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WASTE GENERATION MANAGEMENT AND RECYCLING

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ABSTRACT

Waste is a common problem of affluent societies. It may consist of the unwanted materials left over from a manufacturing process or from community and household activities. Individuals can reduce their waste by buying items with less packaging, using reusable bags for shopping, and separating waste paper, metals and plastics from our daily waste for recycling. A number of waste prevention techniques are reduction, reuse, recycling and recovery. Companies sometimes focus only on the first three in resolving waste management problems. Reducing the amount of waste produced by communities and industry, and its subsequent recycle or disposal, is increasingly becoming a major priority for government, industry, and for society as a whole. Customer concerns over the amounts of packaging waste which accompanies sold goods, in particular those made of non-renewable materials, has prompted major innovation in packaging types and materials, as well as efforts to reduce the amount of material involved. In addition, the gradual reduction in landfill resources available to accept waste continues to diminish, while the costs of disposal continue to increase. Waste management is now one of the most regulated community and industrial activities.

Solid wastes from industrial production, and from municipal plants, have traditionally been either spread to land, sent to landfill, or incinerated. Innovation in technology now offers some alternatives such as re-use, recycling, or conversion into different materials for new uses.

Liquid wastes from industry are generally subject to some form of treatment before releasing them into the environment. Legislation increasingly regulates the quality of such wastes to protect communities and the environment from pollution.

Key Words: Waste minimization Recycling, Waste processing, Vermicompost, vermitea,

Introduction:

Several different types of waste and each has its own requirements for handling. The EPD keeps regular statistics on each waste type, such as composition, quantity sent for disposal and quantity recycled.

Municipal Solid Waste (MSW) comprises solid waste from households, commercial and industrial sources. This excludes construction

and demolition waste, chemical waste and other special waste. MSW is disposed of at landfills.

Food waste is the major constituent of the municipal solid waste. It comprises waste produced during food production, processing, wholesale, retail and preparation, as well as after meal leftovers and expired foods. It is highly degradable which can easily cause odor and hygiene problems.

Construction waste includes waste arising from such activities as construction, renovation, demolition, land excavation and road works. Ideally, the waste is separated and inert material is used as fill in reclamation sites, when available. However, a significant portion of the waste still goes to landfills.

Chemical waste comprises substances specified under the Waste Disposal (Chemical Waste) (General) Regulation as posing a possible risk to health and/or the environment.

Clinical waste consists of waste generated from various healthcare, laboratory and research practices as defined in Section 2 and Schedule 8 of the Waste Disposal Ordinance. It should be managed properly so as to minimize danger to public health or risk of pollution to the environment.

Special wastes include animal carcasses, livestock waste, radioactive waste, grease trap waste and waterworks/sewage sledges. These wastes need to be treated separately. Arrangements are being developed for the proper treatment and disposal of these wastes, but more time is needed to address community concerns about such facilities.

Other solid waste comprises dredged mud and excavated materials disposed of at marine disposal sites.

WASTE MINIMISATION AND RESOURCE CONSERVATION

Waste minimization can be defined as "systematically reducing waste at source". It means: • Prevention and/or reduction of waste generated • Efficient use of raw materials and packaging • Efficient use of fuel, electricity and water • Improving the quality of waste generated to facilitate recycling and/or reduce hazard • Encouraging re-use, recycling and recovery. Waste minimization is also known by other terms such as waste reduction, pollution prevention, source reduction and cleaner technology. It makes use of managerial and/or technical interventions to make industrial operations

inherently pollution free It should be also clearly understood that waste minimization, however attractive, is not a panacea for all environmental problems and may have to be supported by conventional treatment/disposal solutions. Waste minimization is best practiced by reducing the generation of waste at the source itself. After exhausting the source reduction opportunities, attempts should be made to recycle the Wastes Resources Fly ash from power plant Raw material for cement or brick manufacture Biogases wastes from sugar manufacture Fuel for boiler CO2 release from ammonia plant Raw material for Urea manufacture waste within the unit. Finally, modification or reformulation of products so as to manufacture it with least waste generation should be considered.

WASTES AND POSSIBLE RESOURCES

Wastes Resources Fly ash from power plant -Raw material for cement or brick manufacture , Biogas wastes from sugar manufacture - Raw material Fuel for boiler , CO2 release from ammonia plant -Raw material for Urea manufacture.

WASTE REDUCTION

Waste reduction is often associated with recycling, but it is more complex than that. Avoiding the generation of waste in the first place and minimizing waste are also crucial measures in any waste reduction strategy. Individuals can reduce their waste by buying items with less packaging, using reusable bags for shopping, and separating waste paper, metals and plastics from our daily waste for recycling. Businesses can which encourages the private sector to organize their own waste reduction activities. The EPD also offers industry-specific information on waste reduction and outlets for recyclable materials.

Additionally, the EPD launched a territory-wide Programme on Source Separation of Domestic Waste in January 2005 which encourages housing estates/buildings to set up waste separation facilities on building floors and broaden the types of recyclables to be recovered, so as to increase domestic waste recovery and reduce waste requiring disposal

Reduce, Reuse, Recycle

Learn how reducing, reusing, and recycling can help you, your community, and the environment by saving money, energy, and natural resources. Recycling programs are managed at the state and local level.

Recycling Basics

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products. Recycling can benefit your community and the environment.

Seven good reasons For recycle:

1. **Financial Income** – There is money in recycling. In the level of the individual, one of the benefits of recycling is financial income. There are a lot of things lying around the house that we no longer want or need that might just end up in a dumpsite somewhere, that we can recycle and earn money from. Cell phones, PDAs, ink cartridges, etc. Here at Pace Butler, for instance, a phone sent in for recycling could net the owner as much as $50.
There is also the financial benefit for the communities who recycle in that there will be reduced costs of waste disposal or recycling. You think recycling is expensive? Consider these recycling facts: aluminum cans are the most valuable item in your bin. Aluminum can recycling helps fund the entire curbside collection. It's the only packaging material that more than covers the cost of collection and reprocessing for itself.

2. **Recycling helps conserve limited resources** – Throwing away a single aluminum can, versus recycling it, is like pouring out six ounces of gasoline. Last year, Americans recycled enough aluminum cans to conserve the energy equivalent of more than15 million barrels of oil.

Here are some compelling recycling facts from the Pennsylvania Department of Environmental Protection:
By recycling over 1 million tons of steel in 2004, Pennsylvanians saved 1.3 million tons of iron ore, 718,000 tons of coal, and 62,000 tons of limestone. Through recycling newsprint, office paper and mixed paper, we saved nearly over 8.2 million trees.

3. Recycling is energy efficient – On a larger scale, recycling could translate into huge reductions in our energy costs. Consider these facts: It costs more energy to manufacture a brand new aluminum can than it does to recycle 20 aluminum cans. 20 cans can be made from recycled material using the same energy it takes to make one new can.

4) **Recycling builds community** – In almost all communities in the country today, there is a growing concern for recycling and the environment. People are working together in recycling programs, lobbies, and free recycle organizations to help promote recycling. We will be featuring these groups in

our upcoming posts and link with the various networks to help you locate the nearest recycling center or free recycle group nearest your location.

5) **Recycling creates jobs** – Incinerating 10,000 tons of waste creates one job; land filling 10,000 tons of waste creates six jobs; recycling 10,000 tons of waste creates 36 jobs

6) **Recycling builds a strong economy** – Done on a nationwide scale, like what we're doing here in the US, recycling has a huge impact in our economy in terms of jobs, energy cost reduction, resources conservation. Lately, as the price of oil hits close to $120 a barrel, people have become more aware of the huge impact of recycling, particularly in reducing plastic waste material coming from the bottled water and beverage industry. We will be discussing this in detail in our future posts

7) **Recycling is Earth-friendly –** No matter how safe and efficient our landfills are being billed to be, the possibility of dangerous chemicals coming from the solid waste deposited in these landfills, contaminating underground water supply is always present. Combustion or incineration of our solid waste is effective and energy-generating, but we pay the price in increased air pollution. On the other hand, recycling just 35 percent of our trash reduces toxic emissions equivalent to taking 36 million cars off the road. In 2006, according to the EPA, the national recycling rate of 32.5 percent (82 million tons recycled) "prevented the release of approximately 49.7 million metric tons of carbon into the air–roughly the amount emitted annually by 39 million cars, or 1,300 trillion BTUs, saving energy equivalent to 10 billion gallons of gasoline."

Benefits of Recycling

- Reduces the amount of waste sent to landfills and incinerators;
- Conserves natural resources such as timber, water, and minerals;
- Prevents pollution by reducing the need to collect new raw materials;
- Saves energy;
- Reduces greenhouse gas emissions that contribute to global climate change;
- Helps sustain the environment for future generations;
- Helps create new well-paying jobs in the recycling and manufacturing industries in the United States.

Steps to Recycling Materials

Recycling includes the three steps below, which create a continuous loop, represented by the familiar recycling symbol.

- Step 1: Collection and Processing
- Step 2: Manufacturing
- Step 3: Purchasing New Products Made from Recycled Materials

What is vermicomposting? Why use worms?

Known also as worm compost, vermicast, worm castings, worm humus or worm manure, **vermicompost** is similar to plain **compost**, except that it uses worms in addition to microbes and bacteria to turn organic waste into a nutrient-rich **fertilizer**. Vermicompost, or vermiculture, most often uses two species of worms: Red Wigglers (*Eisenia foetida*) or Red Earthworms (*Lumbricus rubellus*) rarely found in soil and are adapted to the special conditions in rotting vegetation, compost and manure piles.

Vermicompost is the product or process of composting using various worms, usually red wigglers, white worms, and other earthworms to create a heterogeneous mixture of decomposing vegetable or food waste, bedding materials, and vermicast. Vermicast, also called worm castings, worm humus or worm manure, is the end-product of the breakdown of organic matter by an earthworm. These castings have been shown to contain reduced levels of contaminants and a higher saturation of nutrients than do organic materials before vermicomposting.

Containing water-soluble nutrients, vermicompost is an excellent, nutrient-rich organic fertilizer and soil conditioner. This process of producing vermicompost is called*vermicomposting*.

Benefits:

Soil

- Improves soil aeration
- Enriches soil with micro-organisms (adding enzymes such as phosphates and cellulose)
- Microbial activity in worm castings is 10 to 20 times higher than in the soil and organic matter that the worm ingests

- Attracts deep-burrowing earthworms already present in the soil
- Improves water holding capacity[28]

Plant growth

- Enhances germination, plant growth, and crop yield
- Improves root growth and structure
- Enriches soil with micro-organisms (adding plant hormones such as auxins and gibberellins.

Economic

- Biowastes conversion reduces waste flow to landfills
- Elimination of biowastes from the waste stream reduces contamination of other recyclables collected in a single bin (a common problem in communities practicing single-stream recycling[29])
- Creates low-skill jobs at local level
- Low capital investment and relatively simple technologies make vermicomposting practical for less-developed agricultural regions

Environmental

- Helps to close the "metabolic gap" through recycling waste on-site
- Large systems often use temperature control and mechanized harvesting, however other equipment is relatively simple and does not wear out quickly..
- Production reduces greenhouse gas emissions such as methane and nitric oxide (produced in landfills or incinerators when not composted or through methane harvest)

As a Fertilizer

Mid-scale worm bin (1 m X 2.5 m up to 1 m deep), freshly refilled with bedding Vermicompost is a fine, peat like humus that is easy to add to soils by either working it directly into the topsoil or applying it to the surface as a mulch. Screened vermicompost makes a good ingredient for potting soil mixtures. Vermicompost is also a much more available and plant-friendly fertilizer. The nutrients within it will not burn sensitive plants, as chemical fertilizers are prone to do when heavily applied.

Vermicompost also contains beneficial microbes that are essential Vermicompost can be mixed directly into the soil, or steeped in water and made into a worm tea by mixing some vermicompost in water, bubbling in oxygen with a small airpump, and steeping for a number of hours or days.
The microbial activity of the compost is greater if it is aerated during this period. The resulting liquid is used as a fertilizer or sprayed on the plants. The dark brown waste liquid, or leach ate, that drains into the bottom of some vermicomposting systems as water-rich foods break down, is best applied back to the bin when added moisture is needed due to the possibility of phototoxic content and organic acids that may be toxic to plants.[The pH, nutrient, and microbial content of these fertilizers varies upon the inputs fed to worms. Pulverized limestone, or calcium carbonate can be added to the system to raise the pH

Contains More Nutrients

According to the Purdue University Extension vermicompost provides high amounts of plant nutrients, including nitrogen, phosphorus and potassium. Typically, vermicompost has more than twice the average amounts of these nutrients, compared to commercial potting soil. Vermicompost may also contain plant growth regulators that improve plant growth. The nutrients in vermicompost can help plants grow more vigorously, produce bigger blooms and both increase and improve the quality of crop yields.

Conclusion: Waste minimization is an approach that aims to reduce the production of waste through education and the adoption of improved production processes and less wasteful practices. We believe that the ultimate goal of waste management efforts should be waste minimization, however, waste processing and waste recycling play an important role in improving production processes and in dealing with 'waste' in a manner that is more environmentally and economically beneficial. Flows of materials and energy from producers and consumers to processers / recyclers must be encouraged as happens in natural ecosystems, and the elements of the system should be located in close proximity to one another. While nations should aspire to such urban and industrial ecosystems, as individuals we can start practically at a household level through recycling, energy efficiency and environmentally beneficial technologies such as vermicomposting, grey water systems, biogas generation, solar power and heating systems and so forth. Recycling and waste generation management can benefit our community and the environment.

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