

## **Current and Future Prospects for Modern Solid Waste Management in the Developing Countries of East Asia**

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### ***Introduction***

Today's media is filled with headlines about real and perceived financial meltdowns in Asia and the impacts on our stock portfolios. But the real, long term impacts will fall on the region's poor and the development process in general. From the standpoint of environmental management in the region, we are beginning to see some slackening in what was a brisk pace confronting a range of issues, including improvements in solid waste management. Many of these efforts have been temporarily shelved as funds are earmarked for social safety nets and financial reform. On the positive side, the quantities of residues produced, in particular industrial wastes, have abated somewhat as economic activities slow. Another example is reduced vehicle pollution on the one hand but increased illegal toxic waste dumping on the other. Nevertheless, solid waste management in many large urban areas such as Manila, Bangkok, Jakarta and large cities in China, have been in crisis for some time.

Special circumstances have brought this crisis to the attention of urban managers. Traditionally, urban residential wastes have been informally recycled by the poor thereby providing a reasonable income when compared to construction work, often considered the yardstick. What is left over after recycling is usually dumped at a large number of informal sites around the suburban periphery. In the case of Beijing, for example, there were some 4000 small dumps located around the city before the development of a new landfill financed by the World Bank. In addition, the market for recycled materials from the developed countries has slowed considerably as imported recycled materials flood local markets.

A second consideration is the fact that many of these peripheral areas which formerly were farmlands or waste lands are now valuable as the cities expand. Again, in Beijing, cleanup of these dumps has been going on for some years and the sale of these properties far exceeds the cost of clean-ups.

A third factor is that many of the informal dumps have caused seriously polluted aquifers which feed local wells since piped water is not yet available in suburban areas. Water shortages in North China, for example, are another factor which requires improved waste disposal techniques so as not to pollute groundwater

Increasing prosperity, prior to the current financial crisis, has also changed the composition of waste and its per capita production. A few years ago, it was roughly 0.5

kg/cap/d and today it is roughly 0.9 kg/cap/d in most urban areas of East Asia. Also, the rush to privatize environmental service infrastructure has prompted urban managers to seek innovative solutions to solid waste management which will provide for some level of cost recovery. However, this has not progressed very far to date.

Finally, with increasing opposition to the siting of incinerators in Europe and North America, suppliers of these systems have been looking at East Asia as a potential market. As a general proposition this is fine, but on closer examination of the technical, financial and institutional feasibility in many countries, this is questionable at this point in time.

### ***Incineration as a Solution***

Incineration is traditionally seen as an effective method for treatment of municipal solid waste; however, compared with direct disposal, it is relatively expensive and complex. The main advantage of incineration is the large reduction in volume and weight for final disposal, hence less requirements for land, and the potential heat energy released from the combustion processes can be used for power generation, district heating and/or industrial purposes. Among the main constraint of incineration of solid waste is high investment and operating costs and demand for highly skilled operators and maintenance crews, and expensive control measures to prevent air pollution. Inadequate institutional and management capacity in many Asian cities to operate, control and monitor incinerators are of concern.

Decision makers often mention incineration as the ultimate solution for disposal of solid waste compared to other, less complete approaches such as landfilling, recycling and composting. It is the method in many countries, which they would like to be technologically compared with. The required financial and technological commitments of incineration are often poorly understood by decision makers and not always built on objective facts. A decision to install an incinerator based on wrong information may therefore be financially and operationally ruinous.

An incinerator for solid waste should be viewed as a thermal power plant which uses waste as its fuel and is therefore highly dependent on the calorific value of that fuel as well as varying refuse characteristics. Generally, the calorific value of urban solid waste in East Asia is very low due to high moisture and inorganics content. In fact, it will probably not burn without auxiliary fuel, a cost item which cannot be accurately predicted. In order for refuse to burn it should not have a heating value below 6 MJ/kg; most refuse in Asia is half this value. The assumed benefit and accompanying revenue stream from electricity via a boiler/steam turbine generator or energy is not technically feasible when burning very low calorific value refuse.

Planning for such a system must accompany a year round refuse analysis to establish heating value as well as proximate and ultimate analyses (used to determine the constituents of typical solid fuels). In addition, a complete mass and heat balance