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WATER, SANITATION AND HYGIENE: CHALLENGES OF THE MILLENNIUM

Recycling municipal solid wastes

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MUNICIPAL REFUSE CONTAINS recoverable materials. It is valued in terms of savings of energy and resources. The percentage of recoverable materials varies in different countries, in different socio-economic compositions and in different seasons.

The purpose of recycling is not only to reduce the Waste load in the dumping ground but more to extract some values that we otherwise achieve through the production processes of agriculture, mining and manufacture. Recycling thus supports the slogan of sustainable development.

Recycling of wastes is an old practice. But due to many factors recycling is not practiced to its fullest potential.

Many formal and informal organisations or individuals are involved in the work of recycling of wastes. Refuse composition is a function of levels of consumption, which is again related to the economic level of the Society.

Waste is waste until the recycled and recovered value is more than the cost and labour for recovery. Municipal waste, once thrown out of the individual premises, is the property of the municipal bodies – a burden to the municipal bodies.

Why Recycle ?

Wastes are generated from many sources. Their character and composition are different. The more this wastes get mixed up, the segregation and recycling process becomes more and more difficult.

What is the incentive of recycling ? Recycling means some additional labour, energy and technology. If the recycling/recovery process is costly and the recovered materials do not value more than the cost of processing, then the system becomes unpopular. It does not attract the municipal body. If the recycling process adds to the value of a good environment, the total process may be re-evaluated from that angle. See Table 1 overleaf.

It is more economical to recycle materials and to save energy than to generate energy from the refuse.

Germany , France, England and Italy can generate only 1 to 2% of their total demand of electricity by converting municipal refuse to electricity or energy.

Water :

Reusable containers of beverages reduced the quantity of process-water in the USA by 44 per cent. In steel industry use of water can be reduced by 40% and thus reducing the water pollution (by discharged waste water) by 76%.

Chemical Fertiliser :

Developing countries import chemical fertiliser for agriculture. By utilising organic municipal and other wastes through the process of composting and anaerobic disgestion, they can reduce the quantity of import. It can also produce some bio-gas.

It is true that compost does not compete its nutrient value of chemical fertilisers by weight. But chemical fertilisers dissolve readily and are easily leached away from the root zones of the plants. Organic fertilisers, being in colloidal from slowly release the nutrients as the organics decompose in the soil.

Shredded paper wastes have been successfully used as a soil mulch – which reduces evaporation of moisture, fights temperature fluctuation, suppresses weed growth and stops soil erosion.

Chemical wastes of one industry can be profitably used as manufacturing input to another complementary industry and the vice-versa.

Constraints & Limitations :

Till now recycling of municipal wastes is not a widely adopted practice.

At the source the waste producer should be sure that his additional expenses will be useful and paying him. High-income people produce more wastes but are less interested in resource recovery. They are to be educated through social education programme so that they may feel the worth of their being helpful in the waste-recovery scheme of the local bodies. If the high-income people can be properly sentimentized and the waste collection process can be made available within his easy reach, great work can be done as are being done by the Salvation Army, goodwill Industries, and similar organisations all over the world.

In absence of any well designated retrieval system of solid wastes management in most of the developing cities it is very difficult to collect valuable materials to the fullest extent. Sorting out of useful materials can be done at all the points – (1) at the source; (2) at the community collection points; (3) in the vehicle while running – just like the old system of sorting of mails; (4) and at the terminal points.

Waste Recovery and Reuse :

Process : 1

Direct reuse of a product or materials without changing the basic form/function. Example – Cans, bottles and old clothes and garments.

Table 1. Types of municipal wastes generated in low-income, middle-income and high-income countries

	Low income country	Low income country	Low income country
Waste generation (kg/Cap/Day)	0.4 to 0.6	0.5 to 0.9	0.7 to 1.8
Moisture content (% wet weight at the point of generation)	40 to 80	40 to 60	20 to 40
Compostion (% by wet weight)			
Paper	1 to 10	15 to 40	15 to 50
Glass, ceramics	1 to 10	15 to 40	15 to 50
Metals	1 to 5	1 to 5	4 to 12
Plastics	1 to 5	2 to 6	2 to 10
Putrescible	40 to 85	20 to 65	20 to 50
Inerts	1 to 40	1 to 30	1 to 20
Energy	**From Virgin Ore**	**Reusable Metals**	**Savings**
Copper	100	10	90%
Magnesium (a)	100	3	97%
Aluminium (b)	100	5	95%
Iron (c)	100	26	74%

Energy Savings (a) 95 x 10^6 K Cal/Tonne
(b) 60 x 10^6 K Cal/Tonne
(c) 55 x 10^6 K Cal/Tonne

Paper: Energy Savings = 7 x 10^6 K Cal/Tonne
(Office paper vs Virgin wood materials)

Glass: Energy Savings – ½ per cent per 1 per cent of broken glass added (above 15%)

Rubber: Energy Savings – 70% (2.5 x 10^6 K Cal vs 8 x 10^6 K Cal/Tonne)

Other examples – are automobile engines, pumps, compressors, telephone sets. Even big industries purchase their old/discarded products to be reused in their recent products. Similarly building components, old tyres, etc, are extensively used.

Process : 2

Broken glasses are used (in certain percentage) to produce new glass. In glass manufacturing cullet replaces the use of soda ash as the basic materials for manufacturing glass. This type of recycling may involve changing both the shape and function of a product. In India tyres are cut into soles for shoes.

Asphalted roofing sheet may be manufactured from waste paper.

Process : 3

Waste is processed into a totally different materials or a form of energy. The processes are composting, anaerobic digestion to produce bio-gas, fermentation (ethanol production) and incineration.

Examples :

Detaining tin plate scrap makes the tinplate scrap more saleable. Resulting tin is more pure than original tin.

Glass produces new materials like quartz or feldspar (used to manufacture high strength porcelain). Composites of waste glass and polymers can be used to manufacture scratchproof sewer pipes.

Composting of wastes is achieved through the process of anaerobic, aerobic and vermiculture processes. In anaerobic process methene gas is produced as an important and valuable by product.

Conclusion :

To identify the most appropriate system and technology for achieving the maximum utilisation of the recycling process, adopt technologies that are sustainable and accepted by all.

In some countries manual scavenging is being discouraged (like banning child labour). In some other countries they are trying to realise the actual ground condition and are rather trying to help the poor scavenger families with better water supply, sanitation and medical facilities.

In the process of waste recovery, the poor scavangers do not get sufficient earnings to meet all the expenses of the family. The middlemen make the maximum profit. Government may think of organising some co-operative systems to engage the poor scavengers also in the secondary sector of recycling.

The number of bio-gas digesters in China was increased from 1300 (in 1972) to approximately 7 millions within ten (10) years time. This was possible due to government support and that to fight firewood shortages and to meet the demand of fertilisers.

Since 1965 India has started its massive bio-gas plant projects. Extensive research work is going on. But the implementation of the programme amongst the masses is not that successful. The Panchayats (Rural Local Governments) could not be effectively involved in this programme as they are involved in many other projects.

Government policies often help the recycling programmes (example : as a substitute of costly foreign import) and sometimes it go against (example – In Pakistan subsidy is given for imported chemical fertilisers).

Recycling can reduce dependence on foreign imports, open up avenues of domestic employment, conserve natural resources, and reduce the open spaces often dedicated to useless garbage.

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