

# Zero Waste: A Novel Way of Waste Management

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**Abstract:** Concept of zero waste is designing and managing processes and products to avoid and eliminate the volume of waste produced and to conserve and recover the resources without harming the environment in any way. By implementing the strategies of zero waste, elimination of discharge to land water or air can be achieved and ecosystem as a whole will be benefited.

**Keywords:** zero waste, reduction, reuse, recycling, recovery, compost, biogas.

## Introduction:

Unwanted materials of no use are generated in almost all activities of mankind and are to be disposed off as these are considered as wastes. In daily life vegetable peelings, fruit cores, skin and fat trimmed off meat, fish etc, bottled ingredients, cans etc generate waste which needs to be segregated and disposed off with a scientific approach. A waste hierarchy has been developed by scientists, which can be applied to help reduce, reuse or recycle the solid waste. A new concept of zero waste has come up and has gained phenomenal response across the globe over the past two decades. The term zero waste was coined in a small town in New Zealand at the zero waste conference held at Kaitaia in December 2000. The campaigner was Warren Snew. The term became viral on internet and gained momentum. The environmentalists became vocal about the concept and started advocating the concept of zero waste or no waste. Cradle to grave is a model where materials begin with the extraction of resources and after production and manufacture ends in a grave. Zero waste is a concept based on cradle to cradle principle. The cradle to cradle principle is based on redesigning industries so that the byproducts produced are recycled and reused leaving no waste. The system is gradually evolving to practice from theory. Chemists are working on the concept of zero waste and to reduce waste. Green chemists have incorporated zero waste concepts as one of the twelve principles of green chemistry.

Scientists have worked on the principles of '3 Rs' i.e. reduction, reuse and recycling along with recovery and disposal and the favored options have been charted out on the waste hierarchy to be followed.

## Waste Reduction:

Waste reduction is at the top of the hierarchy, as it is the most effective way to limit the health and environmental impacts of the waste, as to create no waste is the best way to reduce waste. Waste reduction is important at household level in day to day basis also. It can be achieved by educating householders through house visits by experts and by educating people in community gatherings. In many cities it has resulted in behavioural changes among community members. Target of waste reduction has been taken up by NGOs and private sector enterprises with the support of government agencies. Educational campaigns are undertaken to raise awareness of the economic incentives and to reduce stigma attached to working with waste. In any industry to make a new product, material and energy is the prerequisite. Raw materials after extraction from earth are processed and after manufacturing the product is packaged and transported to be sold. All these stages produce solid waste, liquid waste and air pollutants. Green chemists are finding out and working on new innovative processes that can be adopted to effectively reduce the waste and pollutants and in process reduce pollution, save natural resources, protect the environment and are economically effective. Some of the simpler ways to reduce waste are listed here:

- a) Using less packaging material and buying in bulk
- b) Use of reusable rather than disposable items e.g. rechargeable cells and refillable ink pens.
- c) Use of own shopping bags, preferably made of cloth or recycled materials

## Waste Reuse:

The second option in waste hierarchy is waste reuse. The process of using a waste product without any change in its original nature and its shape is termed as waste Reuse. Bottles, old clothes and books are most easy reusable. Reuse is very helpful for disadvantaged people who cannot afford to buy new goods. Reuse centers are created at local levels which collect and distribute reusable goods. This also provides community benefits as long term unemployed and disabled people can be trained for the job. By reusing products rather than creating new products burden on economy is lessened as there is reduction in raw materials and products import. Reusing lowers the inputs of water, energy and other resources and thus is an environmental friendly approach.

## Waste Recycling:

Recycling waste incorporates reprocessing of the material before being used to make new products. Activities involved in reprocessing can impact health and environment of people associated with the activity. It is to be weighed whether these impacts are lower or the impact if new products from new raw materials are manufactured. It is important to find a market for the new product that is manufactured from the waste otherwise the process will not be economically viable and sustainable. The recycling process to be undertaken depends on the type of waste, so it is important to segregate the wastes. Segregated waste can be put to different uses for example, waste paper can be pulped and new paper for printing and packaging obtained. Waste metals can be melted and new sheets and ribbons obtained. Plastic bottles can be ground and ropes and plastic coatings for various purposes

obtained. Organic waste including the waste obtained from kitchen and all biodegradable waste can be used to get compost. the composting can be done at commercial level as well as in small scale, this helps not only in reduction of waste but also in improving the quality of soil and added advantage is that chemical fertilizer use can be lessened. For composting ideally three parts of brown waste is mixed with one part of green waste. Brown waste is hay, straw, egg shells, woody material etc and green waste is animal waste, food waste dried leaves, grass etc. Composting is usually done in a pile; it is an aerobic process and hence needs to be turned upside down number of times so that oxygen is mixed thoroughly. Once the composting process is complete the raw materials can not be identified.

#### Recovery

Recovery is the fourth option in waste hierarchy. Here some use for the waste is found so that some value can be recovered; usually this is attained by using the waste as a source of energy. In developed countries energy is recovered from waste on a large scale, for this high technology incineration plants are used. It requires highly developed infrastructure i.e. a reliable source of waste, good transportation facility, a power distribution grid etc. Biogas production is also undertaken on large as well as small scale from organic biodegradable waste. Biogas production makes use of anaerobic digestion process. Biogas reduces the use of wood fuel, it is a clean fuel, and it does not pollute the environment and has a good calorific value. Additional benefit is that it contributes in reducing the green house gases. In this process sludge is obtained as a byproduct which can be used as a fertilizer as it is known to improve soil quality. To operate a biogas plant more equipment and expertise is needed.

Thus waste hierarchy is a guide to select the best option and strategy to dispose of waste. The management intervention can be undertaken keeping energy and environmental benefits in mind. This involves chemists in designing processes and products that will reduce or totally eliminate the waste formed that would otherwise be needed to be thrown away later. For achieving the target of zero waste, commitment is needed from industrialists and laws are needed to be framed by government agencies. Compulsory audit for various manufacturing units should be undertaken. The free tool for the same is provided by US Environmental Protection Agency. It can be included as one of the good business practices

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