



Editorial

A comparison of Waste Management throughout Asian countries



Thirty years ago, when I first became involved with solid waste management, waste management strategies applied in Japan (an Eastern country) and other developed countries (the West) differed considerably. Semi-aerobic landfill concepts, widely accepted as a standard structure in Japan, had not gained approval in the West; the source separation practised in Japan was not common in the West; high MSW incineration rates of up to 70 percent in Japan were viewed as exceptional throughout the rest of the world. However, this gap has been reduced in recent years. Forced aeration into old landfills is now an accepted technology used in promoting stabilization, and aerobic landfilling is a widely applied option in the Bioreactor concept of landfilling technology. Source separation of biowaste and combustible waste is considered necessary in the recovery of material and/or energy, and incineration is now carried out on a much higher proportion of waste in the West. What is the explanation for this?

Since waste, as an “unwanted material”, is generated ubiquitously, all countries are called upon to adopt some form of waste management strategy, which is frequently however affected by a series of restrictions related to the level of environmental concern, level of available financial and human resources, available infrastructures, geological conditions, waste characteristics etc. As an example, in Japan, particular focus was placed on incineration as a form of waste management to control the epidemics in 1900. Similarly, a need for volume reduction underpinned the decision to adopt incineration technologies, particularly due to the lack of space for siting of a new landfill, and the availability of subsidies for the construction of MSW management facilities promoted the building of incinerators even in rural area. Worldwide, waste separation was first employed to separate incombustibles from combustibles in order to facilitate incineration, with collection of recyclables only commencing in the 1990s. Under these specific conditions, the current waste management system was developed in Japan. Today however, the world has adopted common goals in the area of waste management: reduction of the duration of landfill aftercare, and the recovery of energy and resources, all with the aim of achieving a universal concept of waste management.

Waste management technologies are categorized into thermal, biological, and mechanical processes. The IWWG Task groups illustrate how extensive research is undertaken to target waste technologies and processes. The mechanisms underlying thermal and biological treatment differ considerably, although the recovery of fuel gas can be performed by means of both thermal pyrolysis and biological anaerobic digestion. A comparison of thermal and biological process is provided in Fig. 1, with thermal–biological treatment in x-axis and aerobic–anaerobic in y-axis. While methane gas is the main product of anaerobic digestion (AD), fuel

gas is produced by thermal pyrolysis, and recovered gas is known as biogas or pyrogas. At specific temperatures and solid waste content, the main product derived is solid fuel such as carbon, thus accounting for pyrolysis also being referred to as carbonization. Solid fuel can be recovered by hydrothermal treatment with higher recovery rate due to the high residual rate of volatile matter. Residual liquids may also result from hydrothermal treatment and anaerobic digestion, and are indicated for use as a fertilizer. Incineration technologies are however principally aimed at recovering energy indirectly from hot flue gas. Alternative technologies are of course available for use in the recovery of gas and solid fuel, and it is our task to select the most appropriate technology, in terms of cost, energy, and environment, suited for the treatment of the specific waste types and local conditions.

Not all Eastern countries however adopt a uniform approach to waste management. In Japan, a major environmental problem was initially the providing of safe drinking water, with wastewater treatment and air pollution control becoming the main focus 30 years later. Solid waste management still lags behind wastewater treatment technologies. However in developing economies, all environmental problems including safe water, wastewater treatment, air pollution, solid waste, and pollution by hazardous chemicals remain problematic issues that need to be addressed. The availability of financial resources remains the main driving force

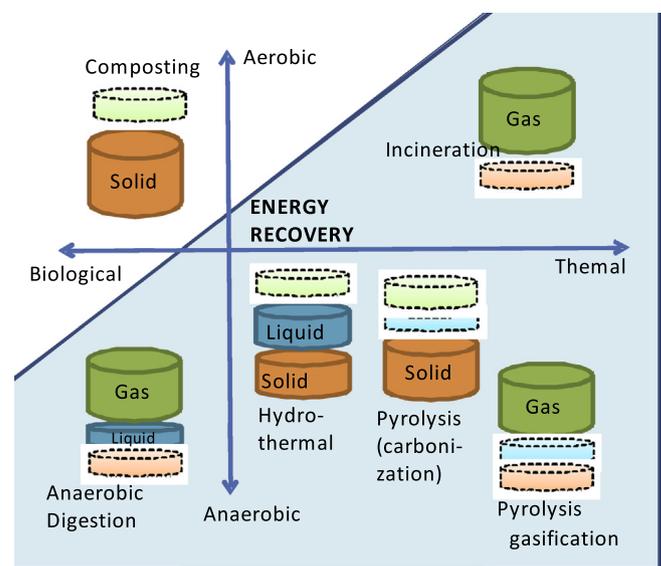


Fig. 1. Comparison of thermal and biological process.

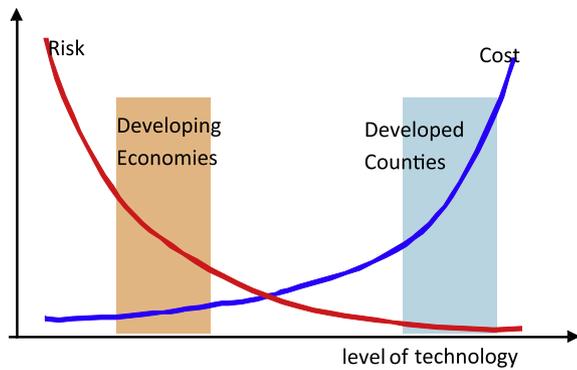


Fig. 2. Relationship between risk level and cost for different technologies aimed at affording environmental protection and conservation.

for environmental policies. In 1970 Japan shifted towards being an environmentally aware nation i.e. numerous environmental regulations were established over this decade of economic growth. Fig. 2 shows the relationship between risk level and cost for different technologies aimed at affording environmental protection and conservation. Although no nations are prepared to adopt the high-risk options, in countries with a poor economy, the “equilibrium point” tends to be reached at a lower level of technology due to financial constraints, and the level of acceptance of risk tends to be higher.

Waste management experts should bear in mind the variability of waste management problems in other countries, and should possess an overarching knowledge of a wide range of technologies.

This underlines the importance of the transfer and exchange of knowledge between researchers from different countries and backgrounds. This special issue comprises a series of papers originating from the first IWWG-ARB (Asia Regional Branch) meeting held in Sapporo, Japan, in March 2013, from the 3rd WasteSafe, Solid Waste Management in Developing Countries conference held in Khulna, Bangladesh, in February 2013, and from other Asia-related papers submitted to Waste Management. It is my firm intention to create and extend a professional network among Asian Solid Waste Management experts through the organization of a range of activities in the near future.

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engineering, economic, and social approach.

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