

ENVIS

Urban Municipal Waste Management Newsletter

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National Solid Waste Association of India

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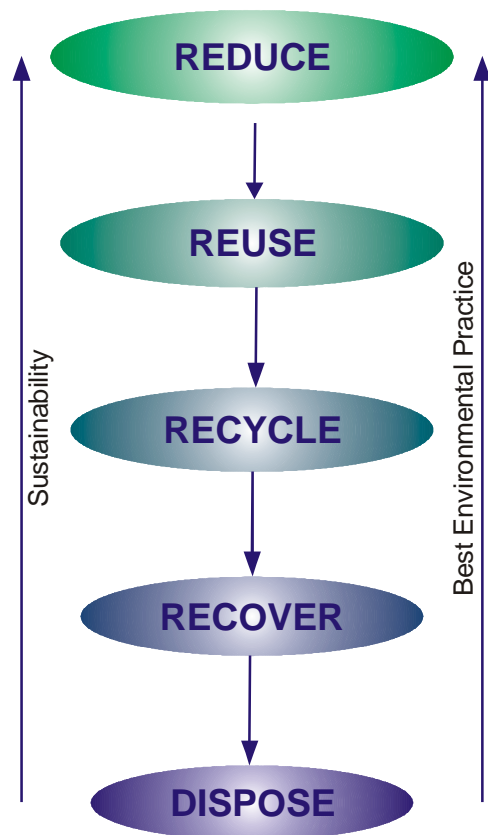
FROM THE EDITOR'S DESK

The more civilized we get, the more waste we generate. Prosperity brings in more waste per person in environment. Ever since the rapid growth in civilization has been witnessed, the complexity of waste generation and its management have been increasing. However, countries all over the world have developed their own strategies to combat their waste management issues and have been successful. Population, infrastructure and regulation are the three main factors that play a significant role in achieving an **Integrated Waste Management** in any locality as they are interrelated. In India, though the waste management policies and regulations are in place, their effective implementation fails due to the growth in population at alarming rate and ineffective implementation plans.

Municipal Solid Waste Management is limited to collection, transportation and disposal of un-segregated waste. The treatment and process technologies more often imported from other countries does not suit our waste characteristics and prove to be unsuccessful. Hence, most of our garbage finds its way to the Municipal Solid Waste Dumping Grounds. The dumps are filling up faster than we can even find newer sites for them. There is a need to have an Integrated Waste Management System that would provide sustainable solutions in our country. The 4 R's principles i.e. **Reduce, Reuse, Recycle & Recover** are the basic components of any waste hierarchy that has to be understood and implemented by each and every citizen of our country to achieve a **Sustainable Integrated Waste Management**. This article makes an effort to demonstrate each of this 4 R's principle and also depicts the present Indian scenario of 4R's along with some successful case studies.

Why do we need to Reduce, Reuse, Recycle & Recover the waste?

- Reduces the amount of solid waste going to landfill.
- Turns waste into a resource &
- Saves natural resources



REDUCE:

Source reduction is by far the most effective way to battle the flow of garbage into the landfill. If we avoid making garbage in the first place i.e. at the point of generation, we don't need to worry about disposal of waste later. The very first step towards



source reduction is less consumption and throwing away less. At commercial level, it refers to any change in the design, manufacture, and purchase of raw materials (including packaging) to reduce their amount or toxicity before they become waste.

Source reduction also refers to segregation of waste at source which plays an important role in reducing the amount of waste going to the landfill. Most of the components of waste can be reused and recycled if they are segregated, stored and collected in a proper way.

A comprehensive waste-reduction strategy can provide significant financial benefits not just by reducing purchases of unneeded materials, but also reducing real estate and energy costs from having to store and transport them.

Hence source reduction is the most preferred method of waste management and is the first step in the waste management hierarchy and goes a long way towards protecting the environment in a sustainable manner.

Tips for reducing waste:-

At Home...

- Purchase products that will not go out of fashion quickly.
- Purchase things with less packaging.

- Purchase durable items that will last long
- Purchase refillable items.
- Bring a shopping bag while shopping instead of requesting for plastic or paper bags
- Cook just sufficient food for meals.
- Use good quality electric fixtures.

At office...

- Use less disposable items e.g. Polystyrene and paper cups and plates.
- Make a few copies of a document to share instead of making one copy for each individual. Print on both sides of paper.
- Use electronic mail to communicate or to send messages.
- Subscribe to electronic mailing list whenever possible.
- Instead of using sticker labels, print addresses directly onto envelopes or use window envelopes to reduce duplicate printing of address.
- Order just adequate drinks and food for meeting, seminars, conference and events etc.
- Buy longer-lasting & useful items as corporate gifts.

In Industry...

Waste minimization will involve changes to three key areas in industry, which also refers to cleaner production:

1. Change inputs - Use resources more efficiently. Replace inefficient systems and materials with more efficient ones.
2. Change processes - Introduce clean technology or improve operating practices. Improve equipment or change the layout and current inefficient processes.
3. Change outputs - The outputs can include products and waste. Reduce environmental impacts by designing new control systems. Separate waste materials for resource recovery and savings.

Segregation...

Waste should be segregated efficiently in an appropriate manner whether at home, office or in industry. Segregation of waste is a key to success for all the successive waste hierarchy components i.e. Reuse, Recycle and Recover. Waste should be segregated as:

- 1) Biodegradable (kitchen waste, vegetables, fruits, flowers, leaves, dust).
- 2) Recyclables (plastics, thermocol, paper, glass, metal, rags, rubber, cartons, leather, rexine).

Old medicines bottles, paint cans, chemical bottles/containers, pesticide bottles/containers, batteries should be handled with care taking proper precautions as it contains toxic materials.

REUSE:

Reuse is the second step in the waste hierarchy. It is often possible to extend the life of something by reusing it in its original state. Reusing items by repairing them, donating them to charity and community groups, or selling them also reduces waste. Reusing products, when possible, is even better than recycling because the item does not need to be reprocessed before it can be used again. Reusing an object will use far less energy than recycling it. There are many local organisations who want to reuse items that we no longer need or want. Reuse can have financial and environmental benefits. One person's rubbish is



another person's treasure. National charity organisations, local charity shops, internet auction sites and free exchange schemes, may be able to re-use unwanted items.

Tips for reusing waste:-**Donate...**

- Unwanted clothes, CDs, Videos, DVDs and toys to charity shops.
- Books already used to charity shops. Alternatively, place them in designated book banks across the district.
- Old clothes can also be taken to local recycling banks.
- Unwanted furniture to those who need it.
- Old computer equipment to community groups or schools.
- Old mobile phones and printer cartridges to charities that can re-use them.

Reuse...

- Carrier bags for shopping or as bin-liners.
- Packaging for other purposes, e.g. jars for storage, plastic bottles as cloches to protect young plants.
- Worn out or badly damaged clothes as rags for cleaning.
- Envelopes by sticking labels over the address.
- Scrap paper for making notes, scratch pads, shopping lists or children's drawings.
- Plastic containers for keeping food fresh, rather than cling film or foil.

Buy...

- Milk and fruit juice that is delivered to our doorstep.
- Rechargeable items instead of disposable ones e.g. batteries.
- Things in refillable containers e.g. cleaning products, ink cartridges.

RECYCLE:

Recycling is the physical reprocessing of old materials into new products, with the aim of preventing the waste of potentially useful materials. In addition, it generates a host of environmental, financial, and social benefits, for example the recycling of aluminum saves 95% of the CO₂ emissions—an environmentally harmful greenhouse gas—compared to refining new metal. Recycling aims to collecting, separating, processing, manufacturing and ultimately using this material which otherwise would have been thrown away as waste. Materials like glass, metal, plastics, and paper are collected, separated and sent to facilities that can process them into new materials or products. However, proper segregation of waste materials at the generation point helps in efficient recycling program. Recycling is a key concept of modern waste management and is the third component of the waste hierarchy. Like any other enterprise, recycling is a business



More and more of today’s products are being manufactured with total or partial recycled content. Common household items that contain recycled materials include newspapers and paper towels, aluminum, plastic, and glass soft drink containers, steel cans, and plastic laundry detergent bottles. Recycled materials also are used in innovative applications such as

recovered plastic in roadway asphalt, in carpeting, park benches, and pedestrian bridges and also as ‘plastofuel’. Construction/demolition wastes are also recycled to manufacture bricks. E-waste recycling is a huge business today due to the technological boom in the IT sector. As a matter of fact, collecting recyclable materials is just the first step in a series of actions that generate a host of financial, environmental, and societal returns.

Few tips for recycling waste:-

- Segregate recyclables like waste papers, plastics, glass, metals, etc as much as possible from waste at your end.
- Adopt a community recycling program.
- Encourage friends and family to get involved in recycling at home, at school and in the workplace.
- Purchase recycled products and green labelled products.

The four main stages involved in waste recycling process are:

1. Collection & separation of recyclables.
2. Delivery to a place in waste recycling sector.
3. Processing of recyclables.
4. Manufacturing of new product.

Recycling facts

Aluminium	Recycling one kilogram of aluminium saves up to 8 kilograms of bauxite, four kilograms of chemical products and 14 kilowatt hours of electricity.	It takes 20 times more energy to make aluminum from bauxite ore than using recycled aluminum.
Glass	For every ton of recycled glass used, approx 315 kilos of Carbon dioxide and 1.2 tons of raw materials are spared.	A 20% reduction in emissions from glass furnaces and up to 32% reduction in energy usage.
Paper	A ton of paper from recycled material conserves about 7,000 gallons of water, 17-31 trees, 60 lb of air pollutants and 4,000 KWh of electricity.	Milling paper from recycled paper uses 20% less energy.

RECOVERY:

The biodegradable fraction of waste can be used directly, as feed stock for the production of biological and chemical conversion products, such as, for the production of 1. manure and 2. energy.



Biodegradable wastes such as plant material, kitchen waste and paper products can be biologically decomposed to produce manure. The manure can be used for agricultural or landscaping purposes. An example of waste management through biological conversion is the bio-bin composting where household organic waste such as kitchen waste and plant cuttings are collected in a dedicated container and then composted in an easy and efficient manner.

The energy content of biodegradable waste can be harnessed directly by using them as a direct combustion fuel, or indirectly by processing them into another type of fuel. Recovery of energy through thermal treatment ranges from using waste as a fuel source for cooking or heating, to fuel for boilers to generate steam and electricity in a turbine. Pyrolysis and gasification are two related forms of thermal treatment where waste materials are heated to high temperatures with limited oxygen availability. The process typically occurs in a sealed vessel under high pressure. Pyrolysis of solid waste converts the material into solid, liquid and gas products. The liquid and gas can be burnt to produce energy or refined into other products. The solid residue (char) can be further refined into products such as activated carbon. Gasification and advanced Plasma arc gasification are used to convert organic materials directly into

a synthetic gas (syngas) composed of carbon monoxide and hydrogen. The gas is then burnt to produce electricity and steam. Biomethanation is another process of energy recovery from waste in which microorganisms break down biodegradable material in absence of oxygen. The process produces methane and carbondioxide rich biogas for energy production, the nutrient rich solids left after digestion can be used as fertiliser.

There are a large variety of methods and technologies available varying in complexity from simple home compost heaps, to industrial-scale enclosed-vessel digestion of mixed domestic waste.

**THE INDIAN SCENARIO OF 4R's**

The Indian scenario is totally different in terms of reducing waste at source. Due to diverse culture and tradition, source reduction of waste lies far apart as the last option in the waste hierarchy. Besides, there is no segregation of waste in India, since there is no efficient collection system, non-enforcement of law and huge cluster of population with paucity of living space particularly in the urban areas. This is a major issue in slums and low-income communities. Ultimately the waste goes to the open dumping yards. However, reusable materials such as plastic and glass bottles, toys, electronic items, etc are reused in the form of refilling and reselling the item. The recycling business in India has a huge network but is highly informal and performed in an un-organised manner such as the e-waste recycling process which are extremely harmful to workers and environment.



Recyclables enter in the recycling process chain through two ways; through waste pickers who sort and collect the recyclables from streets and community bins and sell it to kabadiwalla and secondly the kabadiwalla who buy old newspaper, iron, glass, miscellaneous paper, plastics and rubber at door steps. The waste is transported to wholesale-shopkeepers dealing in these old goods. These dealers in turn sell the old stuff further to large-scale wholesale shops and it leads it way to the processing and manufacturing units. Indian Municipal Solid Waste contains 20% of recyclables out of which 7%-15% is recycled in the country. The last component of the waste hierarchy i.e. recovery in terms of generating energy had been recently implemented in India on large scale. However, projects on energy recovery from waste failed almost at all municipal level due to waste not received in segregated form and the fact that Indian Municipal Solid Waste has a low calorific value which makes its suitable for composting.

CONCLUSION

Waste Management system discussed indicates that the first component of waste hierarchy plays a vital role for Sustainable Integrated Solid Waste Management. The 4R’s are interrelated and depend on component in the direction towards the up stream of waste hierarchy. Considering the present scenario of Indian Municipal Solid Waste Management, the first component of waste

hierarchy is missing in the management part. Secondly the reuse, recycling and recovery is accomplished in a haphazard way which needs to be organised in a practicable and proficient manner.

However, there are some successful case studies that are being initiated at community and Municipal level in our country which are based on 4 R’s principle and aim towards achieving Sustainable Integrated Solid Waste Management.

CASE STUDIES

Zero Waste Management by Susuki Exnora at Vishakapatnam, Andhra Pradesh.

Susuki Exnora a Voluntary N G O initiated a project on zero waste management at Vishakapatnam city in ward no.25. The steps involved in its effort were

- 1) segregation of waste
- 2) segregated collection
- 3) selling of recyclables
- 3) composting of organic waste and its marketing.

The waste management scenario before and after the project are as follows:

	Before	After
Waste generated	18 Tons	11 Tons
Resource Recovery	0	11 Tons
Non Recyclable waste	18 Tons	2 Tons
No. of trips to dumpsite	10 Trips	2 Trips
Sale of recyclable	Nil	Rs. 1500/-

Door to Door Waste collection in Chennai & Matheran.

Collection of Municipal Solid Waste at source (Door to door collection) was implemented in all Zones except Zone VI,VIII & X in Chennai. About 95% of the households were covered under this programme. This was achieved only on introduction of Tricycles which was a wonder tool

for better collection of MSW at door steps. About 1459 tricycles were put in use. Source separation was promoted to reduce the waste coming to the Landfill, thereby increasing the life time of the Landfills.

Matheran is the closest hill station from Mumbai. A large number of tourists visit Matheran. Because of good lodging boarding facilities developed in Matheran, tourists prefer overnight or even long duration stay in Matheran. But this also leads to high waste generation. Matheran Municipal Council appointed a private operator for one year for door-to-door collection, transportation and treatment of solid waste from residential and commercial areas (shops, hotels and restaurants). The Municipal Council advised the hotel owners to strictly adhere to segregation of dry and wet waste and keep them in separate bins. A biogas plant for organic waste is also setup by Matheran Municipal Corporation.

Use of waste plastic in improving road quality, Bangalore

The implementation of this concept was to eliminate waste plastic menace from the Municipal solid waste garbage discarded which in turn helped in recovering of organic waste for composting and avoid non-biodegradable plastic waste getting to the land fill soil polluting the ecological sustainability. The waste processed plastic was used in asphaltting roads which improved longevity and performance of the road by at least two times. This research was evaluated by Bangalore University and was further authenticated by Central Road Research Institute of India and was introduced for the first time in the country.

Waste Diversion in Delhi's Defense Colony.

A community-based waste management pilot scheme was set up by Toxics Link involving 1,000 households in A-block, in Delhi's Defence Colony. Due to restrictions on the availability of land, wet waste for composting was collected from just 500 of the households. Teams of two workers collected

waste from 250 households each, making a total of eight waste collectors for the whole of the block. As a result of the scheme around 600-700 kg of waste that was been sent to landfill sites each day was either composted or recycled. These lead to a saving of 200 tones per year.

Clean Jarkhand Project

Clean Jharkhand Project (CJP) was launched to establish a Community Based System of Solid Waste Management in light of Supreme Court Guidelines, 2000. The CJP, Ranchi Municipal Corporation and Community effectively collaborated to improve community level cleanliness. About 27000 households are covered under door to door collection of waste in Ranchi district. The service of drain cleaning, road sweeping, lifting and transportation of garbage was regularized. Community Contribution went up to \$ 36550. A waste composting plant with capacity of 2.4 ton production per annum was been established at Chuttu a village in Kanke block of Ranchi and technology for use of waste plastic in road construction has been identified.

Important web sources:

<http://www.epa.gov/epaoswer/non-hw/muncpl/reduce.htm>

<http://staging.unchs.org/bestpractices/2006/mainview.asp?BPID=1500>

http://en.wikipedia.org/wiki/List_of_solid_waste_treatment_technologies

http://ec.europa.eu/environment/waste/weee/index_en.htm

<http://www.epa.gov/rcraonline>

<http://www.3rkh.net>

<http://www.recycling.com>

<http://www.biosanitizer.com>

<http://www.biobin.net>

We would appreciate your feedback on this newsletter and welcome you all to contribute articles, news or in any other form pertaining to the Waste Management issues, for publishing in our subsequent newsletters.

Upcoming Events

Green Power Conference on Carbon Markets

29th-30th September 2008

Mumbai, India,

Web: <http://www.greenpowerconferences.com>

Clean Energy Asia, 2008

7th-10th October, 2008

Grand Hyatt, Singapore

Web: <http://www.terrapinn.com/2008/clean/>

Waste Management Conference

13th-14th October, 2008

Mumbai, India

Web: <http://www.ibcinfo.com>

Waste Management & Recycling Congress

20th October, 2008

Berlin, Germany

Web: <http://www.wastemanagementcongresseurope.com>

Wastecon, 2008

21st October, 2008

Tampa, Florida, USA

Web: <http://www.wastecon.swana.org>

Eco Asia Conference

28th- 31st October, 2008

Hong Kong, China

Web: <http://ecoexpoasia.hktdc.com/index.htm>

Urban Development forum

6th-7th November, 2008

Mumbai, India

Web: <http://www.marcusevans.com/html/eventdetail.asp?eventID=14550&SectorID=21>

Green Manufacturing India

17th-18th November, 2008

Mumbai, India

Web: <http://www.marcusevans.com/html/eventdetail.asp?eventID=14574&SectorID=19>

2nd Annual Strategic Contractors Management

20th-21st November, 2008

Mumbai, India

Web: <http://www.marcusevans.com/html/eventdetail.asp?eventID=14631&SectorID=39&divisionID=>

BLS Congress

24th-25th November 2008

Hyatt Regency, Dubai

Web: <http://www.blscongress.com>

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