

GURUGRAM HANDBOOK ON WASTE MANAGEMENT

A handbook on waste management;
issues and solutions and key
stakeholders in the industry



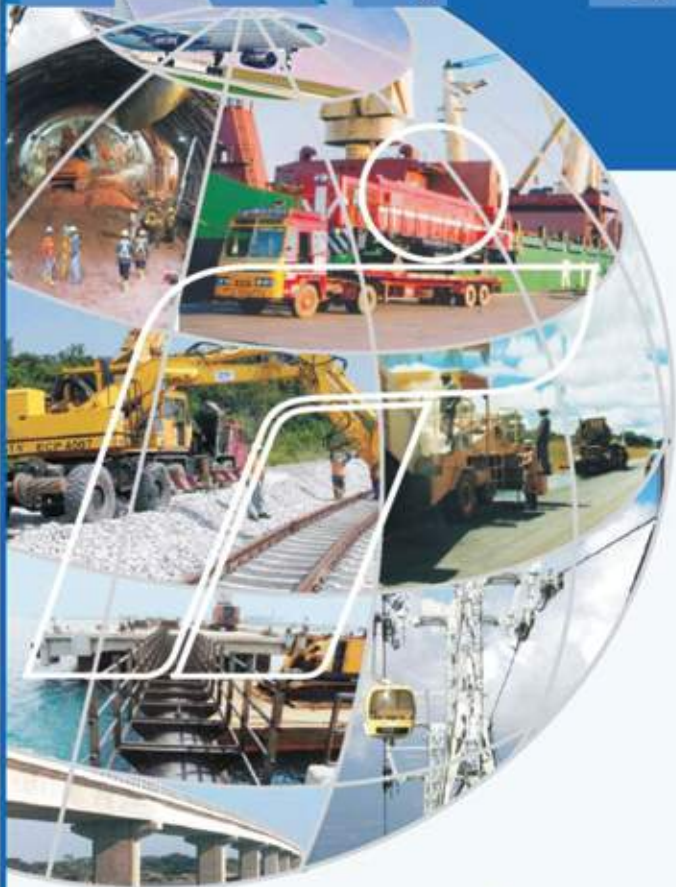
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in association with



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RAO INDERJIT SINGH



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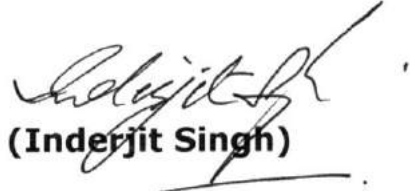
MESSAGE

The mission of achieving “swachhata” in India, as propagated by the Swachh Bharat Mission (SBM), which aims to make India a clean and open defecation free nation by October 2019, needs to become a ‘jan andolan’ with participation from every stakeholder. It is heartening to note that the mission has caught the imagination of citizens across the country.

In this regard, while municipal efforts are on track to achieve the objective of complete scientific solid waste management under the mission, stakeholder participation is critical to ensure a comprehensive approach to the same. Today, we are faced with nearly 80 per cent of generated solid waste going unprocessed. This is compounded by rapid urbanisation, increased rural-urban migration and the complexity of waste management in largely unplanned and expanding cities.

Gurugram, a millennium city with its dynamic population and constantly evolving infrastructure, is an example of a city that requires concerted efforts from all stakeholders to ensure that waste is managed in a sustainable manner. Given this, it gives me immense pleasure to see the *Gurugram Handbook on Waste Management 2017-18* brought out by *Gurgaon First* that provides a primer on waste management solutions, initiatives being taken in Gurugram in waste management as well as the local players in the waste management industry.

I am hopeful that this handbook will inspire and encourage different stakeholders to adopt sustainable solution in waste management in their own spheres and thereby further strengthen the implementation effort culminating towards achievement of envisioned targets under SBM.


(Inderjit Singh)



RECYCLE TODAY, FOR A CLEANER TOMORROW

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FOREWORD

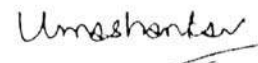
This book titled, Gurugram Handbook on Waste Management, is an outcome of very thorough and sustained research efforts by the authors.

The Handbook rectifies a significant gap in the theoretical as well as practical aspects of waste management at local level. While it dwells on the sectoral basics and contextual information of Gurugram in the initial chapters, the later section deals with available solutions and vendors for waste management solutions.

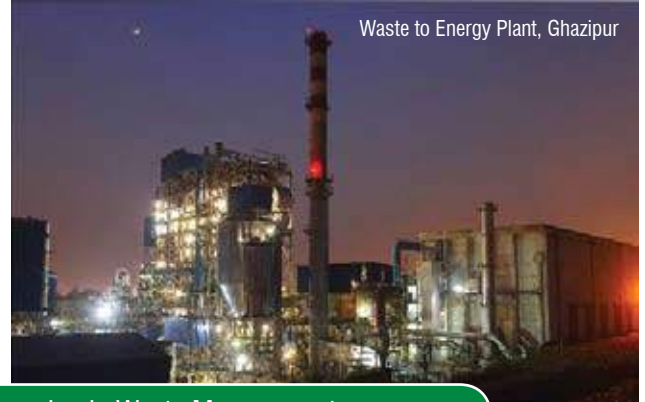
Segregation at source is being accepted as the only viable solution to tackle the issues of waste dumping, expanding landfills and the resulting ecological imbalances. Municipal Corporation, Gurugram seeks to crystallise waste management initiatives being taken up across the city. In this regard, appreciable work has been done by RWAs in Nrivana Country and Hamilton Court among others, however it was felt that a holistic end-to-end strategy will have to be built for such local initiatives to be scaled up, popularised and adopted across the city.

The upcoming waste portal is thus expected to be a single stop for all needs of the enthusiastic residents and RWAs pertaining to best practices; funding and support from MCG; technical guidance; and, information, education, communication (IEC). Such efforts are expected to be suitably supplemented by this handbook as a ready reckoner and a reference book for the residents.

Gurgaon First deserves to be congratulated for making an industrious and dedicated effort in preparation of this Handbook. An extensive approach has been adopted in researching the relevant topics of waste management. An insightful analysis of the various paradigms, methods and solutions has been served in lucid manner. This would help the environmentally conscious RWAs and residents to assess their current situation and choose among the various outlined approaches for achieving a minimum waste generation level.

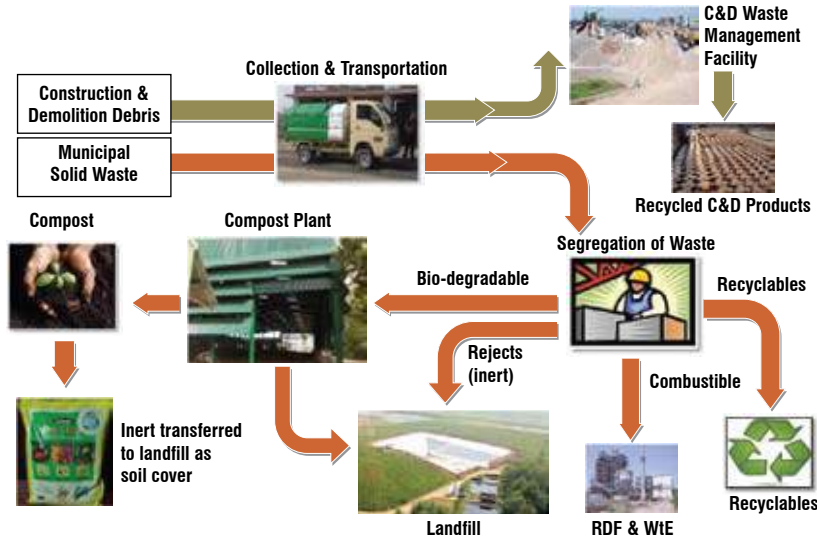

(V. Umashankar)

Commissioner
Municipal Corporation, Gurugram



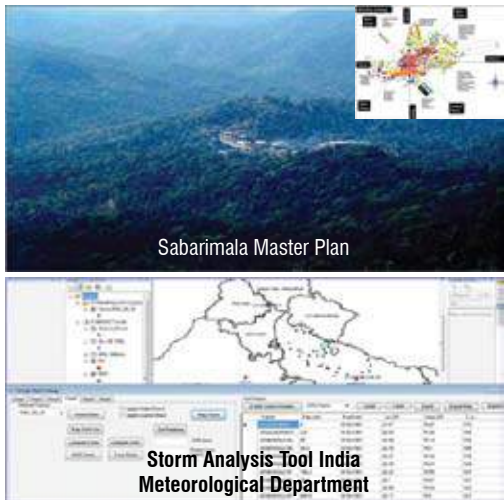
- ❖ Amongst the first to mainstream Carbon financing in Waste Management
- ❖ Over 14000 tons per day (TPD) of waste management mandates across 33 sites in 10 States
- ❖ Established benchmarks in Integrated Waste Management (IWM)

Integrated Municipal Solid Waste Management



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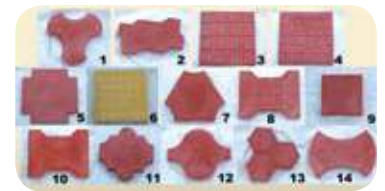
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Preface

For a long time, we have lived in denial as far as “waste” is concerned. It suffered from the syndrome “out of sight, out of mind”. We thought, once it is out of our household, the problem is “not ours”. And, that waste was indeed just waste. Today, we recognise the fact that waste is indeed “our problem” as its effects creep back to pollute the water we drink and the air we breathe. We recognise that waste can indeed be a resource. And most importantly, we recognise that all stakeholders have a role to play in its management.

Gurgaon First is delighted to launch its second handbook on Gurugram after the solar handbook. Titled ***Gurugram Handbook on Waste Management 2017-18***, this book attempts to inspire and encourage stakeholders to move towards sustainable solutions in waste management. The book is a useful compendium of facts and statistics as well as opinions on the waste sector. It is also very timely since many new policies on waste management were announced in 2016 and the “Swachh Bharat Mission” is in full swing too.

The Handbook has five distinct sections. The first section “**Waste Overview**” covers sectoral basics. The second section “**Gurugram Scenario**” provides an exclusive update on waste management in Gurugram, progress made and the way forward. The third section “**Expert Opinion**” should help generate insights. The fourth and fifth sections “**Waste Directory**” and “**Gurugram Stakeholder Directory**” list, respectively, the players in the waste industry and the stakeholders interested in sustainable waste solutions.

We are thankful to MCG for its extensive support in bringing out this handbook. We are also thankful to our advertisers for supporting us. A vote of thanks is further due to several national and local waste experts for their valuable contributions, suggestions and insights. Finally, we thank the students of North Cap University as well as SOIL for assisting us with our research.

We hope the Handbook helps improve awareness about waste issues and inspires stakeholders to work together for more effective solutions. In particular, we hope that reading the various success stories inspires residents across the city to ensure that the bulk of their waste is treated at the household and community levels, so that minimum reaches the landfill site. Many cities across India have demonstrated encouraging progress in waste management. It’s time Gurugram too shows the way.

Team
Gurgaon First

Feedback Foundation has been impacting more than a **million lives** across **7 Cities** through **sustainable solutions!**

- Worked with several Municipal Corporations in cities like **Bhopal, Delhi, Gurugram, Indore, Karnal, Nanded and Puri** for implementing sustainable sanitation solutions.
- Providing technical support to ULBs to improve their expertise, efficiency and enforcement in urban sanitation.
- Demonstrating decentralized solid waste management as a **replicable and scalable model**.
- Undertaking other components of sanitation, such as facilitating **Open Defecation Free (ODF) slums**.

ALIGN with existing Government programmes and policies

ASSOCIATE with Government departments at all levels

ADOPT best practices – local & global

AVOID non-scalable projects that cannot be aligned with Government schemes

ASSIMILATE learning from the pilot into the scaling-up plan

ADVOCATE learning from the pilot in all forums to impact policy

ATTAIN Sustainable Development Goals



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WASTE OVERVIEW



बढ़ाकर हाथ, जीवन बदलते...



...हर ओर मुस्कान फैलाते!

भारत की केन्द्रीय विद्युत पारेषण युटिलिटी के रूप में पावरग्रिड ने हमेशा उपेक्षित और लाभवंचित वर्गों को समावेशी सामाजिक – आर्थिक सशक्तीकरण के प्रति अपनी वचनबद्धता सिद्ध की है। कंपनी ने ऐसी सार्थक और उच्च प्रभाव वाली परियोजनाओं पर कार्य किया है जो पावरग्रिड कार्यक्षेत्रों के आस-पास रहने वाले समुदायों के जीवन के लिए समृद्धिकारी हैं। यह राष्ट्रीय कल्याण कार्यक्रमों जैसे स्वच्छ भारत अभियान और अन्य में सदैव आगे रहा है।

- कई राज्यों के सरकारी स्कूलों में शौचालयों का निर्माण द्वारा "स्वच्छ भारत अभियान" में भाग लिया।
- सड़क, पुलिया, ड्रेनों, कम्युनिटी सेंटर्स, तालाबों आदि का निर्माण।
- गांवों में सौर फोटोवोल्टिक स्ट्रीट लाइट व हैंडपंप।
- वॉटरशेड प्रबंधन।
- स्कूल में बुनियादी सुविधा का विकास।
- निर्धन छात्रों को छात्रवृत्तियां।
- युवाओं के लिए उद्योग रोजगार / स्व रोजगार के लिए कौशल विकास प्रशिक्षण।
- अक्षमता वाले व्यक्तियों के लिए सहायता और उपकरण का वितरण।
- विभिन्न स्थानों में स्वास्थ्य जांच शिविर।
- अस्पतालों के लिए एम्बुलेंस और उपकरणों की आपूर्ति।
- एम्स, नई दिल्ली में "विश्राम सदन" का निर्माण।



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Issues and Challenges

Make cities and human settlements inclusive, safe, resilient and sustainable

– *Sustainable Development Goal 11 of United Nations*

One of the byproducts of economic growth, industrialisation and population increase has been increasing quantities of waste, so much so that waste has today become a threat to the environment and life itself. Half of the world's population lives in cities and in many developing regions less than half of solid waste is safely disposed off. India holds the place of the third largest waste generator after China and US. The country is urbanising at a brisk pace and as per 2011 census, 377 million (31 per cent) of India resides in urban areas. The number is expected to increase to 600 million by 2031.

Waste comprises primarily of municipal solid waste (MSW); industrial waste, construction & demolition (C&D) waste, sewerage (wastewater), biomedical waste and e-waste. The per capita solid waste generation is on an average 450 grams per person per day and is increasing by 1.33 per cent per annum. In volume terms, waste generation has been increasing by 5 per cent annually in the last decade.

As per the Ministry of Environment, Forest and Climate Change, 62 million tonnes of waste is generated everyday by the 377 million people living in urban India. Of this, 43 million tonnes is collected, 11.9 million is treated and 31 million is dumped in landfill sites, which means that only about 75-80 per cent of the municipal waste gets collected and only 22-28 per cent of this waste is processed and treated.

The rest arguably goes to landfills or dumping sites leading to problems of health and environmental degradation. In several cities, the landfill sites have been exhausted with no space to accommodate fresh waste. Besides, most of the landfills in India have not been built according to accepted specifications. Nearly 20 per cent of methane gas emissions in India is caused by landfills. Instead of constructing new landfill sites, the focus should be looking into in-

novative methods to dispose and recycle waste. If its “business as usual”, the total waste generation is projected to be 165 million tonnes by 2031 (that would need 66,000 hectares of land for a landfill for 20 years with 10 metres of height) and 436 million tonnes by 2050.

Being part of public health and sanitation, waste as per the Indian Constitution, falls under the “state list”. Its management is entrusted to the Urban Local Bodies (ULBs). In fact, waste is one of the most important obligatory functions of the ULBs and invariably most of them find themselves lagging in discharging their duties due to lack of financial and institutional bandwidth.



It is estimated that the ULBs spend about Rs 500 to Rs 1,500 per tonne on solid waste for collection, transportation, treatment and disposal. About 60-70 per cent of this amount is spent on waste collection, 20-30 per cent on transportation and less than 5 per cent on final disposal. Hardly any attention is given to scientific and safe disposal of waste.

To be sure, most Indian cities are lagging in the minimum standards of collecting, transporting, treating and disposing waste. There is very little segregation of organic waste and recyclables, no proper sweeping of streets, transportation of waste is in open trucks and unscientific waste disposal is a norm rather than an exception. The concept of 3Rs (reduce, reuse, recycle) is seldom used in practice, despite being an integral part of the policy framework.

Still though limited, but commonly practiced waste disposal processes in India include composting, bi-methanation and incineration of refuse derived fuel (RDF) pellets for power generation. As per information available for 2013-14, compiled by Central Pollution Control Board, municipal authorities have so far set up 553 compost and vermi-compost plants, 56 bio-methanation plants, 22 RDF plants and 13 power plants from waste in the country.

The legal and policy framework for waste is improving over the years but implementation remains poor. A string of new, stringent and more comprehensive national waste policies were announced in 2016. These are the Plastic Waste Management Rules, 2016; the E-waste (Management and Handling) Rules, 2016; the Biomedical Waste Management Rules, 2016; the Construction and Demolition Waste Management Rules, 2016; the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016; and, the Solid Waste Management Rules, 2016.

Besides, there have been progressively stricter norms for the sector (especially for industrial and hazardous wastes). Public interest litigations and the rulings of the courts (Supreme Court) and the National Green Tribunal are also on the rise.


There is private sector interest in the waste sector

though not to desirable levels. For instance, in some cities such as Mumbai, Chennai, Delhi, Bangalore, Hyderabad, Ahmedabad, waste disposal is done by Public Private Partnerships (PPPs). The private sector has been involved in door-to-door collection of solid waste, street sweeping, secondary storage and transportation and for treatment and disposal of waste. Some private firms are carrying out integrated municipal waste management as well. However, there are serious barriers to private sector participation as the financial status of urban local bodies is precarious and urban sector is seen as a very high-risk sector given the institutional complexity due to multiplicity of agencies. Further, there is lack of a regulatory or policy enabling frameworks.

Launched on October 2, 2014, the “Swachh Bharat Mission” was created to tackle waste management, cleanliness and sanitation on a national level. The campaign is expected to be completed by 2019. Through this initiative, the government aims to uplift the sanitation standards of all 4041 statutory towns in the country. The total cost of the mission is estimated at Rs 620 billion out of which the central government will contribute about Rs 146 billion.

Some other centrally driven government programmes with waste management as an integral component have been the Smart Cities Mission, the Atal Mission for Rejuvenation and Urban Transformation and the Jawaharlal Nehru National Urban Renewal Mission. Besides, the government has extended financial assistance to waste-to-energy projects. Projects under the PPP mode have also been initiated.

However, waste management in India needs intervention beyond investment, technology and infrastructure. It needs a more deeper upliftment of collective consciousness of the society given the socio-cultural realities. A multi-pronged, multi-stakeholder approach is the need of the hour. Involvement of all stakeholders including municipalities/gram panchayats, RWAs, CSR managers, NGOs, architects and citizen groups is a must. Some of the elements that will improve the scenario are strict implementation of policies by local bodies, segregation of waste at source, decentralising processing of waste, increasing recycling capacity, active participation by civil society and integration of garbage pickers, *kabadiwalas*, informal workers and ragpickers into waste management plan. ❖



Waste management in India needs intervention beyond investment, technology and infrastructure. It needs a more deeper upliftment of collective consciousness of the society.

Types of Waste

Waste is defined as material that no longer serves a certain purpose and is thus thrown away. Certain types of waste material can be re-used and certain types are particularly hazardous. If not disposed properly, waste has a very negative impact on the environment and health. It is important that waste can be recycled and reused. In this section, we list out the main types of waste, their characteristics and the challenges they pose.

Municipal Solid Waste

All types of solid waste generated by households and commercial establishments is termed as municipal solid waste (MSW). The composition and characteristics of municipal solid wastes vary throughout the world. Even in the same country it changes from place to place, depending on factors such as social customs, standard of living, geographical location, climate etc. MSW is heterogeneous in nature. The composition of an average domestic dustbin can be broken down as follows; vegetable waste (23 per cent), paper/cardboard (30 per cent), inert material including dust, cinders and miscellaneous (21 per cent), glass (10 per cent), tin aluminium and other metals (9 per cent), plastics (4 per cent) and textiles (3 per cent).

It is noticed that the proportion of paper and packaging waste increases with increasing national income and the proportion of putrescible organic matter (food waste) is greater in countries of low income than those of high income. In India, the biodegradable fraction is quite high, essentially due to the habit of using fresh vegetables.

Segregation of waste at source primarily dry waste and wet waste is desirable. While wet waste can be composted, much of dry waste such as paper etc. can be recycled. Inorganic, dry waste sometimes loaded with hazardous substances such as batteries, fused bulbs etc. that needs to be separated and disposed separately through community level collection drives with approved recyclers. Once seg-

Key characteristics of contracts in Municipal Solid Waste Sector

MSW Management & Operation	Characteristics	Relevant Contract Models	Implementing ULBs
Collection and Transportation	Large and diverse workforce, vehicles and equipment; Intensive logistics; Citizen interface; Investment ranges widely depending on scope of work	Service contracts; Management contracts; Concession contracts	Bangalore, Surat, Chennai, Ahmedabad, etc.
Street sweeping	Labour intensive; Minimal investment in tool and equipment; Limited technical skills; Logistics intensive	Service contracts	Delhi, Hyderabad, Chennai, Rajkot, Surat etc.
Transport	Capital intensive; Fleet management skills	Concession contracts	Bangalore, Delhi, Chennai, Surat, Ahmedabad, etc.
Processing/ disposal	Capital intensive; Technical skilled staffing required; Experience of technology deployed	Concession contracts (Design build operate [DBO], Build own operate [BOO], Design build own operate transfer [DBOOT])	Surat, Pune, Delhi, Hyderabad, Coimbatore, etc.

Service Contract: The private sector provides a clearly defined service to the public partner; **Management Contract:** The private partner is responsible for operating and maintaining the system; **Concession Contract:** A concession gives a private concessionaire responsibility not only for operation and maintenance of the assets but also for financing and managing all required investment for a fixed period of time.

Source: Manual on Municipal Solid Waste Management, MoUD

regated, bio-degradable waste can be processed through composting, vermi-composting, bio-gas and Refuse Derived Fuel (RDF) that uses waste to generate energy. At the disposal sites too, there could be composting sites or sanitary landfills or incinerators.

The local authorities are responsible for the development of infrastructure for collection, storage, segregation, transportation, processing and disposal of MSW. About 42 million tonnes of MSW is generated in the country. The per capita solid waste generation ranges between 0.2 kg and 0.6 kg per day and is growing by 1.33 per cent every year.

C&D Waste

Construction and Demolition (C&D) waste is waste generated in the construction, maintenance and disposal phases of a building including waste from demolished structures, renovations in the real estate sector and construction and repair of roads, flyovers, bridges, etc. It consists mostly of inert and non-biodegradable material such as concrete, plaster, metal, wood, steel plastics, earth, stones, roofing material, bricks, rubble etc. These wastes are heavy and occupy considerable storage space, either on the road, landfill, water bodies, open space, floodplains or communal waste bin/container. It is not uncommon to see huge piles of such waste, stacked on roads especially in large projects, or dumped by contractors in low lying areas.

There are no official estimates of the amount of C&D waste generated in India. The Centre for Science and Environment's report in 2014 notes: "The total C&D waste generated in India just by buildings in



one year – 2013 – amounts to a humungous 530 MT". This figure has been ratified by the Environment Ministry. Some studies suggest that C&D waste account for 25 per cent of all waste in cities and cause about 20 per cent of pollution in big cities.

In India, while technically and legally there are no issues in using recycled C&D waste, the problem is red tape and lack of will. Some architects however have now started to reuse C&D waste in their buildings. The Sehgal Foundation building in Sector 44, Gurugram has innovatively recycled and utilised its own construction waste in the building itself.

C&D waste can be used in the following manner. Concrete and masonry waste can be recycled by sorting, crushing and sieving into recycled aggregate. This recycled aggregate can be used to make concrete for road construction and building material. Plastics, broken glass, scrap metal etc. can be used by recycling industries. Rubble, brick bats, broken plaster/concrete pieces etc. can be used for building activity, such as, levelling. Larger unusable pieces can be sent for filling up low-lying areas. Fine material such as sand, dust etc. can be used as cover material over land fill.

E-waste

The term "e-waste" is an abbreviation of used electrical and electronic equipments such as IT and communication, technology equipment such as personal computers, laptops, notebooks, calculators, ipads, telephones etc. and also consumer electronics such as television sets, air conditioners, refrigerators and washing machines. E-waste is growing exponential-ly because global consumer demand is rising.

India, being the world's second largest mobile market is also the fifth largest producer of e-waste. It discards about 15-18 lakh tonnes of e-waste each year and e-waste is estimated to be growing by 30 per cent each year in India. It is not the volume alone, but also the nature of toxicity that is a concern. For instance, 5000 mobile phones contain 100 kg of copper, 1.5 kg of silver, 0.34 kg of gold and 0.14 kg of palladium.

Currently, due to lack of awareness, e-waste items are not being disposed off in a scientific manner and often land up at landfills. Toxic substances like cad-

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WASTE TYPE	TECHNOLOGY AND EQUIPMENT OFFERED BY ALFA THERM	APPLICATION
Organic Waste	1. Small composting machines from 25 kgs per day to 2000 kgs per day. The composting machines are fully automatic and reduce the organic waste by upto 90%. The balance 10% is high quality compost that can be used for gardening.	RWA, Schools, hotels, Group Housing societies, clubs, office canteens, corporate Kitchens, Canteens, Temples and similar establishments
	2. Medium Scale Composting plants from 2 tons per day to 50 tons per day based on mechanical composting equipment and windrows composting.	Town Panchayats, Town Municipal Councils
	3. Bio Methanation plants. These plants generate methane out of organic waste decomposition and the same can be used as biogas or converted to electricity. Plants are manufactured from 100 kgs per day to 50 tons per day.	Town Panchayats, Town Municipal Councils, Agricultural produce markets, Municipal Corporation
	4. Large Scale Composting plants from 50 tons per day to 2000 Tons per day. Mechanized composting plants based on windrows aerobic composting.	Town Municipal Councils and Municipal Corporations
Medical Waste	1. Sanitary Napkin Incinerators. Automatic wall mounted incinerators for easy disposal of sanitary napkins	Schools, Hostels, colleges, Hospitals and similar establishments
	2. Incinerators. High temperature incineration of medical waste in compliance to the CPCB norms and guidelines.	Hospitals, Medical colleges, Laboratories, research Institutes and similar establishments
	3. Shredders. For size reduction of sterilized plastic medical waste to avoid being reused in its original form	Hospitals, Medical colleges, Laboratories, research Institutes and similar establishments
Plastic waste	Shredders. For size reduction and recycling the waste into useful byproducts	Wherever possible
Human Waste/ Sewage	Ecofriendly Bio-toilets. DRDO TOT holder manufacturing high technology bio-digestor toilets for disposal of human waste	Sewage Treatment

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mium, mercury, palladium, rhodium and lead solder are contained in electronic equipment, which, if thrown away without being recycled, can leak into the environment leading to air, water and soil contamination. Plastic waste can be a threat to the stray animals. Besides, due to dumping, natural resources cannot be conserved.

Metals such as copper, silver, gold, lead, cadmium, ferrous metals, chromium, could be recoverable and recycled. Different parts comprising hazardous substances such as mercury, separation of plastic, segregation of ferrous and non-ferrous metals and printed circuit boards can be dismantled at the start of the recycling process. Informal recyclers use unsafe methods such as acid stripping and open air incineration for processing e-waste.

Hazardous Waste

Hazardous waste means any waste, which by reason of characteristics, such as physical, chemical, biological, reactive, ignitable, toxic, flammable, explosive or corrosive, causes danger to health or environment. Unlike household waste, hazardous waste can be extremely harmful and toxic. As per the information furnished by Central Pollution Control Board in 2015, the total hazardous waste generation in the country is 7.46 million metric tonnes per annum from about 44,000 industries. Hazardous waste treatment has been a flourishing industry in India and large quantities of such waste are imported for recycling and treatment.

Unscientific disposal of hazardous and other waste through burning or incineration leads to emission of toxic fumes comprising of dioxins & furans, mercury,

heavy metals, causing air pollution and associated health-related problems. Disposal in water bodies, or in municipal dumps leads to toxic releases resulting in degradation of soil and water quality. The workers employed in such unscientific practices suffer from neurological disorders, skin diseases, genetic defects, cancer etc. Hence, there is a need for systematic management of hazardous and other waste in an environmentally sound manner by way of prevention, minimisation, re-use, recycling, recovery and utilisation.

The hazardous waste can be disposed at captive treatment facility installed by the individual waste generators or at Common Hazardous Waste Treatment, Storage and Disposal Facilities (TSDFs). There are currently 40 TSDFs in the country.

The total hazardous waste generation in the country is 7.46 million metric tonnes per annum from about 44,000 industries. Its unscientific disposal causes air, water and soil pollution and a variety of health problems.

Hazardous wastes such as lead acid battery scraps, used oil, waste oil, spent catalyst etc. and other waste such as waste tyres, paper waste, metal scrap etc. are used as raw material by the industries involved in recycling of such waste and as supplementary resource for material and energy recovery. There are about 1080 registered recyclers; 47 cement plants permitted for co-processing; and about 108 industries permitted for utilisation of hazardous waste.

Plastic Waste

Plastic has multiple uses. Its physical and chemical properties has lead to commercial success. However, the indiscriminate use of plastic has become a major threat to the environment. Around 15,000 tonnes of plastic waste is generated every day in India, out of which 9,000 tonnes is collected and processed, but 6,000 tonnes of plastic waste is not being collected. About 40 plastic carry bags per week

enter an average household in a city. In particular, the plastic carry bags are the biggest contributors of littered waste and every year, millions of plastic bags end up into soil, water bodies and water courses.

Biomedical Waste

Biomedical waste comprises human and animal anatomical waste, treatment apparatus like needles, syringes and other materials used in health care facilities in the process of treatment and research. This waste is generated during diagnosis, treatment or immunisation in hospitals, nursing homes, pathological laboratories, blood bank, etc. It is estimated that 85 per cent of the hospital waste is non-hazardous, 15 per cent is infectious/hazardous. Improper disposal increases risk of infection; encourages recycling of prohibited disposables and disposed drugs; and develops resistant microorganisms. Scientific disposal of biomedical waste through segregation, collection and treatment in an environmentally sound manner minimises the adverse impact on health workers and on the environment. A biomedical waste treatment facility typically comprise of an autoclave (uses steam to disinfect), incinerator and shredder.

Total biomedical waste generation in the country is 484 tonnes per day (TPD) from 1,68,869 healthcare facilities (HCF), out of which 447 TPD is treated. The hospitals servicing 1000 patients or more per month are required to obtain authorisation and segregate biomedical waste into 10 categories, pack five colour backs for disposal. There are 198 common bio-medical waste treatment facilities (CBMWF) in operation



and 28 are under construction. 21,870 HCFs have their own treatment facilities and 1,31,837 HCFs are using the CBMWFs.

Wastewater

Wastewater can originate from a combination of domestic, industrial, commercial or agriculture activities, surface runoff or storm water and from sewer inflow. Municipal wastewater (also called sewage) is usually conveyed in a combined sewer and treated at a waste water treatment plant. Sewage is contaminated by feces or urine from people's toilets. Due to absence of sewer lines, untreated wastewater flows into storm water drains posing a serious health hazard.



It is estimated that less than 20 per cent of domestic and 60 per cent of industrial wastewater is treated. Large cities are treating only about 29.2 per cent of their wastewater; smaller cities treat only 3.7 per cent of their wastewater. To be sure, an estimated 38,354 million litres per day (MLD) sewage is generated in major cities of India, but the sewage treatment capacity is only of 11,786 MLD. Central Pollution Control Board studies depict that there are 269 sewage treatment plants (STPs) in India, of which only 231 are operational, thus, the existing treatment capacity is just 21 per cent of the sewage generation. Conventionally, sewage is collected and transported to a centralised treatment plant, which is resource intensive. Now, the focus is to have decentralised plants. Worryingly, millions of small-scale farmers depend on wastewater to irrigate high-value edible crops for urban markets due to lack of irrigation water. ❖

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Role of Different Stakeholders in Waste Management

Role and Responsibilities	Stakeholders
Make laws and rules; frame policies; prepare guidelines, manuals, and technical assistance; provide financial support; monitor implementation of laws and rules.	Central Government
Advice central government on water and air pollution, set standards, coordinate the activities of and provide technical assistance to State Pollution Control Board and review their proposals.	Central Pollution Control Board
Make state-level laws and rules; frame policies; prepare guidelines, manuals, and technical assistance; provide financial support; monitor implementation of laws and rules.	State Government
Enforce the rules in their state, monitor environmental standards and standards of waste disposal and processing sites, examine proposal for authorisation, advice state governments on pollution control or location of industry.	State Pollution Control Board
Collect, transport, treat, and disposal of waste; plan for waste treatment facilities; frame by-laws; levy and collect fees; finance solid waste management (SWM) system implement policies, monitor the sanitation works, prepare SWM plan, conduct stakeholder consultation, direct waste generators not to litter and promote setting up recycling facilities, organise and integrate ragpickers.	Municipal Authorities
Interface between citizens and local bodies, facilitate in creating awareness and involve in sanitation assessment in their wards.	Councillors
Introduce efficiency and standards, training and motivation of contractual staff, improved wages and working conditions, improve technology and processes.	Waste Contractors
Form ragpickers association, initiative capacity building on alternative livelihood, work with local government and NGOs to ensure basic facilities.	Ragpickers
Mobilise communities for decentralised treatment, conduct awareness workshops, training and capacity building, mobilise financial support for communities.	Non-government Organisation/ Community-based Organisation
Carry recycling at different stages – collection, transportation and disposal site.	Waste Recyclers
Implement the 3Rs, initiate waste management projects, coordinate with authorities, build awareness in their community.	Market Associations and Industry Associations
Promote awareness among employees, undertake CSR projects in waste, help organise rag pickers, contribute in city cleanliness drives, conduct business and industry seminars.	Corporates/Business houses and Industry
Implement the 3Rs, initiate waste management, conduct awareness campaigns.	Educational Institutions
Facilitate information dissemination, build awareness on key issues and policies.	Media
Keep surroundings and work places clean, segregate waste at source, initiate household composting, dispose garbage in designated places, practice the 3Rs of waste management, modify shopping habits to reduce packaging waste, reuse old items as much as possible both at homes and offices.	Citizens

Policy Highlights

Waste management is governed by various legislations by the Ministry of Environment, Forest and Climate Change (MoEF&CC). The Central Pollution Control Board (CPCB) and the State Pollution Control Boards (SPCBs) form part of the regulatory framework. The policy around waste has increasingly become more stringent as evident by the recent policy announcements and some decisions of the Supreme Court of India as well as of the National Green Tribunal. India suffers from weak implementation of these laws. Given below are the main highlights of major policies in waste sector in India.

Central Rules and Act

Solid Waste Management Rules, 2016

The MoEF&CC has revised solid waste management Rules after 16 years. The earlier Rules were **Municipal Solid Waste (Management and Handling) Rules 2000**. The new Rules just like the previous Rules focus on segregation and treatment and to avoid landfilling. They broaden applicability by covering all types of urban agglomerations, clearly list out the role and responsibility of diverse stakeholders, recommend the formation of state level advisory body and mandate submission of annual reports by Urban Local Bodies (ULBs) and treatment plant operators and propose home composting as an integral option. Its salient features are:

1. The Rules are now applicable **beyond municipal areas** and extend to urban agglomerations, census towns, notified industrial townships, areas under the control of Indian Railways, airports, airbase, port and harbour, defence establishments, special economic zones, state and central government organisations, places of pilgrims, religious and historical importance.
2. The **source segregation of waste has been mandated** to channelise the waste to wealth by recovery, reuse and recycle.
3. **Responsibilities of generators** have been introduced to segregate waste in to **three** streams, wet (biodegradable), dry (plastic, paper, metal, wood, etc.) and domestic hazardous wastes (diapers, napkins, empty containers of cleaning agents, mosquito repellents, etc.) and handover


segregated wastes to authorised ragpickers or waste collectors or local bodies.

4. **Integration of waste pickers/ ragpickers** and waste dealers/*kabadiwalas* in the formal system should be done by state governments, and self help group, or any other group to be formed.
5. No person should throw, burn, or bury the solid waste generated by him, on streets, open public spaces outside his premises, or in the drain, or water bodies.
6. Generator will have to pay '**User Fee**' to waste collector and '**Spot Fine**' for littering and non-segregation.
7. The concept of **partnership in Swachh Bharat** has been introduced. Bulk and institutional generators, market associations, event organisers and hotels and restaurants have been made directly responsible for segregation and sorting the waste and manage in partnership with local bodies. All hotels and restaurants should segregate biodegradable waste and set up a system of collection or follow the system of collection set up by local body to ensure that such food waste is utilized for composting/biomethanation.
8. All **resident welfare and market associations, gated communities and institution** with an area >5,000 sq.m should **segregate waste** at source into valuable dry waste like plastic, tin, glass, paper, etc. and handover recyclable material to either the authorised waste pickers or the authorised recyclers, or to the urban local body.

9. The **bio-degradable waste should be processed, treated and disposed off through composting or bio-methanation** within the premises as far as possible. The residual waste shall be given to the waste collectors or agency as directed by the local authority.
10. **New townships and group housing societies** have been made responsible to develop in-house waste handling, and processing arrangements for bio-degradable waste.
11. Every **street vendor** should keep suitable containers for storage of waste generated during the course of his activity such as food waste, disposable plates, cups, cans, wrappers, coconut shells, leftover food, vegetables, fruits etc. and deposit such waste at waste storage depot or container or vehicle as notified by the local authority.
12. The developers of **special economic zone, industrial estate, industrial park** to earmark at least 5 per cent of the total area of the plot or minimum 5 plots/sheds for recovery and recycling facility.
13. All **manufacturers of disposable products** such as tin, glass, plastics packaging etc. or brand owners who introduce such products shall provide necessary financial assistance to local authorities for the establishment of waste management system. All such manufacturers, brand owners or marketing companies should educate the masses for wrapping and disposal of their products.
14. All **industrial units using fuel** and located within 100 km from a solid waste based refuse derived fuel (RDF) plant shall make arrangements within six months from the date of notification of these Rules to replace at least 5 per cent of their fuel requirement by RDF so produced.
15. **Non-recyclable waste** having calorific value of 1500 K/cal/kg or more shall not be disposed of on landfills and shall only be utilised for generating energy either or through refuse derived fuel or by giving away as feed stock for preparing refuse derived fuel.
16. Construction and demolition waste should be stored, separately disposed off, as per the Construction and Demolition Waste Management Rules, 2016.
17. **Horticulture waste and garden waste** generated from his premises should be disposed off as per the directions of local authority.
18. An **event or gathering organiser** of more than 100 persons at any licensed/unlicensed place should ensure segregation of waste at source and handing over of segregated waste to waste collector/agency, as specified by local authority.

Construction & Demolition Waste Management Rules, 2016

The government has notified the Construction & Demolition Waste Management Rules, 2016 for the first time. The focus of these Rules is to recover, recycle and reuse the waste generated. Segregating construction and demolition waste and depositing it to the collection centres for processing is as per these Rules the responsibility of every waste generator. Under the Policy, the ULBs will have to utilize 10-20 per cent material from construction and demolition waste in municipal and government contracts. Cities with a population of more than one million will commission processing and disposal facility within 18 months from the date of final notification of these Rules, while cities with a population of 0.5 to 1 million and those with a population of less than 0.5 million will have to provide these facilities within two years and three years respectively. Permission for construction will be given only when the complete construction and demolition waste management



The SWM Rules 2016 clearly list out the role and responsibility of diverse stakeholders, recommend the formation of state level advisory body and mandate submission of annual reports by ULBs and treatment plant operators and propose home composting as an integral option.



plan is presented. Large generators of waste will have to pay relevant charges for collection, transportation, processing and disposal, as notified by the concerned authorities. The Rules also make it mandatory for large builders or waste generators to submit waste management plan along with their building plan, non-deposition of which may lead to non-grant of permission to the building.

The Plastic Waste Management Rules, 2016

Earlier, the Environment Ministry had notified **the Recycled Plastic Manufacture and Usage Rules in 1999**, which was mainly on manufacturing and usage of plastic carry bags. It is specified that the minimum thickness of plastic bags should be of 20 microns. **The Plastic Waste (Management and Handling) Rules, 2011** laid down certain conditions for manufacturing, stocking, sale and use of plastic carry bags and sachets, which were required to be monitored and implemented by the SPCBs/ULBs. It specified that the minimum thickness of plastic bags should be of 40 microns. However, the implementation of these Rules was not so effective because the ambit of these Rules was limited to notified municipal areas whereas today, the plastic has reached to our rural areas also. There were no provisions on responsibility of waste generators. The Rules did not address the promotion of conversion of waste to useful resources.

The government has recently notified the Plastic Waste Management Rules, 2016, in suppression of the earlier Rules. The new Rules aim to:

1. Increase **minimum thickness** of plastic carry bags from 40 to 50 microns and stipulate mini-

imum thickness of 50 micron for plastic sheets also to facilitate collection and recycle of plastic waste.

2. Expand the jurisdiction of applicability from the municipal area to **rural areas**, because plastic has reached rural areas also.
3. To bring in the responsibilities of producers and generators, both in plastic waste management system and to introduce **collect back system** of plastic waste by the producers/brand owners, as per extended producers responsibility and involving state urban development departments, either individually or collectively, through their own distribution channel or through the local body concerned.
4. To **introduce collection of plastic waste management fee** through pre-registration of the producers, importers of plastic carry bags/multilayered packaging and vendors selling the same for establishing the waste management system.
5. To **promote use of plastic waste for road construction** as per Indian Road Congress guidelines or energy recovery, or waste to oil etc. for gainful utilisation of waste and also address the waste disposal issue; to entrust more responsibility on waste generators, namely payment of user charge as prescribed by ULBs, collection and handing over of waste by the institutional generator and event organisers.
6. To phasing out of manufacture and use of non-recyclable multilayered plastic in two years' time.





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7. **To make waste generator responsible** to segregate and store the waste generated by them in accordance with the Solid Waste Management Rules, and handover segregated wastes to authorized waste processing or disposal facilities or deposition centers, either on its own or through the authorised waste collection agency.
8. **To make it a responsibility of local bodies and gram panchayat** for setting up, operationalisation and co-ordination of the waste management system and **retailers and street vendors to not sell** to consumers in carry bags, or plastic sheet, or multi-layered packaging, which are not manufactured and labelled or marked, as prescribed under these Rules.

Bio-Medical Waste Management Rules, 2016

These regulate the manner of disposal of bio-medical wastes and provide a detailed framework for the processes and mechanisms. The 2016 Rules replace **Bio-Medical Waste (Management and Handling) Rules, 1998**. Under the new Rules, the coverage has increased and also provides for pre-treatment of lab waste, blood samples, etc. It mandates bar code system for proper control. It has simplified categorisation and authorisation. The ambit of the Rules has been expanded to include vaccination camps, blood donation camps, surgical camps or any other healthcare activity. It phases out the use of chlorinated plastic bags, gloves and blood bags within two years. It ensures pre-treatment of the laboratory waste, microbiological waste, blood samples and blood bags through disinfection or sterilisation on-site in the manner as prescribed by WHO or NACO. It provides for training to all its health care workers and immunise all health workers regularly and for the establishment of a bar-code system for bags or



containers containing bio-medical waste for disposal. All major accidents need to be reported and the Rules demand existing incinerators to achieve the standards for retention time in secondary chamber and dioxin and furans within two years.

Bio-medical waste has been classified into four categories instead of 10 to improve the segregation of waste at source. The procedure to get authorisation has been simplified. It provides for automatic authorisation for bedded hospitals. The new Rules prescribe more stringent standards for incinerator to reduce the emission of pollutants in environment. Under the new Rules, state government is to provide land for setting up common bio-medical waste treatment and disposal facility. The operator of a common bio-medical waste treatment and disposal facility to ensure the timely collection of bio-medical waste from the health care facilities.

Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

The hazardous Rules are primarily framed for regulating generation, storage, reuse, recycling, import, transportation and treatment of hazardous wastes. India signed and ratified the Basel Convention, 1992 dealing with transboundary movement and disposal of hazardous waste. The restrictions on cross-border transportation of hazardous waste for purposes of recycling as provided in the Basel Convention are incorporated in the Rules. **The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008** have been replaced by a new set of Rules in 2016. (There were also **Manufacture, Storage and Import of Hazardous Chemical Rules, 1989** that talked about regulating handling and transportation of hazardous chemicals. These were further amended in 2000).

In the 2016 Rules, the ambit has been expanded by including 'Other Waste'. All the forms under the Rules for permission, import/export, filing of annual returns, transportation, etc. have been revised significantly with simultaneous simplification of procedure. The basic necessity of infrastructure to safeguard the health and environment from waste processing industry has been prescribed as Standard Operating Procedure (SOPs), specific to waste type, which has to be complied by the stakeholders and ensured by SPCB/Pollution Control Committee



while granting such authorisation. Co-processing as preferential mechanism over disposal for use of waste as supplementary resource, or for recovery of energy has been provided. The approval process for co-processing of hazardous waste to recover energy has been streamlined and put on emission norms basis rather than on trial basis. The process of import/export of waste under the Rules has been streamlined by simplifying the document-based procedure and by revising the list of waste regulated for import/export. The import of metal scrap, paper waste and various categories of electrical and electronic equipments for re-use purpose has been exempted from the need of obtaining Ministry's permission.

Responsibilities of state government for environmentally sound management of hazardous and other wastes have been introduced as follows: To setup/ allot industrial space or sheds for recycling, pre-processing and other utilisation of hazardous or other waste; to register the workers involved in recycling, pre-processing and other utilisation activities. To form groups of workers to facilitate setting up such facilities; To undertake industrial skill development activities and ensure safety and health of workers. List of processes generating hazardous wastes has been reviewed taking into account technological evolution in the industries. List of Waste Constituents with Concentration Limits has been revised as per international standard and drinking water standard.

Waste edible fats and oil of animals, or vegetable origin; household waste; critical care medical equipment; tyres for direct re-use purpose; solid plastic wastes including PET bottles; waste electrical and electronic assemblies scrap; other chemical wastes especially in solvent form have been prohibited for import. State government is authorised to prepare an integrated plan for effective implementation of these

provisions, and have to submit an annual report to the MoEF&CC. SPCB is mandated to prepare an annual inventory of the waste generated; waste recycled, recovered, utilised including co-processed; waste re-exported and waste disposed and submit to the CPCB by September 30 every year.

E-waste (Management and Handling) Rules, 2016

The **E-waste (Management and Handling) Rules, 2011** aimed at putting in place an environmentally sound e-waste management systems by regulating issues of disposal, import and recycling of e-waste. Earlier, the **Batteries (Management and Handling) Rules, 2001** were notified to effect a regulatory mechanism for dealing in and disposal of used lead acid batteries and their components.

However, more stringent Rules – the **E-waste (Management and Handling) Rules, 2016** – have come into effect in which producers are, for the first time, covered under extended producers' responsibility. While the earlier Rules were applicable to producer, consumer or bulk consumer, collection centre, dismantler and recycler, the new Rules are applicable to a wider section including manufacturer, dealer, refurbisher and Producer Responsibility Organisation (PRO). Also, while 2000 Rules applied to only to Electrical and Electronic Equipment (EEE) the new Rules apply to components, consumables, spares and parts of EEE as well as Compact Fluoro

Extended Producer Responsibility

Extended Producer Responsibility (EPR) is a policy approach wherein a producer is held responsible for the post-consumer stage of a product, typically for defined tasks of separate collection (for e-waste or hazardous waste components), reuse (disposal-refund systems for bottles), recycling (for used cars), and storage and treatment (for batteries). EPR programs are commonly made mandatory through legislation, but can also be adopted voluntarily (retail take-back programs). National, state and local level involvement is necessary to ensure that EPR initiatives are successfully implemented.



rescent Lamp (CFL) and other mercury containing lamp. In the earlier Rules, collection centers could be set up by producer or by any person or agency or association for the purpose of collecting e-waste. Under the new Rules, collection is now exclusively the producer's responsibility, who can set up collection centre or point or can even arrange buy-back mechanism for such collection. There is a recognisable shift from collection centre to collection mechanism approach and removal of need of separate authorisation to ensure effective collection. Besides, earlier the producers were required to obtain authorisation from SPCB for implementing their EPRs, now single EPR authorisation is being made CPCB responsibility to ensure pan India implementation. The Rules prescribe a waste collection target of 30 per cent waste generated under EPR for the first two years, progressively going up to 70 per cent in the seventh year and prescribe stringent penalties for non-action. Lastly under the new Rules, ULBs have been assigned the duty to collect and channelise the orphan products to authorised dismantlers.

The new Rules were the need of the hour to ensure minimal e-waste leakage to the informal sector. Several manufacturers have been found lagging in their responsibilities in India. Websites of many leading brands have very little information on e-waste Rules, especially on the take-back systems. Even when the information is available, it is not easily accessible. There is also negligence on part of SPCB on their duties prescribed under the Rules.

National Environment Policy, 2006

Previous to this policy, a string of policies for water, forest and environmental pollution already existed. These were the National Forest Policy, 1988; the National Conservation Strategy and Policy Statement on Environment and Development, 1992; the

Policy Statement on Abatement of Pollution, 1992; the National Agriculture Policy, 2000; the National Population Policy, 2000; the National Water Policy, 2002; the Environment Protection Act, 1986; the Water (Prevention and Control of Pollution) Act, 1974; the Water Cess Act, 1977, the Air (Prevention and Control of Pollution) Act, 1981; the Indian Forest Act, 1927; the Forest (Conservation) Act, 1980; the Wild Life (Protection) Act, 1972; and, the Biodiversity Act, 2003.

However, the need was felt for a comprehensive policy on environment. The National Environment Policy sought to extend the coverage, and fill in gaps and does not displace, but builds on the earlier policies. Some of the broad areas it covers are conservation of critical environmental resources, inter-generational equity, efficiency in environmental resources use, environmental governance in the management of resources, enhancement of resources, livelihood security for the poor and integration of environmental concerns for socio-economic development. Among other things, the policy promotes the internalisation of environmental costs taking into account the approach that the polluter should, in principle, bear the cost of pollution. It focuses on encouraging the regulatory authorities to institutionalize regional and cumulative environmental impact assessment. The policy aims to expand the protected area network of the country, including conservation and community reserves, to give fair representation to all bio-geographic zones of the country. The policy aims to identify and give legal status to environmentally sensitive zones in the country. It also envisages formulating area development plans for these zones on a scientific basis, with adequate participation by the local communities.

National Urban Sanitation Policy, 2011

Before the adoption of this policy, it was noted that about 12.04 million (7.87 per cent) urban households do not have access to latrines and defecate in the open. 5.48 million (8.13 per cent) urban households use community ones and 13.4 million households (19.49 per cent) use shared latrines. 12.47 million (18.5 per cent) households do not have access to a drainage network and 26.83 million (39.8 per cent) households are connected to open drains. More than 37 per cent of the total human excreta generated in urban India, is unsafely disposed. Keeping these statistics in mind, the Government adopted

the NUSP in October 2008. The NUSP stipulates that municipal solid waste management should also be covered in the state sanitation strategy and the city sanitation plan.

The vision of the policy is that all Indian cities and towns become totally sanitised, healthy and liveable and ensure and sustain good public health and environmental outcomes for their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women. Some of the objectives of the policy were awareness generation and behavioural change; open defecation free cities; integrated city wide sanitation; sanitary and safe disposal; and proper operation and maintenance of all sanitary installations. Among other things, it covers rating of all class I cities of the country. The Policy requires each state to formulate its own state urban sanitation strategy.

Environmental Protection Act, 1986

In the wake of the Bhopal Gas Tragedy, the Government of India enacted the **Environment Protection Act** of 1986 under Article 253 of the Constitution. It covers protection and improvement of environment. Infact it is an “umbrella” legislation designed to provide a framework for central government to coordinate the activities of various central and state authorities established under previous laws. The Act gives the power to the central government to regulate all forms of waste and to tackle specific problems that may present themselves in different regions of India. The primary prohibition, prohibiting harm to the environment establishes that no person

National Mission on Sustainable Habitat, 2008

The National Mission for Sustainable Habitat is a component of the National Action Plan for Climate Change. It highlights the importance of adopting recycling strategies to avoid greenhouse gas emissions. It broadly covers, among others, (a) extension of the building code for energy conservation, (b) modal shift to public transport through better urban planning, and (c) recycling of materials and urban waste management.

carrying on any industry, operation or process shall discharge or emit or permit to be discharged or emitted any environmental pollutants in excess of such standards as may be prescribed.

Haryana Rules and Acts

The Haryana Municipal Corporation Act, 1994

This Act is the governing act for civic matters in Haryana. It is a reasonably well-structured and comprehensive legislation (26 chapters) concerning most aspects of corporation’s functioning including constitution and functions of corporation, transaction of business by the corporation, revenues and expenditure, borrowing, contracts, water supply, drainage and sewage disposal, streets, building regulations, sanitation and public health and public safety. A complete overview of the Act has been covered in “Expert Opinion”.

Haryana Non- Biodegradable Garbage Act, 1998

This was enacted to prevent throwing or depositing of non-biodegradable garbage in drains, roads and public places. Under this Act, the local authority or authorised officer is responsible for provision of depots or places for temporary deposit and collection and removal of non-biodegradable garbage. The Act imposes the prohibition on the traders, retailers and vendors in municipal committees, councils and corporation for using coloured polythene carry bags manufactured from recycled plastic for packaging the goods.

Haryana State Urban Water Policy, 2012

This policy has been formed for prevention of wastage of water. This policy make provision of water supply to the metered connections in the domestic, commercial, industrial and institutional sectors and convert existing unmetered water connections into metered ones. It is applicable to all service-providing authorities such as public health engineering department, housing board, Haryana Urban Development Authority, Haryana State Industrial and Infrastructure Development Corporation and ULBs has the administrative regulations to bind all the stakeholders and for proper management. ❖

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Waste Management Solutions

If it can't be reduced, reused, repaired, rebuilt, refurbished, refinished, resold, recycled or composted, then it should be restricted, redesigned or removed from production.

-Pete Seeger

The 3Rs (reduce, reuse, and recycle) philosophy of waste management is embedded in the “waste management hierarchy” that aims to reduce the waste while maximising resource conservation and efficiency. This also forms the basis of the Solid Waste Management Rules, 2016. These strategies are shown in the illustration below. The most preferred option is “at source reduction and reuse”, followed by “recycling and composting”, and the least preferred option is “landfilling”.

As per data received from Central Pollution Control Board (CPCB), it is estimated that urban India generated 1,43,449 metric tonnes of municipal solid waste per day in 2014-15. Of this waste 40-60 per cent is organic and 10-20 per cent is recyclables. There is a clear waste minimisation potential of 14,344 – 28,689 metric tonnes per day through recycling and recovery.

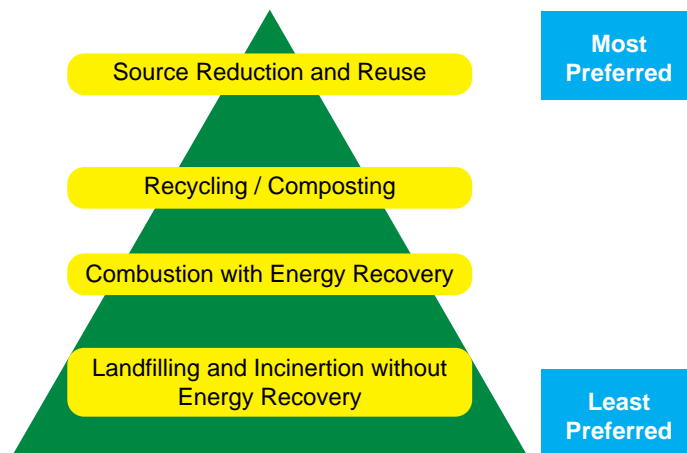
Source Reduction and Reuse

The most preferred option for waste management is to prevent the generation of waste at various stages including in the design, production, packaging, use and reuse of products such as carry bags and packaging jars. Waste prevention helps to reduce handling, treatment, and disposal costs and various environmental impacts such as leachate, air emissions, and generation of greenhouse gases. Waste minimisation programmes should always be supported by institutional mechanisms, market linkages, access to robust recycling technologies, as well as regulatory and penal provisions.

Recycling and Composting

Composting

Decomposition and stabilisation of organic waste matter is a natural phenomenon. Composting is an



The Waste Hierarchy Triangle

organised method of producing compost **manure** by adopting this natural phenomenon. Compost is particularly useful as an organic manure which contains plant nutrients (nitrogen, phosphorous and potassium) as well as micro nutrients which can be utilised for the growth of plants. By composting organic waste, nutrients are returned back into the soil to continue the life cycle. Finished compost resembles soil; it is dark brown, crumbly and smells like forest floor.

Composting can be carried out in two ways i.e., **aerobically** and **anaerobically**. During aerobic composting, aerobic microorganisms oxidise organic compounds to carbon dioxide, nitrite and nitrate. Carbon from organic compounds is used as a source of energy while nitrogen is recycled. In anaerobic process, microorganisms break down organic materials, such as food scraps, manure and sewage sludge, in the absence of oxygen.

Biomethanation is the anaerobic (in the absence of free oxygen) fermentation of biodegradable matter in an enclosed space under controlled conditions of temperature, moisture, pH, etc. It is a method to treat source separated organic waste to recover energy in the form of biogas, and compost in the form of a liquid residue. Biogas consists of methane and carbon dioxide and can be used for cooking, heating as a fuel or, by using a generator it can be converted to electricity on-site. The liquid slurry can be used as organic fertiliser. The ability to recover energy and compost from organics puts anaerobic composting above aerobic composting on the hierarchy of waste management. The gases evolved are mainly methane and carbon dioxide. Anaerobic method conventionally is carried out in pits. Formerly the waste was anaerobically stabilised in pits where alternate layers



A recycling facility in action.

of waste and night soil were laid. The pit is completely filled and a final soil layer is laid to prevent fly breeding and entry of rainwater into the pit. Simple small to medium scale systems have been developed in India, especially for cattle manure; these plants are called gobar gas plants. Biomethanation is one of the most technically viable options for Indian solid waste due to the presence of high organic and moisture content.

Types of Composting

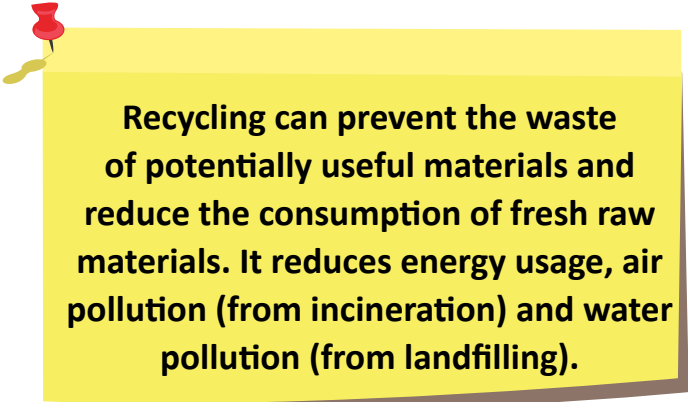
- **Windrow Composting:** Under this method of aerobic decomposition, windrow composting process consists of placing the pre-sorted feedstock in **long narrow piles** called windrows that are turned on a regular basis for boosting passive aeration. Each windrow is turned on 6th and 11th days from outside to the centre to provide aeration. On 16th day, windrow would be broken down and passed through manually operated rotary screens. The screened compost is stored for about 30 days in heaps to ensure stabilization before sale. Windrow composting is the most economical and widely accepted composting process.
- **Aerated static pile composting:** In the case of aerated static pile composting, **forced aeration** is used to spread excess air through the windrows unlike the aerobic windrow composting, where aeration is achieved by turning the windrows so that new cut sections are exposed to air. Aerated static pile technology usually takes 6-12 weeks for producing mature compost. Mechanical aeration of waste piles is done by placing them over a network of pipes connected to a blower, the blower supplies air for composting.
- **In-vessel composting:** This is a controlled process of composting where aeration, moisture, and temperature requirements for composting are maintained in a **chamber or vessel**. The time taken for composting is 1-4 weeks. The advantage of this system is that there is control of the environmental conditions for rapid composting as they occur inside a closed building and the problems of malodour and leachate generation are minimal.
- **Vermicomposting:** Vermicomposting is the process of using earthworms and microorgan-

isms to turn kitchen waste into black and nutrient rich humus. Commonly used earthworms are *Pheretima elongate*, *Lampito mauritii*, *Eisenia fetida*, *Perionyx excavates* and *Eudrilus eugeniae*. Certain biochemical changes in the intestine of the worm result in excretion of cocoons and undigested food known as vermicasting, which is an excellent manure containing vitamins, enzymes, nitrates, phosphates, and potash.

- **Decentralised Composting** Transportation of waste through cities is a big issue. Decentralised composting is the composting of source separated organic waste in limited quantities from households, apartments, neighbourhoods, markets, gardens, or the entire ward. The decentralised composting approach reduces transportation costs and makes use of low-cost technologies based mainly on manual labour. Decentralised composting can be practiced in either box or bin depending on the quantity of waste feed and cost implications

The following composting methods have been implemented in India:

- **Indore Method of Composting Pits:** This is an old method of compost preparation. A portion of pit is filled with farm wastes layer by layer. Each layer is around 3" thick and over it a layer 2" of cow dung slurry is spread. Pit is filled with farm wastes and plastered with 2"-4" thick layer of soil and dung. This prevents moisture loss and allows the temperature to rise up to 60-65 °C within 3-4 days. Material inside the pit is turned after 15-30 days and moisture is maintained by adding water. Another turning is given after an interval of 30 days. Good quality compost becomes ready within 3-4 months.



Recycling can prevent the waste of potentially useful materials and reduce the consumption of fresh raw materials. It reduces energy usage, air pollution (from incineration) and water pollution (from landfilling).

- **Nadep Compost:** This compost method was developed by Naryan Devrao Pandri Pandey. A brick structure measuring 10'x6'x3' is prepared with holes in the side walls to ensure adequate supply of air during composting. The brick tank is filled with farm wastes, soil and cow dung and water is added to maintain moisture between 60-75 per cent. A tank is filled with soil, (16-18 quintals), farm wastes (14-16 quintals) and dung (1-1.2 quintals). Water is added to moisture the material and upper layer is plastered with soil and dung mixture. The material is turned after 15 days and thereafter at an interval of 30 days. At each turning water is added to maintain sufficient moisture. Compost becomes ready within 3-4 months.

- **Nadep Phospho Compost:** This is a method to prepare phosphorus enriched compost using farm wastes, rock phosphate and phosphate solubilising bacteria. Insoluble phosphorus present in rock phosphate is transformed into soluble form through the action of certain specific microorganisms during the process of composting. Compost is prepared using farm wastes, cow dung and soil. This material is plastered with a mixture of dung and soil after adding sufficient water to moisten the decomposing mixture. After 75-90 days of composting, microbial culture of azotobacter, rhizobium and phosphate solubilizing bacteria are added into the mixture. Compost becomes ready for use within 110-120 days.

- **Biogas Slurry:** Biogas slurry is a good manure. Slurry is dried in solar drier. Dried slurry is directly applied in fields.

Recycling Options

Recycling is the process of converting waste materials into reusable materials and objects. Recycling plays a vital role in reducing the quantity of waste, increasing resource recovery and minimising the financial and environmental burden municipal waste. Recycling can prevent the waste of potentially useful materials and reduce the consumption of fresh raw materials. It reduces energy usage, air pollution (from incineration) and water pollution (from landfilling). If appropriate market mechanisms are established, recycling can generate revenues, contributing to the overall cost recovery.

Recyclable materials include many kinds of glass, paper and cardboard, metal, plastic, tires, textiles and electronics. Any recycling programme depends on two crucial factors: community awareness and willingness to cooperate, and access to markets for segregated materials with acceptable and reliable conditions.

Sometimes, reusing can also happen after collection, in cases where informal traders collect materials of no use from households, reshape or repair them and sell in second-hand markets. Unlike reusing a used material, recycling involves using the waste as raw material to make new products. Recycling thus offsets the use of virgin raw materials.

The phenomenon of recycling by means of repair, reprocessing, and reuse of waste materials is a common practice in India. Most of the recyclable waste is collected by the informal recycling sector. The amount of recyclables collected by informal sector prior to formal collection are generally not accounted. Material recovery starts at the primary level, by households who segregate recyclables like newspapers, cardboard, plastics, bottles, etc. from waste to sell such material to local recyclers, scrap dealers or haulers. The item that cannot be sold to the *kabadi* system is discarded and becomes part



Compost (also commonly referred to as black gold) from a composting bin.

of the municipal waste. Ragpickers pick up parts of this waste to earn their living. They segregate the wastes directly from the dumps and bins with no precautions and they are exposed directly to harmful wastes. The separated waste is sold to a small waste dealer, from where the waste is transferred to a medium sized dealer or wholesaler. All these activities are not regulated or monitored by any governmental organisation. Due to this informal segregation, volume reduction is achieved, while it

Important recycling material: Recycling potential and special conditions

Material	Recycling Potential
Aluminium	It has a high market value and can be recycled easily by shredding and melting.
Batteries	It recovers valuable metals and protects environment from heavy metals such as lead and cadmium.
Construction and demolition waste	It can be sorted, crushed and reused for production of pavement material, flooring tiles, road construction, landscaping and other purposes.
Glass	It has a moderate market value and can be melted and sorted into colours. Recycling glass saves energy compared with processing raw material.
Paper and cardboard	It is easily recycled. Paper or cardboard from recycled paper requires less energy during production and helps protect the forests.
Polyethylene terephthalate (PET)	It can be recycled if segregated from other waste. Quality of re-cycled product decreases with every processing cycle.
Other plastics	Polyethylene or polyvinyl chloride, can be recycled but have less value in the market than PET.
Electronic waste	It contains high value metals. Electronic items can be dismantled and its components reused or recycled.
Metal (steel, copper, nickel, zinc, silver)	Scrap metal has a high market value, especially steel, copper, and silver. It can be recycled indefinitely because it does not deteriorate through reprocessing.
Thermocol or Styrofoam	It can be processed to recover fuel and re-ground with new expanded polystyrene for further use. It can be powdered and made into sheets, which can be used to make furniture.

Source: Swachh Bharat Mission, Municipal Solid Waste Management Manual

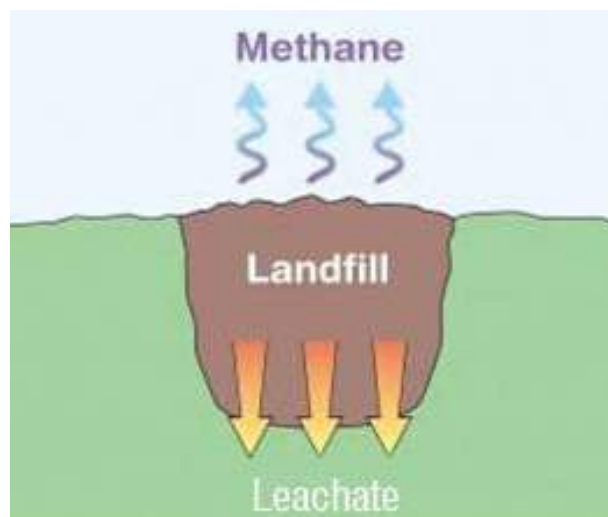
ignores social, economic, environmental and health aspects. Local governments should encourage residential complexes and businesses to adopt and promote recycling initiatives.

Well-segregated recyclables can directly be transferred to a processing site or to the recyclable market depending on local conditions. “Materials Recovery Facility” (MRF) means a facility where non-compostable solid waste can be temporarily stored. A MRF accepts mixtures of waste fractions, separates and diverts recyclable materials, and transfers the remaining waste for disposal. Special waste including domestic hazardous waste is also to be segregated at the MRF and disposed according to the nature of the waste.

Waste-to-Energy Options

Where material recovery from waste is not possible, recovering energy before final disposal of waste is waste-to-energy (WTE). It is assumed that at least 65 to 80 per cent of energy content of waste can be recovered as heat energy through WTE technologies. However, WTE plants are an expensive option for managing MSW, requiring skilled staffing and adoption of high-level technologies. They also have the potential to cause significant environmental impacts through emissions and fly ashes if plants are not operated efficiently and if appropriate emission control mechanisms are not adopted. Two waste to energy technologies – Incineration and Refuse-Derived Fuel – are described below. There are other technologies under development including pyrolysis and gasification.

Incineration: Incineration is a waste treatment process that involves combustion of waste at very high temperatures in the presence of oxygen and results in the production of ash, flue gas, and heat. The success of waste incineration projects depends entirely on incoming waste feed characteristics and quantity. Timarpur Okhla Municipal Solid Waste Management Project is one of the few WTE facilities in India which is using a reciprocating forward moving grate incinerator for combustion of mixed solid waste of Delhi. Other types of incinerators including the fluidised bed incinerator and rotary kiln incinerator are not suitable for mixed waste incineration. Rotary kiln incinerators are typically used for incineration of hazardous waste and biomedical waste.



Landfilling can cause both water and air pollution.

Refuse-Derived Fuel (RDF) is fuel derived from combustible waste fraction of solid waste (like paper, textile, rags, leather, rubber, non-recyclable plastic, jute, multi-layered packaging and other compound packaging, cellophane, thermocol, melamine, coconut shells) in the form of pellets or fluff produced by drying, shredding, dehydrating and compacting. It is used as a fuel for co-processing in cement kilns; co-combustion in coal fired power plants; and on-site or off-site in an appropriately designed waste incinerator for thermal recovery or power generation. The opportunity to produce high calorific value RDF from mixed waste rather than dumping waste makes RDF a more desirable option than landfilling. Using RDF as a fuel in incinerators is a better option because it is typically formed by augmenting calorific value of combustible wastes.

Landfills

Safe disposal of inert residual waste at sanitary landfills which are constructed in accordance with stipulations prescribed in SWM Rules, 2016. All over the world, landfills that capture and use methane are preferred over landfills which do not capture the landfill gas. Only inert rejects (residual waste) from the processing facilities, inert street sweepings, etc. can be landfilled. In cases where old dumps are to be closed, there is a possibility of capturing methane gas for further use. However, repeated burning of waste significantly decreases the potential of capturing methane. ❖

Central and State Schemes

Central Sponsored Schemes

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2016



The Rs 500 billion scheme is aimed at transforming 500 cities and towns into effective urban living spaces. Some of its components are water supply; sewerage facilities and storm water drains to reduce flooding; pedestrian, non-motorised and public transport facilities; parking spaces; and green spaces.

The Mission is for five years initially from FY2015-16 to FY2019-20. Under this project, conventional project by project sanctions by Ministry of Urban Development (MoUD) has been replaced by approval of the State Annual Action Plan (SAAP) once a year. In this way, the AMRUT makes states equal partners in planning and implementation of projects. Under AMRUT, the Haryana government has approved an outlay of Rs 5.25 billion for the SAAP for 2016-17. Detailed reports of nine projects worth Rs 10.33 billion for five towns namely, Karnal, Gurugram, Sonapat, Ambala and Panipat have been approved.

Jawaharlal Nehru National Urban Renewal Mission (JNNURM) 2005



The Rs 660 billion city-modernisation scheme was launched for holistic development of 71 cities over a period of 7 years from 2007 to 2012. This was later extended to two more years. The project funded renewal and upgradation of infrastructure like water, sanitation, transportation and lighting. The project comprised of two sub-missions: a) urban infrastructure and governance and b) basic services to the urban poor. It had two other components including urban infrastructure develop-

ment of small and medium towns and integrated housing and slum development programme.

One of the achievements of the project was implementation of various reforms in the ULBs relating to tax, e-governance, town planning regulations, property tax, citizen services, financial management etc. However, the programme met with only limited success. It could not meet the required targets due to lack of coordination and planning between various ministries, ULBs and departments. The Bandhwari waste treatment project on Gurugram-Faridabad road was funded under this Mission.

Smart City Mission 2016



The Rs 860 billion project entailed developing 100 smart cities to make them highly advanced in terms of overall infrastructure, sustainable real estate and where IT is the principal infrastructure for providing essential services to residents. The core elements of smart city mission are adequate water supply, assured electricity supply, sanitation including solid waste management, efficient urban mobility including public transport, affordable housing, Robust IT connectivity and digitalisation and good governance, especially e-governance and citizen participation.

The MoUD received proposals from the 97 cities to be the beneficiaries of the first year financing from 2016 onwards out of which 20 cities were selected. These are Ludhiana, New Delhi, Jaipur, Udaipur, Ahmedabad, Bhopal, Guwahati, Surat, Pune, Indore, Jabalpur, Solapur, Belgaum, Davangere, Coimbatore, Kochi, Chennai, Kakinada, Visakhapatnam and Bhubaneswar.

The capital invested will be largely made by the state and private investment. The centre has allocated Rs 480 billion for the mission. It has asked the state governments to generate the remaining Rs 480 billion. The funds will be released to urban local bodies (ULBs) at frequent intervals in the next five years.

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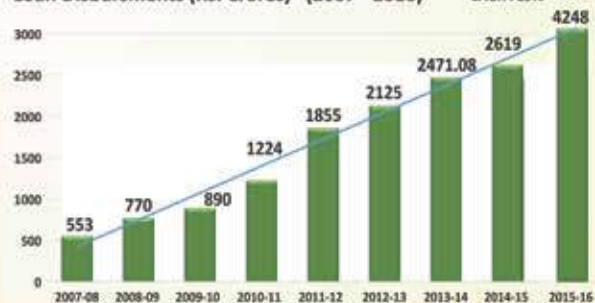
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Swachh Bharat Mission, 2014



The Swachh Bharat Mission (SBM) was launched on October 2 2014 and will continue till October 2, 2019.

The main objectives of the mission include elimination of open defecation, eradication of manual scavenging, modern and scientific municipal solid waste management, to effect behavioral change regarding healthy sanitation practices, capacity building for ULBs, and to create enabling conditions for private participation in capital investment and operation and maintenance. One of the overall objectives is to achieve scientific solid waste management in 4041 cities/towns of the country.

The estimated cost of implementation of SBM in the urban areas is Rs 620 billion. The central government's share as per approved funding pattern amounts to Rs 146.23 billion. In addition, a minimum additional amount equivalent to 25 per cent of central government funding, amounting to Rs 48.74 billion shall be contributed by the states. The balance funds is proposed to be generated through various other sources of fund including private sector. *Swachh Bharat Kosh*, market borrowing and CSR etc.

Under the solid waste component. ULB's are to prepare DPR for solid waste management of their city in consultation with state governments. Smaller cities can form clusters to become viable entities to attract private investment. The DPR's should be bankable. Street sweeping and litter control interventions will be part of DPR which is essential for a clean city. A state level high power committee will approve the DPR. The central government incentive for the SWM projects will be in the form of a maximum of 20 per cent grant/viability gap funding for each project. The remaining funds have to be generated. The states shall be free to choose the technology for SWM projects, toilets and street sweeping.

The Ministry of Urban Development has also started the "Swachh Survekshan" survey, ranking of cities on cleanliness and other aspects of urban sanitation, which ranked 73 cities across the country. Mysuru was declared as the cleanest city followed by Chandigarh and Tiruchapalli. On the same lines,

"Swachh Survekshan" 2017 will conduct a survey to rank 500 cities of India.

Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT), 2009

UIDSSMT is a component of the JNNURM which was launched in 2009 with the objective of assisting all the towns which were not covered under the main Mission. The schemes subsumed the two earlier programmes of the GoI viz., accelerated urban water supply programme and integrated development of small and medium towns with the objectives of promotion of planned development of cities, creating infrastructure and provide durable services, and promoting public private partnerships.

State Sponsored Schemes

Rajiv Gandhi Urban Development Mission, Haryana (RGUDMH)

The state government launched RGUDMH for urban infrastructure development programme in a mission mode approach, in all the urban local bodies of the state. Under the Mission, Rs 4.70 billion was released to the municipalities during 2013-14. During the financial year 2014-15, a budget provision of Rs 7.17 billion has been made.

Rajiv Gandhi Shahri Bhagidari Yojana (RGSBY)

To institutionalise the participation of citizens in the functioning of municipal bodies by setting up ward committees and area sabhas in urban areas, on the pattern of matching grant scheme executed in panchayati raj institutions in Haryana, the Government of Haryana has launched RGSBY with the proposed contribution of the state government and public in the ratio of 60:40. RGSBY will focus on the components like construction and management of community halls/centres, development and maintenance of community parks, construction and maintenance of roads and back lanes on regular basis, construction and management of community toilets, construction and management of cattle ponds for stray animals, installation and maintenance of street lights, infrastructure for door-to-door collection and transportation of waste. ❖



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Dimensions = 2 x 2 x 2 Fts.



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Capacity = 300 kg per hour

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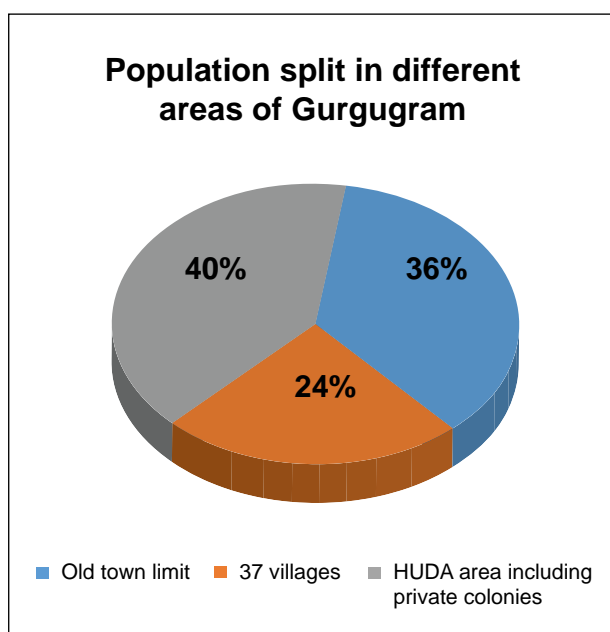


Gurugram Basics

- Located in the state of Haryana, Gurugram shares its boundary with Rajasthan and south Delhi making it a strategically located city. To be precise, it is located 30 km south of national capital New Delhi, about 10 km from Dwarka sub-city and 268 km south of Chandigarh, the capital of Haryana. It is one of the four suburbs of the National Capital Region of Delhi. It is the second largest city in Haryana. It has the third largest per capita income in India, after Chandigarh and Mumbai. It is also called the **Millennium City** with its vast array of commercial malls, cyber parks, hi-tech offices and plush residential buildings.
- The present area of Gurugram city is **231 square km** and it is divided into **35 municipal wards**. Administratively, it comprises three subdivisions Gurgaon South, Gurgaon North and Pataudi, and five Tehsils – Gurgaon, Sohna, Farrukhnagar, Pataudi and Manesar. It has 37 villages in its fold.
- In the last two decades, Gurugram has become the **industrial and financial nerve centre of Haryana**. It houses over 250 of the 500 Fortune 500 companies.
- Gurugram is famous for its **outsourcing and off-shore services** that contribute most to its economy. Among the major industries in Gurugram,

IT, ITES, auto manufacturing and pharmaceuticals have a considerable existence.

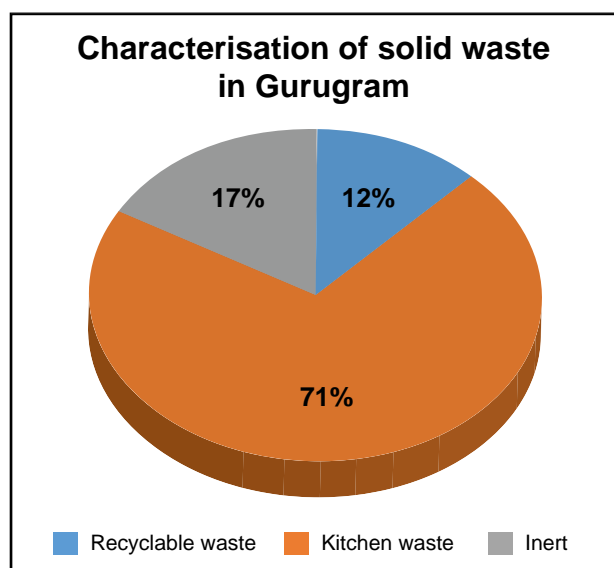
- Professionals from across India come to Gurugram in search of **jobs in the private sector**. People find the city amicable for staying as there are apartments, housing societies, residential colonies and independent homes, where accommodation is available at affordable rates.
- Gurugram is the **“golden goose”** of Haryana. Almost 60 per cent of revenue accrues from Gurugram by way of various taxes and duties.
- Gurugram’s **population** has increased from 870, 539 in census 2001 to 1, 514,085 in census 2011, an increase of 74 per cent in the decade in reference. As per official sources, the current population of Gurugram is estimated to be close to 2.5 million. The population is expected to grow to 4.25 million by 2031, as per Gurgaon Master Plan 2031.
- Rapid growth has put substantial **pressure on city’s resources**. Infrastructural bottlenecks including traffic snarls, road congestions, water scarcity and pollution are on the rise.
- Gurugram is still far away from being an **efficient, sustainable and smart city** that conserves costs, water, energy and uses technology to coordinate various city services. Progressive cities and urban areas across the world are rapidly adopting measures and technologies that will help them become more sustainable.
- One of the issues with Gurugram is that it has been run by **multiple authorities** with somewhat **superimposing roles**. There is Municipal Corporation of Gurugram, Haryana Urban Development Authority, Haryana State Industrial and Infrastructural Development Corporation, Department of Town and Country Planning, Deputy Commissioner’s Office, to name a few.
- The **Gurgaon Metropolitan Development Authority (GMDA)** has been proposed to be set up for better governance. A draft bill for its establishment was put in public domain in November 2016. Extensive consultations on the bill has been done. The GMDA is proposed to be established in 2017. ❖



Management of Municipal Solid Waste

In Gurugram, MSW waste is primarily generated from MCG localities, 37 villages under MCG, HUDA sectors, and private colonies. It is estimated that in the last 10 years, waste production in Gurugram has doubled. Gurugram generates 600 metric tonnes (MT) per day of municipal solid waste (MSW) with the per capita waste generation rate of 545 gram per day. Therefore, a family of four generates atleast 2 kgs of waste in a day. The projected solid waste generation of Gurugram in 2041 is estimated to be 2,839 MT per day.

The Municipal Corporation of Gurugram (MCG) is the apex body responsible for waste planning and management in the city. According to a field study carried out by MCG in September 2015, around 71 per cent of the waste is kitchen waste, while 17 per cent is recyclable and 12 per cent is inert. About 79 per cent of the city's waste is generated by the residents (Tables below).



Source: City Sanitation Plan, Gurugram

Apart from MCG, waste sector is operationally managed by multiple agencies including Haryana Urban Development Authority (HUDA), Haryana State Industrial and Infrastructure Development Corporation (HSIIDC) and private colonisers such as DLF and Unitech. Over the last year, waste collection and disposal in most of the HUDA sectors has been taken over by MCG. To be sure, in all, 55 per cent of waste is collected from Old Gurugram areas maintained by MCG, and 25 per cent from HUDA sectors 1 to 57. The rest comes from private colonies such as DLF and HSIIDC area in Udyog Vihar Sector 37.

As per a study conducted by MCG in 2009, about 400 MT of municipal waste was collected per day in Gurugram of which about 110 MT is generated within MCG area and balance was contributed by HUDA sectors, private developers' area, and villages.

MSW generation (based on study conducted by MCG, 2009)

Area	Total quality of MSW Generated (MT) per day
Gurgoan Old Municipal Area (MCG)	110
Private Developers	35
Ansal (Private Developers)	7
HSIIDC Area (Industrial area of HUDA)	70
HUDA Area	120
Other Private Developers & Commercial Establishments	58
Total	400

Source: MCG, 2009

Source wise classification of MSW in Gurugram

Class	Residential	Shops	Hotel	Hospital	Institution	Industries	Worship
Total (MT)	474	66	12	9.0	12	24	3.0
%	79	11	2	1.5	2	4	0.5

Source: City Sanitation Plan, Gurugram

Sanitation Standards

In November 2009, the Ministry of Urban Development introduced a new benchmarking tool and award scheme to address poor sanitation levels in the country. Gurugram received an overall sanitation score (rating) of 40.6 and an all-India rating as 87 out of 423 cities that put it in the “needs considerable improvement” bracket. In 2014-15, Union Ministry of Urban Development conducted a survey to give *Swachh Bharat* ranking in 476 Class-I cities. Each city has been awarded a *Swachh Bharat* rank, based on 42 indicators (20 related to open defecation practices and 22 pertaining to solid waste management system). Gurugram was ranked 466th out of 476 cities. In the *Swachh Sarvekshan* 2016 under the *Swachh Bharat* Mission, Gurugram received a rating of 36 out of 73 cities.

Present Waste Management Operations

Waste management operations in Gurugram primarily involve employing contractors for door-to-door waste collection and street sweeping. The authorities outsource work to contract agencies through service contracts. Tenders are floated at the time of expiry of a contract. The authorities have their own sanitation staff as well.

The system of waste collection is predominantly manual. (Recently, however mechanical sweeping in the night hours has been introduced for some main roads and markets). Waste is collected in manually-pulled rickshaws and taken to transit



Interaction with sanitary workers engaged in collection of waste from the road side.

sites. Some amount of waste sorting takes place informally by the ragpickers at the transit sites. Three different types of transit points exist i.e. *Dhalao* (community bin), refuse container and the dumper placer containers. From these sites, large dumpers carry the waste to the Bandhwari plant. Some of the waste also gets invariably thrown on the road sides and vacant plots. A very small quantity of waste is treated or recycled. The infrastructure for waste comprise brooms, waste bins, wheel-barrows, tri-cycle, refuse collectors, dumper trucks, tractors, earth mover machines, manually pulled rickshaws and sanitation workers.

In villages, waste management is neglected as drains are uncovered and waste is found in drains. Villages also have suboptimal sewer lines. In the villages, it is still normal to throw waste in the vacant land within or outside the village limit. In some villages, village panchayat have employed sweepers for sweeping of villages roads and collection of waste from the doorsteps.

A few housing societies and condominiums have started segregating waste, and sending dry waste to recycling units and composting wet waste. Some of these have been covered in this section under “Success Stories”.

MCG

For the purpose of waste management, MCG area is divided into four zones across 207 square kms – Zone I, Zone II, Zone III and Zone IV. Zone I has 30 community bins, Zone II has 34 community bins, Zone III has 19 community bins while Zone IV has 23 community bins. There are 470 big dustbins and 6,800 small dustbins across the four zones. Around 40 Tata Ace vehicles (0.6-0.8 tonne capacity), with average four trips per vehicle, collect the waste and carry it to the four transit points, namely Dundahera, Sohna Road, Palam Vihar and Khandsa.

MCG has service contracts with various contractors for door-to-door collection as well as street sweeping. One of the major contractor is K L Envitech. In the door-to-door collection, 24 of the 35 wards have been allocated to

Gurugram generates 600 metric tonnes per day of municipal solid waste (MSW) with the per capita waste generation rate of 545 grams per day.

K L Envitech, while the balance 11 wards are covered by employees of MCG or by third-party agreements for collecting solid waste from shops and other establishments in commercial and residential areas. For each zone, there are 1 or 2 sub-divisional officers, 1 or 2 junior engineers and 1 sanitary inspector. MCG has also appointed consultants for each zone.

MCG has a workforce of 3,648 sanitary workers spread across four zones, including both permanent and contractual staff. MCG charges a tipping fee of Rs 700 per tonne from the private trucks for waste dumping at its disposal site at Bandhwari. At the moment, the solid waste processing plant is non-functional at Bandhwari.

Zone I and II (Khekri Dhaula Toll to Old Railway Road on left (Zone I) and right (Zone II))

Zone I and II comprising 122 colonies are under a single SDO supported by one senior sanitation

Zone wise MCG Staff Strength

Zone No	MCG Rolls	Outsourced/ Third Party	Total
Zone I	586	293	879
Zone II	744	356	1,100
Zone III	227	493	720
Zone IV	268	232	500
Regular			296
Panchayat			105
HUDA			48
Total			3,648

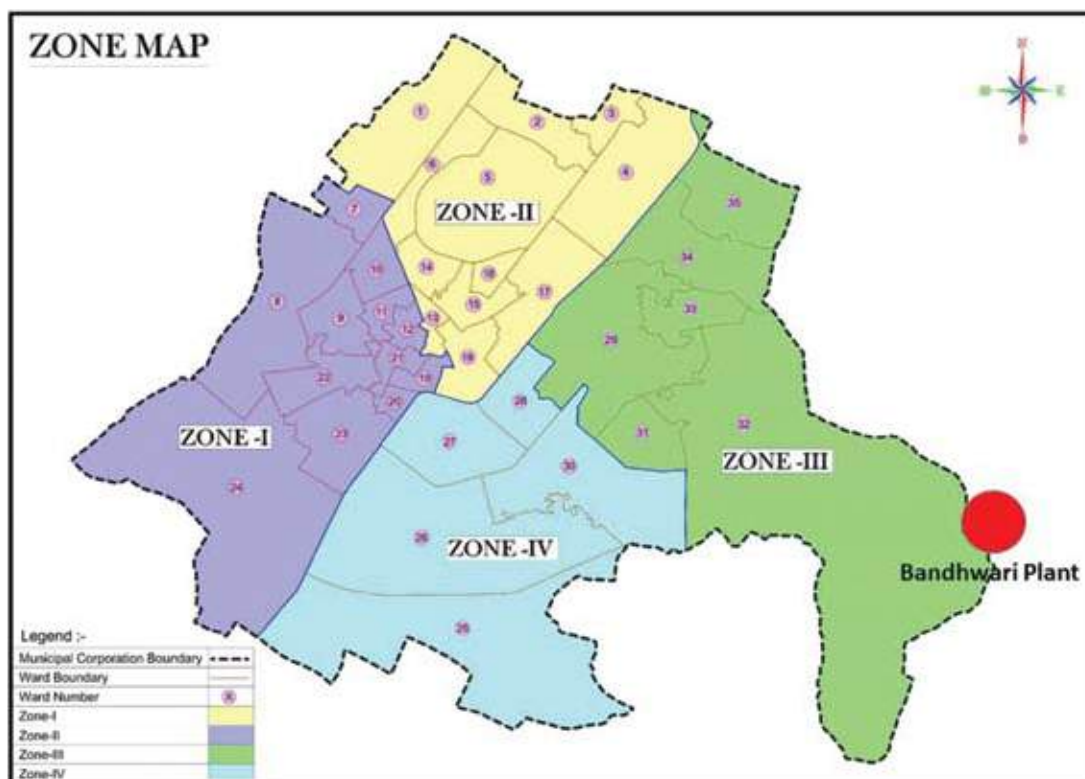
Source: MCG

Zone wise MCG Waste Generation

MCG Zone	Total Waste (TPD)
Zone I	220
Zone II	180
Zone III	140
Zone IV	60
Total	600

Source: MCG

Location map of solid waste management facility



Source: City Sanitation Plan, Gurugram

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inspector and one sanitary inspector. The door-to-door collection is being currently undertaken by KL Envitech while street sweeping is being undertaken by multiple contractors including Badri Vishal Protection, Go Green Services, Sulabh International and KL Envitech. In some areas, MCG's own staff is operational.

Zone III (Star Mall, Sector 31 towards Delhi upto MCG limits)

There is no private contractor for door-to-door collection. There are three contractors for road sweeping. These are K L Envitech, R S Enterprises and Sulabh International. The SDO is assisted by one senior sanitary inspector and two sanitary inspectors.

Zone IV (Star Mall, 31 towards Jaipur upto Kherki Dhaula Toll Tax)

There is no private contractor for door-to-door collection. There are two contractors for street sweeping, namely R S Enterprises and Sulabh International. The SDO is assisted by one senior sanitary inspector and one sanitary inspector.

Composting Initiatives by MCG

Three waste composting plants are currently operational in the MCG area. MCG proposes to contract out a compost plant at *Sabzi Mandi* as well, where 50 tonnes per day of vegetable waste is generated.

Composting plants by MCG

Site	Capacity (TPD)	Status
Sabzi Mandi, Khandsa Road	25.0	Tender under process
Gaushala, Ward 6	2.5	Operational
Sheetla Mata Mandir	2.0	Operational
Sector 15 (Part I)	2.0	Operational

Source: MCG

MCG Budget on Sanitation

The expenditure on sanitation comprises three areas of solid waste management, sewerage and drainage. It includes salary of regular and contractual conservancy workers, operations & management (O&M) cost including contractor's fee, vehicle maintenance and contingencies related to fuel and minor equipment. As per MCG figures, the expenditure under various heads was as follows:

Head	Expenditure in Rs million (2015-16)	Expenditure in Rs million (2016-17 till January 2017)
Salary to sanitation staff	318.0	256.1
O&M	249.3	263.0
Sewerage	371.7	51.9
Drainage	54.0	6.6
Total	993.0	577.6

Source: MCG Accounts Department

HUDA Sectors

Till not so long ago, HUDA was a substantial player in waste management in Gurugram. However, after the take-over of its sectors by MCG in June 2016, only Sector 29 (area around the HUDA gymkhana club) and sector 57 remain with HUDA. HUDA undertakes road sweeping and waste collection through contractors in these two areas.

HUDA sectors transferred to MCG

1 (pocket A, B); 3; 4; 5, 6 (Part 12,12A), 7; 7 extension; 9; 9A; 10; 10A; 14 to 17; 18 (electricity and institutional area); 21; 22; 23; 23A; 27; 28; 30; 31; 32 A; 33; 34; 37-1 and 37-II; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 51; 52; 54; 55; 56; entire HUDA area for horticulture; entire HUDA area (including sector 2 to 57 and meter road) for electrical; and, Palam Vihar-II Pocket C
Note: Horticulture work of Sector-29 and 57, all E&C work, HUDA nursery sector-14 & all parks and green belt is excluded.

Source: MCG

HSIIDC

HSIIDC's Udyog Vihar (sector 18-20) is under MCG for waste management. However, the Corporation is responsible for waste management in IMT Manesar. HSIIDC collects about 900 metric tonnes of waste in a month (30 metric tonnes in a day) from sector 1-8 in Manesar. A single contractor, Neelkanth Delhi Education Society, is responsible for collecting the waste. The contract includes road sweeping, road garbage collection and from garbage bins and dumping points. The waste is collected at three points in Sector 1, 6 and 8 and transported to Bandhwari.

Private Colonies

Private colonies (DLF, Unitech, Ansal, Bestech, etc.) manage their solid waste management on their own. RWA of private colonies have engaged private contractors for waste collection and transportation services. The daily waste from these colonies is transported to Bandhwari by private contractors. ❖

Management of Other Waste

C&D Waste

Due to heavy construction activity, Gurugram generates large quantities of C&D waste. Various estimates suggest the figure to be close to 700 tonnes per day (TPD). It had been a normal practice to dump C&D waste in open areas such as green belts on the roadsides, vacant plots of various localities and also in the Aravallis 'green lungs of the city' along the Gurugram-Faridabad road. Since this waste causes considerable amount of air pollution, the National Green Tribunal has passed various directives from time to time. In a specific order, it has directed every builder and owner to put tarpaulin sheets around the construction area and strictly stated that no person – a builder or owner – would be permitted to throw construction material on roads or inside colonies. It has also hauled up the authorities.

MCG has also issued orders on C&D waste. In one of its orders, it has categorically stated that strict action would be taken against those who do not dump C&D waste in appropriate sites, including a penalty of Rs 5,000 at first detection. The order also informed that MCG would offer a service to collect C&D waste at Rs 1,000 per trolley and Rs 3,000 for each dumper. The services can be availed by dialing the toll-free number 1800 1801817.

To streamline and regularise the collection and disposal of C&D waste, MCG bid out for setting up a C&D waste processing facility of 300 TPD in 2012. As successful bidder, IL&FS Environmental Infrastructure & Services Ltd. (IL&FS Environment), was awarded the project.

Land was identified in Khekri Majra initially and later an alternate site at Kachra Chowk on Gurugram-Faridabad Road was allocated to the project. However, the project was shelved due to environment concerns related to the site.

Gurugram generates 700 TPD of C&D waste, and 1.5 tonnes per day of bio-medical waste. The e-waste potential of Gurugram is 70,000 tonnes annually.

Finally in 2016, MCG awarded the contract for construction of a C&D waste processing plant, to come up at Basai village (as per the master plan), to IL&FS Environment. The plant will be built on a public private partnership model and the concessionaire will run the plant for 20 years. About 300 tonnes of waste will be processed at the plant every day. IL&FS Environment has established India's first large scale operational C&D recycling facility at Buri in north Delhi. It has established one more C&D plant at Shastri Park, East Delhi.

The MCG had identified 13 sites for disposal of C&D waste in Gurugram as listed in the table below.

Sites designated for disposal of C&D waste

Zones	Sites designated for C&D waste
Zone I	Khandsa village (behind Govt. School); Kadipur low line area; village Basai; Bhawani Enclave; and Basai road
Zone II	Palam Vihar (Bajghera Road): Pawala Khusrupur; Udyog Vihar Phase I; and village Sarhaul (near toll plaza)
Zone IV	Fazilpur Jharsa (near Johar in front of Spaze tower); Bagampur Khatola (near Khatta); Naharpur Transport Nagar; Badshahpur (behind Killa)

Source: MCG

E-waste

There is no available estimate on amount of e-waste generated in Gurugram. In April 2016, a joint study by ASSOCHAM and Frost-Sullivan reported that Delhi and NCR is ranked second (after Mumbai) with 98,000 tonnes of e-waste generated in the region. Experts put the e-waste potential of Gurugram to be 70,000 tonnes annually. However, the e-waste output in the city is much lower since corporates, households and industries have a tendency to hoard old items.

As in other cities, e-waste disposal and management is highly unorganised in Gurugram. Only about 5 per cent of e-waste (that too mainly from corporates) goes to the authorised agencies, authorised collection centers/registered dismantlers/recyclers.

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The rest either goes to the *Kabadiwalas*, scrap dealers and the unorganised sector or finds its way to the landfill as mixed waste. This 5 per cent volume mainly comprise refurbishable items that can reach the second-hand market. This is because recovery of materials is considered an expensive option and only a few companies have facilities for recovery.

It is also reported that several *Kabadiwalas* are operating under fake licences and documents for collection, dismantling and processing. The second-hand market thrives in places such as Nehru Place in Delhi. Infact, the biggest e-waste recycling market in India is in Delhi and 30-40 per cent of all e-waste of India lands here. E-waste that is mixed with municipal waste includes wires, bulbs, broken tube-lights and batteries.

E-waste recyclers complain of citizens' tendency to hoard and retain e-waste. There can be more e-waste collection centres both by the local authorities and under private initiative. There is an urgent need to organise regular e-waste collection drives and awareness programmes in residential, corporate and industrial sectors so that authorised recyclers can process the waste safely and sustainably. Training of informal recyclers for proper recycling techniques can also be an effective tool.

Biomedical Waste

Gurugram generates 1.5 tonnes per day of bio-medical waste. The city has a single biomedical waste treatment facility at Dumduma road Bhondsi set up by Vulcan Waste Management. The company has 11 plants in Haryana including at Riwari, Palwal, Mahindergarh and Mewat, and is serving 900 clients. It is involved in collection, transportation, treatment and disposal of bio-medical waste from hospitals, nursing homes and laboratories. Its Gurugram facility's clients are Medanta, Artemis Medicare Services, Paras Hospital, Columbia Asia Hospital, Fortis, Escorts, Asian Hospital, Ranbaxy Laboratories, Alchemist Institute of Medical Sciences and Metro Heart Institute. It is a "common biomedical waste treatment facility" and is authorised by Haryana State Pollution Control Board. Hospitals put waste in two bags, a red bag and a yellow bag. The red bag goes into the autoclave machine and the yellow bag goes to the incinerator. Currently, the plant is running under capacity.

Hazardous Waste

Gurgaon's hazardous waste goes to an integrated hazardous waste facility in Village Pali, Faridabad. It has been developed with the help of Haryana Environmental Management Society, under the guidance of the Haryana State Pollution Control. It uses Canadian technology that combines secured landfill facility, solidification/stabilisation and incineration to treat hazardous wastes generated by various industrial units.

Wastewater (Sewerage)

The sewerage infrastructure in the city comprises sewerage pipes, sewerage pumping stations and sewerage treatment plants. Around 79 per cent of the city population is covered with sewerage pipes. The sewerage generated in the city is about 225 million litre per day (MLD) and the current sewerage treatment capacity in Gurugram is 198 MLD through three sewage treatment plants (STPs).

Two of these STPs are under Haryana Urban Development Authority (HUDA) and mainly treat the wastewater generated in HUDA sectors. Both these plants are located in Dhanvapour and maintained by private agencies. The combined capacity of these plants is 168 MLD with the sewage generation rate of only 39 MLD in HUDA area. About 21 MLD of the 61 MLD sewage generated in 37 villages of MCG is also disposed into the main HUDA sewer line and hence, is treated in the HUDA STPs. The sewage generated in the old city area of the city is discharged into the third STP owned and operated by MCG. This STP is currently overloaded as its capacity is 30 MLD but it disposes off about 42 MLD of sewage on a daily basis.

The Najafgarh drain in which the effluent from all the three existing STPs is discharged also carries treated/untreated residential as well as industrial effluent and is therefore highly polluted. This polluted water is a potential source of groundwater contamination. Plans for construction of new STPs by HUDA and MCG and expansion of existing plants are on the cards in Dhanvapour. For the sewage management of its 37 villages, MCG has adapted a decentralised approach under which around 17 stand-alone small scale STPs along with the augmentation of sewer distribution system have been proposed. ❖

BANDHWARI PLANT

Bandhwari is a landfill-cum-waste treatment site on a 32 acre of land on the Gurugram-Faridabad road. When it was conceptualised in 2009-10, the plant held a lot of promise. It was a 1,000 tonnes per day combined solid waste management “Refuse Derived Fuel” (RDF) facility funded under the Jawahar Lal Nehru Urban Renewal Mission at a cost of Rs 257.5 million. It was responsible for processing the municipal solid waste for Faridabad and Gurugram.

The plant was set up by Mumbai-based Hanjer Biotech’s SPV company AKC Developers. Out of the 30.51 acres of land allotted to the plant, 15 acres of land was to be used for integrated solid waste management facility, 12 acre for landfill and 3.5 acres for green belt/miscellaneous. As per the agreement, the Municipal Corporation of Gurugram (MCG) was responsible for providing the mixed waste at the treatment facility. The operator was responsible for segregation of waste into bio-degradable and non-biodegradable components, its treatment, sale of compost and RDF, followed by disposal of inert material to sanitary landfill site.

The processing facility was underperforming but functional for some time. However, it became to-

tally non-functional since November 2013 due to two major fire incidents. Since then, only dumping of MSW is carried out at this site. As a result, currently 1,35,000 tonnes of huge heaps of untreated waste can be seen lying all across the facility and outside its boundary. The garbage is now filling up land around the site and is also strewn across vacant plots of the city. It has become an eyesore and a health hazard. The stench, flies, mosquitoes and trucks filled with garbage parked throughout the day at the plant gate and the garbage spill onto the main road has made life of villagers nearby miserable. Ironically, the plant is located in the water recharge zone of Aravalli forests. The untreated waste at Bandhwari is also responsible for percolating the ground and degrading the quality of ground water.

In 2015 and early 2016, attempts to control the smell were unsuccessful and in fact disastrous. About 16,000 litres of water with some sanitiser were sprayed daily for three years creating 16,000 litres a day of highly polluting black leachate that was collected in deep ponds around the base of the hill. Contamination of groundwater was a constant danger.

Last year, the National Green Tribunal (NGT) has hauled up MCG on the ‘civic mess’ at Bandhwari. MCG had recently constructed a wall around the plant that got damaged due to monsoon rains leading to seepage of leachate in to the forest area. MCG had assured the tribunal that a new plant would start soon. Results of samples collected by the Haryana State Pollution Control Board (HSPCB) in August 2016 from the backyard of Bandhwari landfill site showed high level of contamination of water.

In October 2016, Almitra Patel, a national expert on solid waste management, along with members of a Gurgaon citizen initiative NCR Waste Matters, met the Municipal Corporation of Gurgaon and shared



Courtesy: NCR Waste Matters

the successful treatment done at Nagpur's dump. On Ms. Patel's recommendation, Raagini Jaain, a dump management expert was invited to work on the site.

Earlier there were over 12 deep ponds of leachate 'garlanding' the dump. A drone video showed the magnitude of the problem, with deep leachate pools encircling the garbage hill. For four days, she focused on reducing and treating the leachate by spraying powerful pollution control bio-culture called "GEA". The earlier sanitising water volumes were reduced from 16,000 litres a day to just 250-300 litres a day of mist spray covering the same entire hill plus the leachate ponds. Smell and flies were controlled and leachate volumes came down by 2-3 inches daily.

Earthmovers sliced several deep vertical trenches from the top to the base of the garbage hill, allowing leachate to flow out and the waste to become dry. Then it was pushed down in layers to form multiple low terraces of waste to provide maximum surface area for aeration. These are being carved and sliced into windrows, long parallel heaps about 5 feet high, 4 feet wide and as long as the available space would allow. In two weeks, the 70 feet high hill had been reduced to half its height, with 30 per cent of its waste spread into terraces. It may take some more time to fully aerate and stabilise the remaining old waste. This bio-remediation will naturally reduce

old waste volumes by 20-30 per cent and make it safe and stable.

Space has been created at Bandhwari for unloading daily fresh waste also into windrows instead of piling it higher and higher. The fresh waste is sprayed with pollution control bio-culture before forming the windrows. These heaps are loosened or turned weekly to promote aerobic decomposition which does not release leachate or smell. There is as much as 40-50 per cent volume reduction of waste after a month of four weekly turnings of the fresh waste.

Meanwhile, since the agreement with Hanjer Biotech has been terminated, plans are afoot to find a new operator at Bandhwari plant. The Haryana Government (through the Urban Local Bodies Department) has engaged Ernst & Young as transaction advisors for assisting in the selection of an operator for an integrated solution to the waste management problem of the city.

The tender was out in October 2016. As per the details of the tender, a single operator will be responsible for door-to-door collection, transport, processing and disposal in landfill site. Organic waste will be composted or will undergo bi-methanation, combustible waste will be used to produce electricity, while the inert waste will go to the landfill. Only 20 per cent of incoming waste will go the landfill site. The operator is expected to produce a minimum of 10 MW of electricity which will be sold to the electricity utility. About 1,200 tonnes of waste will be received at the site from both the cities each day. As a digression from the previous contract, the incentives under the new contract are based on output and volume reduction (such as producing electricity). The incentives under the earlier contract were based on waste aggregation/dumping (such as tipping fee). An awareness campaign to encourage segregation of waste at source would also be undertaken by the operator. The operator will also undertake leachate treatment at the site. Two parties had expressed interest in the tender and qualified the technical round. The financial bids have been evaluated and the selected operator is likely to be announced soon. ❖



Courtesy: NCR Waste Matters

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Waste Issues and Solutions

It is imperative that all modern cities have an integrated waste plan that focuses on waste minimisation and decentralized waste systems, improved technologies and contracting systems with strict rules on waste management at source, zero tolerance for open dumping and burning of waste. The entire system needs to be socially, environmentally and economically sustainable. Some of the issues that need attention in Gururgram are:

Governance/Management Issues

Capacity building and planning at MCG: Governance in waste management needs to be more accountable and responsive. Municipal Corporation of Gurugram today is the apex body managing waste in the city. However, it faces challenges with regards to operations, capacity building and service standards. It needs to follow an integrated waste management plan for the city.

Early solution to Bandhwari needed: Bandhwari is like a ticking time bomb that is polluting the ground water below through leachate and the air above. It is

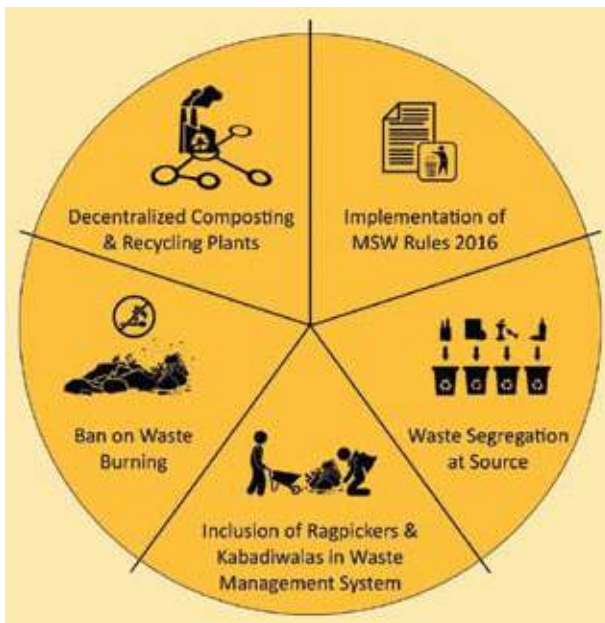
a health hazard to nearby villages. It is high time that a complete and comprehensive solution be found at the Bandhwari plant including waste treatment and sanitary landfilling.

Strict implementation for C&D disposal and safe disposal of hazardous waste: C&D waste should be disposed off safely and not randomly in low lying areas or vacant plots. Sites should be properly earmarked and regularly audited. Hazardous waste such as e-waste should be disposed off safely through certified waste recyclers.

Stop builders charging contractors for waste collection: Often builders and RWAs take money from ragpickers and waste contractors to give them the rights to collect garbage. As a result, contractors do not adopt best practises, hygiene standards are compromised, garbage burning is common and garbage is thrown in empty plots.

Stop practice of burning of waste: Horticulture waste, mixed waste and waste from scrap dealers is often burnt in open spaces and green belts. Open burning causes irreversible damage to our lungs and also leads to methane gas emissions. The practice of burning waste in open has to stop with strict policy implementation and strong penalties.

Regular awareness workshops and citizen connect a must: Awareness workshops to sensitise the public on the 3Rs need to be held regularly in RWAs, schools and corporates. Key messages could also be conveyed through hoardings and distribution of pamphlets. Also, institutionalising a mechanism for regular interaction between authorities and citizens is a must.



Waste Management Solutions for Gurugram

Courtesy: Sarika Bhatt, Architect and Urban Planner



Waste burning is common in Gurugram.

Integration of the informal sector: As per an MCG survey in 2014, about 1,232 ragpickers operated in the city. The ragpickers play a significant role in collection and processing of recyclable material. Creation of livelihoods, social acceptance, and security for informal sector workers and regularising the recycling sector are all benefits of integrating the informal sector. This may be done effectively by organising them into self-help groups or cooperatives. In the future, they may own small recycling facilities. To begin with, a fresh census and survey of ragpickers in Gurugram could be done.

Improve Technologies, Processes and Systems

Overhaul waste management operation: The entire waste management operation needs better tools and equipment, improved infrastructure and mechanised processes for waste collection, transport and disposal. Training of staff on aspects of efficiency, safety and motivation is a must. Absence of a proper monitoring mechanism has resulted in poor supervision of waste management activity. Transport of garbage for instance should not be in over-loaded and un-covered vehicles. Provision of proper garbage transit collection points is needed. There is inadequate sweeping of the main roads, while interior roads and by-lanes are often left unattended.

Need for better contracts: One of the issues that

leads to inefficiency and lack of accountability is that service contracts with waste contractors have not been professionally structured. The contracts need to be very specific in terms of number of workers and the equipment and vehicles required for collection and transportation. Malpractices are common due to lacunas in the contract. Price should not be the only criteria, competence too should be an important consideration.

Better work and pay conditions for contract staff:

Currently, the staff employed by the contractors do not have permanent jobs, and wages are poor and sometimes irregular, resulting in poor job satisfaction which reflects in poor quality work. Training programs on best operating practices, health issues and motivational sessions need to be conducted.

Need for Better Infrastructure

Installation of dustbins: Dustbins with good designs that can be conveniently off-loaded should be installed at all nooks and corners of the city. The dustbins should also be regularly cleaned and cleared as well as repaired and replaced when needed.

More public toilets needed: The city needs more public toilets especially at places of public movements. The toilets, must be maintained neat and tidy at all times. Controlling littering and defacement through imposition and enforcement of severe penalties is the need of the hour. Some key areas where the public toilets need to be placed are IF-FCO Chowk, Golf Course Road, Faridabad Road and Phawara Chowk (near Civil Hospital).

Drainage network needs to be revamped: Open running drains, as observed in several villages of Gurugram, should be immediately covered. Besides, sewerage drains and rain water pipes should regularly be un-clogged and silt removed immediately from the site to avoid water-logging and flooding. ❖

Success Stories

The positive momentum of citizens undertaking waste segregation and composting has started to take shape in Gurugram. Several residential colonies and condominiums are leading the way. RWAs have adopted various kind of waste management solutions depending on cost and level of mechanisation. Several parks such as Leisure Valley and Bio Diversity Park make compost of dry leaves by leaf mulching. Schools too have started composting kitchen and garden waste. Some of these success stories are explained in more details below:

Garden Estate, MG Road

The Garden Estate complex is spread over 22 acres. There are 373 houses and flats of which 321 are occupied presently. Initially, pilot projects were run for segregation and composting. Once successful, it was decided to carry forward the project in full swing. The complex decided to adopt the “two bin-one bag” method that is being extensively followed in Bangalore. Every waste generator was to segregate and store the waste generated by them in three separate streams namely bio-degradable, non-biodegradable and domestic hazardous wastes in suitable bins. The system is completely natural but requires some space and lots of dry leaves. It is cost effective and involves no big machines and very little electricity and water consumption. Also, plastic bags as liner or trash bags are not needed.

The project started in October 2015. Segregation

started in February 2016. The first compost was ready in April 2016. The cost of composting unit is Rs 50,000 while the cost of bins and bags supplied to the residents is Rs 80,000, the cost of composting shed is Rs 1,35,000 and the cost of labour and consumables is Rs 7,000 per month. The funds collected have been Rs 1,000 per unit to cover all costs. The in-house cost of project till date has been Rs 2,35,000.

About 1,000 kilograms (kgs) of compost has been sold till January 2017. The colony gets between 300 to 400 kgs per week of unsieved compost. About 55 per cent of the total waste generated, which is 225 kgs per day, is composted. The colony has reduced waste going to the landfill by 82,125 kgs per annum. About 25 per cent is being recycled as it is now segregated properly. About 20 per cent rejects is going to landfill and the aim is to reduce this figure to less than 10 per cent.



Waste management at Garden Estate, MG Road, Gurugram

G and H Blocks DLF Phase I

More than 600 residents of Block G and H in DLF Phase I set up a decentralised waste management system in 2016 to process over 600 kgs of horticulture and household kitchen waste. Horticulture waste is being shredded, while the rest of the waste is crushed and de-watered to be converted into organic manure. The project was funded by DLF Foundation. The manure is being sold to the residents at a nominal price so that the service provider can sustain the cost of running the system.

Hamilton Court, DLF Phase IV

Hamilton Court is home to 250 households. It has not only adopted an innovative waste segregation technique to convert their horticulture waste into manure, but has also taken steps towards paper recycling by collecting waste paper and making notebooks for the needy. It first installed a horticulture shredder at the cost of Rs 1,40,000 that converts the green waste into powder material which is later fermented. Within two months of installing the shredder, it installed a composting unit to convert food waste into compost at a cost of Rs 3,40,000. The RWA generates 200 kg of compost every month within 21 days to feed green plants and patches in their premises.

Creating awareness among the residents about the waste segregation was an uphill task. The RWA tackled the initial reluctance by forming a team of 12 women who went door-to-door sensitising residents about waste segregation. Later, the RWA made it mandatory for the residents to segregate waste into green and blue coloured bins if they wanted their garbage to be picked up. The RWA also organised workshops for the maids. E-waste collection and disposal is also being done in a systematic way. The members are planning to take up cleanliness of surrounding areas of the society. Apart from waste management, they are also looking at water conservation.

Magnolias, DLF Phase V

The Magnolias, an upscale condominium on Golf Course Road built on 26 acres of land, has set up a green waste management plant. The plant was conceptualised during the construction stage and was part of the building project plan. It has costed Rs 17,00,000. The plant has a capacity of handling

450-900 kgs of waste in a day. The condominium generates close to 350 kgs of organic waste a day. The solid waste is segregated and processed at the plant and is turned into compost for horticulture use. The compost can be collected free of cost by residents from the garbage room and used in balcony gardens. The new occupants and domestic helps in this condominium are given training in waste management. Organic waste and recyclable waste is collected in two separate bins. The kitchen food waste is segregated and processed with sawdust before it is left to turn into manure.

Nirvana Country, Sector 50

The residential colony is still in its early days of waste management. It launched the waste management project in August 2016 and was fully operational by October 2016. It is based on segregation at source by the 'two bin-one bag' method and will be equipped to handle composting of 300 tonnes of kitchen and horticulture waste every day when the set-up is fully functional. For segregation, two colour-coded dustbins and bag have been provided to the 1,100 households. The green bin is for the wet kitchen waste, the red bin for reject and hazardous waste and the bag is meant for dry recyclables like plastic, paper, card board and metal.

The Municipal Corporation of Gurugram provided 250 square yards of land to set up the waste management plant. For composting, a 10,000 liter continuous composter vessel with bio shredder is being



Waste management at Nirvana Country, Sector 50

used of which 6000 litre vessel has already been commissioned. It is made of HDPE plastic and has an electric motor to rotate the vessel for a few minutes every day. A horticulture shredder is also being used to shred garden waste. The semi-compost from this vessel is then laid to rest for a few days in curing pits before it is sent out for use in the lawns. Since November 2016, one tonne of compost has already been generated. The compost produced is to be shared with the residents.

The Palms, South City-I

The RWA at Palms was among the first few RWAs to undertake waste management. Segregation of waste into wet/biodegradable and dry/recyclable waste was undertaken. The RWA has an organic waste convertor machine that helps convert wet

kitchen waste into manure within ten days of treatment. Out of the 450 households involved, the society generates 100-200 kgs of wet waste. The programme manages to get 30-40 per cent compliance on source segregation. A creative training programme was devised. This included a combination of workshops, games, special training programmes for the maids and guards. A youth drive was organised as well.

Richmond Park and Regent House, DLF Phase IV

Richmond Park comprising 270 households and adjoining Regent House comprising 35 households process close to 3,500 kgs of waste a month which otherwise would have gone to the landfill. Household waste segregation began in May 2014 based on the “Doh Bin” waste segregation and disposal model. In October 2014, the society began shredding and mulching the horticulture waste. In July 2015, they started generating compost from the kitchen and green waste. Almost 100 kgs of kitchen waste is collected per day. Another 600-900 kgs of green waste per month is collected, processed and converted into compost, which is then used to feed the green cover in the premises. The compost generated is used for the condominium parks and the excess is sold through a “buy back” arrangement with vendor. E-waste from the two colonies go to an authorised recycler. Constant training, monitoring and motivation is done with new residents, help staff through special sessions. Awareness and consciousness is generated among residents through ongoing communication initiatives, wherein the young minds at Richmond co-opted actively and played their part too.

Vaastu Apartments, Sector 55

This colony of 43 households converts 450 kgs of food and 150 kgs of horticulture waste into 200 kgs of compost every month. Residents are asked to segregate their organic and inorganic waste in two separate bags. A worker collects bags from each flat. A small amount calcium carbonate is put in the organic waste that helps in its bacterial decomposition. Residents get compost on a complimentary basis. The rest is sold to farmhouse owners at Rs 10 per kg. The total capital cost of compost plant is Rs.17,30,000 and its O&M cost is around Rs.10,000.

Decentralised Waste Management Systems

Decentralised waste management systems or community level waste management systems reduce the burden of handling large volumes of MSW at a centralised location, with corresponding reduction in costs of transportation and intermediate storage. Decentralised systems allow for lower level of mechanisation than the centralised solutions, and provide job opportunities for informal workers and small entrepreneurs. Decentralised options can be tailor made for the local waste stream, climate, social, and economic conditions. They need lower level of mechanisation than the centralised solution. It requires high degree of commitment from the community. Decentralised systems reduce the cost incurred for the collection, transportation, and disposal of waste by the ULBs. However, ULBs should be aware of some of the limitations of decentralised waste management: difficulty in obtaining land in many urban areas; difficulty in maintaining scientific and hygienic conditions due to lack of sufficient space and training and capacity of workers; uncertain quality of end products; and difficulty in ensuring economic viability of the system.

Waste Management in Schools

Heritage School, Sector 62

The waste journey in Heritage School started with a waste audit by Grade 7 students based on Centre for Science and Environment guidelines. The audit noted the quantity of total waste collected, sources of waste, waste collection methods and divided waste into categories for effective recycling and final disposal. The school has set up a garbage disposal treatment plant that converts biodegradable waste segregated at source into manure. It installed a hybrid-rapid composting technology in January 2016. The process followed is a three-step process involving crushing, dewatering and curing the crushed and dewatered waste in closed, well-aerated containers.



Organic waste crusher and shredder at Heritage School

The crushing, de-watering and shredding systems are electrically operated. The curing containers do not require any electricity. The skill required to operate these machines is negligible. However, no plastic, metal, glass, or any non-biodegradable waste can be put in these machines. Certain hard biodegradable waste such as coconut shell, etc. may too be avoided. The machine capacity for horticulture as well as food waste is 300 kg per day. The manure produced is 20 kgs to 30 kgs per day and is used for garden areas and plants.

The school has a sewage treatment plant of 1.5 kilo litre capacity. Treated water is being used for gardening and wash rooms flushing. It also has a rain water harvesting system. Paper recycling is done through the paper recycling plant in the art department to make handmade paper.

The Shri Ram School

The two campus of the The Shri Ram School in Gurugram treat the food waste through composting pits. The pits generate as much as 30 kg of compost from 100 kg of waste. The two campuses have STPs with a combined installed capacity of 140 kilo litres. Treated water is used for gardening and maintaining playgrounds.

The society has also successfully implemented safe disposal of hazardous e-waste and recycling dry waste with only sanitary waste and non-recyclables reaching landfills.

World Spa, Sector 30/41

The World Spa - a condominium housing 330 families - has achieved 100 per cent source segregation. Over the past two years, World Spa have been successful in segregating the waste into five constituents – wet waste, dry recyclable waste, e-waste, sanitary waste and horticulture/garden waste. It has an in house wet waste composting machine which treats about 300-400 kgs of wet waste everyday to

create compost being used for horticulture in and around the compound. Every floor in all the towers has four colour-coded bins for waste disposal which has been made possible by the involvement and effort of each resident and their participation in this key initiative. World Spa is also contributing to the waste segregation efforts of other communities by sharing experiences and learning.

Some other residential colonies that have also initiated decentralised waste management are Pragati Co-operative Group Housing Society (Sector 56), IREO Grand Arch (Sohna Road), IREO Uptown (Sohna Road), Essel Towers (MG Road) and Regency Park II (DLF Phase IV). ❖

Positive Initiatives by State and Local Administration

Both the state and the local administration have taken a few but useful steps recently to arrest the waste management problem. These range from tendering out for an operator for Bandhwari plant, announcing incentives for builders, creating a City Sanitation Plan under Swachh Sarvekshan and launching a Swachh Bharat app. Here are the details:

- The **Swachh Bharat Swachh Haryana Abhiyan** was launched on Haryana Day on November 1, 2016. Under this, a Swachta week was organised in all 21 districts of Haryana along with NGOs, citizens and school children. Roads, streets, drains, open spaces and parks were cleaned. Most of public toilets and public buildings were cleaned. Ward level committees were constituted. A web portal www.swachhharyana.org was launched.
- It has been decided that **State Water and Sanitation Mission Haryana** as a registered society will be constituted and situated at Public Health Engineering Department, Panchkula.
- Under the **Swachh Haryana-Swasth Haryana Abhiyan**, all 70 ULBs in Haryana have been divided into 15 clusters for efficient solid waste management, under which manure and power would be generated from the waste. Under the cluster approach, a single private agency would be responsible for collection, segregation, transportation and disposal of solid waste under a ULB to foster an integrated approach to waste management.
- Under the **Haryana Building Code 2016**, Haryana Government has made it mandatory to install solid waste management plant for all buildings including hostels, hotels and group housing societies (except plotted residences). An additional Floor Area Ratio (FAR) of 5 per cent has been announced as an incentive.
- In line with the Urban Sanitation Policy, 2008 and Swachh Bharat Mission, 2014, the Municipal Corporation of Gurugram (MCG) has developed a **City Sanitation Plan** for improvement of sanitation levels.
- In January 2016, the MCG wrote to the state government seeking permission for offering **subsidy** ranging from Rs 1- 5 lakh (depending on the number of residents) to the Residents' Welfare Associations (RWAs) that agree to install waste management system in their premises. The MCG has also asked for exemption of **house tax** for up to 10 per cent for a period of 5 years for those RWAs installing waste management plants.
- MCG is implementing successful **decentralised** waste management projects at Ward 6 and at Sector 15 (Part I). At both places, composting has been contracted to private parties. Composting has also been taken up at Shetla Mata Mandir.
- The MCG issued a notification in December 2015 that binds all horticulture waste generators to treat the **horticulture waste** in scientific manner and strictly prohibits burning of waste.
- The MCG has launched services for lifting of **C&D waste** at Rs 1,000 per trolley and Rs 3,000 per dumper on phone call on toll free number **1800 1801817**.
- In October 2016, the MCG has launched a "**Swachh Map**" **App** to help identify garbage sites across the city and get them cleared in 24-48 hours. The app involves usage of colour coding on google map – red for dirty site and green for cleared site. A user has to tap a red button on the map to report a filthy site and upload a picture of the garbage. The complaint with latitude and longitude readings is then forwarded to the MCG.
- In November 2016, MCG issued directions to all **bulk generators** including commercial buildings such as hotels, institutions such as colleges and schools as well as housing societies to **segregate waste and dispose off at source** by installing compost machines at their own cost. ❖

Contribution by Citizen Groups and NGOs

AIKMM (All India Kabadi Mazdoor Mahasangh)

AIKMM is a platform for informal waste collectors and recyclers. The organisation works in six states across north India, convening programs that focus on workers' rights to livelihood, safety, and health. An interesting initiative of the organisation is *Kabad Se Jugad*, a cooperatively owned business that creates improvised crafts out of waste. In Gurgugram, AIKMM has been successfully carrying out manual, aerobic composting at Nandi Dham Gaushala in Palam Vihar in ward no. 6 for Municipal Corporation of Gurugram (MCG).

Clean Gurgaon

Clean Gurgaon is an environmental group based in Gurugram for improving the city's landscape to make it a modern city with efficient waste management practices. The main purpose of this group is to advise on methods that were being adopted by the waste cleaning staff including street sweeping in the city, designing dustbins for the proper disposal of waste as well as monitor the sanitation standards on a day-to-day basis.

Green Gurgaon

Despite being in operation for less than a year, the Green Gurgaon citizens' group has met with several successes. The 9 A road (Sunset Boulevard road) was cleaned and made malba-free with regular follow-ups with MCG and HUDA. The road has now been fenced by HUDA. It also got the Gurgaon-Faridabad road up to Ghatta Chowk cleaned up. It manages three WhatsApp groups with MCG, each headed by the Joint Commissioner of MCG for Municipal Zones 2, 3 and 4. The group comprises senior officers like SDOs, inspectors and also supervisors and vendors who are responsible for cleaning and sweeping in the zones. The group monitors areas and reports violations in areas like waste disposal, use of plastic and encroachment. It also works in the area of reduction of use of plastic.

Arranging meetings between citizen groups, RWAs and the authorities regarding municipal issues is also a part of their agenda.

Gurgaon First

Gurgaon First is an initiative that works on the issue of sustainability and good governance practices through workshops and research. It has conducted over 34 workshops in Gurgaon including waste management workshops such as "Going Green" (for Confederation of Indian Industry) and "Promoting Eco Green Initiatives". The workshops are well-attended by diverse stakeholders including RWAs, corporates, authorities, citizen groups, industrial associations and media. It has also published *Gurugram's Handbook on Waste Management*.

Hariyali

Hariyali is an NGO that works in primarily looking into the matters of environmental issues by filing cases and public interest litigation in courts. It has fought cases for saving of green belts, felling of trees and retaining the forest cover. It has also worked on banning of plastic bags, providing clean drinking water and for the cause of less polluting public transit systems.

Haryana Environmental Management Society

The NGO played a major role in constructing north India's biggest hazardous waste plant in Aravalli Hills area near Pali village in Faridabad district on 31 acres land. The waste treatment plant has a capacity of about 30,000 metric tonnes annually and dispose off industrial waste scientifically.

I am Gurgaon (IAG)

The Aravalli Biodiversity Park located in the Aravalli range near the Delhi border is an IAG initiative in conjunction with the MCG, envisioned to be a bio-



Leaf composting at Aravali Biodiversity Park.

diversity marvel. This project reinforces the local ecology by reclaiming the native Aravali forest. IAG has been developing the park by planting local and indigenous varieties of plants. IAG has constituted a team that manages waste management and segregation within the park. IAG also organises planting drives, nature walks, cleaning drives, leaf composting as well as cultural events at this park.

NCR Waste Matters

NCR Waste Matters is a citizen initiative to share knowledge, bring together people, communities and suppliers working around SWM to share experiences around waste segregation, recycling, composting and management. Under this initiative, workshops and meets are conducted, and success stories and best practices are shared to propel action in the right direction. Members of this initiative are assisting MCG in providing macro-level solutions for the city and with many RWAs in NCR to find workable solutions for their waste issues.

Society for Urban Regeneration of Gurgaon and its Environs (SURGE)

SURGE aims to support policymakers to plan and execute changes necessary for Gurugram to graduate into a model smart city. Surge collaborates with NGOs, RWAs, civil society, policymakers, companies and committed professionals towards creating a safe and healthy city. It has worked in the area of

water, traffic, external development charges and solid waste management. SURGE studies best practises in some 'islands of excellence' in waste management within the city and disseminates these to a wider audience in collaboration with the authorities.

Uthaan

The NGO works in fields such as vermiculture, organic cultivation, animal welfare and conservation of non-renew-

able fossil fuels. It was a part of a drive to plant 450 fragrant shrubs such as *Raat ki Raani*, *Jasmine*, *Mogra* and *Murraya* to reduce the foul smell of the 'Kachra Chowk'. The Kachra Chowk has now been renamed as Khushboo Chowk and the latter name has even been accepted by google maps. The group now plans to cover the chowk located on Faridabad Road with beautiful, hardy shrubs that can survive in the dry lands here. Uthaan also spreads awareness about environment in schools. At Amity International School, Sector 46, Gurugram it has helped in segregation of waste and composting for the herb garden in the school.

Why Waste Your Waste

Why Waste Your Waste is a citizen's outreach initiative against reckless disposal of waste materials and the need for sustainable waste management. The initiative helps to understand why waste is not really waste, but can be reclaimed to provide economic and environmental benefits. Under this initiative, RWA members, schools, service/ technology providers, citizen groups and civil society have been shown the benefits of waste segregation at source. The initiative has organised an awareness workshop in DLF V. It has also helped MCG to set-up a decentralised waste management project. It has been successful in helping expedite key notifications by authorities on waste burning, C&D waste, as well as recognising progressive RWAs in waste management. ❖

Corporate Initiatives

InterGlobe Foundation and Feedback Foundation

No Open Waste Project

In July 2015, MCG partnered with InterGlobe Foundation (IGF) and Feedback Foundation to pilot an initiative in Ward No 6 covering 4,000 households. The project had three-fold objectives: a) provide technical support to MCG to improve expertise, efficiency & enforcement; b) create a replicable and scalable model of decentralised waste management; and c) take up other components of sanitation, such as 'open defecation' in slum areas.

For the project, Feedback Foundation provided the technical assistance while the project was funded by InterGlobe Foundation. The entire process adopted a citizen-centric approach. Initially, inception and sensitisation meetings with MCG and citizen groups were held. Mr. Parminder Kataria, who was the Deputy Mayor, took an active lead. However, the team faced various challenges initially. Influential leaders in RWAs were reluctant. MCG collection van in the area was irregular in time and frequency and there were absentees among collection team and the drivers. The issues were shared with the MCG sanitation team. Meetings were also conducted between the collection agency (KL Envitech) and sanitation team of MCG. A series of training and capacity building events were conducted for garbage collection agencies as the attrition was very high. The entire



Awareness drive under the MCG pilot project in ward no. 6.

process was new to every stakeholder, so regular meetings "to be on the same page" were held.

Partitions were provided in collection vehicles to collect segregated waste. The collection team was imparted a half day training on waste management and handling. A pig catching drive was initiated with incentives by MCG. A persuasive drive was introduced for open plots to make boundary wall/play ground or vehicle parking purposes by interacting with plot owners. Resultantly, out of 34 open plots, 15 opted for constructing boundary wall, while another 5 opted for parking and children park respectively.

There have been several successes. The All India Kabadi Mazdoor Mahasangh has set up a manual composting site at Nandi Dham Gaushala and composting of segregated waste is happening at the site. The collection van which had no particular pick up place, time and day has started coming at fixed time on daily basis. The entire process has developed a lot of unity, social cohesiveness and empowerment among the woman folk. The programme has generated employment hence making the pilot economically sustainable too.

Seeing the benefits of the exercise, MCG had floated a tender to extend the project to six more wards (2, 14, 18, 33, 34, and 35). These six wards are spread across three zones and cover 70 localities of Gurugram. The scope of services is to create awareness for segregation at source; provide knowledge for vermiculture, composting, bio-gas projects; promote storage of waste in separate bins; treat the biodegradable waste by composting/vermiculture in locality; motivate ragpickers about segregation of waste; work with the hotel, hawker and shopkeepers' association for segregation and recycling; and, identify new projects for decentralised waste management. The same team of Feedback Foundation and InterGlobe Foundation has bagged the project. Work has started in ward no. 2.

Commenting on the results of the pilot project in ward 6 and ward 2, the MCG commissioner has stated that the corporation has experienced "fairly good results if not truly transformational".

Coca-Cola, Tetra Pak and GIZ

Source Segregation Programme

In partnership with Bangalore-based NGO Saahas, the three companies have recently come together to launch a large campaign on implementing “Source Segregation” in Gurugram. The objective of the programme is to implement three-way source segregation of municipal solid waste as mandated by the Solid Waste Management Rules, 2016.

The key components of the programme are awareness and sensitisation campaigns through print and social media; events in public places like malls; workshops and training sessions for RWAs, government officials, estate managers, house-keeping agencies and staff. Starting March 2017, source segregation would be implemented and monitored in more than ten thousand households, schools and offices touching a large chunk of population of Gurugram. The programme would aim to build strong community connect by working closely with the youth including volunteers and schools and colleges students to bring about the required behavioural change. Another key component of the programme involves working with waste workers and engaging them in the collection process to improve recycling rates and also improve their livelihood conditions. This programme is being run in coordination with MCG to align with the city-wide initiatives on solid waste management.

The programme partners hope that their intervention would lead to higher recovery of recyclables, hence saving the limited virgin natural resources. They also hope that it would enable a hygienic environment for handling of waste by waste workers, thus supporting dignified livelihood opportunities.

Tetra Pak

Go Green

A responsible behaviour towards the environment has been one of the focus areas of Tetra Pak. It launched an initiative ‘**Go Green with Tetra Pak Recycling**’ in 2010. By stationing more than 70 collection centres across Mumbai, Bangalore and Delhi NCR, the initiative has made it possible for people to deposit empty Tetra Pak cartons in one place for responsible recycling. Once full, these

bins are emptied by a local NGO partner who sends them to the nearest recycler. The initiative in 2016 was extended to Reliance Fresh stores.

The initiative has also conducted workshops in schools, communities and colleges to reach out and educate the present and possible customers. The “Cycle-to-Recycle” campaign was a cycling rally across retail stores. “Little Master Recycler” and “Say Green Photothon” were creative contests held especially for children. Another contest, ‘Win a Recycled Bench’ involved the RWAs. The initiative has been working towards donating school desks made of recycled Tetra Pak cartons to underprivileged school children. Having collected over 6,00,000 cartons in Mumbai alone, Tetra Pak has been able to supply over 100 school desks made of 100 per cent recycled Tetra Pak cartons. The initiative has made it to the Limca Book of Records in 2013.

Doh Bin

Doh Bin’ was a citizens’ initiative by Tetra Pak and Coca-Cola India to improve waste management and to raise awareness about segregation of household waste into wet and dry waste. The pilot project was launched in DLF Phase IV in December 2013 at Galleria Market. The movement aimed to sensitise and involve RWAs, households, offices and schools to segregate wet and dry waste and incorporate a better waste management system. A dry waste collection and sorting centre was also established for waste collectors. The project was supported by the RWAs, the Indian Pollution Control Association (IPCA) and Parkash Environmental Group. The project motivated several RWAs in DLF Phase IV such as Richmond Park to initiate community-level segregation and composting.

DLF Foundation

Kachre se Kamai

The DLF Foundation’s waste management initiative ‘Kachre se Kamai’ was implemented in Hassanpur, Fatehpur, Kakrola and Dabaripur village in 2014 to create a sustainable solid waste management model in villages. The programme comprised intensive mobilisation and sensitisation activity. The message given out was that garbage can also be put to use if disposed off properly. ❖



EXPERT OPINION





Institutional Issues in Waste Management in India

Dr. Shyamala Mani is a professor at National Institute of Urban Affairs (NIUA). She has a Ph.D in Environmental Science from JNU and a Masters Degree in Public Health from School of Public Health, University of California, Berkeley, USA. She received the UNCHS Global 100 award for waste management and sanitation in Bangalore in 1998 and the Plasticon India award for plastics reuse and recycling in 2005. Dr. Mani joined NIUA in December 2012 after working in Center for Environment Education for 25 years. She helped formulate Biomedical Waste Management Rules 1998 and 2016, Municipal Solid Waste Management Rules 2000 and 2016, Plastics Waste Rules 2011 and 2016. She is currently involved in capacity building of urban local bodies for Swachh Bharat Mission.

Introduction

Urban waste management and especially solid waste management (SWM), often referred to as garbage management, is a contentious issue in any city. This is because garbage is generated by every individual citizen, much of which is rotting and stinking. Hence it has to be taken out of the premises every day. The duty of collecting all this stinking, rotting garbage from every household in every neighborhood and managing it, is mandated to be the duty of the municipality or whichever type of urban local body (ULB) that exists in that place and no special fees or service charges are expected to be levied for this work by the ULB.

Garbage management remains contentious because the domestic garbage from homes, offices and educational institutions has become more complex, comprising biodegradable, non-biodegradable, toxic, insanitary and construction and demolition waste. Such complex garbage cannot be just collected all together and treated in one place and least of all dumped on the outskirts because all the toxic and insanitary elements in it will come back into the city through air, water and food. To collect it, transport it and safely manage it, requires investment. For this reason, it is often outsourced to private entrepreneurs who may or may not be able to deliver the required results and the problem thus remains unresolved.

Challenges to SWM

Currently, most cities in India face some typical challenges.

- Excessive littering by citizens and lack of pride among the city dwellers for cleanliness
- Inability of ULBs to provide appropriate bins in public places for segregated waste deposition

and collection, personnel for regular cleaning and enforcement of fines

- Inability of ULBs to establish systems and technologies required for segregated collection, transportation and processing of different categories of solid waste from households, commercial establishments and institutions. Lack of coordination among departments exacerbates the problem.
- Outdated systems of primary and secondary collection and inefficient transportation
- Inability to meet revenue expenses including salaries, consumables, safety equipment and personal protective equipment and hence no resources available for segregated collection and transportation of waste
- Lack of motivation and lack of will and skill among staff to implement
- Poor or no collection of user charges because of poor services and hence inability of ULBs to meet day to day expenses leading to a vicious cycle of poor performance and poor revenue.

Solid Waste Management Rules and Manual

Ministry of Environment, Forests and Climate Change (MoEF&CC) notified the Solid Waste Management Rules 2016 in April 2016, which has made citizens more accountable for their actions. The Rules require them to be more responsible towards their environment by reducing generation of waste, segregating what they generate into various categories and handing them over as such to door-to-door waste collectors so that the different categories can be separately transported, reused, reprocessed and recycled. The Rules also define bulk generators and make them accountable for the

waste they generate and require bulk generators to submit their plans of action before receiving no objection or clearance from the ULB. Furthermore, the Rules strive to achieve diversion of garbage from dumpsite/ landfill outside the cities. To operationalise the SWM Rules 2016, the Ministry of Urban Development (MoUD) has published a manual which was finalized in October 2016 and which has incorporated the necessary specifications and actions for ULBs to implement the SWM Rules 2016 in their cities.

Need for Capacity Building

To draw maximum advantage of these changes, it is also necessary for state governments, local self governments and citizens' initiatives to develop capacity and the will to implement the Rules so that by 2019, all cities are able to bring about visible changes.

In 2016, under the Swachh Bharat Mission (urban) a set of twelve exposure cum training workshops on SWM were conducted by NIUA at Delhi for officials of the ULBs, which aimed at fulfilling this need of capacity building and training of municipal officials. The 2016 workshops results were analysed and the challenges and needs of the ULBs in SWM, were recorded. Many ULB officials cited the following as their biggest challenges for implementing the SWM Rules 2016:

- Segregation of waste at source to be made mandatory for achieving source segregation of waste at the household/ generator's level, ULBs should provide incentives such as Bags and Bins (blue, green, black etc.) and also impose penalties in case segregation of waste is not properly done despite notification and warnings.
- Waste has to be collected in different streams such as wet, dry, insanitary, e-waste and hazardous waste. Waste, which can be recycled, should be given to ragpickers or NGOs wherein it can be converted to useful products and sold to generate livelihood.
- After segregating and processing whatever is processable, non-recyclable waste must be disposed in a Secured Landfill (SLF). ULBs have to ensure provision of adequate treatment plants and landfill sites. Waste, which are not used for composting, recycling or marketing have to be securely transported to these secured landfill sites or SLFs.

Recommendations

To achieve the above listed objectives, following are the recommendations by NIUA:

Manpower has ULBs: For better management of the solid waste, ULBs should ensure that they have enough skilled labour for carrying out various processes related to solid waste treatment and disposal.

Create destination organisation chart to motivate workers: ULBs should identify staff members currently working in the municipal corporation, monitor individual tasks, monitor and evaluate them. They must also inculcate among the officers and staff, a sense of pride in their work. ULBs must give its staff recognition and prizes.

Special training for unskilled and skilled employees: ULBs should ensure that special training is conducted for unskilled staff so that they can obtain necessary qualification in the field of solid waste management and become skilled. Officers must be exposed to best practices adopted by different cities and learn about new advances in the field.

Develop technologies for sustainable utilisation of solid waste: ULBs should invest on technologies such as vermicomposting, anaerobic digestion/ biomethanation etc. to generate energy and make this process economical for integrated SWM.

Improve collection and transportation of waste: Municipal officers should ensure that vehicles are selected according to capital costs, its carrying capacity, loading speed, local speed, fuel consumption and maintenance costs. In large cities, containers can be transported by a hydraulic vehicle and in small cities containers can be transported by tractors equipped with a container-lifting device.

Increase public-private partnership: ULBs should join hands with PPP to setup sustainable infrastructure (solid waste treatment plants) that are economically viable.

Build awareness through campaigning, training workshop and digital media: ULBs should ensure that awareness campaigns should target elected representatives, schools, non-governmental organizations, media, trade associations, families, and the

public at large. This can be done via door-to-door awareness programme such as rallies, street play, and clean up drives. Television, radio, and the Internet are very powerful media and can be used to inform citizens of new waste collection arrangements made by the ULB as well as public health benefits.

Public participation holds the key: ULBs need to change their mindsets and improve their approach and methods of involving citizens in the day-to-day governance of cities, especially with respect to SWM. They should allow innovation and entrepreneurship from the public, providing space and power within a governance structure where rag pickers, waste workers, slum dwellers, and small and medium entrepreneurs can work alongside health officers, engineers, commissioners, and the rest of the citizenry.

RWAs should promote clean drive: RWAs should ensure that each household segregates its waste into dry, wet, hazardous waste etc. by providing incentives such as bins/bags (blue, green, black etc.), by providing facilities in community centers for collection and processing of dry waste and also disincentives such as fines/warning if they fail to do so. Those residents who contribute their time and resources should be recognised and applauded.

Set good examples: Councillors, corporators and political entities should themselves set an example by following the law and rules so that the citizens are motivated to do so instead of seeking exemptions for frivolous reasons.

Root out corruption: Corruption for award of work to PPP or third party vendors or even NGOs and RWAs can kill any project before it begins. Hence, all such awards and practices should be made transparent, honest and accountable.

Raise funds for SWM: ULBs can raise funds from treating the waste (Wealth from Waste) and develop common facilities on a cost sharing basis to access the capital market to raise fund for such projects through a lead agency that should be established by the state government.

Administer user charges: ULBs need to administer user charges as it is an equitable means of funding SWM and provides incentives to reduce waste generation while encouraging reuse and recycling.

Effectively implement spot fines: Municipal authorities should impose spot fines whenever littering of waste happens.

Make available encumbrance free land within the ULBs' jurisdiction: ULBs should identify and reserve land for SWM facilities such as decentralised composting, dry waste collection centres, recycling plants and SLFs. Land clearance from concerned authorities should be obtained as early as possible.

Assure secure landfill site on the outskirts of the city in accordance to the topography: ULBs should ensure that they have space for dumping non-processable or non-recyclable waste in a SLF. Due to constraints in finding adequate land in hilly areas, waste should be disposed in specially designed landfills that do not contaminate water bodies downstream.

Implement proper land filling technique: ULBs should ensure that segregation at source is done properly at the primary stage and collection of segregated waste is done at the secondary stage. Only non-compostable and non-recyclables waste may go to SLFs. Proper landfilling techniques in SLFs with liners and capsules will help prevent pollution.

Making the environment clean & non-infectious: ULBs need to ensure that their city is kept clean and healthy. Open dumping, littering, polluting drains with garbage can give rise to many infectious diseases. Health officers must inspect all such locations every month to ensure proper usage and maintenance. ULBs must ensure fencing of water bodies and strict action against violators littering drains and canals through spot fines and penalties.

Don't neglect solid waste generation in slums: ULBs must not neglect collection of waste from slum areas. People in slums must be made aware of the need for proper segregation of waste and provided with incentives such as Bags and Bins and regular collection at designated times during the day.

Handle SWM rigorously during festivals: ULBs must ensure that enough manpower and capacity in treatment facilities is available to efficiently manage solid waste during festivals. Tourists and pilgrims may be fined for littering. ❖

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A New Paradigm

Dr. S.R. Maley is a doctorate in Agronomy. He has worked in the field of municipal solid waste management for the past 39 years at various organisations and as consultants to various local bodies. He is known for his pioneering role in municipal solid waste management in India and appeared in the popular social issue talk show "Satyamev Jayate" hosted by Aamir Khan. He is the Director and CEO, Eco Save Systems Pvt. Ltd., a consultancy in waste management.

Proper handling, treatment and disposal of urban solid waste has been a challenging task for city administration world wide. While US/UK have made rapid progress to achieve desirable levels of cleanliness, specially after enactment of Clean Air Act 1963 (USA), in India the subject got some attention only after the Surat plague in September 1994. As of the day, 377 million urbanites from 486 class I cities (above one lakh population) are generating about 63 million metric tonne of solid waste. At 454 g/cap/day, this is as about one-fourth the rate of generation as compared to US/UK counter parts.

Alarmingly as of 2015, after 15 years of enactment of MSW Rules 2000, India could see only 15 per cent of its total waste treatment and disposal on scientific lines, the balance 85 per cent has been disposed off as open land disposal. This practice has resulted into creation of at least one garbage hill in each major city instead of secured landfills. These garbage hills are source of continuous pollution to our water resources, soils and now spoiling our air quality. Newly enacted SWM Rules 2016 is now specific about obligations of city administrations and responsibility of citizens to keep their city clean and hygienic. Under the SWM Rules 2016, there are specific bindings on the urban local bodies that require them to:

- Prepare action plan for solid waste management as per the state's policy and strategy.
- Arrange for door-to-door collection of segregated waste streams as per notified schedule with 100 per cent area coverage for all households, commercial, institutional and residential complexes on daily basis.
- Establish system to recognise organisations of waste pickers of informal chain of recyclers towards better efficiency of recycling. Inclusion of self help groups to encourage better SWM practices and prompt collection services.
- Levy of user fee towards door to door collection services and waste treatment on scientific lines.
- Institutionalise or regulate waste disposal from gated housing societies and encourage decentralized processing treatment of source segregated biodegradable wastes as well as disposal of dry recyclables through approved agencies for the purpose.
- Introduce the practice of three bin system for storage of biodegradable wastes in green colour bins/bags, recyclables in white and hazardous wastes in black coloured bin/bag.
- Establish waste deposition centres for domestic hazardous category like batteries, e-waste, mercury tube lights, bulbs, and other contaminants so as to conserve the quality of processable materials towards safety of resources.
- All such excluded category of wastes to be collected and transported separately to dedicated disposal facility like secured landfill. Street sweepers not to burn tree leaves or push these into drains but to hand over the same to authorised collection agency.
- Collect waste from markets of vegetables, fruits, flowers, meat, poultry, fishery on a day-to-day basis and provide the same to decentralised facility like biomethanation.
- Provide training on SWM to waste pickers and waste collectors and ensure collection of dry recyclable wastes on periodic basis as per notified schedule or on call basis.
- Economise on transportation costs for garden waste and horticulture waste by arranging insitu microbial composting in the public parks and other such areas. ❖

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A Synopsis of the Haryana Municipal Corporation Act, 1994

Harish Kapoor is the founding member of Clean Gurgaon Group. He has worked as a voluntary consultant with HUDA to oversee the cleanliness of zone II. He has also conducted sanitation audits of many areas of Gurugram including villages. He has devised scientific cleaning processes for street sweeping that do away with the ills of the current system. He has introduced a working tool 'litter-picker' for use by sanitation workers and improved design of dustbins.

The Haryana Municipal Act, 1994 is a comprehensive statute covering various civic matters. It is having 424 sections and two schedules. It extends to the whole of the state of Haryana excluding the cantonment areas therein. Thus the provisions of the Municipal Act apply to all areas including the areas under HUDA and private colonies. The areas directly under the Municipal Corporation may be as declared by the State Government. (Sections 1 and 3).

Functions of the Corporation

Here are some of the 24 functions listed as **Obligatory Functions** of the Corporation in Section 43:

- Construction, maintenance and cleaning of drains and drainage works and of public latrines, urinals;
- Construction, maintenance of works for providing supply of water for public and private purposes;
- Scavenging, removal and disposal of filth, rubbish and other obnoxious or polluted matters;
- Regulation of places for the disposal of the dead and the provision and maintenance of places for the said purpose;
- Construction and maintenance of cattle pond;
- Measures for preventing and checking for the spread of dangerous disease;
- Construction and maintenance of municipal markets and regulation thereof;
- Construction, maintenance, alteration and improvements of public streets, bridges, culverts, causeways and the like;
- The lighting, watering and cleaning of public streets and other public places
- Naming and numbering of streets and premises;
- The laying out and maintenance of public parks, gardens, recreation grounds;

- The maintenance of fire brigade and protection of life and property in the case of fire;
- Planting and care of trees on road sides.

Apart from this there are further tasks that the government may entrust to the corporation such as slum improvement and upgradation, urban poverty alleviation and regulation of slaughter houses.

Municipal Commissioner

Section 45 of the Act provides for appointment of an IAS officer as the Commissioner of the Corporation with a term of at least three years in the first instance which may be renewed for another term of three years. (In the case of Gurugram, Commissioners do not even complete one year before they are transferred out). The executive powers and responsibility for complying and implementing the provisions of the Act vest with the Commissioner.

Citizens Duties

The Act casts certain responsibilities on the citizens. Violation of these invite penal action under the Act. These responsibilities (most of the dos and don'ts) are as follows:-

- The owners and occupiers of all premises must provide and maintain receptacles (dustbins) in good condition and repair. The receptacles type are to be approved by the Commissioner. The owners/occupiers shall remove rubbish from their respective premises and deposit in public receptacles, depots provided for the purpose. (Section 271).
- No person shall after due provision has been made for the deposit and removal of the rubbish, filth etc. deposit any rubbish, filth etc in any street or unoccupied place. (Section 273).

- No person shall ease himself in any public street or public place or being engaged in the removal of rubbish, filth etc wilfully or negligently cause any filth to spill or fall in any street or place.
- No person shall affix without proper authority any bill, notice or other document upon any building, monument, wall, tree etc,
- No person shall deface without proper authority deface or write upon any building, monument, wall, tree or other things.
- No person shall carry rubbish, filth etc. in any manner and time, not approved by the Commissioner.
- No person shall deposit or allow to be deposited earth or materials of any description in any public place or unoccupied land. (C&D waste is covered under this provision).
- No person shall use or permit to be used any place as a latrine, not intended for this purpose. Even a child is not to be allowed to ease himself in any public street or public place.
- The owner or keeper of any animal shall not allow it straying in public street or public place. If any animal is found straying as aforesaid it is to be removed by an employee or by any police officer to a pound. (Sections 271, 309 etc).

Facilities to be set up for Waste Management

The Municipal Act recognises that for waste management activities land and facilities would be required. Accordingly, it has provided in Section 270-A that Corporation may use any place or land belonging to the Corporation or the State Government or private land for the purpose of collection, treatment and disposal of waste and may do all acts, things which may be necessary or expedient. Payment of reasonable compensation to the owner or occupier of the land has been authorised if it belongs to any private person The Act has also provided that Urban Development Authorities (HUDA) as well as private colonisers shall provide suitable land/site for solid waste management at the time of planning of new residential and industrial complexes. (Section 370-A).

Duties of the Commissioner

The Act has specifically mandated the Commissioner to perform certain duties relating to sanitation

and waste management. These are as follows: to ensure daily surface cleaning of all streets and removal of the sweepings therefrom; to provide and place dustbins/ receptacles in proper and convenient locations for the temporary deposit of rubbish and other obnoxious matter; to provide vehicles or other suitable means for the removal of rubbish and offensive matter; to make adequate provisions for preventing receptacles, dustbins and vessels etc. from becoming sources of nuisance. (Sections 268, 269, 270); to provide and maintain sufficient number of public latrines and urinals. The public latrines and urinals should be separate for each sex. These are to be regularly cleaned and kept in proper order. (Section 275).

Punishment for Violations

The Municipal Act provides punishment as per the table in the Third Schedule of the Act to whoever contravenes any of the provisions of the Act or fails to comply with any order lawfully given. (Section 380).

Police Establishment

The municipal work involves substantial interaction with the general public. The Act requires the citizens to comply with certain rules and regulations as laid down in the Act and/or orders given thereunder. The Act has provided for the corporation to maintain police establishment for its police requirements for law enforcement. The police officers of the corporations are empowered to arrest any person for a period of 24 hours who commits any offence under this Act, rules, regulations without the order of a magistrate or for a longer period with the order of a magistrate. (Sections 383, 384).

Conclusion

Gurugram has the finest commercial and residential buildings of the country and has two metro rail systems which no other city can boast of. It has highly educated civil society. Most importantly, it has no dearth of funds. It has everything going for it to make it among the finest cities in the world. It simply needs to be taken to its rightful place. ❖

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Sustained Investment in Behaviour Change is Critical

Bhawani Shankar Tripathy is a development sector professional, specialising in communication. A resident of Gurgaon, he is a socially-active citizen, with particular interest in infrastructure development, environment, water, and waste management. He is a founder member of Mission Gurgaon Development, a think-tank on strengthening local governance.

Introduction

No matter how much money is spent on setting up waste treatment plants, hiring human resources and machinery, the goal of achieving a clean city will always remain partially successful. Because what is missing from all the efforts on municipal solid waste (MSW) management in our cities – besides being arbitrary, orthodox, and unsustainable – is adequate and sustained investments in achieving appropriate behaviour towards waste at both community and service provider level.

Why do people behave the way they do towards waste?

Behaviour change (whether at individual or group level) is a complex process, but for sake of simplicity it has been broken down to the process involving three broad steps: having **Knowledge**, developing a positive **Attitude** (desire), **Practising** the desired action (or KAP).

Let's take the example of *waste segregation at source* (the strategic mantra) as a key desired behaviour among individual/family/community towards the daily waste that is generated at home. The KAP principle says that any waste generator must first know what waste segregation means, followed by having the right attitude (desire or inclination) towards segregating waste, and then taking the steps to actually practising waste segregation.

Sounds simple, isn't it? Well, not really.

Because, having knowledge about effective waste segregation does not necessarily mean that there is also the required attitude to practising it and that it is also actually practised. This is because between having knowledge of waste segregation to putting that knowledge to practice, individuals may face many barriers that they find difficult to overcome.

Barriers can be for multiple reasons, ranging from sheer apathy and lack of concern towards waste, to specific cultural and lifestyle pressures, to lack of resources, to failure of service providers in providing the necessary support after segregation at source such as door-to-door collection. Barriers can exist both at the citizens' level (individual/family) and at the level of the service provider (ie, city administration).

Barriers to waste segregation at source

Given below is an indicative list of KAP barriers (Note: only a properly conducted KAP survey can identify the real barriers, which can run into dozens):

1. Knowledge-level barrier:

- Absolutely no knowledge within family about different types of waste and waste segregation process
- So many daily waste can fall in either/or category of dry, wet, semi-wet, semi-dry, biodegradable, non-degradable, human and animal waste, medical waste, sharp or dangerous objects like broken glass, blades, etc, which can be confusing

2. Attitude-level barrier:

- Low perception of benefits of waste segregation, leading to a negative attitude
- Waste segregation not my job or why should I make it easier for administration?
- Lack of accountability of service providers

3. Practise-level barriers:

- a) Cost, availability, space for storage of multiple bins
- b) Additional work and additional expenses for handling multiple bins
- c) Door-to-door collection is ineffective and inefficient
- d) Lack of policy support or monitoring from service provider (ie, local administration)

Desired role for service provider (local administration)

Get evidence: Once *waste segregation at source* is identified as a key behavioural objective to achieving effective MSW management, the administration must first conduct a well-designed KAP study to find out the key barriers (reasons) that prevent people from segregating waste. From the findings from the survey, the administration can then invest accordingly.

Prepare an investment plan: For example, if the gap is found at the knowledge level, then investments will need to be made to increasing knowledge about waste segregation. Now different types of waste generators will need different types of knowledge, such as a hospital generating hospital waste will need different knowledge from the knowledge required by a family at home generating domestic waste. Separating the different types of waste generators is very important. Investments will have to be made on using a variety of methods and information channels such as mass media and social mobilisation.

On the other hand if more barriers are found at the attitude (desire/inclination) level, then investments will have to be made on adopting those strategies that influence attitudinal changes. Human beings are influenced by, and interact with their physical, cultural, and social environments and the norms in these environments (*social norms*) are an important influence in their behaviours. One-to-one meetings or interpersonal communication, identifying and using key influencers within families, friends or community, supporting and timely information, and in-

centives can influence positive attitude.

While barrier at the practice level will need a different level of resource support such as provision of affordable bins, timely replacement of damaged bins, regular and unailing collection in a well-coordinated manner, holding service provider accountable for any failures are some of the investment strategies.

Monitor progress regularly: This is very important because any behaviour has the potential to lapse to old practices. Behaviour change investments need to be sustained over a certain period of time to convert a habit into a behaviour. Regular monitoring will help in identifying the gaps in investments, gaps in strategies, and gaps in results.

Adopt and adapt good practices: There are enough good practices at the local and global level that are available to adopt, with quality documented evidence of outcomes, including what worked and what did not work. Good practices can also be adapted and customised to local needs. The new municipal solid waste guidelines brought out by the Urban Development Ministry is a very good reference document, and should be followed.

Investing in behaviour to bring about cultural change

In the old times, Indian society was always very particular about sanitation and hygiene. For example, toilets were always constructed outside the living area, and certainly away from areas such as kitchens and bedrooms; people changed into a different piece of attire before going for defecation and changed back after ablution; entering the house wearing footwear was prohibited; washing of feet and hands before entering the house was essential; feeding vegetable waste to cattle or disposing in kitchen gardens was common, and many such similar practices are indicative of the fact that sanitation and hygiene was always accorded great importance in Indian culture. It is high time Indian cities invested adequately in making sanitation and hygiene part of the Indian culture once again. ❖

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Beware: Our Waste Enters Our Water and Air

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Mary Ann George is research consultant at Centre for Ecology, Development and Research (CEDAR). She is an environmentalist who is passionate about contributing towards the development of tangible and sustainable local communities.

Underlying the flooding and Guru-jam of July 2016, the leachate pond at the Bandhwari waste dump in the monsoon, and the spike in air pollution post-Diwali in November 2016, is our lifestyles and technologies that generate massive amounts of waste that choke our water ways, poison our groundwater, and pollute our air.

Gurgaon has very high air pollution levels, surely a perverse achievement for the fastest growing city in the NCR. In short, our waste impacts our water, or soil and our air. Surely we can do better.

Municipal solid waste, generally referred to as 'garbage', predominantly consists of waste from individual houses. In the default business-as-usual scenario, the several waste streams of solid waste mingle together in an unholy mess that is difficult to treat and recycle, and is often dumped locally, burnt, or dumped in informal landfills. The diagram on the next page shows the default scenario and its attendant outcomes on air and water pollution.

Open burning of waste causes local air pollution as well as contributes to global warming and climate change. It releases fine particulate matter (PM_{2.5} and PM₁₀) a short term climate pollutant, and carbon dioxide which has a longer climate impact. Other gases depend on what is burnt – mixed waste could release toxins like dioxins and other pollutants.

Dumping waste in unmanaged landfills leads to release of methane, a short-lived climate pollutant, from anaerobic decomposition, and also increases ground-level ozone, thereby contributing to both air pollution and climate change.

Landfills also generate leachate from water that has

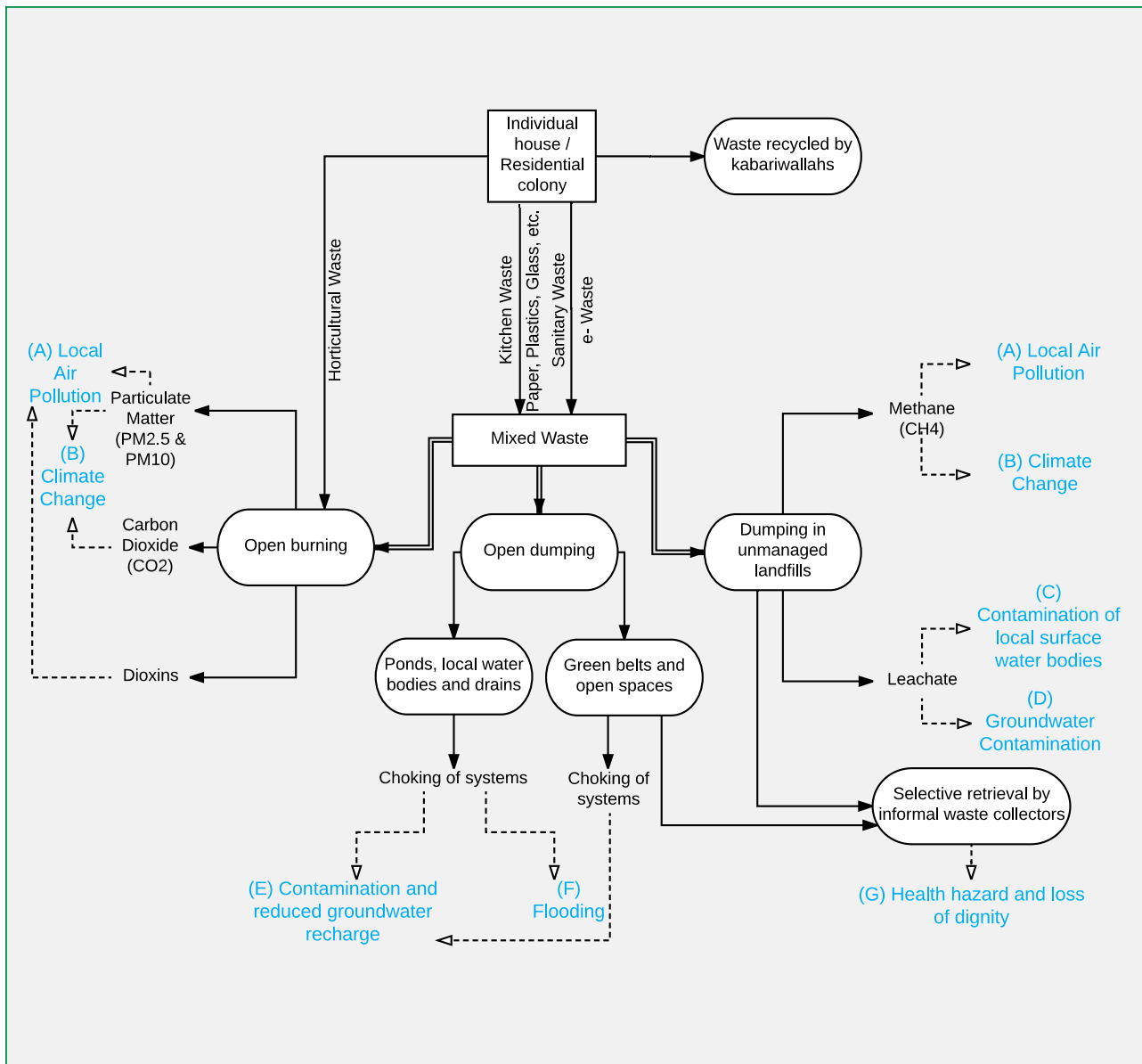
percolated through the waste. Leachate is a cocktail of pollutants and can include heavy metals. In unmanaged landfills, leachate contaminates the groundwater and flows on the surface and contaminates local water bodies. This damages the local ecosystem such that vegetation is unable to survive as has been seen at Bandhwari defacto landfill.

Open dumping of waste, particularly plastics, in drains or water bodies cause choking of these systems, such that water is unable to percolate through the earth, thereby reducing recharge of groundwater and increases flooding risk.

Waste pickers manually search through mixed waste for recyclable items, exposing themselves to all kinds of hazards, which threatens their health and lowers their dignity.

In contrast, in a sustainable waste management scenario, when waste is reduced, segregated, recycled, etc., then both air and water pollution is reduced. This requires steps at multiple stages, from home to colony, to city and beyond.

Segregated waste at the point of origin in the household is the key element here. In a residential colony, biodegradables from every household would be collected and composted along with horticultural residues. Bio-methanation is another alternative that could be adopted. The recyclables would be sold or given to recycling plants through organised waste collectors. Thus, the volume of waste being generated for disposal in landfill would be a small fraction as opposed to the earlier default scenario. Managed landfills would thus be smaller and last longer and would have effective leachate management that prevents groundwater contamination and also capturing mechanism to capture and utilise methane.



Other broader policies would include banning plastic bags and promoting reusable shopping bags, reducing extent of packaging waste, organising waste collectors and recyclers.

In addition, to garbage, another waste stream of domestic households is that of liquid waste i.e. waste water from kitchens, baths, and toilets. Untreated, pollutes water ways and ponds, and can impact groundwater quality.

With minimal open dumping and open burning of garbage, there would be less contribution to air pollution and climate change, and less impact on water bodies, better groundwater recharge, lowered flood-

ing risk, and clean green spaces that invite recreational activities.

Recognising the environmental pollution burden of unmanaged waste can be a motivating factor for action and thereby reduce the pollution burden. This should be accompanied by basic assessment of the baseline pollution scenario, to subsequently assess the positive impact of improved waste management measures. ❖

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chetan_agarwal1@hotmail.com

Mary Ann George, mageorge923@gmail.com



Garbage to Greens

An engineer by qualification, Poornima Savargaonkar has served at Indian Space Research Organisation as a scientist. She has travelled extensively to learn urban organic gardening and farming. She helps communities and individuals to create “Garbage to Greens” Poornima won the first prize in 2016 for the best kitchen garden in the small garden category by the All India Kitchen Garden Association.

Each time I look at the mountainous landfill in Delhi and Gurugram, I go back to my memory lane. When did we start building these sites? Are our parents' generation responsible? No, I am certain that our parents' generation did not do this. They were much more conscious and responsible. I remember using old clothes of my siblings and even distant relatives and also remember flaunting them with pride. I remember how we use to get the second hand books from friends for our studies. I remember the *pattals* made out of *Palash* or Banana leaves that we ate food in social and family functions. Indeed, my parents' generation practiced the 3Rs with conviction.

It is our generation that started building these piles. Pressured by increasing urbanisation and consumerism, our generation invented polythene bags, shied away from using second hand things for my children, stuffed refrigerators with things we need for today, tomorrow, and weeks. We created and continue to create these huge piles of waste to load the nature which is incapable of taking care of it.

To correct the situation, proactive steps are needed. We need to take the action to treat it at source. Waste management at home is simple as well as collaborative and holistic. I take great pride in using the compost generated from wet waste at my home to grow organic vegetables. I also reuse much of grey water generated in my house for watering plants around my house. It gives me a great satisfaction to follow my *dharma* towards environment. Waste management at home is simple, doable and practical. Every residence should treat the kitchen waste at source. Every residential society should have a fully functional integrated waste management system. It should have a) its own wet waste and horticulture waste treatment plant as well as gray water treatment plant within its premises b) certified recyclers attached for dry waste and e-waste collection and

recycling c) waste water treatment plant within its premises.

The output of both a) and c) above should be used for horticulture. In Gurugram, there is a huge need for manure and water to maintain greenery. Every school, corporate, government building too should be mandated to have their own treatment plants and use their output for horticulture. Every school/office with kitchens, every religious place serving food and every restaurant should be mandated to convert their food waste into biogas. Every large building having measurable roof surface area, should have green roofs and these roofs should be fed with recycled water and manure generated in-house.

The municipal corporation should a) facilitate residential colonies with provision of space/land within their premises to have waste treatment plants; b) stop collecting kitchen waste from affluent societies; c) have composting facilities in every sector for the horticulture waste that is collected from roads and common parks, vegetable mandis, religious places etc to treat it at source without adding cost to it by transporting it to other composting facilities; d) back compost and treated water from the citizens/corporate /schools etc.; e) amend the existing policies to cater to contemporary needs of the city waste management; f) issue list of certified dry waste and e-waste collectors/recyclers from time to time for the citizens to avail the facility.

The government should encourage more waste recycling plants around big cities and bring out suitable policies for city administration to implement waste management at source. I feel that all stakeholders should come together to make our cities clean, green and sustainable. It is the need of the hour! ❖

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Don't Mix your Waste - Be Waste Wise

Monika Khanna Gulati is leading NCR Waste Matters, a Citizen Action Group for waste management. This initiative supports and inspires two bin one bag segregation at source, resource optimisation, composting and connects people aspiring to manage their waste in situ by sharing resources and detailed information. She is also spearheading the waste management initiative in her colony, Nirvana Country, and has assisted authorities to tackle the Bandhwari mess.

Segregation does not mean dirtying hands to separate mixed waste. It simply means to ensure not to mix different types of waste. All kitchen waste can be collected separately and composted. All the dry paper, plastic and cardboard can be kept in a separate bag. So, the question of segregation does not arise as it is all already separated. Within the confines of my small garden, I have been experimenting with four different kinds of composters including a leaf composter, two aerobic composters and one anaerobic composter. I do not allow a single leaf to fly out of my home or go waste as leaves are the essential source of carbon that the soil needs to nourish itself. The compost generated nourishes my garden, the common areas in Nirvana Country and is also gifted to family and friends.

Composting is a combination of the greens, browns and the good microbes left to nature to do her job. The greens constitute the fresh kitchen or garden waste, the browns could be the dry leaves, shredded branches, cocopeat or sawdust.

You could either undertake aerobic composting or anaerobic composting. For aerobic composting, many container options are available in the market. It is ideal for homes with a covered balcony or a garden. Each day's waste from the kitchen is emptied into it with a handful of leaves and a little bit of the accelerator to initiate the microbial activity. The dry brown leaves or cocopeat or sawdust help to absorb the moisture. The accelerator could be sour buttermilk or even diluted cow dung. It needs to be stirred after a few days and within 30 to 40 days, beautiful, black, earthy smelling compost is ready.

Anaerobic composting is ideal for small apartments which do not have space for an outdoor composter. In the first stage, simply add the waste daily and cover it with the bosaki powder that comes

with the bins and shut it. Once full, leave the bin's contents to turn to pickle. Keep harvesting the leachate from the outlet every few days. This leachate can be diluted and used to water plants as it is highly nourishing and is even strong enough to clean blocked drains. In the second stage, which is aerobic in nature, layer



Leaf composting

the pickle with soil or old compost and leave it aside for a few days in a *gamla* or any container which has small holes in it. The microbial activity starts and within a few days wonderful earth smelling compost is ready to nourish your soil.

Please remember, to compost, one does not necessarily have to buy an expensive composter as composting can even be done in a bucket with a holes, a *matka* with a few holes drilled into it, a pit in the ground or a cane basket. One just has to understand the principle and get creative.

People who compost at home not only inspire others but also demonstrate how easy it is to manage waste at the home level. There is very little that goes to the landfill after that as the dry waste is sent to the *kabadiwallahs* or recyclers as it has not been dirtied by the kitchen waste. Communities which have members composting their waste are the ones which are quickly converting to managing their waste within their premises thereby reducing the burden on the Bandhwari landfill and on black spots in the city. ❖

Contact: 9810299796, ncrwastematters@gmail.com



A Small Step Towards a Long Journey

Gurpreet Kaur is Founder of Action in Community and Training (ACT). She has worked on women empowerment, education, micro finance as well as health and waste management projects with organisations such as UNICEF, World Bank, Aus-Aid, National Institute of Urban Affairs and International Red Cross Society. Her experience with waste handling began while leading the pilot project on waste management under Yamuna Action Plan. In ACT, she is enabling women at the grassroots to generate livelihoods from waste in Faridabad.

Solid waste going into landfills has a serious impact on the environment. Action in Community and Training (ACT) is an NGO working since the last five years in Lakkarpur village in Faridabad, NCR with ragpickers and other working children. The NGO had stepped into dry waste recycling initiative as a source of livelihoods for the under privileged women about two years ago. This group began with recycling of Tetra Paks, paper plates etc. into handmade paper in the year 2013. The following year, it ventured to take it a step forward into community-led waste management and had been awarded an aid from United Nation Development Programme's small grant's programme funded by the Global Environment Facility. The course of action ahead was not easy as mixed waste is useless as a resource until waste separation at source is practiced.

The catchment area for collection of dry waste was Charmwood Village located in the vicinity of the slum Lakkarpur Village. The recycling initiative focused on recycling Tetra Paks into handmade paper and paper products as well as making handicrafts



Products made from wrappers of biscuits and chips at ACT's recycling centre.

from chips and biscuit wrappers. The objective was that recycling would decrease the solid waste going to the landfill as well provide green jobs to the ragpicker women.

The collaboration with RWAs in Charmwood was an uphill task. We began with the ones which were convinced easily to segregate waste at household level. The leaders of these RWAs were the initiators for segregation of dry waste among the residents. They got it collected at a single point within their campus from where it was collected by our staff and taken to the recycling centre.

In our endeavour, we faced many challenges like segregation of waste at source, no dry waste collection centres, uncertainty of supply of materials, technical challenges to recycling, cost of collection and transportation of dry waste and last but not the least the finance required for recycling activities. Marketing of recycled products is again a challenge due to its high production cost.

From our brief experience, we feel that the way forward is decentralised waste management. This can be led by continuous education and awareness on segregation, dry waste collection centre at ward level, creating local champions in waste management, decentralised waste recycling, emphasising on extended producer responsibility, providing financial incentives for investments in recycling, and ensuring purchase of recycled products.

Inculcating behavior change is difficult but not impossible. We look forward to make Charmwood Village a model as "Clean Charmwood-Green Charmwood" with the co-operation of the RWAs, residents, market associations, schools, and corporates. ❖

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Citizens' Perspective

Gurgaon First asked four citizens actively working in the area of waste management in Gurugram about what they thought were the key issues and solutions. Their perspective is mentioned below.

What according to you should be the overall waste management strategy for Gurugram at the macro and micro level?

Rumjhum Chatterjee

The Corporation should prioritise sanitation sector; promote decentralised and in-situ segregation and composting of wastes; institutionalise informal vendors within the corporation; incentivise vendors for collection of segregated wastes; promote ward level composting facility; mobilise sanitation champions in each ward and involve them in sanitation drive; reward champions; establish sanitation helpline in ward and zone; install GPS in collection vehicles for monitoring of vehicles; ensure timely collection of segregated wastes; incentivise RWAs who undertake initiatives for self-management of solid wastes; impose heavy penalty for dumping of construction wastes and impose challans for landowners who allow their plots to be converted into dumping sites.

Monika Khanna Gulati

To create a strategy, there must be data collection and mapping of all the zones to survey, assess and evaluate current practices and resources, including the quantity and types of waste being generated, the types of waste generators, all types of the existing mechanisms of waste collection, including the arrangements for pickup, segregation, and transport, and the relevant equipment and manpower.

Data collection is of utmost urgency since no clear picture of waste collection and disposal currently exists because of the multiplicity of government agencies and private parties involved in the tasks. The collected data should be compared with waste management laws, regulations and rules, (solid waste, plastic waste, construction waste, e-waste,

bio-medical waste, hazardous and other waste) and identify the gaps. Any strategy would always begin with awareness creation. The fact that most people including the functionaries of the Urban Local Bodies are not aware of the SWM rules 2016, is an indication as to where to begin. We as a city are not talking about it enough and also not in the right spirit.

The gaps should be plugged through:

- The roadmap of 'Know your Waste' needs to be created and shared with the city at all levels highlighting problems and solutions through a mass communication and outreach programme.
- Building capacity (knowledge, skills, equipment) among civic agencies tasked with SWM.
- Building capacity (knowledge, skills, equipment) among waste collectors, and improving their conditions of work so as to assure work with dignity.
- Empanelling waste workers, waste collectors and *kabadiwallas* across the city and integrating them into the city-wide waste management system and sharing information on a public platform.
- Creating the ecosystem and logistics network to bridge the connect between end products of e-waste, compost, dry waste and biogas.
- Enforcing penalties on all generators of waste (after awareness building, sharing multiple solutions and giving sufficient notice).
- Using IT at every step to collect, compile, collate and share information, with the twin objectives of enhancing transparency and accountability.

Keshav Jaini

To begin with, Haryana must implement the solid waste management (SWM) Rules 2016 at the macro level and waste segregation and inhouse composting at the micro level for communities, RWAs, educational institutes, businesses etc.

Ravi Kapoor

Each category of waste needs to be dealt with in a unique way. The key is to reduce, recycle, reuse, recover. Segregation of waste at source is the key.

- **Wet Waste:** Organic waste comprises kitchen and horticulture waste. Approximately 60 to 70 per cent of waste generated from homes is wet organic waste. On an average, organic waste generated per person is about 500 gms per day. This can be easily made into compost. The process takes three weeks. Many apartment complexes in Gurugram have already installed the composting plant. Together with HUDA and MCG, we held a meeting with a Sector 29 res-

taurant and hotel owners and told them to install a large composting unit in Sec 29. The incentive from the government will be in terms of rebate on property tax.

- **Dry Waste:** After removing the organic waste, we are left with the inorganic stuff. Inorganic waste comprises of plastic, glass, aluminum cans, other metals, paper, card boards, styra-foam, thermacol, other packaging material etc. C&D waste includes bricks, RCC, wood, glass, pipes, wires, bathroom fittings, etc. Plastics need to be segregated according to their type. There are many kinds of plastics. Each needs to be shredded and melted separately and then it can be reused again. Glass needs to be separated and melted so that it can be reused. The same is true for aluminum and other metals.
- **C&D Waste:** In a few months, MCG will be starting a C&D recycling plant. The end product can be used in making roads, bricks, used as fillers in construction and for making tiles for pedestrian walkways.



Garbage on the road sides is a common sight in Gurugram.

All the waste from Gurugram and Faridabad reaches Bandhwari. At the moment, the situation is alarming and disastrous for the environment. The leachate from the untreated waste has already percolated to the aquifers and has started polluting the ground water. Only 10 to 15 per cent of the waste should reach the landfill site. At the moment 90 per cent of waste reaches the landfill site. Everything that can be recycled or reused must not reach Bandhwari.

At the macro level, the city needs to ensure that minimal garbage reaches land fill site. For this, maximum recycling, reuse and recovery needs to be done at all levels. C&D recycling plant needs to be installed. Waste-to-energy plant needs to be installed. Incineration is needed for inert material. We need large composting units for horticulture waste and bio-methanation plants. At the micro level, societies and commercial establishments need to install wet waste composting units. They first need to start segregating immediately.

What could be the credible incentives for communities/ RWAs and households to segregate waste?

Rumjhum Chatterjee

Even a formal letter from MCG would a great trigger. Apart from this, establish most clean and green award for RWAs; provide other development support to the RWAs and move away from being a provider to a facilitator.

Monika Khanna Gulati

In this world of monetisation, we do not see the extended health, environmental and spiritual benefits of living in a clean city. And maybe, this is even more true of the millennium city which seems to have lost its soul. It has now become imperative, that we take charge of the solution for our own good if we do not wish to be sandwiched between the worst possible standards of soil, water and air pollution. What would be a more tangible benefit than the reward of good health and safe breathing air? Not to mention, our children taking pride in their city and Gurugram becoming a place where people come from elsewhere to admire citizenship which comes together for the larger good.

Also, it does not stop at communities segregating their waste if the pickup truck is going to mix it all up again. The biggest incentive for any citizen/community is to see the complete eco-system working efficiently bringing the spirit of the waste management rules to life. The authorities must gear up and embrace methodologies to integrate efficient waste management practices as a way of life.

At the micro level, communities doing good work and managing their waste responsibly should be awarded and good stories should be shared. Sharing of good stories breeds positivity and inspires others to follow suit and makes them confident that one can move out of the complaining mode to the positive action mode.

Keshav Jaini

Incentives have not materialised in the last so many years from the government and therefore very few have implemented any SWM (claiming they are waiting for the government to announce incentives). Minor incentives will not work as we are so set in our wasteful methods. Instead, strict law and strict implementation with 'challans' would be more effective. Some rewards and recognition of good work would help.

Ravi Kapoor

In our meetings with MCG, they have suggested to give rebate on property if people in societies and independent houses start segregating their waste and install a wet waste composting unit in their community. A level of 10 to 20 per cent rebate in house tax is being worked out. A similar rebate can be worked out for commercial establishments and industries like restaurants, offices, malls and factories.

What according to you is one single aspect that the authorities should implement urgently? In what aspects of waste management could the citizens and authorities work hand in hand?

Rumjhum Chatterjee

Just focus on mass mobilisation for segregation of wastes (push trigger) and establish ward/zone level composting facility (pull trigger).

Monika Khanna Gulati

The problem arises when the stakeholders of the city fail to see waste as a potential source of energy and agricultural input in the form of manure. The Bangalore Corporation, which recently made three-way waste segregation mandatory at the household and institutional level, is showing the way to the rest of India. There is a single unified message that the authorities need to send out to the city on the segregation format, so that everybody from the waste worker to the citizen has uniform training on how and what to do.

The waste management system needs to incorporate this message and integrate the back-end services and create destination for the segregated waste so that each and every one is on board with the same information and knows how each and every type of waste is to be dealt with. The authorities thus, have to begin collecting only segregated waste at the doorstep to comply with Sections 4 and 15 of the SWM Rules 2016.

Keshav Jaini

One single aspect that the authorities should implement with immediate effect is that waste segregation and in-house composting by law should be immediately implemented, not just for household waste but also for horticulture waste. Citizens and authorities must work together and complement each other starting with awareness programmes, reduction of waste (ban on plastic and one time use products), pilot projects and help in community level projects.

Ravi Kapoor

A law that makes it mandatory for residents, commercial and industrial establishments to segregate their garbage. Penalty should be imposed on dumping waste in the open. We as citizens are already working with MCG and have created groups as per the four MCG Zones. We are working towards elimination of plastic bags, proper disposal for C&D waste, segregation of garbage at source, installing composting units, E waste management etc. ❖



Rumjhum Chatterjee, a resident of Palam Vihar, is one of the co-founders of Feedback Infra Group. She serves as a Director on the board of Feedback Infra Pvt. Ltd. and is also the chairperson of the Feedback Foundation. The Trust is implementing a model village project in Mewat, Haryana as the CSR Project of the Feedback Infra Group. Rumjhum is currently the Chairperson for CII's Northern Regional Council. Feedback Foundation is associated with MCG in a pilot project of segregating waste in a few wards of Gurugram.

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rumjhum.chatterjee@feedbackinfra.com*



Monika Khanna Gulati is leading NCR Waste Matters, a citizen action group for waste management. This initiative supports and inspires two bin one bag segregation at source, resource optimisation, composting and connects people aspiring to manage their waste in situ by sharing resources and detailed information. She is also spearheading the waste management initiative in her colony, Nirvana Country and has assisted authorities to tackle the Bandhwari mess.

*Contact: 9810299796,
ncrwastematters@gmail.com*



Keshav Jaini is a resident of Garden Estate, one of initial residential colonies in Gurugram to segregate waste and compost. He is an avid proponent of waste management having set up the waste segregation based on "two bin one bag" method and a decentralised in-house composting system at a low cost without machines and electricity and a low carbon footprint.

*Contact: 9313379994,
keshavcj@gmail.com*



Ravi Kapoor is Steering Committee Member, Green Gurgaon (a citizen initiative) and also the public monitor for waste appointed by the MCG. Ravi is also part of the NGO, Surge where he works with the authorities on Gurugram's traffic management issues.

*Contact: 9811014912,
ravikapoor2005@gmail.com*



WASTE PLAYERS DIRECTORY



Central Bodies

Bureau of Indian Standard

Bureau of Indian Standard (BIS) is a statutory institution established under the BIS Act, 1986 for the harmonious development of the activities of standardisation, marking and quality certification of goods. Under the Swachh Bharat Mission, BIS is developing fresh standards for solid waste management. In the past, it has also issued guidelines for solid waste management and recycling of plastic waste.

Website: www.bis.gov.in

Telephone: 011-23230131, 23233375, 23239402

Email: info@bis.gov.in

Address:

9 Bahadur Shah Zafar Marg,
New Delhi-110002

Ministry of Chemicals and Fertilisers

The Ministry of Chemicals and Fertilisers is the administrative unit of three departments namely the Department of Chemicals and Petrochemicals, the Department of Fertilisers and the Department of Pharmaceuticals. The Ministry provides market assistance for selling compost and propagates the use of compost. It also conducts seminars related to sustainable management of chemical waste.

Website: www.chemicals.nic.in

Phone: 011-23386752

Email: ashok.mathur57@nic.in

Address:

344, A-wing, 3rd floor,
Shastri Bhawan,
New Delhi-110001

Ministry of Agriculture

It is the apex body for formulation and administration of rules and regulations related to agriculture in India. As part of the centre's cleanliness mission, the agriculture ministry has decided to provide Rs 10 lakh each to 585 'mandis' (wholesale agriculture markets) across the country for setting up waste management plants. Besides, the ministry has also decided to earmark funds from its flagship Rashtriya Krishi Vikas Yojna for cleanliness drives.

Website: www.agriculture.gov.in

Telephone: 011-23782691/23384129

Email: am.krishi@nic.in

Address:

Krishi Bhawan,
Room No. 120, First floor,
Dr. Rajendra Prasad Road,
New Delhi-110001

Ministry of Electronics and Information Technology

Ministry of Electronics and Information Technology is involved with providing e-infrastructure for delivery of e-service and promotion of electronics hardware manufacturing and IT-enabled services industry. It is also involved in framing e-waste (Management and Handling) rules and publishing reports on e-waste.

Website: www.meity.gov.in

Phone: 011-24301851

Email: webmaster@meity.gov.in

Address:

Electronics Niketan,
6, CGO Complex,
Lodhi Road, New Delhi-110003

Ministry of Environment, Forest and Climate Change

The Ministry of Environment, Forest and Climate Change (MoEF&CC) is the nodal ministry in the central government for the planning, promotion, coordination and overseeing the implementation of India's environmental and forestry policies and programmes. The Ministry has notified the Municipal Solid Wastes (Management and Handling) Rules, 2016, Plastic Waste Management Rules 2016, e-waste (Management) Rules, 2016, Bio-Medical Waste Management Rules, 2016,

Website: www.enfor.nic.in

Telephone: 011-24695456

Email: ak.pateshwary@gov.in

Address:

Paryavaran Bhavan,
Jorbagh Road, New Delhi-110003

Construction and Demolition Waste Management Rules, 2016, Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. The emphasis of the policies is on management of the waste in a sustainable way.

Website: www.panchayat.gov.in
Telephone: 23782373
Email: min-mopr@gov.in
Address:
Krishi Bhawan, Dr. Rajendra Prasad
Road, New Delhi-110001

Ministry of Panchayat Raj

The Ministry of Panchayati Raj is the nodal body governing the gram panchayat system. The ministry has oversight of all state panchayat bodies. The ministry has to ensure creating a sustainable waste management system at the gram panchayat level.

Website: www.powermin.nic.in
Telephone: 011-23717474 /0411
Email: piyush.goyal@gov.in
Address:
Shram Shakti Bhawan
Rafi Marg, New Delhi-110001

Ministry of Power

The Ministry of Power is primarily responsible for the development of energy in the country. The Ministry of Coal and New and Renewable Energy come under the Ministry of Power. The Ministry decides tariff for power from waste-to-energy projects and ensures its compulsory purchase by distribution companies. The Ministry funds projects for recovery of energy from wastes and funds research in biofuels.

Website: www.rural.nic.in
Telephone: 011-23385484
Email: asmathew@ias.gov.in
Address:
Krishi Bhawan,
Dr. Rajendra Prasad Road,
New Delhi-110001

Ministry of Rural Development

Being the apex Ministry for most of the development and welfare activities in the rural areas, the Ministry of Rural Development also plays a role in creating awareness about waste management through a community participatory approach such as women self-help groups for composting and recycling. It has to ensure implementation of the waste rules in rural areas.

Website: www.moud.gov.in
Telephone: 011-23063495, 23061162
Address:
MoUD, Maulana Azad Rd,
Rajpath Area,
Central Secretariat,
New Delhi-110001

Ministry of Urban Development

The Ministry of Urban Development is the nodal ministry for urban development in the country. The ministry is implementing the Swachh Bharat Mission and has made a manual for municipal solid waste management. The manual will assist the policy and decision makers, planners, managers and technical personnel involved in safe and hygienic handling and disposal of municipal solid waste generated in the urban areas in the country.

Website: www.cpcb.nic.in
Telephone: 011 2230 7233
Email: ccb.cpcb@nic.in
Address:
Parivesh Bhawan,
CBD-cum-Office Complex,
East Arjun Nagar, New Delhi-110032

Central Pollution Control Board

The Central Pollution Control Board (CPCB) is a statutory organisation constituted in 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. It provides a legal framework for ensuring proper management and handling of municipal solid wastes, hazardous wastes, bio-medical waste, plastic waste, e-waste and batteries management. It conducts periodic reviews with state pollution control boards and set standards for pollution levels.

Haryana Bodies

Department of Environment

The Department of Environment is taking necessary steps for protecting and preserving our environment. Besides, enforcement and implementation of the waste Acts, various laws regulating pollution caused by bio-medical waste, hazardous waste, solid waste, use of plastic etc. are also being effectively implemented by the department. It has a climate cell and also gives environmental clearances. Thanks to its efforts, a hazardous waste disposal site is being developed at village Pali, in district Faridabad for safe disposal of hazardous waste generated by the industries.

Website: www.harenvironment.gov.in

Telephone: 0172-2581005; 2581006

Email: hspcb@hry.nic.in,
hspcbho@gmail.com

Address:

C-11, SEC-6, Panchkula, Chandigarh

Department of Town and Country Planning, Haryana

The Department is the nodal body to enable regulated urban development in Haryana. The policies of the department aim at encouraging a healthy competition amongst various private developers and public sector entities for integrated planned urban development. It is also responsible for integrated regional development within the National Capital Region.

Telephone: 0172-2548475,
0172-2549851

Email: tcp hry2@gmail.com

Address:

SCO-71-75 (1st to 3rd Floor),
Sector 17C, Chandigarh

Directorate of Urban Local Bodies Department, Haryana

The function of the Department is to provide a policy framework for the urban development in Haryana, to facilitate the working of urban local bodies and to maintain the civic amenities in the state. It has municipal corporations, committees and councils under its wing. Some key programmes such as JawaharLal Nehru Urban Renewal Mission, Urban Infrastructure Development Scheme for Small and Medium Towns and Rajiv Gandhi Shahri Bhagidari Yojna (RGSBY) all of which have solid waste management component are being implemented by the Department.

Website: ulbharyana.gov.in

Telephone 0172-2560075/2560082 .

Email: dulbhry@hry.nic.in

Address:

Bays No. 11-14, Sector-4,
Panchkula
Phone No: 0172-2570020

Haryana Environment Protection Council

Haryana Environment Protection Council (HEPC) is an advisory committee formed in 2006 to advise the Department of Environment, government of Haryana on environment issues. It is headquartered at Chandigarh. On the advice of council, the Environment Department has introduced three new schemes i.e. sewerage treatment plant in Haryana, Ghaggar and Markanda action plan and setting-up of Environment Training Institute at Gurugram in the 11th Five Year Plan (2007-12).

Website: www.harenvironment.gov.in

Telephone: 0172-2701628, 2709462

Address:

Directorate of Environment,
Government of Haryana,
SCO 1-2-3 Sector 17-D (2nd floor)
Chandigarh

Website: www.haryanaforest.gov.in

Telephone: 0172-2563988

Email: cffc-hry@nic.in

Address:

Sector-06 , Plot No.C-18,
Van Bhawan, Haryana Panchkula

Haryana Forest Department

The Haryana Forest Department runs and maintains many protected areas, including two national parks, eight wildlife sanctuaries, two wildlife conservation areas, four animal and bird breeding centers, one deer park and 49 herbal parks. Its vision is to make the state ecologically stable and to conserve the biodiversity of forest and wildlife in the state.

Website: www.hspcb.gov.in

Telephone: 0172-2581005, 2581006

Email: hspcbho@gmail.com

Address:

Vikas Sadan, First Floor,
Near District Court,
Gurugram, Haryana

Haryana Pollution Control Board

The Haryana Pollution Control Board is responsible for prevention and control of pollution in the state of Haryana. Its objectives are to advise the state government, collect and disseminate information, as well as encourage, conduct and participate in investigations and research relating to problems or pollution and prevention, control or abatement of pollution. It looks into water and air pollution, biomedical waste, hazardous waste, solid waste etc. It also gives pollution certification for various commercial or residential projects. It enforces rules, monitors environmental standards and issue authorisations.

Website: www.hsiidcprod/

welcomeLink.action

Telephone: 0172-2590481, 2590482

Email : info@hsiidc.org.in

Address:

Plot No: C-13-14, Sector 6,
Panchkula Haryana, 134109

Haryana State Industrial and Infrastructure Development Corporation

Haryana State Industrial and Infrastructure Development Corporation (HSIIDC) is a company established in 1967 to develop industrial infrastructure in the state of Haryana. It is responsible for solid waste management in the industrial area of Udyog Vihar, Gurugram.

Website: wss.hry.nic.in

Telephone: 0172-2583334/

094166 65896

Email: fcph@hry.nic.in

Address:

Bay No. 13-18, Sector 4,
Panchkula, Haryana-134112

Public Health Engineering Department

The main function of the Public Health Engineering Department is to plan, implement and maintain rural and urban water supply schemes as well as rural sanitation schemes. It undertakes sewerage treatment in Gurugram and also monitors the quality of waste water at inlet point of STPs as well as treated effluent.

Gurugram Bodies

Deputy Commissioner's Office

The deputy commissioner's office (DC office) is divided in various branches, which deals with law and order, judicial, recovery of dues, environmental issues, natural calamities, census work, renewal of arms licenses, issue of driving licenses, panchayat control work, flood relief as well as Aadhaar card. The DC office has from time to time issued notifications on waste burning and treatment of horticulture waste.

Telephone: 0124-2329988

Email: dcgrg@hry.nic.in

Address:

Deputy Commissioner's Office
3rd Floor, Mini Secretariat,
Near Rajiv Chowk, Sector 51,
Gurugram, Haryana

Haryana Urban Development Authority

The Haryana Urban Development Authority is a statutory body of the Haryana Government. It was constituted under the Haryana Urban Development Authority Act, 1977. HUDA is the urban planning agency of the state of Haryana in India. It develops and disposes of land for residential, industrial, institutional and commercial purposes. The authority is divided into various departments including engineering, finance, town-planning, architecture, legal, monitoring, enforcement, vigilance, establishment and authority, policy, land acquisition, and information technology. The objective of HUDA is to promote and secure development of urban areas in a systematic way. It also looks after solid waste management including (door to door collection and street sweeping) in its areas, though some of its areas have been handed over to MCG.

Website: www.huda.org.in

Telephone: 0124-2573694

Email: admggnhuda@gmail.com

Address:

HUDA Office Complex, Sector 14,
Gurugram, Haryana

Municipal Corporation of Gurugram

The Municipal Corporation of Gurugram (MCG), constituted in 2010 is governed as per the provisions of the Haryana Municipal Corporation Act, 1994, and amendments made thereafter. The MCG, as an institution of local self-government under the 74th Constitutional Amendment Act functions under the corporation system with an elected body comprising 35 councillors which is headed by a Mayor. The area under the MCG is about 231 sq.km. It provides various services to the citizens of Gurugram under its jurisdiction like granting birth or death certificate, house tax, sanitation monitoring, marriage registration, trade licence, tenders, right to information, property record, grievances registration, fire safety, maintenance of municipal and common parks. It is also the apex body for solid waste management in Gurugram. It is responsible for waste collection and disposal in a large part of Gurugram. It appoints contractors for waste management (for both door-to-door collection and street sweeping) and has its own sanitation field staff as well.

Website: www.mcg.gov.in

Telephone: 0124-2220011

Email: contact@mcg.gov.in

Address:

C-1, Info City, Sector 34, Gurugram

MCG Commissioner

Mr V. Uma Shankar: cmc@mcg.gov.in

Additional Commissioner

Mr Amit Khatri: adcmc@mcg.gov.in

Joint Commissioner 1

Mr Vivek Kalia: jc1@mcg.gov.in

Joint Commissioner 2

Ms. Anu Shokan: jc2@mcg.gov.in

Joint Commissioner 3

Ms Y.S. Gupta: jc3@mcg.gov.in

Joint Commissioner 4

Mr Rohit Yadav: jc4@mcg.gov.in

Industry Associations

1. GENERAL ASSOCIATIONS

Website: www.assochem.org

Telephone: 011-46550555

Email: assochem@nic.in

Address:

Assocham Corporate Office,
5, Sardar Patel Marg, Chanakyapuri,
New Delhi-110021

Associated Chambers of Commerce & Industry

A not-for-profit-organisation, the Associated Chambers of Commerce & Industry is also referred to as 'chamber of chambers'. It includes about 400 industry chambers, trade associations to serve more than 45,000 corporate members. Assocham along with Frost & Sullivan has conducted a study on e-waste, detailing the growth of e-waste in the country. It conducts many national seminars and gives awards on sustainability and environment.

Federation of Indian Chambers of Commerce & Industry

The Federation of Indian Chambers of Commerce & Industry is one of the largest and oldest apex business organisation in India. A non-government, not-for-profit organisation, it draws its membership from the corporate sector, both private and public. FICCI has an initiative called DRDO-FICCI Associated Technologies Assessment and Commercialisation. FICCI has organised many international and national workshops on waste management. It also organised stakeholder consultation on Draft Waste Management Rules 2015. FICCI-Con-federation of Micro, Medium and Small Enterprises provides integrated services on waste minimisation, cleaner production and pollution control systems. It has conducted several studies on waste sector.

Website: www.ficci.in

Telephone: 011-23738760-70, 011-23320714, 011-23721504

Email: ficci@ficci.com

Address:

Federation House
Tansen Marg, New Delhi-110001

All India Association for Industries

The AIAI is a non-profit organisation that has over 1400 members and through its affiliates it represents over 30,000 industries. Nearly 70 per cent of its members are from the SME sector. The AIAI acts as a catalyst for industrial growth and investment promotion. It represents its members on various national and regional level panels and also with financial institutions on economic, trade and fiscal issues. AIAI conducts workshops, seminars and field visits to waste management plants.

Website: www.aiaiindia.com

Telephone: 022-2201 9265

Email: info@aiaiindia.com

Address:

New Excelsior Building,
6th Floor, A.K. Nayak Marg,
Fort, Mumbai-400 001

Confederation of Indian Industry

Confederation of Indian Industry (CII) is India's premier business association having over 7,200 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 100,000 enterprises from around 242 nations and regional sectoral industry bodies. Its primary goal is to develop Indian indus-

try, and to ensure that government and other stakeholders recognise the needs and contribution of the industry. CII runs a centre called CII – Sohrabji Godrej Green Business Centre (www.greenbusinesscentre.com) which is into energy efficiency, environment, recycling and green buildings, green audits and training in hazardous waste management and capacity building on environment in schools. It also contributed in organising extensive consultation with the industry on draft management rules 2015 before the final policy launch. It has formed several task forces and organised seminars on the topic of waste management.

PHD Chambers of Commerce

PHD Chamber of Commerce and Industry is a proactive and dynamic multi-State apex organisation. The chamber acts as a catalyst in the promotion of industry, trade and entrepreneurship. PHD Chamber, through its research-based policy advocacy role, positively impacts the economic growth and development of the nation. It has conducted many workshops on waste management.

National Association of Software and Services Companies (Nasscom)

National Association of Software and Services Companies is a non-profit trade association of Indian information technology and business process outsourcing industry. Headquartered in New Delhi, NASSCOM's member companies are in software development, software services, software products, BPO services and e-commerce. It facilitates business and trade in software and services and encourages the advancement of research in software technology. It organises workshops and seminars to create awareness about e-waste. NASSCOM Foundation has "BigBridge" a hardware donation programme that provides NGOs access to refurbished computers with licensed software, donated by IT companies.

2. WASTE RELATED ASSOCIATIONS

National Solid Waste Association of India

National Solid Waste Association of India is a non-profit organisation in solid waste management in India. With over 500 members worldwide, NSWAI comprises of national and international experts in the area of municipal solid waste, biomedical waste, hazardous waste, e-waste and construction & demolition waste. NSWAI helps in drafting policies and actions plans on solid waste management. It also collects, processes and compiles a database on solid waste management throughout the country; disseminates information on all

Website: www.cii.in

Telephone: 011-45771000 / 24629994-7

Email: info@cii.in

Address:

The Mantosh Sondhi Centre
23, Institutional Area, Lodi Road
New Delhi-110 003

Website: www.phdcci.in

Telephone: 011-26863801-04

Email: phdcci@phdcci.in

Address:

PHD House, 4/2 Siri Institutional Area,
August Kranti Marg,
New Delhi-110016

Website: www.nasscom.in

Telephone: 011-45771000/24629994-7

Email: info@cii.in

Address:

The Mantosh Sondhi Centre
23, Institutional Area, Lodi Road,
New Delhi 110 003

Website: www.nswai.com

Email: nswaindia@gmail.com

Address:

B-703, Custom's Colony 'A'
Military Road, Marol,
Andheri (E), Mumbai-400059

aspects of solid waste management through seminars, workshops, refresher courses, literature and audio visual techniques; and conducts on training for professional competence in solid waste management. It participates in committees set up by various authorities and institutions and renders advice and consultancy in solid waste management.

Website: www.ipcaworld.co.in

Telephone: 011-42207478

Email: info@ipcaworld.co.in

Address:

DDA Shopping Complex,
Hargovind Enclave, Vikas Marg Ext.,
Delhi-110092

Indian Pollution Control Association

The Indian Pollution Control Association (IPCA) is not-for-profit, non-governmental organisation comprising of a multi-faceted group of environmentally conscious individuals who are from the business, legislative, legal, engineering, finance, energy and environmental sectors. It is an organisation which is engaged in creating environmental awareness and implementing Integrated solid waste management system. It is providing its services of solid waste management to various corporate, industries, educational institutes and residential colonies. About 700 ragpickers from Delhi, Noida and Gurugram are associated with IPCA for a waste management project.

Website: www.icpeenvi.nic.in

Telephone: 022-2282 0491/96

Email: icpe@vsnl.net

Address:

Kushesh Mansion, 2nd Floor,
22, Cawasji Patel Street and
48/54, Janmabhoomi Marg, Fort,
Mumbai-400 001.

Indian Centre for Plastics in the Environment

The Indian Centre for Plastics in the Environment (ICPE) has been set up on the recommendation of a task force constituted by the Ministry of Environment and Forests and Climate Change. It is a nodal agency to handle all issues related to plastics and environment in the country. Its objectives is to encourage, promote and support upgradation of plastic waste management in India, develop and sustain a respectable and environment friendly image of the plastic industry, associate and seek the cooperation of the plastics industry with the common objective of promoting the image of plastic waste management, collect, collate, publish and disseminate statistical data and technical information on plastic waste industry/plastic industry and interact regularly with the relevant government departments and committees on the subject of plastic and plastic waste.

Website: www.iwma.in

Telephone: 044-45522655,
044-24728069

Email: iwma12@gmail.com

Address:

New No34 (Old No. 70), First Floor,
Brindavan Street, West Mambalam,
Chennai-600 033

Industrial Waste Management Association

The Industrial Waste Management Association was formed on the directive of Tamil Nadu Pollution Control Board to establish facilities for the safe and scientific disposal of the solid wastes from industries. Besides periodic review of the landfill site operation, IWMA conducts seminars, training programs and offers consultancy services to industries/ industry clusters in partnership with institutions and IIT-Madras on environmental issues related to air, water and waste management. IWMA has been actively involved in creating awareness among school children in areas of environment, renewable energy, recycling, climate change, water conservation and global warming. It conducts "Enviro" programme in collaboration with Science Olympiad Foundation for school children. IWMA also annually conducts "Young Environmental Scientist" programme.

3. GURGAON INDUSTRY ASSOCIATIONS

Gurgaon Industrial Association

Gurgaon Industrial Association is an apex and oldest industrial outfit of Gurugram. GIA is a non-government, not-for-profit, industry managed organisation. It is a 44 year old association with a present membership base of about 400 organisations in big, medium and small categories.

Website: www.giaonline.org

Telephone: 0124-2320746

Email: info@giaonline.org

Address:

Gurgaon Industrial Association,
GIA House, Opp. Sector 14, IDC
Mehrauli Road, Gurugram, Haryana

Gurgaon Chamber of Commerce and Industry

Gurgaon Chamber of Commerce and Industry was formed about two decades ago. All the affairs of the Chamber are managed by its Managing Committee which is elected every year by the members. The Chamber serves Gurugram, Udyog Vihar, Sohna, Roz-Ka-Meo, Dharuhera and Pataudi Industrial belts.

Website: www.gurgaonchamber.org

Telephone: 0124-2370303

Email: gcci@gurgaonchamber.org

Address:

Gurgaon Chamber of Commerce &
Industry, Khandsa Road
Gurugram, Haryana

NCR Chamber of Commerce and Industry

NCR Chamber of Commerce and Industry was established in 2004. It is working for promotion of industry, trade and entrepreneurship through its research-based policy and advocacy role to positively impact the economic growth. It has more than 200 members. It has conducted workshops on hazardous waste and e-waste.

Website: www.nccionline.org

Telephone: 0124-4268612

Email: president@nccionline.co.in,
ncci@ncci.org

Address:

NCR Chamber of Commerce &
Industry, B-604, Sushant Lok, Phase-1
Gurugram, Haryana

Manesar Industrial Welfare Association

Constituted in 2009, Manesar Industrial Welfare Association has been formed by industrialists of IMT Manesar to address and resolve numerous common infrastructural and other issues affecting them. It has membership of over 500 entrepreneurial initiatives of micro, small and industrial enterprises.

Website: www.miwamanesar.org

Telephone: 9891142017

Email: manesar.miwa@gmail.com

Address:

Manesar Industrial Welfare Association
Plot No 69, Sector 3, IMT Manesar
Gurugram, Haryana

Waste Research Institutes

Website: www.asci.org.in
Phone: 040-6653300
Email: directorgeneral@asci.org.in
Address: Bella Vista,
Raj Bhawan Road, Khairatabad,
Hyderabad-500082

Website: www.asci-india.com
Telephone: 0124-4288322,
4047488, 4046678
Email: info@asci-india.com
Address:
304-305, 3rd Floor,
Bestech Chambers B-Block,
Sushant Lok-1, Gurugram
Haryana-122002

Website: www.cbri.res.in
Telephone: 01332-272243
Email: director@cbrimail.com
Address:
CBRI Colony, Roorkee,
Uttarakhand-247667

Website: www.cpheeo.nic.in
Telephone: 011-23063495
Address:
Ministry of Urban Development,
Maulana Azad Road, Rajpath Area,
Central Secretariat, New Delhi-110001

Administrative Staff College of India

It is a government and industry management educational institute based in Hyderabad. It focuses on capacity building and applied research assignments in the areas of public policy and business management. It also conducts a large variety of management development programmes. Some of its focus areas are energy, environment, urban governance, infrastructure development, innovation and technology. It has conducted several workshops on decentralised solid waste management.

Agriculture Skill Council of India

The Agriculture Skill Council of India has been working towards creating a sustainable industry, entrepreneurship development in agriculture and allied sector. Apart from teaching better farm practices, the ASCI helps illiterate farmers understand the value of certain waste and help them in managing the waste that is produced from their farms to provide for resourceful manure and fertilizers.

Central Building Research Institute

The Central Building Research Institute has been vested with responsibility of generating, cultivating and promoting building science and technology. The Institute has been assisting the building construction and building material industries in finding solutions to the problems of building materials, health monitoring and rehabilitation of structures, disaster mitigation, fire safety, energy efficient rural and urban housing. Its focus areas of R&D include water and waste management; low cost sanitation and wastewater disposal systems; bagasse-cement boards and panels and light weight sandwich panels using paper industry waste. It also does R&D on C&D waste disposal.

Central Public Health and Environmental Engineering Organisation

It is part of the Ministry of Urban Development and looks into the area of urban water supply, solid waste management and sanitation in the country. It has published technical papers and manuals on waste management and also conducted R&D activities in waste. It acts as an advisory body at central level to advise the concerned state agencies and Urban Local Bodies (ULBs) in implementation, operation and maintenance of urban water supply, sanitation and solid waste management projects and helps to adopt latest technologies in these areas.

Centre for Environment and Development

The Centre for Environment and Development is an autonomous research and development, training and consultancy organisation focussing in fields related to environment and development.

Council for Energy, Environment and Water

The Council on Energy, Environment and Water is a not-for-profit policy research institution. It engages in high-quality research and develops partnerships with public and private institutions. It has published more than 100 research papers on energy policy, climate environment and resource security as well as on water governance and security. Its team published a report on “Decentralised Waste Management in Indian Railway” in June 2016 which discussed details about management of fecal waste, wastewater management and water-use efficiency.

Centre for Environmental Science and Engineering, IIT Bombay

The Centre provides degrees in major industrial sectors. Some of its research in waste management includes environmental impact assessment and hazardous waste management, innovative bioreactors for wastewater treatment and modelling of urban and regional scale air pollution in India. Some of the consulting projects include air pollution dispersion modelling for Trombay thermal power station, environmental impact assessment of a combined hazardous waste disposal facility and treatability of wastewater from Mantari Industries.

Centre for Rural Development and Technology

The Centre for Rural Development and Technology in IIT Delhi is involved in research pertaining to waste management and waste-to-energy. The centre was established in 1979. The centre lays more focus on biogas generation from waste and cow dung. It has developed a technology for biogas scrubbing and bottling. Research is carried out in solid waste management.

Centre for Science and Environment

The Centre for Science and Environment (CSE) is a public interest research and advocacy organisation based in New Delhi. CSE researches into, lobbies for and communicates the urgency of development that is both sustainable and equitable. CSE has released key statistics, issues and data about waste management through its independent research. A book by CSE on waste titled “Not in my backyard” (co-authored by its Director General Dr Sunita Narain) has been very successful in raising awareness about waste management. CSE also offers short term training in waste management and also confers the “clean city” awards.

Website: www.cedindia.org

Telephone: 0471-2369720/ 2369721/
2369722

Email: director@cedindia.org

Address:

Centre for Environment and
Development
Thozhuvancode, Vattiyorkavu P.O.
Thiruvananthapuram-695 013

Website: www.ceew.in

Phone: 011-40733300

Email: info@ceew.in

Address:

Council on Energy,
Environment and Water
Thapar House, 124, Janpath,
New Delhi-110001

Website: www.cese.iitb.ac.in

Phone: 022-25767851

Address:

Centre for Environmental Science &
Engineering,
Indian Institute of Technology Bombay,
Powai, Mumbai-400076

Website: www.crdt.iitd.ac.in

Telephone: (91) 011-2659 1121

Email: hodrdtat@rdat.iitd.ac.in

Address:

Centre for Rural Development
Technology
Indian Institute of Technology Delhi
Hauz Khas, New Delhi-110 016

Website: www.cseindia.org

Phone: 011-29955124

Email: cse@cseindia.org

Address:

Centre for Science and Environment
41, Tughlakabad Institutional Area,
Vayusenabad, Near Batra Hospital,
New Delhi-110062

Website: www.iari.res.in
Telephone: 011-25842367
Email: director@iari.res.in
Address:
Pusa Institute, New Delhi-110012

Indian Agricultural Research Institute

The Indian Agricultural Research Institute (IARI) commonly known as Pusa Institute is India's premier national institute for agricultural research, education and extension. It has been working proactively for finding appropriate uses for organic waste residues to create fertilisers and manures and improve upon their interaction with soil and plant; improving and maintaining soil fertility for sustained optimum agricultural production; utilisation of organic waste residues as a manure and production of biogas as fuel; soil test crop response correlation studies; advice to the farmers on soil test-based fertilizer recommendations.

Website: www.ecology.edu
Telephone: 011-29535053
Email: ecology@ecology.edu
Address:
A 15, Paryavaran Complex
South of Saket
New Delhi-110030

Indian Institute of Ecology and Environment

The Indian Institute of Ecology and Environment has been organising programmes having social, educational, cultural, economic dimensions to create a sustainable society. The Institute has provided training in the areas of ecology, environment, pollution control, disaster management, sustainable development, ecological tourism and environmental education.

Website: www.iima.ac.in
Phone: 079-66323456 / 26308357
Email: admission@iima.ac.in
Address:
Indian Institute of Management
Vastrapur, Ahmedabad-380015

Indian Institute of Management, Ahmedabad

The IIM(A) is a premier management institute of the country. Among other things, it has published a paper on how technology can be used to help solid waste management proposing an automated system for waste collection and container monitoring system using radio frequency identification, global positioning system, geographical information systems and global system for mobile communications. The system provides real time monitoring of waste collection through a web-based application. This application helps administrators in decision making related to reallocation of routes and containers, and observing performance of contractors thereby enhancing transparency and accountability.

National Environmental Engineering Research Institute

National Environmental Engineering Research Institute (NEERI) has been engaged in the research and development of better and scientific solid waste management practices for more than four decades. Its hazardous waste management division has done pioneering work and the focus of the research has always been addressing the contemporary issues, regulations, and industrial requirements for the sustainable development. New research initiatives have been taken for e-waste management, hydrogen production from solid residues, bioreactor landfills, and demonstration of solid waste management, specifically bio-methanation and composting, facilities for rural areas. NEERI also supports academic and frontier research in the waste management through the doctoral and post graduate research work in collaboration with national and international universities.

Website: www.neeri.res.in
Phone: 040-27160639
Email: rb_biniwale@neeri.res.in
Address:
NEERI, Nehru Marg,
Nagpur-440020

Sardar Swaran Singh National Institute of Renewable Energy

Sardar Swaran Singh National Institute of Renewable Energy (SSS-NIRE), at Wadala Kalan, district Kapurthala in Punjab is an autonomous institution focused on biomass energy research and development. It has a state-of-the-art research facility for biodiesel, bio-ethanol, gasification, biogas, biomass cook stoves and for other areas in bio-energy. In addition, research projects on process development for bioethanol production from agricultural residues and biogas have been conducted.

Website: www.nibe.res.in
Telephone: 0182 225 5544
Email: sss.nire@gmail.com
Address:
12th K. M. Stone,
Jalandhar-Kapurthala Road
Wadala Kalan, Kapurthala,
Punjab-144601

The Energy Research Institute

The Energy Research Institute (TERI) is carrying out research in the areas of solid waste management, hazardous waste management and environmental site assessments, and waste-to-energy technologies. TERI works close with the Ministry of New and Renewable Energy, the Ministry of Environment and Forests, the Municipal Corporation of Delhi and the Central Pollution Control Board. The TERI Enhanced Acidification and Methanation (TEAM) digester is a unique product developed for producing energy from any organic waste. TERI's sustainable habitat campus in Gurugram, Haryana has been generating bio-gas and manure from organic wastes since 2000.

Website: www.teriin.org
Phone: 011-4682100, 41504900
Email: mailbox@teri.res.in
Address:
TERI, Darbari Seth
Block, IHC Complex, Lodhi Road,
New Delhi-110 003

Transdisciplinary Research Cluster on Sustainability Studies (TRCSS)

An arm of the Jawahar Lal Nehru University, the Transdisciplinary Research Cluster on Sustainability Studies focuses on interface between the issues of social and ecological justice. It recently organised an extensive consultation on challenges of water and wastewater management in Gurugram in order to create a feedback driven platform for policy making to foster participatory and sustainable urban planning practices.

Website: www.jnu.ac.in/TRC/SS
Phone: 011-26738797
Email: pravin.kushwaha@gmail.com
Address:
Centre for Studies in Science Policy,
School of Social Sciences - I,
Jawaharlal Nehru University,
New Delhi-110067

Waste Contractors in NCR

Company Name	Website	Contact Number	Email	Address
Arise	www.ariseindia ltd.com	011-45047166/ 67	corporate@ariseindia ltd.com	309, Narain Manzil, 23, Barakhamba Road, Connought Place, New Delhi-110001
Antony Waste	www.antony-waste.com	022-41009295, 41002376	aaysonpaul@antonyasia.com	Flat No.1403, 14th Floor, Dev Corpora Building, Opp.Cadbury Co., Eastern Express highway, Thane, Maharashtra-400601
Balaji	www.balaji.co.in	022-22074824/25	info@balaji.co.in	6th floor, New Excelsior Bldg., A.K. Nayak Marg, Fort, Mumbai-400001
Basic Solution	www.basic solution.in	9718337818	basic solution.in@gmail.com	18B, Om Vihar, Palam Vihar Extn., Gurugram, Haryana-122001
Badri Vishal Protection	www.indiancompany.info	9899529105	protectioncompany@gmail.com	C-2/19, Laxmi Vihar Extn., C-2/19, Laxmi Vihar Extn, Delhi-110084
Bhavani Bioorganics Limited	www.bhavanibio.in	040-65159369	bhavanibio@gmail.com	Manjeera Heights, Phase-1, 401-B, Block, Chitra Layout, Saroor Nagar, Hyderabad, Andhra Pradesh-500 074
Eco Wise Waste Management Pvt. Ltd.	www.ecowise.net.in	9811177864, 7290022782	naina@ecowise.net.in	Plot 14 F, Ecotech 3, Greater Noida, Uttar Pradesh-201308
Go Green Services	NA	8527493144	citizengurgaon1@gmail.com	Plot No. 54, Sector 40, Gurugram-122002
Indian Pollution Control Association	www.ipcaworld.co.in	9312432405, 9818323370	info@ipcaworld.co.in	4, DDA Shopping Complex, Hargovind Enclave, Vikas Marg Ext., Delhi-110092
Kanak Resources	www.kanakresources.com	011-49691000	info@kanakresources.com	4th floor, Dr.Gopaldas Bhawan, Barakhambha Road, New Delhi-110001
K L Envitech	www.antony-waste.com	9899979616	cs@antonyasia.com	Flat no. 1403, 14th Floor, Dev Corpora Building, Opp. Cadbury Company, Eastern Express Highway, Thane, Maharashtra-400601
Proton Enviro	www.protonenviro.com	8800779003	rahul@protonenviro.com	F93, DLF Park Place, Golf Course Road, DLF Phase V, Gurugram-122001
RS Enterprises	NA	9810857722	absolute_ggn@yahoo.in	Shop No 123, Mata Road, Prem Nagar, Sector 12, Gurugram, Haryana-122022
Shree Shyam Industries	www.shreeshyamindustries.com	0180-2655178, 9795193841	aman@shreeshyamindustries.com	Tehsil-Fatehpur, District-Barabanki, Uttar Pradesh-225305
Sulabh International	www.sulabhinternational.org	011-25031518	info@sulabhinternational.org	Sulabh Gram, Mahavir Enclave, Palam-Dabri Road, New Delhi-110045

Solid Waste Management/ Decentralised Waste Solution Providers

Company Name	Website	Contact Number	Email	Address
A2Z Waste Management	www.a2zgroup.co.in	0124-4300426	communication@a2zemail.com	O-116, First Floor, Shopping Mall, Arjun Marg, DLF City Phase-1, Gurugram-122002
Aecom	www.aecom.com	0124-4830100	pawan.gupta@aecom.com	9th Floor, Infinity Tower C, DLF Cyber City, DLF Phase II, Gurugram-122002
Alfa Therm Ltd.	www.alfathermltd.com	011-28115396	alfatherm@vsnl.com	6, Community Centre, Mayapuri Industrial Area Phase-I, New Delhi-110064
Antony Waste	www.antony-waste.com	0120-2514692	aaysonpaul@antonyasia.com	FWH-2, IInd Floor, Pearls Plaza, Block K-24, Sector-18, Noida, Uttar Pradesh-201301
Arkin Creations Pvt. Ltd.	www.arkin.org.in	0129-4179992	contact@arkin.org.in	I-45, DLF Industrial Area, Phase-1, Sector-32, Faridabad, Haryana-121003
Bhavani Bioorganics	www.bhavanibio.in	040-65159369	bhavanibio@gmail.com	Manjeera heights, Phase-1, 401 B, chitra layout, Saroj Nagar, Hyderabad-500074
Bharat Oil and waste management	www.bharatoil.com	011-26216466	bharat@bharatoil.com	169, Kailash Hills, New Delhi-10065
Daily Dump	www.dailydump.org	080-41175311	hello@dailydump.org	1163, 1st Cross, Off 12th Main, Near Sony Center, HAL 2nd Stage, Bangalore-560008
Ecogreen Energy	NA	9899660676	rupesh@ecogreenenergy.co.in	219, IInd Floor, Vipul Trade Centre, Sohnam Road No 48 Gurugram-122002
Ecoman Enviro Solutions	www.ecomanenviro.com	020-32535122	inquiries@ecomanenviro.com	Flat No 19, 4th Floor, Kundan park, Behind Hardikar Hospital, Shivaji Nagar, Pune-411005
Excel Industries Ltd.	www.excelind.co.in	022-66464200	excel.mumbai@excelind.com	184-87, S.V. Road, Jogeshwari (West), Mumbai Maharashtra-400 102
Exigo Recycling Pvt. Ltd.	www.exigorecycling.com	0124-4046076	sourcing@exigorecycling.com	338, Paras Trade Centre, Gurgaon-Faridabad Road, Gurugram-122002
Fitchner Consulting Engineers	www.fitchner.co.in	9791043460	bdt@chn.fichtner.co.in	Menon Eternity, 9th Floor, No 165, St Mary Road, Alwarpet, Chennai-600018
Green Bandhu Environmental Solutions and Services	NA	9818167932	greenbandhu@gmail.com	H-25/7, DLF Phase 1, Haryana, Gurugram-122002

Company Name	Website	Contact Number	Email	Address
Green Planet Waste	www.gpwm.strikingly.com	011-22375415	info@gpwm.in	506, 5th Floor, Nipun Tower, Karkardooma Community Centre, Vikas Marg Extn., Delhi-110092
Grundfos Pumps	www.in.grundfos.com	044-45966800	gaurav@grundfos.com	118, Rajiv Gandhi Salai, Thoraipakkam, Chennai-600097 301C, D 21, Corporate Park, Sector 21, Dwarka-110075
Jindal ITF Urban Infrastructure Ltd.	www.jindalitif.com	011-66463983	info.jindalitif@jindalitif.com	Jindal ITF Centre, 28, Shivaji Marg, New Delhi-110015
Jusco Ltd.	www.juscoltd.com	0657-6646000	rajesh.rajana@tatasteel.com	Sakchi Boulevard Road Northern Town, Jamshedpur-831001
Kanak Resources	www.kanakresources.com	011-49691000	info@cdcindia.org	4th Floor, Dr. Gopal Das Bhawan, 28 Bharakamba Road, New Delhi-110001
Larsen & Turbo Ltd.	www.larsentoubro.com	044-22526000	ttrs@Intecc.com	Mount Poonamallee Road, Manapakkam Chennai-89 9th Floor, Ambadeep Building, 14 KG Marg, Delhi-110001
Mailhem Ikos Environment Pvt. Ltd.	www.mailhem-ikos.com	020-25532228	info@mailhem-ikos.com	Subhadra Bhavan, 2nd Floor, Apte Road, Pune Maharashtra-411004
Organic Solutions	www.organicsolutions.in	0124-4057323	organicsolutions@gmail.com	949, Sector 17B, Gurugram, Haryana-122001
Proton Enviro	www.protonenviro.com	8800779003	rahul@protonenviro.com	F93, DLF Park Place, Golf Course Road, DLF Phase V, Gurugram-122001
Peak Traders	www.peaktraders.in	9810458073	info@peaktraders.in	N-10, DLF Qutab Plaza Market DLF City 1. Gurugram, Haryana-122002
Ramky Enviro Engineers	www.ramkyenviroengineers.com	040-23015000	sksanjiv@ramky.com	Ramky Grandiose-13th Floor, Ramky Towers Complex, Gachibowli, Hyderabad-500 032
Reddonatura India Pvt. Ltd.	www.reddonatura.com	080-25200189	info@reddonatura.com	#3555, 2nd Floor, 13th H Main, 3rd Cross, Dhoopanahalli, Indiranagar, Bangalore-560038
Sampurn(e)arth Environment Solutions	www.sampurnearth.com	9920113470	sampurn.e.arth@gmail.com	Office No. 2, Mahinder Chambers, WT Patil Marg, Off V.N. Purav Marg, Near Shivaji Chowk, Chembur, Mumbai-400 071
Senes Consultants India	www.senesindia.com	0120-4368400	senes@senesindia.com	1st Floor, Tower B, Logix Techno Park, Plot No. 5, Sector 127, Noida, Uttar Pradesh-201301
Shivalik Solid Waste Management Ltd.	www.sswml.net	01795-260427	infosswmlmkt@gmail.com	Village Majra, Post Office Dabhota, Tehsil nalagarh, Distt. Solan, Himachal Pradesh-174101

Company Name	Website	Contact Number	Email	Address
SMS Envocare	www.smsl.com	9923037416	dyaneshwar.battalwar@smsl.co.in	IT Park, 20 S.T.P.I, Gayatri Nagar, Parsodi, Nagpur-440 020
Southern Cogen Systems Pvt. Ltd.	www.scogen.in	082-21228614	ab@scogen.in	Plot No.5, Phase II, Thandya Industrial Area, Chikkayana Chatra, Nanjangud Taluk, Mysore Dist., Karanataka-571 301
SPML Infra Limited	www.spml.co.in	0124-3838300	rishabh@spml.co.in	SPML House, Plot No. 65, Sector-32, Gurugram, Haryana-122001
UPL Environmental Engineers Ltd.	www.upleel.com	0265-3011800	info@upleel.com	Bhil, Near Bhaili Rly.Station & Banco Products, Padra Road, Vadodara, Gujarat-391410
Vedika Infracon Pvt. Ltd.	www.vedikainfracon.com	011-26025773	vedika21.vp@gmail.com	Office No. 17/A-4, Kalkaji Extension, Delhi-110019
Veolia Water Technologies	www.veoilawatertechnologies.com	011-24651465	patrick.rousseau@veolia.com	B-1 Marble Arch 9 Prithviraj Road, New Delhi-110011
Vermigold Ecotech Pvt. Ltd.	www.vermigold.com	022-26463589	info@vermigold.com	11, Garden Homes, C.D. Marg, Khar West, Mumbai-400052
Vishvaraj Infrastructure Pvt. Ltd.	www.vilindia.com	0712-6644888	vikram.khinchi@vilindia.com	305, Arunachal Building, 19 Barakhamba Road, New Delhi-110 001
Vulcan Waste Management Pvt. Ltd.	www.vulcanwaste.com	9971794840	info@vulcanwaste.com	Damdama Road, Bhondsi, Gurugram, Haryana-122102
Waste Ventures	www.wasteventures.com	9848622544	info@wasteventures.com	Survey No. 311 & 317, Behind K.J.R. Weighbridge, Bachupally, Miyapur, Rangareddy Dist. Hyderabad-500090

Composting Bin Solution Providers

Company Name	Website	Contact Number	Email	Address
Daily Dump	www.dailydump.org	080-41175311	hello@dailydump.org	1163, 1st Cross, Off 12th Main, Near Sony Center, HAL 2nd Stage, Bangalore-560008
Earth Care Solutions	www.earthcaresolutions.in	8592053562	earthcaresolutions@gmail.com	Room No.12/453-7, Deshasneham Buildings Vadamkalam Lane, MG Road, Poothole PO, Thrissur, Kerala-680004
Eco Care Technologies	www.garbodrain.com	044-26253705	sales@garbodrain.com	22/23, Thiyagaraya Road, 11GF-Rainbow Arcade, T.Nagar, Chennai-600 017
Ecoman Enviro Solutions	www.ecomanenviro.com	020-32535122	feedback@ecomanenviro.com	Flat No 19, 4th Floor, Kundan park, Behind Hardikar Hospital, Shivaji Nagar, Pune-411005
Green Tech Life	www.greentechlife.in	09820086532	support@greentechlife.in	Level II, Prestige Omega, 104 EPIP Zone, Whitefield, Bangalore-560 066
Green Bandhu Environmental Solutions and Services	NA	9818167932	greenbandhu@gmail.com	H-25/7, DLF Phase 1, Haryana, Gurugram-122002
Myco Compost	www.mycocompost.org	9604046983	koustubhyadre@yahoo.com	Shivam-149/3, House No. 894/1, Ganesh Nagar, Opposite Solapur, Janata Sahkari Bank, Dhyari Pune, Maharashtra-411041
Orbin	www.orbin.in	7259404888	contact@orbin.in	701, Brigade Rubix, 20, HMT Main Road, Yeswanthpur, Bangalore-560 013
Reddo Natura	www.reddonatura.com	8892973952	tvshat23@gmail.com	No. 3555, 2nd Floor, 13th H Main, 3rd Cross, Dhoopanahalli, Indiranagar, Bengaluru-560038
Ritesway Enviro Pvt. Ltd.	www.riteways.net	8023452279	solutions@rite-ways.com	Shed No. 304/5B, Sitaram Industrial Estate, Jalahalli, Bengaluru-560013
Sintex Industries Ltd.	www.sintex.in	02764-253500	cc@sintex.co.in	Kalol (N. Gujarat)-382 721
Scope Unlimited	www.scopeunlimited.co.in	8071807128	scopeunlimited@live.in	Kunal Kapre (Founder), G-72, Sector 6, Noida, Uttar Pradesh-201301
Vivesty Green	www.vivesty.com	9526-077123	green@vivesty.com	F-6, 49/ 1380, N.M Complex, C.H Cross Road, West Nadakkavu, Calicut-673011

Waste Recycling Companies

Company Name	Website	Contact Number	Email	Address
Ecoreco	www.ecoreco.com	1800-102-1020	info@ecoreco.com	Eco House, S. No. 22, H. No.6 & 7, Bhoipada, Near Range Office, Sativali, Vasai (East), Thane, Mumbai-401208
Exigo	www.exigorecycling.com	9650676997	sourcing@exigorecycling.com	338, Paras Trade Center, Gwal Pahari, Gurugram-Faridabad Road, Gurugram-122001
Extra Carbon	www.extracarbon.com	1800-30701065	info@extracarbon.com	615, ILD Trade Center, Sohna-Gurgaon Road, Malibu Town, Sector 47, Gurugram-122001
Greenobin Recycling Pvt. Ltd.	www.greenobin.com	0124-2361077	info@greenobin.com	Shop No. 1 &2, Opp. State Bank of India Main, Sohna Rd, Badshahpur, Gurugram-122001
Green-O-Tech India	www.greenotechindia.com	7840024848	rohtak@greenotech.in	Raghu Nagar, Block A, Raghu Nagar, Dabri, New Delhi-110045
IDE Technologies	www.ide-tech.com	0120-4681500	amitg@ideindia.com	Office No. 6 & 7, Tower 1, Plot No. C-25, Stellar IT Park, Sector-62, Noida-201309
Jaagruti Waste Paper Recycling Services	www.we-recycle.org	9810191625	paper@we-recycle.org	F Block, Shopping Centre, Mayapuri Flyover, Mansarover Garden, New Delhi-110015
Karma Recycling	www.karmarecycling.in	8470063726	hello@karmarecycling.in	971/1 Kapashera, (opposite Fun n Food Village), New Delhi-110037
KK Plastic Waste Management Ltd.	www.kkplasticroads.in	09886505811	info@kkplasticroads.com	#50, I Floor, Opposite Post Office, Yelchenahalli, Kanakapura Main Road, Bangalore-560 078
Let's Recycle	www.letsrecycle.in	07940050400	hr@letsrecycle.in	206, Kalasagar Mall, Opp. Saibaba Temple, Sattadhar Cross Road, Ghatlodia, Ahmedabad, Gujarat-380 061
Organic 121.com	www.organic121.com	7312720143	info@organic121.com	A-298, LG, Sector 55, Gurugram-122003
Pom Pom Recycling Private Limited	www.pompom.in	8881766 766	hello@pompom.in	F 27/2, First Floor, Okhla Phase II, Okhla Industrial Area, New Delhi, Delhi-110020
Proton Enviro Solution Private Limited	www.protonenviro.com	88007 9003	rahul@protonenviro.com	F093 DLF Park Place, Sector 54, Golf Course Road, Phase 5, Gurugram-122001
SFC Environmental Technologies Pvt. Ltd.	www.ctechsbr.com	022-27832646	sandeep@ctechsbr.com	21st Floor The Ambience Court, HI-Tec Business Park, Plot No 2, Sector 19D, Vashi Navi Mumbai-400705
Sri Banke Bihari Plastic Recyclers	NA	9818912399	sbbplr@yahoo.com	Near Radha Swami Satsang Bhawan, Ch Ramdev Marg, Marmurpur, Delhi-110040
Tetra Pak India Pvt. Ltd.	www.tetrapak.com	0124-4124600	pravin.mallick@tetrapak.com	DLF Cyber Terrace, Building No. 5, Tower C, 16th Floor, Cyber City, DLF Phase III, Gurugram-122002
Thermax India Ltd.	www.thermaxglobal.com	020-67156000	nandan.prabhune@thermaxindia.com	Environment House, Plot No. 90-92, BG Block, MIDC Bhosari, Pune-411026

Waste to Bio-gas Companies

Company Name	Website	Contact Number	Email	Address
Alliance Thermal Engineers	www.alliancethermal.com	9822430891	alliance.thermal@gmail.com	Sector 10, MIDC, Bhosari, Pimpri-Chinchwad, Maharashtra-411026
Biotech Renewable Energy	www.biotech-india.org	0471 2331909	mailtobiotech@gmail.com	MP Appan Road, Vazhuthacaud, Dist. Thiruvananthapuram, Thycaud, Kerala-695014
Clarke Energy	www.clarke-energy.com	020-25397167	india@clarke-energy.com	Plot No. 160 CTS No. 632 Lane No.4 Dahanukar Colony Kothrud Pune-411038
Envitec Biogas India Private Limited	NA	080-26580466	nsmohan@envitec.in	63 B, 13th Cross, J. P. Nagar, liird Phase, Bangalore-560078
FRD Biomech Private Limited.	www.frdgroup.co.in	8129366300	caajith@yahoo.com	Building No.12/503,Opp. Sakthi Automobiles, Nadathara Mannuthy Bypass Road, Near Petrol Bunk, Nadathara, Kerala-680 751
GGE Power Pvt. Ltd.	www.ggepower.com	9311035656	sales@ggepower.com	26/24 East Patel Nagar, New Delhi-110008
Green Elephant Engineering	www.greenelephant.in	9845372120	irina@greenelephant.in	13, Kotbagi Hospital Rd, Harmony Society, Ward No. 8, Wireless Colony, Aundh, Pune, Maharashtra-411007
GPS Renewables	www.greenpowersystems.co.in	8065690586	info@greenpower systems.co.in	22nd B Main Rd, Parangi Palaya, Sector 2, HSR Layout, Bengaluru, Karnataka-560102
Lars Enviro	www.larsenviro.com	0712-222 4130	sales@larsenviro.com	168, South Ambazari Road, Nelco Society, Subhash Nagar, Bajaj Nagar, Nagpur, Maharashtra-440010
Perfect Bio-Waste & Power Management Pvt. Ltd.	www.perfectbiowastepower.in	9311160471	perfectgasgenerators@gmail.com	B-301, Okhla Industrial Area, Phase-1, New Delhi, Delhi-110020
S P Renewable Energy Sources Pvt. Ltd.	www.spre.co.in	9978764099	cmd@spre.co.in	1st Luv-Kush Complex, Dist. Anand, Gujarat-388001
Spectrum Bioenergy	www.srel.in	040-23281918	drrao@srel.in	Banjara Hills, Hyderabad-500034
S&S Biofuels Consultants	NA	9422046664	ssbiofuels@gmail.com	Plot No-298, K-2, A Ward, F 5, Dnyanraj Park, Margai Galli, Shivaji Peth, Near Gandhi Maidan, Kolhapur, Maharashtra-416012

Waste-To-Energy Companies

Company Name	Website	Contact Number	Email	Address
A2Z Waste Management	a2z infraservices.com.in	0124-4300426, 2566582	amit@a2zemail.com	O-116, First Floor, Shopping Mall, Arjun Marg DLF Phase-1, Gurugram-122002
Abil	www.abilgroup.com	020-25578888	info@abilgroup.com	Abil House, Plot no 2. Ganesh Khind Road, Range Hills Corner, Pune, Maharashtra-411007
Enhanced Wapp Systems	www.wappsys.com	0124-6710000	sales@wappsys.com	914-B, Park Centra, Sec-30, Gurugram, Haryana-122001
Green Brick Eco	www.gbcs.in	011-40526992/93	info@gbcs.in	F-58. Okha Industrial Area Phase-1. New Delhi-110020
GPS Renewables Pvt. Ltd.	www.greenpowersystems.co.in	080-65690586	info@greenpowersystems.co.in	619, 22nd B Main, 21st Cross, Sector 2, HSR Layout, Bengaluru-560102
Hydroair Tectonics Ltd.	www.hydroairenviro.com	022-27564347	hydroenviro@vsnl.net	116, Raheja Arcade, Sector-11, Plot No.61, CBD Belapur, Navi Mumbai, Maharashtra-400614
Hanjer Biotech	www.hanjer.com	0261-2410663	info@hanjer.com	Hanjer Chambers, Ground Floor, Zampa Bazar, Surat, Gujarat-395003
Hitachi Zosen	www.hz-india.com	0124-4861760	yamada_yu@hitachizosen.co.jp	N0.503, 5th Floor, Vatika City Point, Mehrauli Gurgaon Road, Gurugram-122002
IL&FS India Ltd.	www.ilsindia.com	022-26533333	info@ilsindia.com	Plot C22, G Block, Bandra Kurla Complex, Bandra East, Mumbai-400 051
Jain Irrigation Systems	www.jains.com	011-26691569	jainnewdelhi@jains.com	B-30, Shivalik Malviya Nagar, New Delhi-110017
Jindal ITF Ecopolis	www.jindalif.com	011-45021983	info.jindalif@jindalif.com	Jindal ITF Centre, 28, Shivaji Marg, New Delhi-110015
Mailhem Engineers Pvt. Ltd.	www.mailhem-ikos.com	020-25532228	info@mailhem-ikos.com	14, Vishrambaug Society, 2nd Floor, Senapati Bapat Road, Opp. International Convention Centre, Pune, Maharashtra-411016
Ramky Enviro Engineers	www.ramkyenviroengineers.com	040-23015000	sksanjiv@ramky.com	Ramky Grandiose-13th Floor, Ramky Towers Complex, Gachibowli, Hyderabad-500 032
Selco International	NA	9848047634	selco@satyam.net.in	House No. 1-1-336/49, Chikkadpali, Hyderabad-500020
Timarpur-Okhla Waste Management Pvt. Ltd.	www.towmcl.com	011-26843044	info.jindalecopolis@jindalecopolis.com	Old NDMC Compost Plant, Behind CRRI, Jasola, New Delhi, Delhi-110020
Zanders Engineers Limited	www.zanders.in	0172-6610661	mohalica@zanders.in	D-98, Phase 8B, Phase 7, Industrial Area, Sector 74, Sahibzada Ajit Singh Nagar, Punjab-140308

Waste Equipment Manufacturers

Company Name	Website	Contact Number	Email	Address
Advance Equipment & Projects	www.advanceequipment.co.in	9873384443	advance_equipment@yahoo.com	E-18-B, Sector-8, Noida, Uttar Pradesh-201301
Asia Brooms Udyog	www.asiabrooms.com	8447556004	info@asiabrooms.com	1/1/41 Shing Sabha road, Subgi Mandi Clock Tower Delhi-110007
AVK Technologies Pvt. Ltd.	www.a-v-ktechnologies.com	0124-4002426	bbchaudhry@rediffmail.com	Plot No.440, Udyog Vihar-3, Udyog Vihar, Gurugram, Haryana-122016
Balaji Plastics Pvt. Ltd.	www.balajiplastics.com	04146-250172	info@balajiplastics.com	4. Senji Road, (Opposite to Jayandra School), Villupuram Tamil Nadu-605602
Genesis Waste Handling Pvt. Ltd.	www.genesis-india.co.in	9818190759	gwh.equip@gmail.com	I 12-16, Gajraulla Indl. Area, (U.P.S.I.D.C.), Gajraulla II, J.P. Nagar, Uttar Pradesh-244235
Green Bandhu Environmental Solutions and Services	NA	9818167932	greenbandhu@gmail.com	H-25/7, DLF City, Phase I, Haryana, Gurugram-122002
GreenTech Life	www.greentechlife.in	9820086532	support@greentechlife.in	Level II, Prestige Omega, 104 EPIP Zone, Whitefield, Bangalore-560 066
GSE Lining	www.gseworld.com	022-28440841/42	sudhrr@gseworld.com	223, Gemsstar Commercial Complex, Ramachandran Lane, Extn. Kanchpada, Malad West, Mumbai-400064
Hindustan Brooms Company	www.hindustanbroomsindia.com	09871366445	hindustanbrooms308@gmail.com	308/1, Shahzada Bagh Industrial Area, Old Rohtak Road, Shahzada Bagh, Delhi-110035
JCB (J C Bamford Excavators Ltd.)	www.jcb.com	0129-4299000	delhi.marketing@jcb.com	23/7, Mathura Road, Ballabgarh, Faridabad, Haryana-121004
Jwala Plastic	www.jwalaplastic.com	9811338477	jwala_plastiks@yahoo.com	Plot No L-88 Mangal Bazar Road and Swaran Park, Mundka, Delhi-110041
KC Green Revolution Pvt. Ltd.	www.green-revolution.in	8048410313	sales@green-revolution.in	J-56, 2nd Floor, Paryavaran Complex, IGNOU Road Near Saket, New Delhi-110068
Marvel Gloves Industries	www.marvelgloves.com	9810688683	marvelgloves@gmail.com	Plot No.954, Gali No. 2, Luxman Vihar, Phase 1, Railway Road, Gurugram, Haryana-122001
Navdeep Engineering Pvt. Ltd.	www.neplsystems.com	8071802590	meenakshibajaj33@rediffmail.com	732, Near Bus Stand Babyal, Ambala Cantt, Haryana-133005
Neelkamal Ltd.	www.nilkamal.com	0120-2822926	delhi.ro@nilkamal.com	Office No-11 & 12, R-14/8, Shopper Square Mall, Raj Nagar, Near Hint Mall, Ghaziabad-201002

Company Name	Website	Contact Number	Email	Address
Orbin	www.orbin.in	7259404888	contact@orbin.in	#701, Brigade Rubix, 20, HMT Main Road, Yeswanthpur, Bangalore-560 013
Sheetal Garbage Bins	www.sheetaltanks.com	011-27351170	info@sheetaltanks.co.in	NIMS, 3rd Floor, City Tower, Netaji Subhash Place, Pitampura, Delhi-11034
SMS Hydrotech	smshydro.com	9811853399	info@smshydro.com	E-34, E-14 Sanjay Colony, Sector-23, Faridabad, Haryana-121005
SRG International Private Limited	www.indianindustry.com	8071803487	srgprefab@gmail.com	Plot No 13 A, Sector 4, Industrial Area, Faridabad, Haryana-121004
Sushil Brush Industries	www.sushil-brush-industries.com	0124-2373349	sushilbrush@yahoo.com	Khandsa Road ,Near Village Khandsa Sector 37, Gurugram Ncr-122001
Usha Engineering	www.ushaengineers.com	0120-2658299	rakesh.sales@ushaengineerings.com	S-70/71, Lodhi Road Industrial Area Mohan Nagar, Ghaziabad-201005

E-waste Solution Providers

Company Name	Website	Contact Number	Email	Address
Aer World Wide(India) Pvt. Ltd.	www.aerworldwide.com	044-49503344	ewaste@aerworldwide.com	Parsn Commercial Complex, Ground Floor #1/1, Kodambakkam High Road, Nungambakkam, Chennai, Tamil Nadu-600034
Attero Pvt. Ltd.	www.attero.in	0120-4087100	arijit@attero.in	H-59, Sector 63, Noida, Uttar Pradesh-201307
Deshwal Waste Management Pvt. Ltd.	www.dwmpl.com	0124-4993499	info@dwmpl.com	SCO-81, Ground Floor, Huda Market, Sector 17-A, Haryana, Gurugram-122001
Earth Sense Recycle Pvt. Ltd.	www.earthsenserecycle.com	044-42014765 9566099352	ewastedelhi@earthsense.in	Plot No.100, Sector-5, IMT Manesar, Gurugram, Haryana-122050
Eco Pro Environmental Services	www.ajayjain.org	9893269299	ecopro@rediffmail.com	302, Swastik Chambers, Manoramganj A.B Road Indore, Madhya Pradesh-452001
En-vision Enviro Technologies Pvt. Ltd.	www.en-vision.in	0261-2224004	info@en-vision.in	2nd Floor, Shree Ram Complex, Above Bank of India, Nr Kargil Chowk, Surat Dumas Road, Pipload, Gujarat, Surat-395007
E-Parisaraa Pvt. Ltd.	www.ewasteindia.com	080-28360902	recycle@ewasteindia.com	No. B-41/1, 3rd Stage, Peenya Industrial Estate, Bengaluru-560 058
E-Waste Recyclers	www.ewri.in	9990133388	info@ewri.in	E-50, UPSIDC Industrial Area, 98 KM Stone, NH 2, Kosi Kotawan, Distt Mathura, Uttar Pradesh-281403
G J Multiclave India	www.gjmulticlave.com	044-24451683	chennai.cdm@hotmail.com	New No. 20, Old No.37, Teachers Colony, Kamarajar Avenue, Adayar Chennai, Tamil Nadu-600020
Global Engi Tech Pvt. Ltd.	www.globalengitech.com	076-98739850	info@kalpvruksh.com	A-205, Swagat Rainforest III, Kh Road, Gandhinagar, Gujarat-382006
Green E Waste Recyclers Pvt. Ltd.	www.greenwasterecycler.tradeindia.com	9911346644	info@e-waste-recyclers.com	97 A DDA Flats, Shastri Park New Delhi-110053
Greenscape Eco Management	www.greenscape-eco.com	9871884449	info@greenscape-eco.com	512, Elegance Tower, Non-Hierarchical Commercial Center, Jasola, New Delhi-110025
Green Vortex	www.green-vortex.com	0124-4146402 9971389851	shankar.sharma@green-vortex.com	Plot 177, Sector 7, IMT Manesar, Gurugram, Haryana-122050

Company Name	Website	Contact Number	Email	Address
Green World Recycle	www.gwr.co.in	022-29678967	assetdisposal@gwr.co.in	Pritesh Complex Bldg. No. B-12, Gala No. 7-8, Anjur Phata, Dapoda Road, Bhiwandi, Thane-421 302
Greentech Environ	www.greentechenviron.com	9903050502	sales@greentechenviro.com	Mouza-Dihinarayani, Plot No-164, Dhauma Road, P.S-Mograhath South 24-Parganas-743503
HRA E-Waste Pvt. Ltd.	NA	011-22572736, 9968413109	info@ehra.in	Shop No: A-59, Industrial Area, Phase II Rd, Block A, Jhilmil Colony, Delhi-110095
Karma Recycling	www.karmarecycling.in	0847-006-3726, 011-42634263	hello@karmarecycling.in	971/1 Kapashera, (opposite Fun n Food Village), New Delhi-110037
Maridi Eco Industries	www.maridibmw.com	080-22103270	sridhar@maridibmw.com	#5, II Floor, C.M.Plaza, 71, 8th Cross, 1st Main, S.R.Nagar, Bangalore-560027
Namo eWaste Management Ltd.	www.namoewaste.com	012-92279612	info@namoewaste.com	14/1 Mathura Road, Faridabad-121003
Ramky Enviro Engineers Ltd.	www.ramkyenviroengineers.com	040-23015000	sksanjiv@ramky.com	13th Floor, Ramky Towers Complex, Gachibowli, Hyderabad-500 032
Rockwell Industrial Plants Limited	www.riplindia.com	9988899509	cssd@gmail.com	VPO Sarsini Lalru S.A.S Nagar, Mohali, Punjab-500 032
SEZ Recycling Pvt. Ltd.	www.sezrecycling.com	044-26590800, 9790711555	surendhara@sezrecycling.com	Mahindra World SEZ Techno Park 7, 4th Avenue, S.P Koil, Chennai-603204
Sims Recycling Solution	www.simsrecycling.com	0120-2397114	info@ashrecyclers.com	Plot No. 1, Udyog Kendra, Extn-2, Ecotech-3, Greater Noida, Uttar Pradesh-201306
TES-AMM India Pvt. Ltd.	www.tes-amm.net	044-45000353	recycle@tes-amm.net	A 365, 6th Cross Rd, Peenya stage 1, Peenya Industrial Area, Bengaluru-560 058
3R-Recycler Pvt. Ltd.	www.3rrecycler.com	011-43026362	info@3rrecycler.com	404, 4th Floor, DDA Complex, Distt Center, Laxmi Nager, Delhi-110092

Biomedical Waste Companies

Company Name	Website	Contact Number	Email	Address
Maridi Eco Industries	www.maridibmw.com	080-22103270	sridhar@maridibmw.com	#5, II Floor, C.M.Plaza, 71, 8th cross, 1st Main, S.R.Nagar, Bangalore-560027
Alfa Therm	www.alfathermindia.com	011-28115222	alfatherm@vsnl.com	6, Community Centre Mayapuri, Ph-1, New Delhi-110064
Biotic Waste Solutions	www.bioticwastesolutions.com	011-47528107	info@bioticwastesolutions.com	46, SSI Industrial Area, GT Karnal Road, Delh-110033
Earth Sense Recycle Pvt. Ltd.	www.earthsenserecycle.com	956099352	ewastedelhi@earthsense.in	Plot No.100, Sector - 5, IMT Manesar, Gurugram-122050
En-vision Enviro Technologies Pvt. Ltd.	www.en-vision.in	0261-2224004	info@en-vision.in	2nd Floor, Shree Ram Complex, Above Bank of India, Nr Kargil Chowk, Surat Dumas Road, Pipload, Surat, Gujarat-395007
G J Multiclave	www.gjmulticlave.com	044-24451683	kannan@esventures.in	G.J.Multiclave (India) Pvt. Ltd., New No.20, Old No.37, Teachers Colony, Kamarajar Avenue, Adayar Chennai, Tamil Nadu-600020
Global Engi Tech Pvt. Ltd.	www.globalengitech.com	76-98739850	info@kalpvruksh.com	A-205, Swagat Rainforest III, Kh Road, Gandhinagar, Gujarat-382006
Greentech Environ	www.greentechenviro.com	9903050502	info@greentechenv.com	Mouza-Dihinarayani, Plot No-164, Dhauma Road, P.S -Mograhath, South, 24-PGS, 743503
Hanjer Biotech Energies	www.hanjer.com	022-26841425	info@hanjer.com	702, 7th Floor, Hubtown Solaris, N.S Phadke Marg, Mumbai-400069
Myco Compost	www.mycocompost.org	020-20245566	koustubhyadre@yahoo.com	Shivam-149/3, House No. 894/1, Ganesh Nagar, Opposite Solapur, Janata Sahkari Bank, Dhyari Pune, Maharashtra-411041
Ramky Enviro Engineers Ltd.	www.ramkyenviroengineers.com	040-23015000	sksanjiv@ramky.com	13th Floor, Ramky Towers Complex, Gachibowli, Hyderabad, Telangana-500032
SGS	www.sgsgroup.in	022-66408888	sgs_india@sgs.com	SGS House 4B, Adi Shankaracharya Marg, Vikhroli (West) Mumbai, Maharashtra-400083
Synergy Waste Management Pvt. Ltd.	NA	011-49222982	info@synergyworld.co.in	517-518, D-Mall, Sector-10, Rohini, Delhi-110085
Vulcan Waste Management Pvt. Ltd.	www.vulcanwaste.com	9971794840	info@vulcanwaste.com	Damdama Road, Bhondsi, Gurugram-122102

Wastewater Treatment Companies

Company Name	Website	Contact Number	Email	Address
Aquatech	www.aquatech.com	020-66547000	asa@aqatech.com	Survey No. 244/2 Rajiv Gandhi Infotech Park Hinjewadi, Pune-411 057
Arkin Creations Pvt. Ltd.	www.arkin.org.in	0129-4179992	contact@arkin.org.in	I-45, DLF Industrial Area, Phase-1, Sector-32, Faridabad, Haryana-121003
Green Bandhu Environmental Solutions and Services	NA	9818167932	greenbandhu@gmail.com	H-25/7, DLF City, Phase I, Haryana, Gurugram-122002
Hindustan Dorr-Oliver Ltd.	www.hdo.in	022-28359400	hdoho@hdo.in	Hindustan Dorr-Oliver Ltd. Dorr Oliver House, Chakala, Andheri (East), Mumbai-400099
L&T	www.lntech.com	044-22526000	info@lntech.com	2nd Floor, TC 1 Building, Mount Poonamallee Road, Manapakkam, Chennai-600 089
SFC Environmental Technologies	www.ctechsbr.com	022-27832646/47	info@ctechsbr.com	The Ambience Court, Hi-Tech Business Park, 21st Floor, Sector-19D, Plot No. 2, Vashi, Navi Mumbai-400705
Southern Cogen Systems Pvt. Ltd.	www.scogen.in	082-21228614	ab@scogen.in	Plot No.5, Phase II, Thandya Industrial Area, Chikkayyana Chatra, Mysore Dist., Karanataka, Nanjangud Taluk-571301
SPML Infra Limited	www.spml.co.in	011-26387091	info@spml.co.in	F-27/2, Okhla Phase II, Okhla Industrial Area, New Delhi-110020
Sweep Enviro	www.sweepenviro.com	011-47094404	adsulprashantr@gmail.com	144, RG Mall, Sector-09, Rohini, Delhi-110 085
Synergy Waste Management Pvt. Ltd.	NA	011-49222982	info@synergyworld.co.in	517-518, D-Mall, Sector-10, Rohini, Delhi-110085
Toshiba India Pvt. Ltd.	www.toshiba-india.com	0124-4996600	uemindia@uemgroup.com	3rd Floor, Building No. 10 Tower-B, Phase-II DLF Cyber City Haryana, Gurugram-122 002
Triveni Engineering & industries Ltd.	www.trivenigroup.com	0120-4308000	shares@trivenigroup.com	8th Floor, Express Trade Towers, Plot No. 15 & 16, Sector 16-A, Noida-201301
UPL Environmental Engineers Ltd.	www.upleel.com	0265-3011800	info@upleel.com	Bhil, Near Bhaili Rly.Station & Banco Products, Padra Road, Vadodara, Gujarat-391410
Unique Technology	www.uniquetechnologies.com	011-41014433	sales@uniquetechnologies.com	Shop no.6 24/6, Double Story, Ashok Nagar, Near Tilak Nagar Metro Station New Delhi-110018
Vatech Va Wabag	www.wabag.com	044-39232323	wabag@wabag.in	Wabag House, No.17, 200 Feet Thoraipakkam-Pallavaram Main Road, Sunnambu Kolathur, Chennai-600 117
W.O.G. Technology	www.woggroup.com	011-46300300	info@woggroup.com	E-5 Agrawal Metro Heights, Unit 752 Netaji Subhash Place, Pitam Pura, New Delhi-110034

NGOs in Waste

Company Name	Website	Contact Number	Email	Address
Action in Community and Training	www.act.ngo.org	9313984414	act-org@yahoo.co.uk	J 1/71, DDA Flats, Kalkaji, New Delhi-110019
All India Kabadi Mazdoor Mahasangh	www.aikmm.org	9968413109	info-india@aikmm.org	F-10/12 (Basement), Malviya Nagar New Delhi-110 017
Bal Vikas Dhara	www.balvikasdhara.org	011-26785008	bvd_childhelp@yahoo.com	Khasra No. 822, Near Friday Market, Tarachand Colony, Mahipalpur, New Delhi-110037
Center for Science and Environment	www.cseindia.org	011-29955124, 29956110	cse@cseindia.org	41, Tughlakabad Institutional Area New Delhi-110062
Chintan Environmental Research & Action Group	www.chintan-india.org	011-29842809	info@chintan-india.org	C-14, Second Floor, Lajpat Nagar III, Second Floor, New Delhi-110024
Development Alternatives	www.devaltd.org	011-26544100	mail@devaltd.org	B-32, Tara Crescent, Qutub Institutional Area New Delhi-110016
Gramin Vikas Samiti Society	www.gvsgurgaon.org	9250056255	graminvikassamiti@yahoo.com	504/1, Bhim Gerh Kher, Gurugram-122001
Hariyali	www.hariyali.org.in	9873396676	hariyaliwelfaresociety@gmail.com	H.no 30, V.P.O, Chakkarpur, Gurugram, Haryana-122002
Haryana Environmental Management Society	www.hesynr.org	01732-228889	hesynr.org@gmail.com	283-P, HES House, Sector-15, HUDA, Jagadhri Distt. Yamuna Nagar, Haryana-135001
Intach	www.intach.org	011-24631818	intach@intach.org	71, Lodi Estate, New Delhi-110003
Jyoti Samiti Deeksha	www.deeksha.net	011-26912358	deeksha.ngo@gmail.com	A-222, New Friends Colony, New Delhi-110025
Saahas Waste Management Private Limited	www.saahas.org	088-41689889	arun@saahaszerowaste.com	21, Ground Floor, MCHS Colony, 5th C Cross, 16th Main, BTM Layout 2nd Stage, Bangalore-566076
Society for Urban Regeneration of Gurgaon and its Environs	www.surgegurgaon.org	9910908660	secretary@surgegurgaon.org	Plot No. 105, Udyog Vihar Phase 4, Gurugram-122015
Solid Waste Management Round Table	www.swmrt.com	9741544685	swmrtbengaluru@googlegroups.com	The Anonymous Indian Charitable Trust, W 202, Sunrise Chambers 22, Ulsoor Road, Bangalore-560 043
Teri	www.teriin.org	011-24682100	mailbox@teri.res.in	Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi-110 003
Toxics Link	www.toxicslink.org	011-24328006	info@toxicslink.org	H2 (Ground Floor), Jungpura Extension, New Delhi-110014
Utthan	www.uthaanngo.org	9811175332	info@uthaanngo.org	102, Sector-46, Gurugram-122002
Vatavaran	www.vatavaran.org	011-26499030	info@vatavaran.org	190-A, Shahpur Jat, New Delhi-110049

Waste Consultants

Company Name	Website	Contact Number	Email	Address
Accenture	www.accenture.com	9953703054	anuj.rikhe@accenture.com	Ansal API Palam Corporate Plaza, Carterpuri Rd, Block C 2, Sector 3, Gurugram, Haryana-122017
ABM Enviro	www.abmenv.com	7838388093	info@abmenv.com	Shop No. 2, Satyam Ansal Building, Hapur Road, Block 1, P & T Colony, Raj Nagar, Ghaziabad, Uttar Pradesh-201001
Blue & Green Consultants Pvt. Ltd.	www.blueandgreenconsultants.com	022-24175662	support@blueandgreenconsultants.com	A 331, Antop Hill Warehousing Complex, VIT College Road, Wadala(E), Mumbai-400037
CDM Smith	www.cdmsmith.com	080-23543408	ashishkp@cdmsmith.com	75, 2nd Floor, 1st Block, 14th Cross Road R T Nagar, Bangalore / Bengaluru Karnataka-560032
Crisil Infrastructure Advisory	www.crisil.com	0124-6722000	abhay.kantak@crisil.com	Plot No. 46, Sector 44, Opp PF Office, Gurugram, Haryana-122003
Ecosave Systems	www.ecosaveinc.com	9820325313	maleys@gmail.com	01 Dwell Inn, St Anthony Street, Santacruz East, Mumbai-400055
Ernst & Young	www.ey.com	0124-4545000	himanshu.chatuvedi@in.ey.com	Unitech Info Space, Fouth Floor, Tower 3-B, Old Delhi Gurgaon Road, Gurugram, Haryana-122001
Enkey Enviro	www.enkayenviro.com	0141-2354997	info@enkayenviro.com	92, Heera Nagar-A, Near Shalimar Bagh, Ajmer Road, Jaipur, Rajasthan-302021
Lea Associates	www.lasaindia.com	011-26973950	lasa@lasaindia.com	B1 E27 Mohan Cooperative Industrial Estate New Delhi, Delhi-110044
Senes Consultants	www.senesindia.com	0120-4368400	senes@senesindia.com	1st Floor, Tower B, Logix Techno Park, Plot No. 5, Sector 127, Noida, Uttar Pradesh-201301
Unihorn India	www.unihornindia.com	0124-2841260-99	info@unihornindia.com	Suncity Success Tower, Unit No 324-327, 3rd Floor, Main Golf Course Extension Road, Sec-65, Gurugram-122005
Vegma Enviro Consultants India Private Limited	NA	9999112215	ltcolanand@gmail.com	301 Odeon Plaza 2, Plot 13, Sector 10, Central Market, Dwarka, Dwarka Sector 10, New Delhi-110075
Zanders Engineers Ltd.	NA	0172-6610661, 09927031226	mohalica@gmail.com	D-98, Industrial Area Phase 7 Mohali, Punjab-160055

Banks and Multilateral Agencies in Waste

Company Name	Website	Contact Number	Email	Address
Andhra Bank	www.andhrabank.in	040-2323419	corp@andhrabank.co.in	5-9-11, Dr. Pattabhi Bhawan, Secretariat Road, Saifabad, Hyderabad, Andhra Pradesh-500004
Asian Development Bank	www.adb.org	011-24107200	adbirm@adb.org	4 San Martin Marg, Chanakyapuri, New Delhi-110021
Bank of India	www.bankofindia.co.in	022-66684444	v.vishwanathan@bankofindia.co.in	Star House, C 5, G Block, Bandra-Kurla Complex, Bandra (East), Mumbai, Maharashtra-400051
DFID India	www.gov.uk	011-24192100	enquiry@dfid.gov.uk	British High Commission, Shantipath, Chankayapuri, New Delhi-122002
GIZ	www.giz.de	011-4949 5353	giz-indien@giz.de	46 Paschimi Marg, Sector B1, Vasant Vihar, New Delhi-110057
HDFC Bank	www.hdfcbank.com	022-66521000	support@hdfcbank.com	1st Floor, C.S. No. 6/242, Senapati Bapat Marg, Lower Parel, Mumbai, Maharashtra-400013
IDBI Bank	www.idbi.com	022-22189111	anunay.jha@idbi.co.in	IDBI Tower, WTC Complex, Cuffe Parade, Colaba, Mumbai, Maharashtra-400005
International Finance Corporation	www.ifc.org	011-41111000	fjns@ifc.org	3rd and 4th Floor, Maruti Suzuki Building, 1Nelson Mandela Marg, Vasant Kunj, New Delhi-110070
ICICI Bank	www.icicibank.com	022-26531397	managingdirector@icicibank.com	ICICI bank Towers, Bandra-Kurla Complex, Bandra (East), Mumbai, Maharashtra-400051
IFCI Bank	www.ifcilt.com	011-41792800	helpdesk@ifcilt.com	IFCI Tower, 61 Nehru Place, New Delhi-110019
Indian Overseas Bank	www.iob.in	044-28524212	kvkrishnan@iobnet.co.in	763, Anna Salai, Chennai Tamil Nadu-600002
Japanese International Cooperation Agency	www.jica.go.jp	011-47685500	id_oso_rep@jica.go.jp	2nd Floor, Dr. Gopal Das Bhawan, 28 Barakhamba Road, New Delhi-110-001
Kotak Mahindra Bank	www.kotak.com	022-66581100	service.bank@kotak.com	Apple Building, Bandra-Kurla Complex, Bandra (East), Mumbai, Maharashtra-400051
Power Finance Corporation	www.pfcindia.com	011-23456000	pfcgel@pfcindia.com	Urjanidhi, Barakhamba Lane Cannaught Place, New Delhi-110001
Vijaya Bank	www.vijayabank.com	080-25584662	neft@vijayabank.co.in	41/2, Trinity Circle, M.G. Road, Bengaluru, Karnataka-560001
World Bank	www.worldbank.org	011-49247000	smozumder@worldbank.org	70, Lodi Estate, New Delhi-110003
Yes Bank	www.yesbank.in	022-66699000	yestouch@yesbank.in	Nehru Centre, 9th Floor, Discovery Of India, Dr. A. B. Road, Worli, Mumbai Maharashtra-400018

Companies with Waste as CSR Focus

Company Name	Website	Contact Number	Email	Address
Coca Cola India Pvt. Ltd.	www.coca-colaindia.com	0124-4785000	ssekhar@coca-cola.com	16th Floor, 1 Horizon Center, Golf Course Road, DLF Phase-5, Sector 43, Gurugram-122106
DLF Foundation	www.dlffoundation.in	0124-4769200	dlffoundation@dlf.in	4th Floor, Gateway Tower, DLF Cyber City, Phase III, Haryana, Gurugram-122002
Feedback Foundation	www.feedbackfoundation.in	0124-4211834	inquiries@feedbackfoundation.in	15th Floor, Tower 9B, DLF Phase III, Haryana, Gurugram-122002
InterGlobe Foundation	www.igt.in	0124-4352300	neelanjana.singh@interglobe.com	DLF Corporate Park, Block 2B, DLF City, Phase-III, Haryana, Gurugram-122002
Mahindra & Mahindra	www.mahindra.com	022-24901441	balwani.roma@mahindra.com	Mahindra Towers, G M Bhosale Marg, Worli, Mumbai-400018
PepsiCo India	www.pepsicoindia.co.in	0124-2355880	neelimadwivedi@pepsico.co.in	DLF City Phase 3, 3B DLF Corporate Park S Block Kutub Enclave, Gurugram-122002
Tetra Pak India Pvt. Ltd.	www.tetrapak.com	0124-4124600	pravin.mallick@tetrapak.com	DLF Cyber Terrace, Building No. 5, Tower C, 16th Floor, Cyber City, DLF Phase III, Gurugram-122002
Tata Projects	www.tataprosjects.com	022-67402900	saineshjoshi@tataproject.com	11th Floor, Hiranandani Knowledge Park, Powai, Mumbai, Maharastra-400 076
Wipro	www.wipro.com	0124-3084000	akhilesh.shahi@wipro.com	Plot no. 480/481 Phase III Udyog Vihar Gurugram, Haryana-122016



GURUGRAM STAKEHOLDER DIRECTORY



RWAs in Gurugram

RWA Name	Email	Contact Number	Address
Ardee City	contact@ardeecityrwa.com	0124-2386133	D-11/18, Basement, Sector-52, Gurugram-122003
Beverly Park I	beverlypark1@yahoo.com	0124-4011757	Beverly Park I, MG Road, DLF Phase II, Gurugram
Beverly Park II	bp2gurgaon@gmail.com	0124-4013191, 4387198	DLF Phase II, MG Road, Near DT City Centre, Gurugram
Belvedere Tower Condominium Association	btca_dlf@hotmail.com	9268050683	DLF Cyber City, Phase-II, Near RBS Building, Gurugram
Carlton Estate Condominium Association	carltonestate5@gmail.com	0124-2572048	DLF City, Phase V, Gurugram
Citizen Welfare Society	amarjitsbhatia@rediffmail.com	9711144925	Sector-51, Gurugram
DLF Magnolias	maan-harjinder@dlf.in	9958966199	DLF-Phase V, Gurugram
DLF Qutab Enclave	dlfqrwa@gmail.com	0124-2387845	BB-8, Qutub Plaza, DLF Phase I, Gurugram
DLF Phase-I	prws.hr@gmail.com	9650028278	47/9, DLF Phase-I, Gurugram
DLF Phase-I, H Block	hbrc.dlf1@gmail.com	9810843278	H 35/6 First Floor, DLF-I, H Block Residential Community, Gurugram
DLF Phase-IV	chaudhry.dlf@gmail.com	9810037773	Garden Villas, DLF Phase-IV, Gurugram
DLF Phase-IV, Windsor Court	ashok.dhingra@gmail.com	9810164610	Windsor Court, DLF Phase-IV, Gurugram
DLF Phase-V, Exclusive Floors Owners Society	efosggn@gmail.com	0124-4109536	DLF Phase-V, Gurugram
Essel Tower	info@esseltowersgurgaon.com	0124-2817144/ 9810099933	MG Road, Near DT City Centre, Gurugram
Garden Estate	gardenestate2013@gmail.com	0124-4061802, 4061801	Garden Estate, DLF Phase I, MG Road, Near GD Metro Station, Gurugram
Green Wood City	gwc.rwa@gmail.com	9818377894	RWA Green Wood City, Sector-46, Blocks-D, E & F Gurugram
Heritage City	herwa@airtelmail.in	0124-4015213	DLF City, Phase-II, MG Road, Gurugram
Hamilton Court	hc.eo@hotmail.com	0124-2385436	DLF Phase IV, Near Galleria Market, Gurugram
Hamilton, Windsor and Regency Park-II	rwa.windsorcourt@gmail.com	0124-2396331	DLF Phase-IV, Gurugram
Icon Condo Association	ckpsinha@yahoo.co.in	9810807385	Sector-43, DLF 5, Gurugram
Infocity Occupants, Sector-33 & 34	anil.godara@bhartiirealty.com	9818620013	A-27, Info City, Sector-34, Gurugram
JMD Gardens	jmdgardensrwa@gmail.com	0124-6671896	Sector-33, Sohna Road, Gurugram
Jalvayu Vihar	javva@gmail.com	0124-4032622	Sector-30, Near Park Centra, Gurugram
Kendriya Vihar, Sector 56	kv006_gurgaon@yahoo.com	9868174098	Apartment Owners Association, Kendriya Vihar, Sector-56, Gurugram
Mittals Royale Orchards	mrerwa@gmail.com	9810499277	Village-Borhakalan, NH-8, Tehsil-Pataudi, Near IMT Manesar, Gurugram
Mayfield Garden	swastikggn@hotmail.com	9910855999	C-Block, Sector-50, Gurugram

RWA Name	Email	Contact Number	Address
Malibu Towne	maliburwa@gmail.com	9811158845, 0124-4018845	PW-33, Malibu Towne 51, Sohna, Gurugram
Maple Crescent Condominium Association	estatemanagermcca@gmail.com	0124-4221241	C-Block, Shushant Lok-1, Haryana, Gurugram
Nirvana Country	office.nrwa@gmail.com	9899771594	Community Center Grounds, Nirvana Country, Sector-50, Gurugram
NRI Group Housing Palam Vihar Condominium	nricondiceleb@gmail.com	9810114743	Zone- I, Palam Vihar, Gurugram
Oakwood Eatate	oecagng@yahoo.co.in	0124-2351526	Akash Neem Marg, DLF Phase-II, Gurugram
Old Jail Land Complex Welfare Association	mlgupta1952@gmail.com	8130539911	Sona Chowk, Gurugram
Orchid Island	deshbandhug@gmail.com	9654997578	Sector-51, M-Block, Mayfield Gardens, Gurugram
Park View Spa Next Condominium Association	board@dvsn.in	9711143737	Sec-37, Gurugram
Princeton Estate Condominium Association	princeton_estate@yahoo.com	0124-4055279, 4055277	Princeton Estate, DLF Phase-V, Gurugram
Progressive Gurgaon Association	pw58ffmalibutown@gmail.com	9818303690	CW 58, First Floor, Sohna Road, Gurugram
Progressive Resident Association	pracv.sushantlok@gmail.com	9810253159	Sector- 43,Sushantlok-I, Gurugram
Palam Vihar	sk_sodhani@yahoo.co.in	9810039024	H-452, Sector-1, Palam Vihar, Gurugram
Ridgewood Estate	rweoffice@yahoo.com	0124-4040821, 4040311	DLF City, Phase-IV, Near Galleria Market, Gurugram
Richmond Park	manager.richmondpark@gmail.com	0124-4044625	DLF City, Phase IV, Near Galleria, Gurugram
Ramprastha Edge Towers	varun101184@yahoo.com	9311647555	Sector-37D, Near Hero Honda Chowk, Gurugram
Rich Reg Condominium Association	richregcondominium@yahoo.co.in	0124-4272778	Regency Park, DLF Phase IV, Gurugram
Sector-5	manusingh356@gmail.com	9810737536	555, Sector-5, Gurugram
Sector-9 A	rwasec9agurgaon@gmail.com	9711778585	House No. 501, Sector 9A, Guragaon
Sector-15, Part II	rajaramyadav601@gmail.com	9810415575	1386, Sector-15, Part-2, Near Salwan International School, Gurugram
Sector-17 A	raj_prema@yahoo.com	9818610029	RWA 327, Sector-17A, Gurugram
Sector-17 B	info@rwa17b.com	0124-2340363	IFCCO Nagar, Sector-17B, Gurugram
Sector-21	chandrarakesh39@yahoo.com	9868670735	House No. 1113, Sector-21, Gurugram
Senior Citizen, Sector-22	srcitizen@gmail.com	9810059849	House No. 202, Sector-22, Gurugram
Saksham, Sector-22 A	saksham.rwa@gmail.com	9911031920	House No. 180, Sector 22A, Opp. Rotery Public School, Palam Vihar Road, Gurugram
Sector-23	dahiya_saneep74@yahoo.co.in	9810621839, 9810037415	Shop No. 84, Basement, Sector-23, Gurugram
Sector-23	sector23rwa@gmail.com	9810171873	Community Centre, Sector-23, Gurugram
Sector-37	spbhatiabiz@gmail.com	9810134883	Plot No. 377, Sector-37, Phase-2, Gurugram
Sector-39	energyresapp@gmail.com	9311380194	Plot No. 294, Sector-39, Near Medicity, Gurugram

RWA Name	Email	Contact Number	Address
Sector-39, Housing Board Colony	pemchauhan@gmail.com	9910061604	363 GF, Housing Board Colony, Phase-I, Sector-39, Gurugram
Sector-47	rwasec47@gmail.com	9810939890	House No. 554, Sector-47, Gurugram
Sector-54	pk1964@yahoo.com	9811157445	RWA Sector-54, Gurugram
Sector-54, SunCity	balodaop@yahoo.co.in	9873410999	F-120, Suncity, Sector 54, Gurugram
Sector-56, KV	shersyadav@yahoo.com	9810993326	Kendriya Vihar, Sector-56, Gurugram
Sector-56	subhash.sharma170@gmail.com	9999982351	Flat No. 806, Alankar Appartment, Sector-56, Gurugram
Sun City Heights	estatemanager@suncityheights.in	9810701785	Suncity Heights, SunCity, Sector-54, G.C. Road, Gurugram
South City-I, EWS	rakesh.sharma@uniliver.com	9891780804	Q-303, South City-1, Gurugram
South City-I	vinodkumar05@gmail.com	9818817838, 9899119568	C-99, South City-1, Near Huda City Center, Gurugram
South City-II	scsharmaadvocate@yahoo.com	9811101625	H-18, Ground Floor, South City-2, Gurugram
Sushant Lok-I	spdawar@rediffmail.com	9810247045	1st Floor, C-Block, Community Centre, Sushant Lok-1, Gurugram
Sushant Lok-II, Sector-57	rpsinghtata@gmail.com	9811205149	F-18 A, Ground Floor, Sushant Lok-2, Sector-57, Gurugram
Sushant Lok-II	yng@rediffmail.com	9810010819	C-106, Sushant Lok-II, Gurugram
Sushant Lok Extention	slerwa23@gmail.com	8375041719	C-238, Sushant Lok-III, Sector-57, Gurugram
Slewra Extension	smarora.pnb@gmail.com	9891998824	F-278, GF, Slewra Extension, Sushant Lok-II, Sector-57, Gurugram
The Laburnum	estatemanager@thelaburnum.com	8826131820	RWA The Laburnum, Gurugram
The Palms	palmsapartment@gmail.com	9811068938	South City 1, Gurugram
Tarika Central Government Housing Society	tarikacghs@yahoo.com	9810393620, 0124-4046664	GH-8, Sector-43, Near Huda City Center, Gurugram
The Retreat Appartment	rwa2375@gmail.com	0124-2581130	Hights Building, Sector-29, Gurugram
Trinity Tower Condominium Association	ttca@rediffmail.com	0124-4364512	Trinity Tower, DLF Phase V, Gurugram
Uniworld City Appartment	adm.uwcrwa@gmail.com	0124-4227909	Sector-30/ 41, Near Park Centra, South City I, Gurugram
Uniworld Garden	ugaoa.manager@gmail.com	0124-4227548	Sector-47, Sohna Road, Gurugram
Urban Estate Residents Welfare Association (Sector-4, 7)	uerwasector4.7@gmail.com	9971166400	Community Centre, Sector-4, Urban Estate, Gurugram
Vaastu Apartment	anayar@aldreexports.com	9971217755	Sector 55, Gurugram
Vijay Vihar, Sector-30	narenderkharb@gmail.com	9810300725	House No.164, Vijay Vihar, Sector 30, Gurugram
Wellington Estate	weca2002@gmail.com	0124-2385469	DLF Phase-V, G.C Road, Gurugram
World Spa	jyotichaba@hotmail.com	9650619900	Worls Spra/east and West, Sector 30 and 41, Gurugram

Schools in Gurugram

Name of the Schools	Email	Contact Number	Address
Alpine Public School	admin@alpineconventschool.com	0124-2575188/ 2306064	Sector-38, Next to Medanta Hospital, Gurugram-122001
American Montessori Public School	info@americanpublicschool.com	0124-4018944/ 2352580	L-Block, Cassia Marg, DLF City, Phase-II, Gurugram-122002
Amadeus High School	amadeushigh@gmail.com	0124-4261032/ 33	Block-F, Greenwoods City, Sector-46, Gurugram-122001
Ajanta Public School	info@ajantapublicschool.org	0124-2381823/ 2381824	Ajanta Public School, Sector-31, Gurugram-122001
Blue Bells Model School	bbms@bluebells.org	0124-4698888	Sector-4, Gurugram-122001
Chiranjiv Bharti School	anscbpsv@airtelmail.in	0124-4398600	I-Block, Palam Vihar, Gurugram-122017
CCA School	ccaschool.gurgaon@gmail.com	0124-2330098/ 2331264	Sector-4, Urban Estate, Gurugram-122001
DAV Public School	davsector14gurgaon@yahoo.com	0124-2324070	Sector-14, Gurugram-122018
DPS Gurgaon	dpsgurgaon1@gmail.com	0124 4125800/801	Site No. 1, Sector-45, Urban Estate, Gurugram-122001
DPS Sushant Lok	info@dpsnl.net	0124-4041221/441	DPS Sushant lok, B-Block, Phase-I, Gurugram-122102
Euro International School	eurointernationalschool_10@yahoo.in	0124-2212290/ 2212291	Euro International School, Sector-10, Gurugram-122001
GD Goenka Public School	school@gdgoenka-gurgaon.com	0124-2362895/96	Block-A, Sector-48, Gurugram-122001
Golden Jubilee Air Force School	principal.afgji@gmail.com	0124-2330991	Sector-14, Delhi-Gurugram Road, Gurugram-122018
The Heritage School	info@ggn.theheritageschool.in	0124-2855124/25/26	The Heritage School, Sector-62, Gurugram-122002
Kunskapsskolan School	info@kunskapsskolan.edu.in	0124-4107777	1122, Block-A, DLF Phase-I, Gurugram
Lord Jesus Public School	lordjps@ndf.vsnl.net.in	0124-2320525/ 2307725	Vijay Park, Behind Laxmi Bazar, Gurugram-122001
Lt. Atul Katarya Memorial School	akmsggn@rediffmail.com	0124-4238225, 8860634320	Lt Atul Katarya Marg, Near Sheetla Mata Parisar Gurugram-122001
Lancers Public School	info@lancersinternationalschool.in	0124-4171900	DLF Phase-V, Sector-53, Gurugram-122001
Lotus Valley School	principal@lotusvalleygurgaon.com	9899657100	M-Block, South City-II, Nirvana Country, Sector-50, Gurugram-122018
Manav Rachna International School	info.mris51@mris.edu.in	0124-4985100	Block-C, Mayfield Garden, Sector-51, Gurugram-122001
Pathways World School	school.gurgaon@pathways.in	0124-2318888/9	Baliawas, Off Gurugram Faridabad Road, Gurugram-122003
Presidium School	gurgaon57@presidiumonline.com	9643103499	HS-1, Block-E, Mayfield Garden, Sector-57, Gurugram-122011

Name of the Schools	Email	Contact Number	Address
Rishi Public School	rishischool@indiatimes.com	0124-2381891	NH-8 Sector-31, Gurugram-122001
Rabindranath World School	info@rwsurgaon.com	0124-3292818	W-10 Block, Site No. 3120, Opposite U-Block, Town Houses, DLF Phase-III, Gurugram
Red Roses Public School	p2c.support@gmail.com	0124-4005886	D-Block, Palam Vihar, Gurugram, 122017
Ridge Valley School	info@ridgevalleyschool.org	0124-4666161	Ridge Valley School, 4111-4112, DLF Phase IV, Gurugram-122001
Ryan International School	ris.s40gurgaon@ryangroup.org	0124-2580096	Site No 1, Sector-40, Gurugram-122001
Salwan Public School	spsurgaon@salwanschools.com	0124-4886050/90	Sector-15, Part-II, Gurugram-122001
Shalom Hills Internattional School	feedback@shalomhills.com	0124-4046471	Block-C, Sushant Lok, Phase-I, Gurugram-122002
Shiv Nadar School	principal.ggn@sns.edu.in	0124-6465557/59	DLF City, Phase-1, Block-E, Pahari Road, Gurugram
Sharda International School	info@shardainternationalschool.in	0124-2321732	Shiv Nagar, Pataudi Road, Near Sector-10A, Haryana, Gurugram-122001
Shikshantar School	office@shikshantarschool.com	0124-4889100	Shikshantar School, J-Block, South City-I, Gurugram-122001
Starex International School	admission@starex.edu.in	0124-2379990/1/2/ 3/4	NH-8, Binola, P.O. Bhorankalan, Gurugram-122413
Swiss Cottage School	info@swisscottageschool.in	0124-4259944	Salahpur-Bijwasan, Opp. Sector-23 & Palam Vihar 110061
Scottish High International	info@scottishhigh.com	0124-4112781/90	Block-G, Sector-57, Sushant Lok-II, Gurugram-122011
Summer Fields School	summeritesdlf1@rediffmail.com	0124-2353687	DLF Qutab Enclave Complex, Phase-I, Gurugram-122001
Sehwag International School	info@sisj.in	9711188700	Silani Kesho, 7 Km stone, Main Gurugram Jhajjar Road, Jhajjar, Gurugram-124103
The Banyan Tree World School	shibani.ghosh@banyantree.ws	0124-6675755/ 9350556501	2 Knowledge Centre, G.C. Road, 70-2, Sector 53, Gurugram-122003
The Sagar School	administrator@thesagarschool.org	0124-2806100	Remfry House at the Millennium Plaza, Sector-27, Gurugram-122009
The Shri Ram School	senior.aravali@tsrs.org	0124-4784300	Hamilton Court Complex, Phase IV, DLF City, Gurugram-122002

Colleges/Other Institutions in Gurugram

Name of the Colleges and Other Institution	Email	Contact Number	Address
American Institute of India Studies	aiisgurgaon@aiis.org.in	0124-2381424	22, Sector-32, Institutional Area, Gurugram-122001
Amity University	info@ggn.amity.edu	0124-2337015/ 2337016	Amity Education Valley, Panchgaon, Manesar, Gurugram-122413
Anupama College of Engineering	aceggn.rngi@gmail.com	8010132944/ 9412260760	ACG, Bhora Kalan, Near Bilaspur Chowk, Pataudi Road, NH-8, Gurugram-122413
Ansai Institute of Technology	feedback@aitgurgaon.org	0124-24116111/ 4750400	Sector-55, G.C. Road, Gurugram-122003
Apeejay College of Engineering	ace@apj.edu	0124-2013718-721/ 2013218	Village-Silani, Sohna, Palwal Road, Gurugram-122103
Algol School of Management and Technology	deepaksharma@algolworld.com	0124-3212001	ASMT, Near Hero Honda Chowk, Behind Marble Market, Sector-34, Gurugram-122001
BM College of Technology & Management	tpo.bmctm2007@gmail.com	8505876611	Plot No. 119, Sector-46, Gurugram-122002
Dronacharya Government College	dgcgurgaon@gmail.com	0124-2320322	New Railway Road, Sector 8, Gurugram-122022
Global Institute of Technology and Management	info@gitmgurgaon.com	0124-2016600/700/ 800	5KM Mile Stone, Kheda Khurrampur, Farrukhnagar, Haily Mandi Road, Gurugram
Government P.G. College	gcggn@sify.com	0124-2320783	Govt. College, Sector-14, Gurugram
Gurgaon College of Engineering	info@gce.com	0124-3257801	Bilaspur-Tauru Road, Village-Pathreri, Near Bilaspur-chowk, NH-8, Gurugram
Guru Gram Group of Institutions	admission@gurugram.org.in	9818059667	Opposite Sector-4, Luxman Vihar, Dhanwapur Road, Gurugram
ICFAI Business School	ibsdel@ibsindia.org	0124-4980950	IDPL Complex, Old Delhi-Gurugram Road, Dundaheera, Gurugram-122016
IILM Institute	nivedita@iilm.institute.ac.in	0124-334300/ 3096874	1 Knowledge Centre, G.C. Road, 71-1, Sector-53, Gurugram-122003
Infinity Business School	info@inbuss.com	0124-4171204/ 4171202	Infinity Knowledge House, No.-34, Sector-32, Gurugram-122001
Institute of Apparel Management	admissions@iamindia.in	0124-270 8201	Apparel House, Sector 44, Gurugram
INLEAD Event Management Institute	info@inlead.in	0124-4220000	National Expressway-8, 81P, Sector-34, Gurugram-122001
ITC Hospitality Management Institute	info@itshotels.in	0124-4481448	ITC Limited, Hotels Division, Plot No. 3, Sector-5, IMT Manesar, Gurugram-122050

Name of the Colleges and Other Institution	Email	Contact Number	Address
JK Business School	admissions@jkbschool.org	0124-2014091	Gurugram-Sohna Expressway, Damdama Lake Road Bhondsi, Gurugram-122102
KIIT Group of Colleges	info@kiit.in	0124-2658000/10/20/30/40/50	KIIT Campus, Sohna Road, Gurugram, Haryana
Kyra School of Business & Technology	contact@kyrauniversity.com	0124-4040690	Kirpa House, S-27/9, DLF Phase-III, Gurugram-122002
Management Development Institute	dean-ca@mdi.ac.in	0124-4560000	Management Development Institute, Mehrauli Road, Sukhrali, Gurugram-122 007
N.B. Gurubachan Singh Memorial College	nbgsm.college@gmail.com	0124-2362269	Sohna, Gurugram-122103
Rao Lal Singh College of Education	rls.principal@gmail.com	0124-2679128/2679028	65 KM Milestone, Delhi-Jaipur Road, NH-8, Sidhrwali, Gurugram-122414
SGT Medical College & Research Institute	principal@sgtmedicalcollege.org	0124-2278256	Near Sultanpur Bird Sanctuary, Village Budhera, Gurugram-122505
Sushant School of Art & Architecture	info@ansaluniversity.edu.in	0124-2570317	SSAA, Sector-55, Gurugram, Haryana
Savera Group of Institutions	saverainstitute@gmail.com	0124 4275103	Haily Mandi Road, Farukh Nagar, Gurgaon-122506
School of Inspired Leadership	info@soilindia.net	0124-4302222	Plot No. 76, Sector-44, Gurugram-122003
The Institute of Company Secretaries of India	gurgaon@icsi.edu	0124-2306064	Behind Government Girls College, Sector-5, Part-II, Gurugram
The North Cap University	daulet@ncuindia.edu	0124-2365811	Sector 23-A, Gurugram-122017
University Institute of Law & Management Studies	vc@mdurohtak.ac.in	0124-2383343	Sector-40, M.D.University, Gurugram-122002, Haryana
World College of Technology & Management	admin@wctmgurgaon.com	9717964085	WCTM, Farukhnagar, Khera Khurrampur, Gurugram

Hospitals in Gurugram

Name of the Hospital	Email	Contact number	Address
Artemis	info@artemishealthsciences.com	0124-6767999	Sector 51, Gurugram-122001
Alchemist Institute of Medical Sciences	healershospital@rediffmail.com	0124-4511111	55-56, Golf Course Road, Saraswati Kunj, Sector 53, Gurugram-122003
Apollo	gurgaon@theapolloclinic.com	0124-4082229	SCO2, Old Delhi Gurugram Road, Sector 14, Gurugram 122001
Acme Healthcare	info@acmehealthcare.com	0124-4301616	C-2, Sector-40, Gurugram-122001
Aarvy	info@aarvyhospital.com	0124-4222270	Nehru Stadium, Railway Road, Civil Lines, Gurugram-122007
Chirag	info@chiraghospital.com	0124-2468848	Near Railway Station, Bajghera Road, Block B, Rajendra Park, Sector 105, Gurugram-122001
Columbia-Asia	customercare.palam@colombiaasia.com	0124-39898969	Block-F, Gol Chakkar, Palam Vihar, Gurugram-122017
Fortis Healthcare	enquiries@fortishealthcare.com	0124-4921021/ 4921071/4962200	South City-I, Sector 41, Gurugram-122003
Kalyani	karishma.khpl@gmail.com	0124-2303101-03	Mehrauli-Gurugram Road, Gurugram-122001
Life Care Medical Centre	info@lifecaremedicalcentre.com	0124-4118254	Madan Puri Main Road, Patudi Chowk, Gurugram-122001
Lall Nursing Home	ashishlall@rediffmail.com	0124-3222410/ 5065410	New Railway Road, Gurugram-122001
Max Health Care	info@maxhealthcare.com	0124-6623000	B-Block, Sushant Lok-I, Opp. Huda City Centre Metro Station, Gurugram-122001
Medanta	info@medanta.org	0124-4141414/ 4411441	Sector-38, Gurugram-122001
Neelkanth	info@neelkanthhospital.com	0124-5063697/ 5013696	Mehrauli Gurugram Road, Near DLF Corporate Park, Phase-III, Gurugram-122022
Paras	info@parashospital.com	0124-4585555/ 4049062	C-1, Sushant Lok-1, Sector-43, Phase-I, Gurugram-122002
Privat	info@privathospital.org	0124-4324300	MG Road, DLF City-II, Near Gurugram Central Mall, Gurugram-122002
Pushpanjali	pushpanjalihospital@rediffmail.com	0124-4770000	Plot No. 1, Johan Hall Road, Civil Lines, Gurugram-122001
Sunrise	sunrisehospital2009@yahoo.in	0124-6410841/ 4388831/2212222	Near Sector 10A, Khandsa Road, Sector 10A, Gurugram-122001
Uma Sanjeevani health Center	sanjeevaakas@yahoo.co.in	0124-2350460/ 2351257	1, Dakshin Marg, DLF City Phase-II, Gurugram-122008

Hotels in Gurugram

Name of the Hotel	Email	Contact number	Address
Altis	resggn@avedahotels.com	0124-4840 000	Sector-15, Kirti Nagar, Jharsa Road, Gurugram-122002
Courtyard By Marriott	cy.delgu.fo@courtyard.com	0124-4888444	Plot No. 27-B, Sector Road, B Block, Sushant Lok-1, Sector-27, Gurugram-122002
Crowne Plaza	reservation@cpgurgaon.com	0124-4534000	Site No.2, Sector-29, Opposite Signature Tower, Gurugram-122001
DoubleTree by Hilton	naresh.saini@hilton.com	0124-4911234	DLF G.C. Road, Sector-56, Gurugram-122011
Fortune Select Global	contactus@fortunehotels.in	0124-4062388	Global Arcade, M.G. Road, Gurugram-122002
Hyatt Regency	gurgaon.regency@hyatt.com	0124-6181234	NCR, NH8, Sector-83, Gurugram-122004
Ibis Hotel	h6363-du@accor.com	0124-4755000	Block-1, Sector 53, G.C. Road, Gurugram-122002
Lemon Tree Premier	hi.gn@lemontreehotels.com	0124-4480200	48-52, Leisure Valley Road, Sector-29, Gurugram
Lemon Tree	hi.gn@lemontreehotels.com	0124-4423232	866, Udyog Vihar, Phase-V, Gurugram-122016
Le Meridien	lemeridien.gurgaon@lemeridien.com	0124-4992000	Sector-26, M.G. Road, Gurugram Delhi Border, Gurugram-122002
Park Inn	pigr@sarovarhotels.com	0124-4795555	282, Civil Lines, Gurugram-122001
Park Premier	info@parkpremierhotels.com	0124-4604600	353-357, Sector-29, City Centre, Gurugram-122001
Park Plaza	res@parkplazagurgaon.com	0124-4150000	B-Block, Sushant Lok-1, Gurugram-122002
Radisson Blu Suites	businesscentre@radissondel.com	0124-4719000	B Block, Sushant Lok, Phase 1, Gurugram-122022
Ramada Gurgaon Central	commerce@ramadagurgaoncentral.com	0124-4886400	Plot No. 2, Sector-44, Gurugram-122003
Silver Oak	silveroakhotel@gmail.com	9873159641	43, Akashneem Marg, DLF City-II, Gurugram-122002
The Palms Town & Country Club	banquet@thepalms.in	0124-4199900	B-Block, Sushant Lok-I, Near HUDA City Metro Station, Gurugram-122001
The Oberoi	generalmanager.gurgaon@oberoihotels.com	0124-2451234	443, Udyog Vihar, Phase-V, Gurugram-122016
The Heritage Village Manesar	manesar@sresorts.com	0124-2871500	NH-8, Manesar, Gurugram-122050
The Leela Ambience	nidhi.verma@theleela.com	0124-4771234/1235	National Highway 8, Gurugram-122002
The Westin Resort & Spa	westin.sohna@westin.com	0124-4508888	Vatika Complex, Karanki Road, Sohna, Gurugram-122103
The Bristol	gm@thebristolhotel.com	0124-4351111/2356030	DLF Phase-1, Gurugram-122002
Vivanta by Taj	dmvivanta.gurgaon@tajhotels.com	0124-6671234	Sector-44, Near Fortis Hospital, Gurugram-122004

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Where can you use the compost?

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