

Background

Overseas experience shows that no matter how well a city performs in waste avoidance, reuse, recovery and recycling, there will still be large volumes of unavoidable waste which require final disposal. Instead of direct disposal at landfills, alternative waste treatment methods have to be adopted to further recover recyclable materials from the mixed municipal solid waste (MSW) and to reduce the volume of waste before final disposal.

2. The Government intends to develop Integrated Waste Management Facilities (IWMF) to treat the unavoidable MSW. The IWMF shall adopt a multi-technology approach so that the most suitable technology could be applied to deal with different waste streams of the mixed waste. The preferred technologies to be adopted are mechanical biological treatment (MBT) and incineration.

Mechanical Biological Treatment

3. MBT is a process which comprises mechanical operation to separate recyclable materials (e.g. glass) for recovery, and biological treatment to convert the degradable fraction into compost or soil conditioner. Some MBT processes further extract the higher calorific value waste (e.g. paper and plastics) from the mixed waste for production of refuse-derived fuel (RDF).

4. The scale of MBT has to take into account the market available for the products. In 2005, the Department for Environment, Food & Rural Affairs (Defra) of the United Kingdom (UK) issued a technology brief on the application of MBT. The brief indicates that the market for the products from MBT does not exist in the UK. It is unlikely that the organic residues of a MBT process will meet the British compost standard since a significant amount of non-biodegradable material may be present in the compost. The organic residue will be a lower grade soil conditioner which is unsuitable for agricultural use and can only be utilised in applications such as landfill restoration.

5. The limited market for compost equally applies to Hong Kong, since Hong Kong does not have much agricultural land, and exporting compost to the Mainland is not practicable since the latter has strict import control on the quality of compost produced from MSW.

6. Regarding RDF, another useful product of MBT, its potential outlets are also severely limited. In Europe, power plants have the largest potential capacity to use RDF as fuel, but they were not designed to burn RDF and have difficulty in meeting the standards required under the new EU Waste

Incineration Directive. Other outlets such as cement, steel and paper industries have much lower consumption capacity for RDF, and are non-existent in Hong Kong.

7. In terms of the effectiveness of bulk reduction of MSW, MBT can only reduce the waste volume by about 50%, but requires 2 – 3 times more land area. Given the comparatively lower bulk waste reduction rate, requirement for land uptake and limited outlets for the residues, MBT cannot be used as the only method to treat MSW in Hong Kong.

Thermal Treatment

8. For the remaining portion of the mixed waste which is not treated by MBT, thermal treatment technologies should be considered for bulk waste reduction with energy recovery.

9. Incineration is considered the preferred thermal technology as it is a well-proven and effective technology adopted by many advanced countries. It has a favourable treatment cost and is the most cost-effective technology to divert waste from the landfill (i.e. some 90% reduction by volume). Land requirement is also low as compared with MBT.

10. For other thermal technologies, gasification is less cost-effective than incineration at the present stage of technology development. As for co-combustion, its application will depend on the viability of a local cement manufacturing plant or other industrial operations capable of accepting RDF.

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背景

海外經驗顯示，個別城市在減少、重用、回收和再造廢物的成績無論如何理想，仍難免會有大量不能避免的廢物需要最終處置。除將廢物運往堆填區棄置外，我們有需要採用其他廢物處理方法，進一步從混合都市固體廢物中回收可再造物料，並將廢物體積縮減後才最終棄置。

2. 為處理不能避免的都市固體廢物，政府正計劃興建綜合廢物處理設施。鑑於本港的都市固體廢物性質混雜，綜合廢物處理設施應採用多技術方針，而最適合的技術是採用機械生物處理技術及焚化技術。

機械生物處理

3. 機械生物處理是以一連串機械處理程序將混合廢物中可再造物料(例如玻璃)分隔出來，並透過生物處理將可降解物料轉化成堆肥或土壤改良劑。有些機械生物處理技術更進一步提取混合廢物中較高熱量的物料(例如廢紙及塑膠)，製成廢物衍生燃料。

4. 在決定採用機械生物處理技術的規模時，必須考慮其產品的市場。英國環境、食品及鄉郊事務部在二零零五年發表有關應用機械生物處理技術的技術便覽中指出，機械生物處理技術的產品在英國本土並無市場。由於機械生物處理技術所生產的堆肥可能含有大量不可生物降解的物質，因此，這項技術工序所產生的有機剩餘物不大可能符合英國的堆肥標準。該等有機剩餘物屬於低品質的土壤改良劑，不適合農業使用，只能用於堆填區修復工程等用途。

5. 本港並無太多農地，因此堆肥產品市場在香港亦有限。內地對都市固體廢物所生產的堆肥質量有嚴格的入口管制，出口堆肥往內地亦不可行。

6. 廢物衍生燃料是機械生物處理技術的另一項有用產品，但其出路同樣極為有限。在歐洲，發電廠是最具潛力的廢物衍生燃料用家，但因在設計上並無預計需要燃燒這類燃料，若要達到最新歐盟廢物焚化指令的標準，殊不容易。其他出路，例如水泥廠、煉鋼廠和造紙廠等對廢物衍生燃料的使用量很低，且香港並無這類工業。

7. 縮減都市固體廢物體積的成效方面，機械生物處理技術只能將廢物體積縮減約 50%，但所需土地空間則高出兩至三倍。考慮到相對偏低的廢物體積縮減率、較大的土地面積需求及剩餘物出路有限等因素，香港不能單靠機械生物處理技術處理本港的都市固體廢物。

熱能處理技術

8. 對於餘下不經機械生物處理技術處理的混合廢物，我們應考慮採用具能源回收功能的熱能處理技術，以縮減廢物體積。

9. 在眾多熱能處理技術中，焚化技術被視為最佳選擇，在不少先進國家的實踐中，證明效果良好。這項技術的處理成本較低，在減少堆填廢物方面最具成本效益(可縮減廢物體積約 90%之多)。相對於機械生物處理技術而言，佔用土地亦較少。

10. 在其他熱能處理技術方面，以目前的科技水平而言，氣化技術的成本效益不及焚化技術。至於共燃技術能否應用，則取決於本地水泥製造廠的前景或其他工業生產能否採用廢物衍生燃料。

二零零五年七月