NEWSLETTER

ENVIS CENTRE
ON
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Special issue on Waste Management

Editorial

Waste management has become a global concern since the early eighties of last century. The alarm rang with the changing types of wastes, from biodegradable market wastes to the e-waste of today. Accordingly, the landmark global convention in 1989 under the United Nations to control the transboundary movement of hazardous wastes and their disposal, commonly called the **Basel Convention** has become more contemporary. It witnessed a growing number of signatories hitting a figure of 168 countries including European Union in 2006.

Recent developments in biotechnology are providing new ways towards waste management to make wealth from the waste. Beside reclaiming polluted lands and cleaning up the disposal fields, biotechnology helps in conversion of industrial and other wastes into nontoxic and even useful products. The energy recovery from wastes is another flourishing aspect of waste management, which is being advocated in developing countries now a days.

However, till date the biotechnological approaches do not seem sufficient to treat huge amount of wastes altogether. Hence, integration of processes such as landfill, pulverization, incineration etc. with composting and/or other biotechnological techniques are considered efficient, and can be used properly with better collaborations of private operators. In India, this need has been felt and the processes have started rolling with private-public interface carrying the laboratory to the field. But, the policy designs and land allocations need highest level of critique to retain environmental harms at its minimum, in spite of achieving the highest economic benefits possible.

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In This Issue:

Hazardous Waste Management Facilities – War On Waste

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Hazardous Waste Management in India has been a neglected subject over the years. The first legislation governing the management and handling of hazardous was enacted in the year 1989 titled "Hazardous Wastes (Management and Handling) Rules 1989" under the aegis of Environment (Protection) Act 1986. In response to one of the Public Interest Litigation, the Hon'ble Supreme Court of India has directed all the State Pollution Control Boards (SPCBs) to close down industries, which are not attuned to use the hazardous waste facilities and also to quantify the wastes generated in every state of this country. Subsequently, the SPCBs are taking necessary steps and evolving policy directions for use and sustainability of such facilities. Under the orders of Supreme Court, a monitoring committee known as 'Supreme Court Monitoring Committee' has been constituted for continuous monitoring of the initiatives taken by each and every State to curb the menace of hazardous Waste.
However, little efforts towards effective waste management was put in until the first integrated hazardous waste management facility has been established by **Ramky**, which came into operation during September 2001. Maharashtra is the biggest generator of hazardous wastes.

As on date there are not more than four recognised facilities in this country for Hazardous Waste Management. The first engineered landfill has been developed and constructed by Ramky Enviro Engineers Ltd., under the name Hyderabad Waste Management Project in Sept 2001 and the second integrated facility was set up during August 2002 by Ramky Infrastructure Ltd under the banner of Mumbai Waste Management Ltd. These two waste management facilities have acted as benchmarks in the area of Hazardous Waste Disposal and are today considered as industrial infrastructure projects. Of late, the same group has commissioned facilities at Haldia in West Bengal, Pithampur in Madhya Pradesh, Udaipur in Rajasthan and Parawada near Visakhapatnam in AP. It is also constructing Hazardous Waste Management Facilities near Bangalore, Kanpur, Punjab, Bulandshar, Durgapur and many more places.

Hazardous Wastes are well-known to have long-term and short-term health and environmental impacts, and there is no proven single solution for the entire range of hazardous wastes generated by the industries and hence there is immense need for integrated waste management facilities. Further, constantly changing national regulations demand a range of solutions ranging from low cost direct landfilling to incineration of wastes for integrated waste management systems.

However, the keys to a Hazardous Waste Management facility generally includes the following as main modes of waste disposal:

- Recycling and Reuse of waste wherever possible
- Direct Landfill of waste
- Treatment of waste followed by Landfill
- Incineration of waste
- Treatment of waste followed by incineration

Ramky being a forerunner in the field, is equipped with all the requirements, those are demanded by an integrated waste management facility. As have already been stated that there are several modes of hazardous waste disposal, recycling and reuse, or precisely of the waste management, a few of those are discussed here. Indeed, in the state of West Bengal, these are the options being practiced presently, mostly under the initiatives of West Bengal Waste Management Ltd. – the Ramky.
In the following paragraphs, some of the methodologies for hazardous waste disposal are discussed, emphasized on the present activities of Ramky in West Bengal.

Waste Stabilization is a treatment technology applied to wastes rendering them non-hazardous or less hazardous one – suitable for further treatment and/or disposal. The term stabilization covers basic concepts like, Encapsulation, Chemical Fixation, neutralization, precipitation, solidification using clay, cement, bentonite etc. and the odour mitigation.
National regulations on hazardous waste management and subsequent guidelines have provided land disposal restrictions and ensured that such guidelines are met with these facilities. However, it is important to incorporate these facilities prior to framing of these guidelines, which may play major role in the national policy making in this direction.

Typically wastes are unloaded into the stabilization pits wherein recipe for treatment as recommended by the laboratory predominantly comprising of cement, lime, clay and ash combination are added along with water and are thoroughly mixed. These stabilized wastes are then cured to drain off excess water. Subsequently, these are re-subjected to a lab analysis before its final pathway of treatment/ disposal is effected with.

Secure landfill is regarded as one of the most reliable and useful waste disposal technology for hazardous wastes. In this particular case, the facilities have been designed with double liner systems meeting the US-EPA's RCRA – Subtitle 'C' requirements. Here, while the primary system is designed for prevention of leachate migration into subsurface, the secondary system is provided a double safety and to provide an early warning of the potential damages in the primary liner system. The landfills have also been designed and built with two layers of leachate collection system having the primary system for leachate collection and removal while the secondary system is for leak detection and removal system.
The landfills have been designed to be built on a well compacted and graded sub-base, over which a 1-m compacted clay liner is placed. Over the compacted clay liner a 2-mm HDPE liner is placed and then a leachate detection and removal drainage system is provided. Above the secondary drainage system, there is a geo-textile on which a primary 2-mm HDPE liner system is laying. The primary leachate collection and removal system is placed over the primary HDPE liner. On the drainage system another geo-textile is present to prevent choking.

Landfill operation demands high integrity ensuring occupational safety. Hence, thorough training on handling of hazardous waste and use of safety equipments including gloves, masks, goggles, hats, boots etc. are recommended. However, our company follows the same most meticulously. During the operations waste is properly compacted and adequate daily/ intermittent cover material – used from excavated earth, which acts as barrier between various wastes while minimizing odour and increasing the aesthetic appeal of the facility.

Upon filling up the facility, the waste is capped. Capping of the landfill is performed with a soil cover over the waste. A gas vent system is provided over the soil cover, on which a layer of compacted clay liner is laid down. Over the clay liner there is HDPE liner. Above the HDPE liner, there is a geo-textile and drainage system to divert the storm water from entering the landfill. The drainage system is covered by a vegetative cover, on which lawns are to be grown to minimize erosion of soil and to improve aesthetics.

The entire facility is completely secured for the groundwater contamination by way of base liner. The Storm water is diverted from the facility by network of drains running all along the landfill ensuring protection of surface waters. To protect the air environment, all the wastes are provided with daily and intermittent covers thereby minimizing the fugitive emissions (if any) and the final cap ensures complete security of the facility.

Incineration of wastes is an integral part of the hazardous waste management. National regulations on land disposal restrictions indicate that organic bearing hazardous wastes with greater than 5% degradable organic wastes and greater than 20% non-degradable organic wastes not be disposed into the landfill. Most of these hazardous wastes after consideration of alternate options would end up in the incinerator.

Reuse and Recycle of waste leads to the concept of 'wealth from the waste', which is considered to the best practice to built up a pollution free sustainable society. Ramky is now on the way of establishing reuse - recycling facilities for wastes. Identification of waste followed by reuse/ recycling technologies provides cost-effective solutions to the industry, along with conservation of the natural resources. As on date Ramky has identified

Gypsum Washing Operations (Lime Sludge, Sulphuric Acid, Ash etc.), Fuel Blending, Waste Oil Recovery, Battery Recycling as the major strategies for re-use and recycling of wastes.

Leachate/ Wastewater Treatment: Leachate generated from the landfills should be and is being effectively collected and treated off so that no adverse effects fall on to the environment. In addition, wastewater is generated from various other sources in the facility including stabilization plant, incinerator, reuse plants, laboratory, storage areas and other locations. All the wastewater is collected and presently these wastewaters are being evaporated by the solar energy. It is proposed that once the incinerators come into operation, the heat recovered from the incinerator can be used to evaporate these wastewaters by the forced evaporation method using the multiple effect evaporators.

The waste management has become a bottleneck for any industrial development. Certain wastes like the CFCs, Wastes containing high concentrations of Mercury, PCB containing wastes and such other wastes for which economically viable treatment or disposal solutions are not available, are termed as intractable wastes. To provide a one-stop solution to the hazardous waste disposal needs of the industry, all the TSDFS designed by Ramky incorporate an intractable waste stores, wherein such wastes are stored following all safety requirements, until economically viable solutions are made available. In contradiction to the belief that, waste management is a burden to the industries and the state, it is observed that, the states, having such facilities have witnessed rapid and enhanced industrialization. New industries being set up by multinationals as well as locals, prefer states with such facilities. So, the war against waste has already taken a shape.

A Few Organizations Working in this filed

Name of the Company	Address	Service provided
RAMKY ENVIRO ENGINEERS LTD.	Necklace Road Rly. Station, Raj Bhawan Road, Hyderabad – 500082 Tel: 91-40-23310091 e-mail: info@ramky.com www.ramkyenviroengineers.com	Municipal, Biomedical and Hazrdous Waste management services to Commercial, Industrial and Municipal customers including recycling, collection and disposal services.
KIRLOSKAR CONSULTANTS LTD.	917/19 A.F. Road, Pune – 411004, Maharastra, India. Tel: 91-020-2321211	Solid waste Management and Resources, Water and Environment treatment susytems.
CONCEPT ENVIRO CHEM (I) PVT. LTD.	303-308 I.P.Tower, 6, Comm. Centre, Wazirpur Industrial Area, Delhi – 110052. http://www.concept.trade-india.com	Waste Management, Water Treatment Plants, Agni Incinerator, Pollution Monitoring Equipments, Industrial Waste Management
DECCAN ENVIRONMENTAL CONSULTANTS	Mandar, Tulshi Baugwale Colony Pune – 411009, Maharastra, India. Tel: 91-20-24222278	Water, Sewage,& Effluent Treatment Plants Water, Sewage,& Effluent Treatment Plants
GREEN TECHNOLOGIES	56, 5th Cross, 10th Main, 7th Block, 4th Phase Bsk 3rd Stage, Bangalore 560085, Karnataka ,India; Tel: 919448571861	Waste Management Rain Water Harvesting, Purifying The Wastage
MC CLELLAND ENGINEERS PVT. LTD.	705, Vindhya Commercial Complex, Sector-Xi, C.B.D. Belapur, Navi Mumbai- 400614, Maharashtra, India Tel: 91-22-27576661	Hazardous Waste Incinerators, Solid Waste Management, Incinerators for Solidwaste, Aqueous Waste Incinerator, Industrial Waste Incinerator
TEXOL INCINERATOR INC.	346/A, Chennigappa Ind. Estate, Sri Gandhadakaval, Sunkadakatte, Bangalore 560091 Karnataka, India Tel: 91-80-23288129	Incinerator (Waste Disposable Equipments) & Total Waste Managements Systems

Wealth from Waste

Wastes are produced from industrial, municipal, domestic, biomedical and many other types of sources. Hence, there remains a clear classification of different waste categories having varying chemical compositions. The need for waste segregation and reduction at source, is therefore, considered to be the most important strategy for waste management. The decision on mode of waste treatment or recycling and reuse however, in most of the cases leads the generation of wealth from the waste materials. In this connection, frequently biotechnological applications are met, which act as elixir to convert hazardous leftovers to an economic currency. The nature of waste treatments and its requirements depend predominantly on wastes categories, as are discussed below.

The construction waste and inert wastes renders problem of topography and land allocation, but are less potent to cause environmental pollution. Therefore, the best option for recycling and/or reuse is practiced for quarry-filling, earthwork of roads and other areas of compaction requirements, which may make a significant cut to the cost of compaction materials.

Industrial Waste composes chemicals and toxic materials and may impart huge environmental consequences in respect to the soil and other pollution. Frequent leaching of chemicals through soil leads to the surface water and ground water contamination. Therefore, the waste disposal sites of industrial outlets are of great concern for the society, environmentalists and industrial authorities as well. The problem may be mitigated by the use of biotechnology, which provides options for bioremediation, biodegradation and bio-transformation. While microbial treatment of soil and wastewater facilitate reclamation of toxic lands, on the other hand bio-leaching may recover some of the economically viable materials out of the wastes. But, till date for large-scale waste treatment, physical processes like pulverization, incineration and land filling are being preferred by most of the industries. Here also, heat recovery is feasible through incineration of wastes or bio-activated sludge from secondary treatment having high calorific value.

Biodegradable or market wastes, consisting of organic materials have highest potential of being used as wealth. A good number of disposal and treatment strategies including composting technology, vermicomposting, landfill gas and biogas generation as energy source etc. can be adopted to convert the biodegradable waste materials to the substances having high economic returns. It has been possible to generate 150 to 250 litre of methane/kg total solid waste in industrial scale, which in tern reduce pollution load by 70 to 80%.
However, solving the problem for industries only does not suffice, as the municipal bodies suffer economic burden from the menace. To overcome it, anaerobic technologies have been adopted to treat the domestic and industrial wastewater and solids. This technology, in addition to saving in high-energy costs from anaerobic reactors, generates biogas, which can be used as an additional source of energy.
According to Environmental Protection Agency of United States, compost is organic material that can be used as a soil amendment or as a medium to grow plants. It is created by combining organic wastes (e.g., yard trimmings, food wastes, manures) in proper ratios into piles, rows, or vessels; adding bulking agents (e.g., wood chips) as necessary to accelerate the breakdown of organic materials; and allowing the finished material to fully stabilize and mature through a curing process. Whenever, the earthworms (vermin) are used for decomposition and conversion of the wastes to organic manure, the process is called vermicomposting. In this technology, municipal wastes are aerobically destroyed to low organic value in presence of enzyme producing simpler substances. The waste is thus converted to good soil conditioner. Both the organic and vermicompost are gaining demand as commercially viable product, for its eco-friendly nature and potential of being a soil enricher material.

Other hazardous wastes including plastics may also be recycled and reused in a huge quantity. The rag-pickers play a very important role in this context in India. Recycling the waste plastics for production of lower grade plastics suitable for manufacturing of products like furniture, rooftop materials etc. not only adds value to the waste, but also reduces the waste volume. An estimated low proportion of plastic use in India (50-100 g/capita/day) compared to developed countries (1-2 kg/cap/d) may be indicative of such recycling practices of the wastes. Similarly, glass and metals too have high recycle potential in this country.

It seems, that a proper and meticulous strategy formulation for waste recycling or reuse may become a useful tool for waste management, which may even capture significant economic benefits in turn.

News and Views

Sewage, waste to light up Jaipur streets

Jaipur Municipal Corporation (JMC) is heading towards making wealth from the waste. The JMC has decided to generate electricity using solid waste and sewage water to light up the city's streets. "The sewage and solid waste that have been creating problems for the civic bodies would now be used to generate electricity. A part of the power generated from the plant would be used for the street lights," JMC officials said.
The initiative to be funded under Jawaharlal Nehru National Urban Renewal Mission would generate 8,000 units per day with a plant efficiency at 60-80 percent level.

The project is expected to come up by the end of 2009. "JMC would generate power through sewage water by moving the shaft of the plant. Besides generating electricity plant would also purify the sewage water," officials said.

(Source: Hindustan Times, April 5, 2007)

Biogas Plant to power street lights

A Rs. 6.15 lakh biogas plant, utilizing human waste, is nearing completion at Durga Nagar under the Tiruneermalai town panchayat in Kancheepuram district.
The town panchayat, which is funding the non-conventional energy project began work on the 25 cubic meter plant on a trial basis in December 2006. It is likely to completed in a fortnight. According to site engineers, night soil from 240 housing units of the TNHB housing colony will be deposited in a sump. After the biological changes, the sludge will generate methane gas, which will be piped to a power generator to power the streetlights in the area. The power generation from the plant will be 3kVa, sufficient for providing power to 50 lights for five hours.
According to the officials of the Directorate of Town Panchayat, this is the first plant of its kind in Kancheepuram district. It is planned to extend the non-conventional energy model to other areas.

(Source: The Hindu, Chennai, April 13, 2007)

Managing Solid Waste, Japanese way

Several firms in Chennai have evinced interest in the Japanese models of Solid Waste Management , going by the responds at an environment training programme organized recently by Japanese environmental solutions company Hiyoshi Corporation. Participating in the programme, Tamil Nadu Petroproducts Ltd. executive (production) V.Muralidharan said inspired by the Japanese experience, TPL is working towards stringent emission control measure in his company.
Based on his visits to the waste processing companies at the Shiga Prefecture, TPL had started segregating industrial waste and giving away food waste to the cattle.
Several other participant companies are planning to imbibe the Japanese experience. Orchid Chemicals and Pharmaceuticals senior vice president (manufacturing) S. Mani said the environmental laws in Japan are effective as they have social. endorsement. The five main laws relate to offensive odour control, recycling, green purchasing, home appliances, construction and material recycling. "Source segregation is the key," Mr. Mani said pointing out that only 70 per cent of the design capacity of waste-recycling machines is used taking care not to overload. Only 20 per cent of the wastes go to landfills and the remaining wastes are recycled.
The trainees in the group gave an account of how the Japanese recycle economy functions. The team observed that the municipalities had a waste-clearance schedule ready for the whole year. Senior managing director of Hiyoshi Corporation Hiroshi Murata said 50 crore tonnes of domestic and industrial wastes in Japan produced mountains of garbage annually. Thirumalai Chemicals assistant manager (production) G Rajendran said the wastes viz. - plastics, food, glass, metals and scrap and papers are collected day wise. The plastics are crushed and given to plastic manufacturers, food waste is composted and given to farmers at a low price.

"Even to dispose off an old television set, the municipality inspects and tags it and the set is taken away on payment of money," he says. His company has now gone in for zero discharge of effluents by reducing the inputs and optimisation of chemicals.
As the Orchid vice president summed up: "A Buddhist monk in Japan picks up the tiniest specks of paper with chopsticks and puts the waste back into a trash can."

(Source: The Hindu, Chennai, April 28, 2007)

Master plan silent on source segregation of waste

The Chennai Metropolitan Development Authority's (CMDA) second draft master plan for Chennai, while recognising the potential for composting, is silent on the process of waste segregation at source. Chennai sends 3,000 tonnes of waste from 10 zones and 500 tonnes of debris to the two dumping yards at Perungudi and Kodungaiyur every day with a projection of 6,590 tonnes of waste generation (excluding debris) in 2026.
Though cities around the world are increasingly adopting waste segregation at source, former CMDA planners feel the draft plan does not clearly spell out the need to segregate waste. The draft plan observes a lack of data on e-waste and the extent to which it could be recycled and disposed off while calling for a detailed study by the Tamil Nadu Pollution Control Board.
With the statistics suggesting the need for source segregation, composting and recycling wastes, experts say the master plan should take a critical look at the subject. The draft has spelt out clearly that the composition of the garbage indicated a high potential for composting. The garbage mix has more of compostable wastes and a small amount of recyclables.

(Source: The Hindu, Tamil Nadu, May, 17, 2007)

Delhi ranks poorly in solid waste management

With only one per cent of skilled personnel engaged in solid waste management out of a battery of 52,000 workforce, which is highest in the metros, Delhi has faired badly in handling the solid waste, according to a survey conducted by FICCI.
Compared to Delhi, producing 5,900 metric tonnes waste per day (mtd), cities like Mumbai with 8,000 mtd, Kolkata (3,000 mtd) and Chennai (3,500 mtd) have, recorded better total waste efficiency. This can be attributed to a higher number of skilled manpower engaged in solid waste management. For instance, Mumbai ranks second with 40,140 personnel (5,000 skilled workers) followed by Madurai, Coimbatore and Nasik, deployed for solid waste management.
Intending to cover 35 cities with a population of more than one million, the team got response from urban local bodies of 25 cities including Agra, Ahmedabad, Delhi, Indore, Hyderabad, Jamshedpur, Cochin, Surat, Meerut, Mumbai, Patna and Nasik.

With the highest population size of 1.5 crore, Delhi has the highest per capita expenditure on solid waste management (Rs 431) followed by Mumbai (Rs 428), Jaipur (Rs 301), Chennai (Rs 295) and Ludhiana (Rs 258).
Though door-to-door collection has almost failed in Delhi, 17 out of 25 cities surveyed have introduced door-to-door collection. Nagpur, Nasik and Bangalore claim 100 per cent collection efficiency in terms of households from where waste is collected, while Surat and Hyderabad have shown an efficiency of 80 per cent and 75 per cent respectively.
The survey emphasized that lack of appropriate space, funds and adequate technical know-how are major bottlenecks, faced by almost all the cities in waste management. In this respect privatization may be a key to better management. In cities like Bangalore, Mumbai, Jaipur and Nagpur the maximum activities have been handed over to the private sector, while Coimbatore and Asansol have evinced a possibility of privatising all solid waste management activities in future. However, twenty-three out of 25 cities selected for the survey have opted for privatisation.

(Source: The Times of India, India, May 23, 2007)

Forthcoming Events

Events	Date	Place
MWIN (Municipal Waste Integration Network) Annual Conference	**Ontario, Canada**	**June 12-14, 2007**
International Conference on Sustainable Solid Waste Management	**Chennai, India**	**5-7 September, 2007**
ESD 18th Annual Solid Waste Technical Conference,	**East Lansing, MI**	**October 24, 2007**
23rd International Solid Waste Conference	**Philadelphia, PA**	**March 30 –April 2, 2008**
Waste – the Social context '08: Urban Issues and Solutions	**Alberta, Canada**	**May 11-15, 2008**
Waste Management '08	**Granada, Spain**	**June 2-4, 2008**

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