Paper WMSC 01/10
For discussion

Integrated Waste Management Facilities
Sorting and Recycling Plant

Purpose

This paper seeks Members' views regarding the inclusion of a sorting and recycling plant in the proposed Integrated Waste Management Facilities (IWMF).

Background

2. We are planning the development of the IWMF to treat municipal solid waste (MSW) in Hong Kong. The first phase of the IWMF is proposed to have a treatment capacity of 3,000 tonnes per day (tpd) adopting advanced incineration with energy recovery as the core technology.

3. At the meeting of the Advisory Council on the Environment (ACE) on 14 December 2009, while the ACE had no objection to the recommendation of adopting moving grate incineration technology as the core technology for the development of the IWMF Phase 1, the ACE would like to have further deliberation on the need to have a sorting and recycling plant in the IWMF and suggested the matter be thoroughly discussed at the Waste Management Subcommittee meeting.

Background of the Sorting and Recycling Component of the IWMF

4. In 2002, the Government set up an Advisory Group (AG) comprising members from professional bodies, academia, green groups and business sectors to assist and advise in selecting the appropriate technologies for the IWMF. The AG recommended that the IWMF should adopt a multi-technology approach such that the most suitable technology could be applied to deal with different waste streams of MSW.

5. The AG specifically advised that incineration be adopted as the major component of the IWMF strategy. It also noted that the mechanical and biological treatment (MBT) technology was generally less effective in

reducing the volume of waste for landfill disposal (could reduce the MSW by only around 50% in volume), had a relatively large footprint and rather limited outlets for its products (such as Refuse Derived Fuel (RDF) or low grade compost etc.). These constraints limit the opportunity for large-scale MBT application in Hong Kong. However, use of MBT could be considered at suitable scale under particular circumstances and as a component of the overall IWMF strategy. These recommendations were incorporated in the Government's "A Policy Framework for the Management of Municipal Solid Waste (2005-2014)" promulgated in December 2005.

6. Subsequently, a delegation of the ACE visited some waste treatment facilities in the Netherlands and Germany in March 2006. The delegation visited the Hannover Waste Treatment Centre, which was a MBT Plant, and had the following observations which were reported in the ACE Paper 10/2006:

(i) The plant required a large area of about 25 ha. to handle 200,000 tonnes of MSW per year, and despite it could reduce the volume of MSW by some 50%, the remaining 50% would still need to be disposed of at landfills;

(ii) Debris and dust problems were found in the sorting area, and there were potential odour problems which needed to be addressed if MBT was to be applied to Hong Kong;

(iii) MBT produced RDF which still needed to be incinerated. Hence, MBT had to go with incineration. In some situations, there were no profitable outlets for the RDF. The MBT operators would therefore need to pay to the incineration plants for the treatment and disposal of RDF; and

(iv) Given the circumstances of Hong Kong and the problems highlighted in (i) to (iii), it seemed not practical to handle MSW by MBT as the core technology for waste treatment. Nevertheless, small scale of mechanical treatment (MT) for source-separated mixed recyclables[1] might be considered.

[1] In some places, citizens are required to separate their waste at source into two categories, viz. clean recyclables and contaminated waste. The source-separated recyclables including mixture of clean aluminium can, paper and plastic etc. would be collected to a sorting/recycling facility for sorting for further recycling.

7. Hence, in ACE Paper 11/2006, the delegation recommended that for the treatment of waste, mechanical sorting and recycling plants could be used for source-separated mixed recyclables. Based on the German experience, the MBT method for un-sorted mixed MSW should not be applied to Hong Kong.

8. Having considered the views of the AG and ACE, the planned IWMF Phase I is not proposed to adopt large scale MBT as the core technology. Regarding the ACE's recommendation of setting up small scale mechanical sorting and recycling plant (para 6 (iv)) and our general lack of a collection system for mixed recyclables in Hong Kong, it is our original proposal to include a limited scale sorting and recycling plant in the IWMF. We had in fact included this recommendation to the ACE in January 2008 when we reported on the IWMF initial site search result.

Review of Sorting and Recycling Plant

9. At the ACE meeting on 14 December 2009 when discussion was held on the sorting and recycling plant, there were mixed views on whether this facility should be incorporated in the IWMF. The ACE hence suggested that the matter be carefully re-considered with a view to coming up with a recommendation on whether a sorting and recycling plant should be incorporated in the IWMF. If so, what should the recommended technology and the scale of operation be (extract of the relevant discussion at the ACE meeting is at the **Annex**).

10. We have reviewed the matter and come up with the following analysis regarding the pros and cons of incorporating a sorting and recycling plant in the proposed IWMF.

<u>Pros</u>

(i) AG has recommended Hong Kong to adopt a multi-technology approach to tackle the MSW problem. Hence, incorporating a sorting and recycling plant in the proposed IWMF will align with the vision of developing a multi-technology facility;

(ii) Though incineration technology would be the core technology for the IWMF, the resources devoted to the sorting and recycling plant could be seen as part of the Government's effort to recycle useful waste before it is incinerated or landfilled; and

(iii) The inclusion of a sorting and recycling plant in the IWMF project could provide useful local experience and information for further consideration of the application of non-incineration technology for MSW management in Hong Kong.

Cons

(i) Overseas experience reveals that successful operation of sorting and recycling plant for source-separated mixed recyclable requires a good and effective collection system for these recyclables. At present, while source separation of waste is being promoted and is wider applied than before in Hong Kong, there is still scope for improvement. In view of this, the volume of MSW suitable for sorting and recycling is likely to be limited. This would limit the feasibility of wide application of sorting and recycling operation for the treatment of waste in Hong Kong ;

(ii) The development of two organic waste treatment facilities and a proposal to implement a mandatory Producer's Responsibility Scheme for waste electrical and electronic equipment (WEEE) are being pursued. The latter proposal will involve the setting up of facilities and plants to collect and recycle WEEE. These facilities will meet the purpose of sorting and recycling of organic wastes and certain recyclables and the case for incorporating a sorting and recycling plant for demonstration is weakened;

(iii) As compared to incineration, the sorting and recycling plant would require a relatively large footprint. The incorporation of a sorting and recycling plant capable of handling up to 200 tpd of MSW will require 1-2 ha of site area and the construction/annual operational costs[2] would be some HK$150 million and HK$30 million per year respectively.

(iv) Overseas experience has revealed that there might have debris and dust, as well as odour problems associated with the operation of the sorting and recycling plant; and

---

[2] There are wide variations in construction and operation costs for different sorting and recycling plants. The figures quoted are the construction and operation costs of a 200 tpd MBT plant in Tel Aviv, Israel.

(iv) The outlets for its products (such as Refuse Derived Fuel (RDF) or low grade compost etc.) are rather limited and the recyclables recovered are usually contaminated and have low recyclable values.

11. The Sub-committee is invited to advise if a sorting and recycling plant should be incorporated in the proposed IWMF. In the event that such a plant is found desirable, we need to consider what should the technology be and the suggested scale. On this, the review carried out by our consultant under the feasibility study elaborated on two options. First, MT is a well-proven technology which could recover materials such as metal, plastic and glass, etc. from the MSW. It is relatively simple to implement. However, the technology could only reduce the volume of MSW marginally (by less than 20%). Moreover, it would have the potential problems of debris, dust and odour as observed by the ACE delegation in their visit. The waste residues of MT would also contain substantial energy contents and biodegradable matters. Further biological or thermal treatment would be required if the waste residues are to be stabilized so as to avoid generation of landfill gas and leachate prior to disposal at landfills. If the remaining 80% of MSW is then incinerated, the estimated 160 tpd of MSW will generate some 80,000 kWh of electricity per day for export to the power grid and the volume will be reduced to about 10%.

12. Alternatively, if it is decided to produce a more stable waste residue and to maximize the recovery of energy from the biodegradable matters, the review has suggested that MBT with the adoption of anaerobic digestion be considered. This is because this technology can produce biogas for energy generation and achieve a comparatively higher waste volume reduction than MT. Overseas experience also finds that MBT with anaerobic digestion is commonly applied in international context. As regard the size of operation, the review has suggested a plant capacity of 200 tpd, noting that the minimum capacity for an economical operation of MBT plant is between 150 tpd to 220 tpd. For a plant with a capacity of 200 tpd, it could recover some 15 tpd of recyclable materials, produce 40 tpd of low quality compost, and 10,000 m^3/d of biogas per day which could generate some 9,000 kWh of electricity for export to the power grid on a daily basis. The MBT plant could reduce the volume of waste for final disposal by some 50%. However, as pointed out by the ACE delegation, the plant needs careful management so as to avoid the debris, dust, and odour problems which are commonly found during the operation of these plants.

ADVICE SOUGHT

13. Members are invited to comment whether a sorting and recycling plant should be incorporated in the IWMF Phase I development, and if so, whether MT or MBT technology with the adoption of anaerobic digestion be applied and the proposed capacity. Members may also advise if engagement of professional bodies, green groups and other stakeholders to evaluate the merits or otherwise of incorporating a sorting and recycling plant in the proposed IWMF should be arranged.

Environmental Protection Department
January 2010