91.8
Sikkim	75.2
Tamil Nadu	67.3
Tripura	42.0
Uttar Pradesh	76.0
Uttarakhand	50.9
West Bengal	47.8
All-India	58.2

Initiative—a Delhi-based policy research group, said, “Targets for construction of toilets are somewhat irrelevant to resolving the sanitation problem. Building toilets does not mean that people will use them and there seems to be a host of cultural, social and caste-based reasons for that. People need to be taught the value of sanitation.”

A 2009 report on open defecation by Asian Development Bank (ADB) reveals religion and caste based differentials. The report said that only 41 percent Hindu households have a toilet in their house, followed by Muslim households with 60 percent. Studies of India’s population show how since the 1960s child mortality rates have consistently been higher in Hindu families than Muslim ones—though Muslims typically are poorer, less educated and have less access to clean water. At present, out of every 100 children, 1.7 more Muslim than Hindu children survive to five years.

Christian and Sikh households fare

much better, at 70 percent and 74 percent respectively. It is also worth noting that, of the ten poor performing states listed above, eight of them have Hindu populations exceeding 88 percent of their total populations. Caste-based differentials are scarier. Scheduled castes (SCs) and scheduled tribes (STs), which include some of the most disadvantaged groups in India, both suffer from poor household sanitation and drainage. ST households have the lowest ownership of toilets—only 18 percent in 2005–06. Moreover, only 23 percent of ST households have access to any form of drainage. This is likely due to a high degree of inequality in access to basic drainage facilities associated with dispersed hamlets and remote rural and forest areas. SC households fare slightly better, with access at 32 percent for toilets and 46 percent for drainage.

Need of nationwide awareness

Building toilets will not solve the sanitation crisis. People can be seen urinating even outside the public toilets. The reasons could be a behavioural issue or poor cleanliness in public toilets. Alongside building toilets, the government needs to make a mechanism to maintain those toilets and promote their use.

It is evident that, according to a survey of 3,200 rural households by the Research Institute for Compassionate Economics in the National Capital Region (NCR), the majority of people in households with a government latrine don't use it.

The UPA government in the year 2012 created a five-year 'Sanitation and Hygiene Advocacy

Stats

- » 1 billion people practice open defecation globally. India accounts for 600 million, around fifty percent of its total population
- » India's neighbours have performed better in tackling the crisis. Only 3 percent people in Bangladesh, 1 percent in China and 23 percent in Pakistan defecate in open
- » Around 68 percent rural population of the country defecates in open
- » Every minute 1.1 million litres of human excrement enters in to River Ganges
- » Lack of access to sanitation, including the practice of open defecation, costs the world's poorest countries USD 260 billion every year



Making toilets either at the community or household level and having them affordable and attractive is a tough challenge. If you were to provide piped clean water for toilet in every home, you're talking about literally hundreds of billions of dollars

Bill Gates, Founder, Microsoft

and Communication Strategy Framework' to advise states on how to counter the culture of open defecation, including setting up local education committees. However, the political will to implement such initiative seem to be absent. It is to be noted that almost more than half of the country's sanitation education budget since 1999 hasn't been spent, according to the Ministry of Drinking Water and Sanitation. Harsh Vardhan, Union Health Minister, said in a written statement on July 28, "More needs to be done by government and private agencies to build national awareness of the dangers of poor sanitation. The fact that India's health administrators failed to spread mass awareness on diarrhoea management speaks volumes of the inefficiency of previous programs." India spent 2.6 billion rupees in fiscal 2013 on a campaign to help eradicate polio after 44 cases were reported between 2010 and 2011, according to the World Health Organization. In the same year, the nation spent half that amount on education for toilets and sanitation.

Finance Minister Arun Jaitley, in his budget speech, announced that the government has set Mahatma Gandhi's 150th birthday in 2019 as its target for achieving "total sanitation," including access to toilets for all 1.2 billion residents. Jaitley doubled spending on new toilets to 40 billion rupees. Ratio of the funds that can be spent on information, education and communication, remains at 15 percent. ■

DEMANDING DIGNITY

The role of waste pickers is very vital in collection and source segregation of the garbage. They are sole contributors in day-to-day services in waste management.



India's maiden wholly owned co-operative of self-employed waste pickers in solid waste management was initiated in the city of Pune with the formation of SWaCH from the Kagad Kach Patra Kashtakari Panchayat (KKPKP).

The group has its operational strategy in providing door-to-door collection services to around 1,25,000 households in the city.

The KKPKP, a membership-based trade union was formed by a group of waste pickers and waste buyers in Pune to assert waste pickers' rights and generate awareness of their role in Solid Waste Management (SWM) of the city. With over 9,000 members the KKPKP initiated a pilot programme with the civic body to involve waste pickers in a door-to-door waste collection (DTDC) programme.

With support from the Department of Adult Education, SNDT Women's University, the programme christened as SWaCH DTDC. The thought proved to be a successful venture as it provided improved conditions for waste pickers, sustainable solid waste management for the Pune Municipal Corporation (PMC) and increased sanitary conditions for the general public.

Operations & Strategy

SWaCH was institutionalised in 2008 as SWaCH Seva Sahakari Sanstha Maryadit, Pune. SWaCH is a wholly-owned worker's co-operative, complete with board members, various managers, supervisors, area supervisors and representatives. The decision making body of the NGO comprises of several waste pickers, founding members of the KKPKP and the PMC officials. The organisation has actively participated in every part the entire waste collection and disposal process which includes collection, segregation and transportation to dumpsites.

Moving a step ahead from regular door-to-door collection the SWaCH team has launched SWaCH Plus programme, which is an attempt at livelihood upgradation for the waste pickers.

Initiatives

While the NGO aims at improving the door-to-door collection of waste, the SWaCH Plus programme promotes sustainable living and recycling amongst citizens. For instance, the ST Sipo Bags is an initiative at creating clean and hazard free working environment for waste pickers. Citizens can buy these paper bags for disposing sanitary towels so that they can be easily identified by waste pickers.

The SWaCH composter is a three tier terracotta composter that can be easily used at homes to create fine quality compost for potted plants and home gardens. The composter comes with a ready-to-use kit for easy installation. SWaCH members also help maintain bio-gas plants and take up cleaning and house-keeping contracts.

Another effective recycling programme is V-Collect which encourages citizens to give away commodities which are not used in the house such as electronics, furniture, kitchen utensils, clothes and more.

Impact

The impact of the NGO initiative received much accolades. The status and the lives of waste pickers was no longer considered a low rung job but a contribution to the environment and society. SWaCH was featured on a popular TV show Satyamev Jayate, hosted by actor Aamir Khan, where members discussed problems faced by waste pickers and proposed solutions. There are enterprises which have had international exposure through participation in waste management initiatives. SWaCH has also been selected as a winner of the Citi Micro Enterprise Awards (CMEA) 2013 in two categories of the 'Best Community Micro Enterprise of the Year' and 'Best Urban Micro Enterprise of the Year'.

The sense of empowerment and entrepreneurial streak brought about by SWaCH in the lives of waste pickers makes it one of the foremost community initiatives. ■



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On Being a 'Bin-less' city

THE CAPITAL OF GOA and one of the most important tourist destinations in the state, Panaji is expected to be on par with international standards on waste management. Sanitation and waste management was a major issue during the 90's in Panaji which was improved through various initiatives. The case study documents the various initiatives for waste management in the city that are underlined below:

Solid Waste and Resource Management (SWARM)

The Solid Waste and Resource Management (SWARM) project was launched as a joint initiative between the Government of India (GoI), United Nations Development Program (UNDP), Panjim Municipal Council (known as Corporation of the City of Panaji since 2002) and Water and Sanitation Program - South Asia (WSP - SA) in 1995. The programme aimed at planned upgradation of sanitary infrastructure and was completed with satisfactory results.

Together for Panjim

The 'Together for Panjim' was an all encompassing civic programme for increased citizen cooperation in revitalisation of the city's infrastructure and heritage. As solid waste management (SWM) could generate little interest on its own amongst the general population, various cultural programmes were held with the recurring theme of sanitation.

DTDC program with People's Movement for Civic Action

The 'house-to-house garbage collection scheme' was implemented by the CCP with help from the People's Movement for Civic Action NGO in Dona Paula (not a part of Panaji anymore) December 2000. This scheme was the first to introduce nominal service charge for the sanitation service provided across 200 households. It formed the base of the much larger 'Bin-less City' campaign.

Bin-less City Campaign

The 'Bin-less City' campaign was one of the biggest campaigns undertaken by the CCP for restructuring the city's waste management. The pilot scheme launched in Dona Paula



was considered as a base model and the programme was implemented across the city of Panaji. The main objectives of this initiative was implementing service charge based DTDC for the entire city, automated truck loading systems and substitution of bins and recycling of plastic waste. The first goal was achieved through structured implementation and detailed hierarchical responsibilities divided.

The garbage bins provided were modified for the automated loading process. Incentives were offered PET bottles and milk bags to achieve higher level of plastic waste recycling.

Mission Chakachak Panaji

In 2006, 'Mission Chakachak Panaji' was launched by the CCP to fight the plastic bag menace. The month long drive discouraged citizens from using plastic bags and advocated complete ban on their use. 'Gagged by the Bag', a three day festival was held to provide citizens with eco-friendly alternatives.

The latest addition to these waste management efforts is the approval of Integrated Municipal Solid Waste Management Facility (IMSWMF) in Banguinim. This is a perfect culmination of CCP's MSW initiatives which has resulted in Panaji being one of the cleanest cities in the country. ■

Defusing waste 'TIME BOMB'

Gurgaon can achieve 'zero waste' target by implementing a three tier waste management system that ensures segregation at source and treated in a decentralised system



With the Indian Prime Minister launching the Swachh Bharat mission, waste management is at the centre of talking points. The million dollar question for the Millennium city is: how to achieve 'zero waste' target and implement effective waste management system?

As of September 2014, 6,00,000 tonnes of solid waste lay at Bandhwari—the dump yard where no waste treatment plant exists now. With each individual contributing around 400 grams daily on an average, the pile is rising.

The Municipal Corporation of Gurgaon (MCG) finds solution in reopening the Bandhwari plant but its success in long term is uncertain. Population is expected to grow at the massive rate of 403 percent, as it did between 2001 and 2011, there will be approximately 3.5 million people contributing to the quantity of waste reaching Bandhwari by 2021. The viability of processing waste at a centralised facility that has capacity of treating 1400 tonnes, just seven years later, is doubtful.

At present, Rs 60 crore is spent annually on maintaining the current waste management system, with transport itself costing Rs 695 per ton daily. Retaining the existing system would imply a manifold increase in the MCG budget.

The solution lies in adopting a zero landfill waste structure. According to extensive empirical study, between 75 percent and 79 percent of waste generated by each individual comprises of organic waste while the 'dry waste' component comprises a recyclable portion of high-grade plastic, paper and glass of nearly 15 percent. This implies that between 90 and 95 percent of waste can be processed separately while the leftover could be sent to a centralised facility.

To implement this possibility of optimum utilisation of resources, a three-tier model is essential. The first crucial tier would be segregation of waste at source into dry, organic and hazardous waste at the household level. The second tier would involve managing the aforementioned 90 to 95 percent at a decentralised level. Since Gurgaon is



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divided into 35 wards each with population ranging between 30,000 and 60,000, the decentralisation could be ward-wise. The third and final tier would be a centralised facility to deal with the remainder of waste.

The organic waste would need to be processed at the ward level. Lack of return on investment renders composting inferior to biomethanation to do this. A maximum population of 60,000 in each ward would generate 20 tonnes of organic waste. A biogas plant of 5 tonnes per day, as seen in Thane and Pune, would involve a capital expenditure of between Rs 28 and 35 lakhs with payback period of 4 to 6 years (including operational cost). To deal with the 20 tones organic waste, four such plants could be established in different corners of the ward. In wards having the minimum population of 30,000 people, two such plants would be sufficient. This would be environmentally and economically sustainable.

From each household, two organisations would collect the waste—one would collect the organic and another would collect dry and hazardous waste components. Such a system

of check and balances would be put in place so that neither organisation would collect the other type of waste.

One straight forward methodology is that the company operating the biomethanation plants also be responsible for collecting feed and be paid an appropriate amount by the Municipal authority for this. An independent organisation could also be paid per quantity of organic waste delivered to the biomethanation plants with no payment for mixed waste.

The dry waste could be collected by the existing informal sector of 'kabaadi waalas' organized formally as in Pune. At payment rates of Rs 12 per kg for high grade plastic and Rs 7 per kg for paper, this could provide daily remuneration of nearly Rs 25 for a typical family of five while the collectors would collect additional low grade plastic and hazardous waste at no payment rate. Each biogas facility could also be equipped with a collection room wherein dry waste collectors could dump the leftover unrecyclable waste amounting to 30-50 tonnes for the city. Authorised recyclers may also pick up the e-waste generated from these centers on a weekly basis.

This second tier hinges on the functioning of the first tier. Since an additional effort is required by households to segregate their waste, monetary incentive is essential to make them segregate. Property tax rebates of 5-15 percent on a monthly basis or/and the aforementioned dry waste collection payment could be helpful.

Statutory mandates and strict punitive action for non-compliance are crucial. By implementing the check-and-balance system between the collecting organisations, it will be ensured that neither will collect the mixed waste compelling households to segregate. Further, households failing to do so may be reported against by the associations in which circumstance specific consequences such as a fine of Rs 500 may be imposed.

The third and final tier of a centralised facility may be in the form of a pyrolysis or plasma gasification plant as deemed appropriate. Construction debris would have to be dealt with in a separate singular plant for the city.

The system can make Gurgaon a zero landfill city in next couple of years. Although the cost involved during the first year exceeds the present budget but the gains from a marginal increase in initial expenditure are massive. The neo waste management system would also ensure long term financial sustainability and optimum resource utilisation. ■



CLEANLINESS TOP PRIORITY

Taking a cue from the initiatives of Prime Minister Narendra Modi for clean India, MP from Mathura Hema Malini is making concerted efforts to clean Mathura-Vrindavan. The objective is to make the religious towns a model tourist and pilgrim destination by making them clean and beautiful. In a freewheeling interview with Waste Monitor, Hema Malini talks about her action plan to clean temple cities

What is your action plan to clean Mathura Vrindavan and why is it your top priority?

Mathura and Vrindavan attract millions of tourists every month. Visitors coming here should not be welcomed by choked drains and stinking garbage. The city should be spick and span to attract more tourists. Keeping the city clean is a big challenge. I'm working and focusing on formulating policies to keep the city clean with government officials, waste management experts. Efforts are being made to make Mathura clean and turn it into an ideal tourist hub.

Public attitude towards sanitation and cleanliness seems to be the biggest hurdle in making cities clean. What are your plans for sensitising public?

I am contemplating plans to make people aware about the importance of cleanliness. Public cooperation is paramount in making any city clean and without them any programme cannot succeed. We have planned public rallies, marathon and other events for clean Mathura-Vrindavan. I would attend those events and interact with locals to encourage residents to join hands with the government to keep their city clean. To attract youngsters to be part of the clean Mathura-Vrindavan, we would run campaigns on social media sites too. I am also planning to engage school students and community groups in spreading awareness on

the importance of cleanliness and sanitation among residents of the cities. A campaign called Swachh Harit Mathura-Vrindavan (Clean and Green Mathura-Vrindavan) has begun in the city through which shopkeepers, street vendors and locals will be taught how to help the government and local bodies in making the city clean and garbage free.

There is a big scheme for cleaning Ganga River but there is no programme announced yet to clean Yamuna River. Have you spoken to PM regarding this to allocate funds to initiate cleaning of Yamuna River too?

Prime Minister Narendra Modi has launched nationwide mission for cleanliness and ready to extend all kind of support to ensure cleanliness in the country. I have already requested PM to undertake a project for cleaning Yamuna River. I have also submitted my plans for rejuvenating the river. He has assured me to undertake cleaning of Yamuna alongside Ganga cleaning programme. I have also had consultations with cabinet ministers Nitin Gadkari, Uma Bharti, Piyush Goyal and Minister of State Nirmala Sitaraman in this regard. The process is expected to begin soon. In the past, I have been part of river cleaning project. I was the brand ambassador of 'Ganga Sparsh'. Now, I will initiate cleaning project for Yamuna. I have also taken up the cleaning up of Juhu beach area in Mumbai.



I am planning to engage school students and community groups in spreading awareness on the importance of cleanliness and sanitation among residents of the cities. A campaign called Swachh Harit Mathura-Vrindavan (Clean and Green Mathura-Vrindavan) has begun in Mathura through which shopkeepers, street vendors and locals will be taught how to help the government and local bodies in making the city clean and garbage free.

Hema Malini, Member of Parliament for Mathura

Does waste collection and management system in Mathura need an overhaul to improve cleanliness in the city?

We are already on it, I'm consulting waste management expert companies and civil society organisation to chalk out a foolproof waste management system that can handle increasing waste generation on both temple cities. Local authorities are also planning to formulate tough policies to handle industrial waste as it is polluting the river Yamuna and affecting ground water. ■



The uncounted WASTE MANAGERS

Despite playing a significant role in managing municipal solid waste and reducing the burden of local bodies, the community of waste-pickers remains one of the most neglected lot of people living in tatters



Solid waste management (SWM) is a complex system of various strongly interrelated activities, like primary and secondary collection, transportation to processing plants and waste disposal sites, and recovery and recycling activities.

The sector as a whole consists of a formal and an informal sector. Formally, the municipal bodies are responsible for processing household, commercial and institutional waste. But the urban local bodies (ULBs), besides facing financial crunch, are also characterised by ineffective institutional arrangements and organisational problems. It is here that the informal sector steps in to reach the reduce the processing units, passing through several channels of the sector, including waste-pickers, waster dealers and the wholesalers selling solid waste as raw material to the recycling sector.

In many cities of the developing countries, the informal sector plays a significant role in managing municipal solid waste (MSW). The informal recovery of recyclables from the solid waste system reduces overall SWM costs for the municipalities. Millions are saved annually in the process. Apart from this, the informal sector waste management activities also help municipalities achieve recycling objectives and reduce use of precious landfill space.

A report of a Supreme Court-constituted Committee in 1999 had stated that in India there is a large urban informal sector of rag pickers, who earn their livelihood from waste-picking from the streets, community

garbage collection bins and waste disposal sites. It is estimated that these waste-pickers pick up about 5-10 percent of the total waste generated in large urban centres and pass it on to the informal waste recycling sector through various levels of intermediaries.

Uncared, unrecognised

Although the waste-pickers also add value to recyclable waste and help in conserving national resources, their contribution is yet to be duly recognised by the society or the municipal authorities. Thousands of waste-pickers in cities start picking up waste in the early hours of the day and work throughout the day. But despite this useful service, waste-pickers are invariably driven away by the police and looked down upon with distaste and suspicion by the public at large as well as the local authorities.

A large number of waste purchasers buy recyclable material from waste-pickers at very low costs and pass on the reusable material to recycling industry at a good profit margin. However, the waste-pickers have to be content with anything between Rs 25 and Rs 80 per day. They generally pick up paper, plastics, metal, glass, rags, etc. Besides the waste-pickers, there are several small waste purchasers, who move from house to house for buying reusable materials.

People working in the informal recycling sector often suffer from harsh working conditions. They are exposed to many health hazards, live in poor conditions, have low



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social status and earn low.

A very large network of urban poor operates in the informal waste collection sector, giving impetus to reuse and recycle of solid waste. But organising them has been a difficult task as the people involved in purchasing recyclable material work against the interests of the waste-pickers. Therefore, quite often, efforts made to organise waste-pickers are sabotaged by such vested interests. However, some initiatives in Ahmedabad, Rajkot, Mumbai, Pune, Chennai, Bangalore, etc. prove that waste-pickers can be organised to ensure them better quality of waste through doorstep collection, which would in turn fetch them better living and dignity of work as waste-collectors or eco-aids.

The role of the urban informal sector workforce in SWM and its cost-effectiveness can no longer be ignored. It is now recognised that this network of urban poor, wherever systematically organised, has yielded remarkable results. It is, therefore, pertinent to launch initiatives that can link mobilisation of citizens, including the waste-pickers, in environmental cleanliness and municipal clean city programmes to bring about changes that benefit all stakeholders in the city.

Institutionalising informal sector

Legitimising or institutionalising the role of informal waste recycling within the municipal solid waste management sector can go a long way to change the lives of waste-pickers significantly. It would require a change in the orientation of solid waste management, as well as an overall change in perception about the informal waste recycling activities.

Waste-pickers may be supported to: form cooperatives, access better equipment, negotiate direct access to waste sources, and generally improve their health, safety and livelihood. Co-operatives are one of the institutions available for organising the rag-pickers at the grass roots. The committee report of 1999 suggested that the urban local bodies encourage NGOs or co-operatives of waste-pickers to enter this field, organise them for doorstep collection of waste and provide them with an opportunity to improve their working conditions and income. The civic agencies can give incentives to NGOs in their effort to organise the waste-pickers in primary collection of recyclable / or organic waste, and provide financial and logistic support to the extent possible.

With a view to initiating a proper waste management system, bio-degradable and non bio-degradable wastes should be segregated at source and arrangements should be made by the municipal corporation to ensure that the two components of waste are not allowed to get mixed up at subsequent stages of waste collection system.

Local bodies can do it

The municipal bodies can also mobilise NGOs to take up the work of organising street waste-pickers and convert them to door-step waste collectors. However, such a service should be provided or may be contracted out on 'full cost recovery basis'. This will improve their working condition by stopping them from collecting soiled and contaminated garbage from refuse bins, streets or dumping sites.

The ULBs can prescribe that the segregated wastes should be collected on door-to-door basis only by licensed doorstep waste collectors or waste-pickers, who should not be employed by the municipal corporation directly, but only by licensed locality-wise residents' associations or NGOs after verification of their antecedents. By making necessary provisions in the waste management bylaws, these licensed doorstep waste collectors can also be authorised to collect monthly service charges for garbage collection at prescribed rates from each household.

This will help raise their social status and self-esteem, improve members' incomes and quality of life in part by circumventing middlemen and improve working conditions, provide institutional frameworks for hiring of waste-pickers by the local bodies/firms, prevent harassment, violence, and eliminate child labour in waste picking.

Initiatives to emulate

Some innovative initiatives by various government as well as non-governmental agencies in various cities demonstrate that innovations are slowly but surely occurring at various levels of urban environment and SWM exercise.

Parisar Vikas initiative

The Municipal Corporation of Greater Mumbai (MCGM), in collaboration with two non-governmental organisations, has developed a comprehensive, socio-economic package for people involved in waste recycling activities. For the first time in Mumbai city, 500

SOFT CORNER

rag pickers



Who are they?

Waste-pickers roam from garbage to pit site to collect materials like plastic bottle, recycle material, metals, glass material, etc., which they exchange with merge sum of money for their livelihood

An exploited lot

Waste purchasers buy recyclable material from waste-pickers at very low costs and pass on to recycling industry at a good profit margin, restricting individual waste-picker's income below Rs 100 per day

Harsh realities

People working in the informal recycling sector often suffer from harsh working conditions, exposing themselves to many health hazards, living in poor conditions and having low social status

women waste-pickers in Deonar area are being adopted by two NGOs with the help of the Municipal Corporation. The features of this programme are -

- » Forming co-operative societies of waste-pickers to help them save their earnings;
- » Setting up Balwadi Kendras (crèche) for their children to mainstream them;
- » Conducting regular health check-up programmes;
- » Marketing and selling usable waste materials collected by them to recycling units; and
- » Strengthening and engaging waste-pickers in vermiculture projects in the city.

The waste-pickers are given a Parisar Vikas identification card jointly by the Solid Waste Management Department of the Municipal Corporation, Stree Mukti Sanghatana and Suvidha. Waste-pickers are also trained in waste recycling practices and organisation of co-operatives, which would market collected waste materials directly to waste recycling units to fetch more money than if sold to regular middlemen dealers in the recycling market. The programme also aims to give legitimacy to the informal waste recycling work to improve their working conditions.

Kagad, Katch, Patra Kashtakari Panchayat

The Kagad, Katch, Patra Kashtakari Panchayat (KKPKP) is a registered association of waste-pickers working in the cities of Pune and Pimpri Chichwad of Maharashtra. The KKPKP was born in 1990 at the SNTD Women's University's National Adult Education Programme, which attempted to organise rag-pickers. With the help of a renowned social worker, Baba Adhav, the Panchayat was formed in 1993. At present, KKPKP is a strong union of 6,500 individuals, working to secure their livelihood, restore dignity, stand

up for rights and set up an organised front for empowerment of the waste-picker community as a whole.

The KKPKP motivated residents to separate waste at source and hand it over to the rag-pickers, who have been provided with identity cards. The waste thus collected has been put to diverse uses, such as vermiculture, composting and production of some consumer items. Various programmes and activities of the KKPKP are also helpful in savings, reducing expenditure on health, education of children and other financial needs. Apart from income generation activities for the rag-pickers, the KKPKP has also introduced social and health insurance schemes, savings linked credit schemes, gold loans, etc. They have also organised several campaigns for education of girls, elimination of child labour and other social issues concerning the rag pickers.

Gitanjali - An Example in PPP

'Gitanjali Industries' in Mumbai is an exceptional example of a public private partnership that is owned by a lady entrepreneur. This privately-owned industry works in coordination with the MCGM for dry waste recycling. It employs 350 waste-pickers, who collect various kinds of wastes, such as mineral water bottles, scrap iron, polythene bags, and e-waste like television, computer screens, electronic parts, etc., from six centres in the city. This is transported to the factory site in six trucks and then sorted by 20 sorters. Each category of waste has its own utility value. The firm has its marketing outlets in cities like Bangalore, Belgaum, Gurgaon, Goa, Jammu, Bhubaneswar, Sambalpur, Ranchi and Mumbai. It has adopted 25 gutters in the surrounding area of its unit, which are cleaned by sweepers. They are also involved in maintaining community bins, from where the dry garbage is collected by the rag-pickers. ■

ZERO WASTE TO LANDFILL

Twenty three Indian cities will each generate more than 1000 metric tonnes of municipal solid waste per day in the next five years. Cumulatively they will generate 93,000 tonnes of municipal solid waste every day. At this scale, solid waste management systems without waste to energy combustion technology, will not be able to safely and economically treat and recover energy from post-recycled waste



Every day, urban India generates 188,500 tonnes of MSW - 68.8 million tonnes per year - and waste generation increases by 50% every decade. Some of this waste will be recovered by an army of informal recyclers - 20% in large and less in smaller cities, cities according to the Chintan Environmental Research and Action Group.

However, more than 80% reaches open dumpsites where it causes damaging public health, deteriorating the environment, and causes climate change.

Scale of problem

Getting an landfill space is hard in and around India's urban centres. Dumpsites are almost overflowing in every city. Finding new landfills near cities is almost impossible due to the sheer lack of space for Locally Unwanted Land Uses (LULUs) like waste management because of the NIMBY phenomenon, the population density and the scale of increasing urban sprawl, and the track record of dumpsite operations and maintenance in India.

From the experiences of second generation waste management facilities in India, built in around the year 2000, the SWM industry learnt that the role of composting in reducing waste sent to landfill was overestimated. Composting was considered to be an obvious choice due to the high organic content (51%) in Indian MSW.

However, due to a lack of source separation, the yield of composting plants or Mechanical Biological Treatment (MBT) was only 6-7% making them economically unfeasible. Rejects from these plants were more than 60% of the input stream - the rest of the mass transfer was in the form of escaped water vapour and CO₂.

Technologies

For the next 20 years, the only way India's large quantities of post-recycled mixed municipal waste can be treated is through a combination of



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MBT, WtE and Sanitary Landfilling (SLF). This is not to discount other technologies which are effective at smaller scale, such as household and institutional scale biomethanation and kitchen waste composting.

Zero waste has become a buzzword in recent years, and is now a widely used term to help drive reduction efforts up the hierarchy. However the definition of 'zero waste' is open to interpretation - often it means simply diverting all waste away from landfill, rather than preventing no waste occurring in the first place. Thus there is a danger that setting zero waste targets as the first step in working towards a circular economy will send out mixed messages about the end goal, especially if its definition is taken to mean different things by different societies and stakeholder groups. Given this, there is a strong argument for developing a zero waste global standard that can act as a valid milestone for circular economy realisation.

It is also worth considering that 'zero waste to landfill' is not a particularly ambitious strategy if it just means most materials are sent for energy recovery, rather than being recycled or reused. There is emerging evidence that energy recovery is being actively discriminated against by some circular economy thinkers, who want to see an acceleration in closed loops for materials, rather than energy. So how to align the more achievable goal of 'zero waste to landfill' - where there are established goals and targets - with circular economy aspirations to design out waste? Will those nations with more mature waste treatment infrastructure find themselves locked into conventional recycling and disposal options going forward, while developing countries seize the opportunity to cult.

Proposing panacea

A clear trend observed during India's recent waste crisis is that the outbreak of epidemics and public protests around happening in

Heaps of trash

Urban India generates 188,500 tonnes of MSW - 68.8 million tonnes per year - and waste generation increases by 50% every decade. However, more than 80% reaches open dumpsites where it causes damaging public health, deteriorating the environment, and causes climate change.

the biggest cities of their respective regions. When looking at converging factors such as improving public health, scale of the problem and the time at hand, there is no confusion about WtE being the solution.

Municipal governments should practice caution in scoping projects, choosing private partners, and carry out transparent tendering processes by hiring knowledgeable consultants.

Meanwhile, the national government must design reasonable and strong regulatory framework for emissions monitoring, and policy for integrating the informal recycling sector. It should not hesitate to seek guidance from other Asian countries which have already passed through this phase of waste to energy development. ■



The Waste CONUNDRUM

An old adage claims that 'haste makes waste'. This can't be truer when applied to Indian cities, especially when it is emphasised that India, hitherto delayed in its urbanisation process, should hurry up and develop



aste is a by-product of living. Expenditure towards commuting, housing, and living in urban areas are accepted as the investment required for attaining a high standard of life. However, no one seems to be sensitive to the ever-increasing costs of natural resources that the fast pace of urban growth is resulting in. The deterioration in clean water, air and surroundings is contributing to higher expenditure in healthcare. The haste in attaining the 'developed' tag and the efforts made at 'Keeping up with the Joneses' is increasing the waste load, thereby affecting the overall quality of life for which people are having to pay a heavy price.

In industrial processes, a by-product is generally fed back into the system or utilised through another process, which then contributes to higher productivity and recovery of vital process-ingredients like catalysts. Most importantly, it reduces waste that needs to be disposed safely, having implications on land and the environment. This approach of minimising wastage and promoting increased utilisation of resources is termed as clean production, which uses clean technology. Hence, it is a vital component of green growth and green economy.

Business owners are willing to invest in clean technology research and infrastructure besides Operation and Maintenance (O&M) costs because in the cost-benefit analysis, clean technology saves the business a substantial amount through reduction in tipping fee for waste and the cost of pollution control,

which is mandated by the country's laws and regulations.

Problems of Municipal Solid Waste Management

Municipal solid waste management involves the management of domestic and commercial waste generated by households and commercial units. The management of wastes like plastic waste, e-waste, drain and silt waste, construction and demolition waste, small and tiny industries waste, bio-medical waste and other such streams of waste get mixed with the municipal solid waste (MSW). Unfortunately, the Urban Local Bodies (ULBs) do not have a clue as to how to manage these various streams of waste. Therefore, instead of utilising or minimising the waste, they try to get rid of it by outsourcing the management of MSW to a concessionaire or sometimes a transporter and a concessionaire for treatment of waste at the dumpsite on payment of huge fees with practically no recovery of resources from the waste.

A complex system

It is not that the ULBs do not know that there is a complex system involving waste pickers, buyers and recyclers. The community can retrieve and reduce approximately 18 to 20 percent of the waste from the domestic and commercial streams of the MSW by segregating and utilising the recyclables. However, the inertia within the ULBs is high to change procedures and change the tendering



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system to include waste retrievers and their collectives for waste management contracts similar to the concessionaire agreements.

The ULBs are also not adept at involving citizens and Resident Welfare Associations (RWA) to compulsorily carry out localised segregation. They also don't deliver different components to waste pickers through door to door collection and establish materials recovery centres in different parts of the city.

Furthermore, the political will in the city councils, to implement actions that would reduce the tipping fee to the concessionaire and instead establish a system which will enhance cost recovery and employment generation, is absent. It is probably because there is an absence for accountability of decision makers from citizens or lack of resistance from RWAs to allow the city administration to make such agreements with concessionaires.

It leads to citizens being forced to bear the brunt of pollution such as emissions from waste incinerators and ground water contamination from dumpsites. Most importantly it leads to corruption within localities where the concessionaire illegally collects a fee from the waste pickers or their collectives to allow them to separate the recyclables from mixed waste at the intermediate storage site.

Bulk generators such as hotels, restaurants, clubs, marriage houses, pandals, large malls, eateries, vegetable, fruit markets and others generate over 50 percent of the waste. They neither pay for their waste to be treated nor deposit it properly in the Dalao. On the other hand, they demand money from the waste pickers for taking their waste since it has many recyclables that the waste pickers can sell at a price.

Waste mountains

In the haste to get rid of waste, cities have created garbage-mountains of 35 metres in height (for example: Ghazipur dumpsite) extending to at least 100 acres. Such mountains have contaminated ground and sub-soil water besides putting out toxic emissions and dust from burning and dumping, all of which have weakened human and animal metabolism and increased our expenditure on healthcare.

The ULBs' claim that they privatize and outsource the management of MSW to waste management companies because their own staff is incapable of handling and managing the growing quantities of waste. It is becoming more complex with many streams of waste

mixing with MSW, distinctly changing the quality of waste.

However, they turn a blind eye to the corruption and indignity that the bulk-generators and concessionaires perpetrate on the waste pickers, who are indirectly trying to help the ULBs in reducing the quantity of waste and facilitating its treatment by segregating the various categories despite non-availability of personal protective gear while they rummage in garbage.

The big picture

It is estimated that the current municipal solid waste generation in India is over 50 million tonnes per year since the average national per capita generation of waste is about 150-160 grams per day. A report on Sustainable Municipal Solid Waste Management by the Earth Engineering Centre (2012) estimates the MSW generation in India to be 68.8 million tons per year with the 53 cities with a million-plus population generating 31.5 million tonnes, about 46 percent of total MSW. Of this, the larger cities alone namely Kolkata, Mumbai, Delhi, Chennai, Hyderabad and Bengaluru account for an estimated 17.5 million tonnes, a quarter of the country's generation of solid waste.

Therefore, it can be said that of the 7935 urban centres enumerated in the 2011 Census about 7882 cities, other than the 53 million-plus cities, are responsible for 37.3 million tons of MSW generation in a year in India. So, many of the smaller cities and towns may be generating only between 5 and 50 tonnes of waste per day.

While the government focuses on solving the issues of large cities generating 5,000 tonnes and above MSW per day, it should not forget to



find sustainable solutions for smaller towns so that they become clean and green, and do not end up like their bigger counterparts as they grow and develop.

It is worth noting that the report of High Powered Expert Committee (HPEC, 2011) constituted by the Ministry of Urban Development estimates that the waste generation in Indian cities will increase five-fold to touch 260 million tonnes per year by 2047. India has to find means of reducing the generation of MSW.

Furthermore, although, the share of paper, plastics, rubber, glass and metals, besides several multi-layered materials is constantly increasing, the share of the biodegradable organic material still remains significant in our cities and towns. In India, more than 50 percent waste is organic, 31 percent inert and 18 percent recyclable (Earth Engineering Centre, 2012). It is apparently clear that half of India's waste is wet waste or biodegradable waste, which can be composted or used for generating biogas and compost. Similarly 18 percent of recyclables can be recovered, if segregated at source and given to waste pickers.

The Twelfth Finance Commission statistics

The community can retrieve and reduce approximately 18 to 20 percent of the waste from the domestic and commercial streams of the MSW by segregating and utilising the recyclables. MSW generation in India is 68.8 million tonnes per year with the 53 cities with a million-plus population generating 31.5 million tonnes, about 46 percent of total MSW. Of this, the larger cities alone namely Kolkata, Mumbai, Delhi, Chennai, Hyderabad and Bengaluru account for an estimated 17.5 million tonnes, a quarter of the country's generation of solid waste.

show that the 53 Class 1A cities received the major chunk of the per capita capital as well as O&M investment of Rs 2444.55 crore

devolved through it for improvement of Solid Waste Management. However, there was significant improvement only in the collection and transportation sector of SWM, and not in segregation, treatment, disposal, recovery or any of the other processes.

Hence, increasing investment either in infrastructure or through PPP may not lead to solving the conundrum. In this approach, local bodies would be accumulating and transferring aggregated mixed waste to a location outside the city, where the residents of that area would be resisting its treatment and disposal as 'Not in my backyard (NIMBY)' since that would pollute their environment.

The calorific value of Indian MSW is also too low for effective incineration and would again involve high costs for controlling emissions, pollution control monitoring and resultant health implications despite all the investments. Trying to retain the dry waste in the MSW for increasing the calorific value, and wastes resources and energy deprives waste pickers and recyclers of their livelihood.

Aggregated mixed waste is worse than the Frankenstein's monster because its by-products like leachates and fumes can annihilate its creator and the subsequent generations. So, treating such waste within the city is inviting disaster. It is being experienced by the residents of Sukhdev Vihar, Delhi. They are close to the waste incinerator at Okhla and have to bear the brunt of pollution from it.

Therefore, the best way would be to compost wet waste at home or within localities and separate the recyclables to be given to the waste pickers and recyclers. The bulk generators would have to be made to pay to have their waste collected and treated. They should also adopt segregation of waste as required by the service provider.

The question is, if we have to spare land in small pockets within the city to treat smaller quantities of source separated waste, can we integrate it with the master plan and allocate the required space for them? The initial answer to this question is a hasty 'No' citing the price of land within the city, intolerance by neighbours, inefficiency of the Municipalities, high-handedness of RWAs and the difficulty in monitoring waste pickers in managing the material recovery centres and composting sites.

Decentralise Waste Management A VIABLE SOLUTION

THE GENERAL POOL Residential Accommodation (GPRA) complex at New Motibagh is 110 acre campus housing about 1000 families of bureaucrats and their domestic helps. The GPRA complex was constructed and maintained by the National Building Construction Corporation (NBCC) Ltd. The NBCC put in place a decentralized waste water and municipal solid waste management system for the houses at New Motibagh and integrated a solar energy street lighting and solar water heating system with the housing plan. The project demonstrates that clean environment is not a burden on the exchequer or the ecosystem.

The direct savings of the decentralised waste water system is Rs 14.60 lakhs per annum on account of saving surcharge of 50 percent on water bill for non-disposal of sewage to municipal system. The recycling of sewage to obtain secondary treated water from the decentralized Sewage Treatment Plant (STP) and using the same for gardening and horticulture in the campus to the tune of about five lakh litres per day saves Rs 27.50 lakhs per annum. Use of sludge cake from the STP for horticulture, is responsible for saving an additional Rs 2 lakhs per annum. The total net saving is Rs 5 lakhs per year after the fixed cost and O&M are deducted.

Solid waste management

The SWM project installed by Green Planet Waste Management Private Limited (operator) in collaboration with the NBCC cost around Rs 20 lakh on account of providing 4000 Square feet for covered sheds. All other expenditure of approximately Rs 50 lakhs.

The total generation of waste from the households and shops is 1.5 MT while the garden waste accounts for another 1 MT. Of the household waste, the wet compostable waste from households is about 1 MT per day which is converted to compost using the Excel method, This is followed by composting in trays kept on racks, humidified and turned daily for about 3-4 weeks. Thereafter it is cured, sieved and packaged to be sold at Rs five per kg.

Similarly, for enhancing segregation of all dry waste at source, a campaign to separate dry waste in homes besides the materials recovery shed would increase the revenue generated from selling recyclables and reducing hazardous components in the compost.

Financial viability

The total monthly expenditure including depreciation, return on investment, management charges, consumables, work force salary, and maintenance, as claimed by the operator, is about Rs 3 lakh. While the monthly revenue generation from sale of 12.5MT of compost (there is a 50-60 percent reduction by weight during composting due to evaporation, and other reasons) at Rs 5000 per MT, and recyclable materials fetches about Rs 2.37 lakh per month. The operator is presently claiming a shortfall of Rs 65,300 per month.

Although, the pellets made from the garden waste like lawn cuttings and garden pruning, using a well-designed garden waste dryer and pellet maker, have not been marketed and are lying packaged at the site. It is estimated that of the 12-12.5 MT of pellets generated per month. This would cover the shortfall and generate a small surplus by yielding Rs 90,000 per month.

The energy savings from the solar street lighting at the GPRA complex, scientifically installed to cover all significant areas of the campus including internal roads, common areas, parking lots and bungalows numbering about 300 street lights, help in saving at least Rs 2.69 lakhs per month or about Rs 32.28 lakh a year. Along with solar water heaters, the savings on electricity is close to Rs 35 lakh a year.

Therefore, a decentralised integrated solid waste, waste water and solar energy project for about 1000 households can achieve clean and green surroundings in addition to financial savings to the tune of Rs 40-50 lakh per annum. This is in addition to achieving green surroundings, ground water recharge and the reduction in carbon footprint, which is yet to be monetised. ■



Behavioural shift necessary

The success of cleanliness drive strongly depends on people's behaviour. Reformation changes in waste disposal practices can be best made when people understand the issue

WITH THE BOOMING populace, cities are witnessing the menace of solid waste more so because there seems a lack of attitudinal as well as motivational desire among the citizens. Although the country in terms of regulation does have the comprehensive Municipal Solid Waste (Management and Handling) Rules, 2000, the absence of proper enforcement and implementation leaves it as just a mere directive on paper.

Almost every Indian city has ongoing waste management projects, but no project is operating at the optimum level. Much has been talked about the issues relating to urban governance, financial health of corporations and marketability of products from recycling, at various forums. But, although waste is a community-based issue, the required bottom-up approach is still amiss from the projects.

The herculean task of managing solid waste cannot be completed without people-led initiatives and involvement of all the stakeholders playing a vital role in its successful implementation. As SWM is a concerted effort of all stakeholders - civic agencies, RWAs, communities, rag-pickers, NGOs, private parties and the government - each one has to play a pro-active role to make it a success.

NGOs have always proved to be a major catalyst in mobilising community action. They have the expertise to systematically initiate the programme, put the system in place, monitor its progress and provide valuable guidance.

Although seldom counted, informal sector contributes substantially to waste management. Similarly, residents' welfare associations can play a crucial role in awareness generation on segregation at source and making waste generators part of the waste handling process.

Information about such projects should, however, be disseminated properly before their execution, so as to obtain the desired results. Public at large need to be educated and informed about the economics of a joint effort, which would result in huge savings by way of utilisation at source, leading to reduction in manpower, transportation, health services and creation of livelihoods for the weaker sections of the society.

Now, with the Swachh Bharat Mission being flagged off on Mahatma Gandhi's birth anniversary, what needs to be monitored is the consistency of the cleanliness drive and the zeal among the citizens along with the authorities to make the country a spic and span soon. ■

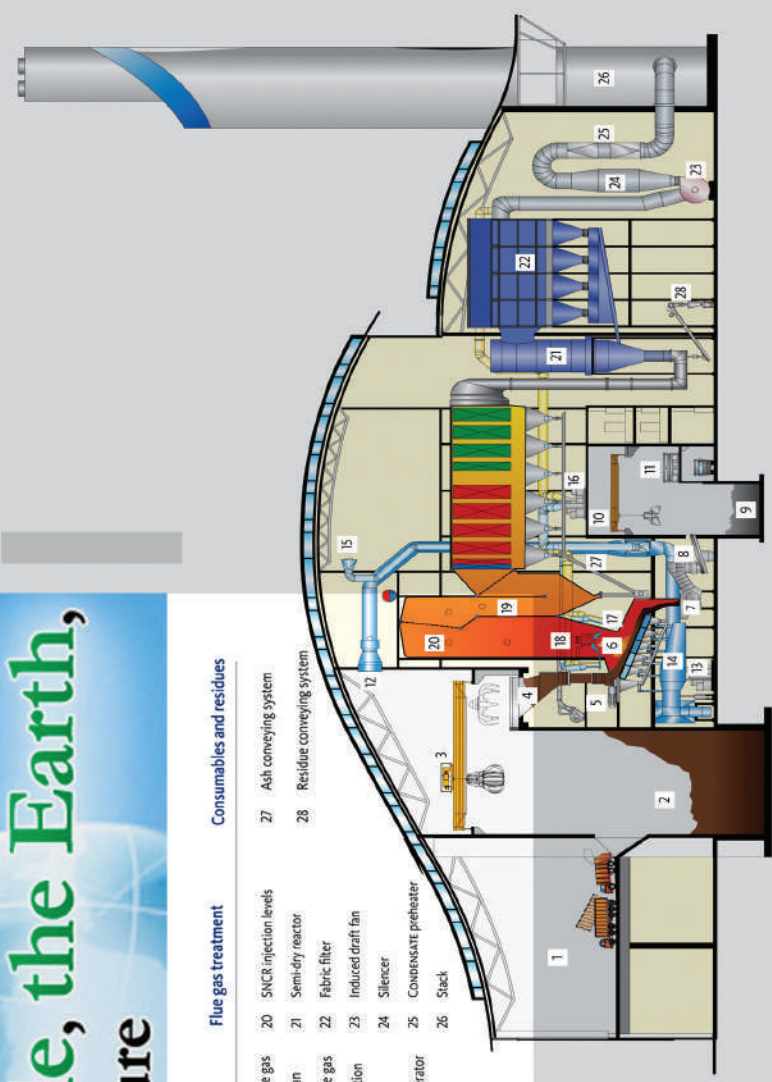
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1	Tipping hall	4 Feed hopper	20 SNCR injection levels	27 Ash conveying system
2	Waste pit	5 Ram feeder	21 Semi-dry reactor	28 Residue conveying system
3	Waste crane	6 Hitachi Zosen Inova grate	22 Fabric filter	
		7 Bottom ash discharger	23 Induced draft fan	
		8 Bottom ash conveyor	24 Silencer	
		9 Bottom ash pit	25 COMPENSATE preheater	
			26 Stack	
		10 Bottom ash crane		
		11 Bottom ash loading station		
		12 Primary air intake		
		13 Primary air fan		
		14 Primary air distribution		
		15 Secondary air intake		
		16 Secondary air / flue gas gas recirculation fan		
		17 Secondary air / flue gas recirculation injection		
		18 Start-up burner		
		19 4-pass steam generator		



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