(ACE Paper 24/2001)
For Discussion

Management of Construction and Demolition Materials

PURPOSE

This paper sets out the problem related to the management of construction and demolition (C&D) materials produced by local construction activities, and our strategy to tackle it.

BACKGROUND

2. C&D materials are a mixture of inert materials and wastes arising from construction, excavation, renovation, demolition and road works. Local construction activities produce about 14 million tonnes of these materials a year[1]. At present, about 80% of them, all of which are inert materials, are reused in reclamation projects. The remaining 20%, which are mixed inert materials and wastes, are landfilled. These materials are voluminous, and they already accounted for 42% of the waste disposed of at landfills in 2000. Information on C&D materials generation and their disposal between 1990 and 2000 is at Annex A.

Annex A

3. There are three landfills in Hong Kong[2]. They occupy 270 hectares of land[3], cost $6 billion to construct and over $400 million each year to operate. Our current estimate is that they could serve Hong Kong's waste disposal needs till 2016.

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1 In 1999 and 2000, 13.5 and 13.8 million tonnes of C&D materials were generated respectively.

2 They are located at Nim Wan, Tseung Kwan O and Ta Kwu Ling.

3 This is about two-third the size of Tin Shui Wai.

THE PROBLEM

4. The problem is that we are running out of reclamation projects that have hitherto been the major outlet for inert C&D materials. Existing reclamation projects can only provide sufficient capacity until mid-2002. Between mid-2002 and end-2005, we estimate that about 69 million tonnes of inert C&D materials will be generated. This could fill the Happy Valley Racecourse to a height of 91 storeys. If nothing were done, they will have to be disposed of at landfills, thereby shortening the life of landfills by 10 years i.e. the landfills will be exhausted between 2006 and 2008. It is not possible to build new landfills within that timeframe. Annex B shows the shortfall in the capacity to receive inert C&D materials between 2000 and 2010.

Annex B

STRATEGY

5. Our strategy to tackle the problem comprises the following action areas:

- *Avoiding and minimising* C&D materials at source through better planning, design and construction management;

- *Sorting* – sorting inert C&D materials from C&D wastes, contaminated wastes from uncontaminated wastes, and also soft materials from the hard ones, such that the inert materials and uncontaminated wastes could be reused or recycled, and only the contaminated wastes would go to landfills[4];

- *Maximising* the reuse of both hard and soft inert materials;

- *Recycling* hard inert materials;

- *Establishing temporary fill banks* to regulate temporary mismatch between the capacity to receive C&D materials and the volume of C&D materials generated; and

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[4] The typical composition of C&D materials in recent years is as follows – 59% are soft inert materials like soil, earth and slurry. They can be reused as fill materials in reclamation and earth-filling projects. 25% are hard inert materials like rocks, broken concrete and bricks. Some can be recycled as aggregates for concrete/asphalt production, and others can be used for seawall construction, or as granular materials in road sub-base and drainage bedding layers. 16% are C&D wastes like plastic, timber and packaging waste. If not contaminated, they can be recycled. However, most of them are contaminated and have to be disposed of in landfills.

➢ *Introducing Landfill Charging* to provide the economic incentive for waste producers to reduce C&D materials that require disposal.

The following paragraphs elaborate on each of the above areas of work –

(a) Avoiding and Minimizing C&D Materials

6. Reducing waste at source is most crucial[5]. In this respect, Government is taking the lead by requiring contractors of public works projects to prepare and implement Waste Management Plans. This would ensure that contractors take actions to avoid C&D materials, and to reuse and recycle C&D materials generated.

7. To encourage the private sector to do the same, the Buildings Department has issued Practice Notes to advise Authorized Persons to minimize C&D materials. It is also developing an assessment system to foster green buildings. Under this system, credits would be given to measures to minimize C&D materials, such as the use of metal formwork, prefabrication and modular design. Incentives like fast tracking plan processing and open commendation would be given to projects with high scores. Relevant professions/industries will be consulted before the scheme is finalized.

(b) Sorting of Mixed C&D Materials

8. Sorting enables the reuse and recycling of the inert materials and reduces the amount of waste to be landfilled. Sorting at source (i.e. at construction sites) is most ideal as it prevents cross-contamination of the different types of materials and also minimizes cost. The Government has again taken the lead by requiring mandatory on-site sorting for government demolition projects.

9. We are fully aware that site constraints may make on-site sorting difficult. We have thus put in place two temporary sorting facilities, one within the Southeast New Territories Landfill and another at Tseung Kwan O. The third temporary facility in Tuen Mun would start operation shortly. We plan to set up long-term sorting facilities together with C&D materials recycling facilities or barging points. They will be built and managed to the highest environmental standards to minimize impacts.

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[5] For instance, prefabrication and metal formworks could reduce the use of timber. Metal scaffolding could also replace bamboo.

(c) Reusing Inert C&D Materials in Reclamation or Earth Filling Projects

10. Soft inert materials can be reused as fill materials in reclamation or earth-filling projects, whereas rocks can be reused for seawall construction. However, as mentioned earlier, we are running out of reclamation projects, especially after mid-2002. Through the joint effort of bureaux and departments, most planned projects will use inert C&D materials to meet 70% or more of their fill requirements. There is little scope to increase further because of engineering or other constraints. We estimate that this measure may absorb 28.6 million tonnes of soft materials and 15.3 million tonnes of rocks between mid-2002 and end-2005.

11. We are aware that long haulage of dump trucks carrying fill materials to reclamation projects would create environmental and traffic problems. Conveniently located barging points will help reduce such truck journeys and transport fill materials in bulk to reclamation areas. We will ensure that there are sufficient barging points[6] in the territory, and that they put in place special measures to reduce the environmental and traffic nuisance to nearby residents[7].

(d) Recycling Hard Inert Materials As Construction Materials

12. Recycling is important because it provides an alternative outlet for hard materials, which otherwise would displace soft fill materials in reclamation projects or take up precious landfill space.

13. Hard materials may have different uses. The highest quality excavated rocks can be processed into aggregates for concrete/asphalt production. We estimate that this measure could recycle approximately 10.3 million tonnes of rocks between mid-2002 and end-2005. As regards other hard materials like broken concrete and lower quality rocks, we need to test if they are suitable for use in concrete production or in road sub-base etc. Performance testings are being conducted and the relevant specifications for public works projects are being reviewed. To facilitate these tests, we plan to set up temporary recycling plants at Tuen Mun and Kai Tak in mid-2002 and early 2003 respectively.

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[6] The five existing barging points are at Quarry Bay, Sai Ying Pun, Shatin, Tseung Kwan O and Tuen Mun.

[7] Examples are fully paved compounds, water-sprays for dust suppression, enclosure of the tipping ramps to contain, perimeter walls to soften the visual impact and on-site queueing areas.

(e) Establishing Temporary Fill Banks

14. Even with reuse and recycling, we estimate that by end-2005, there will still be some 14.8 million tonnes of materials that have no outlets. We plan to establish temporary fill banks to stockpile the materials. As shown in Annex B, if all planned reclamation projects proceed with no delay or reduction in scale, there would be sufficient capacity in 2006 and 2007, both to receive C&D materials generated in those two years, and to reduce substantially the stockpile at the fill banks.

15. Following a thorough site search, we have identified two sites at Tseung Kwan O and Tuen Mun for this purpose. These sites are far away from residential or commercial developments. We will minimize the traffic impact to nearby roads by transporting most of the materials by sea. We will also put in place measures to mitigate possible environmental impacts. We will explain to the District Councils the need to establish fill banks and the mitigation measures that will be implemented.

(f) Landfill Charging

16. Currently, disposal of waste at landfills is free. There is little incentive to reduce C&D materials. It is therefore essential to put in place a landfill charging scheme to provide the economic incentive for waste producers, including developers and contractors, to reduce C&D materials and to reuse and recycle as much as possible. Practical arrangements for implementation are now under discussion with the various industries that will be affected.

LONG-TERM ARRANGEMENTS

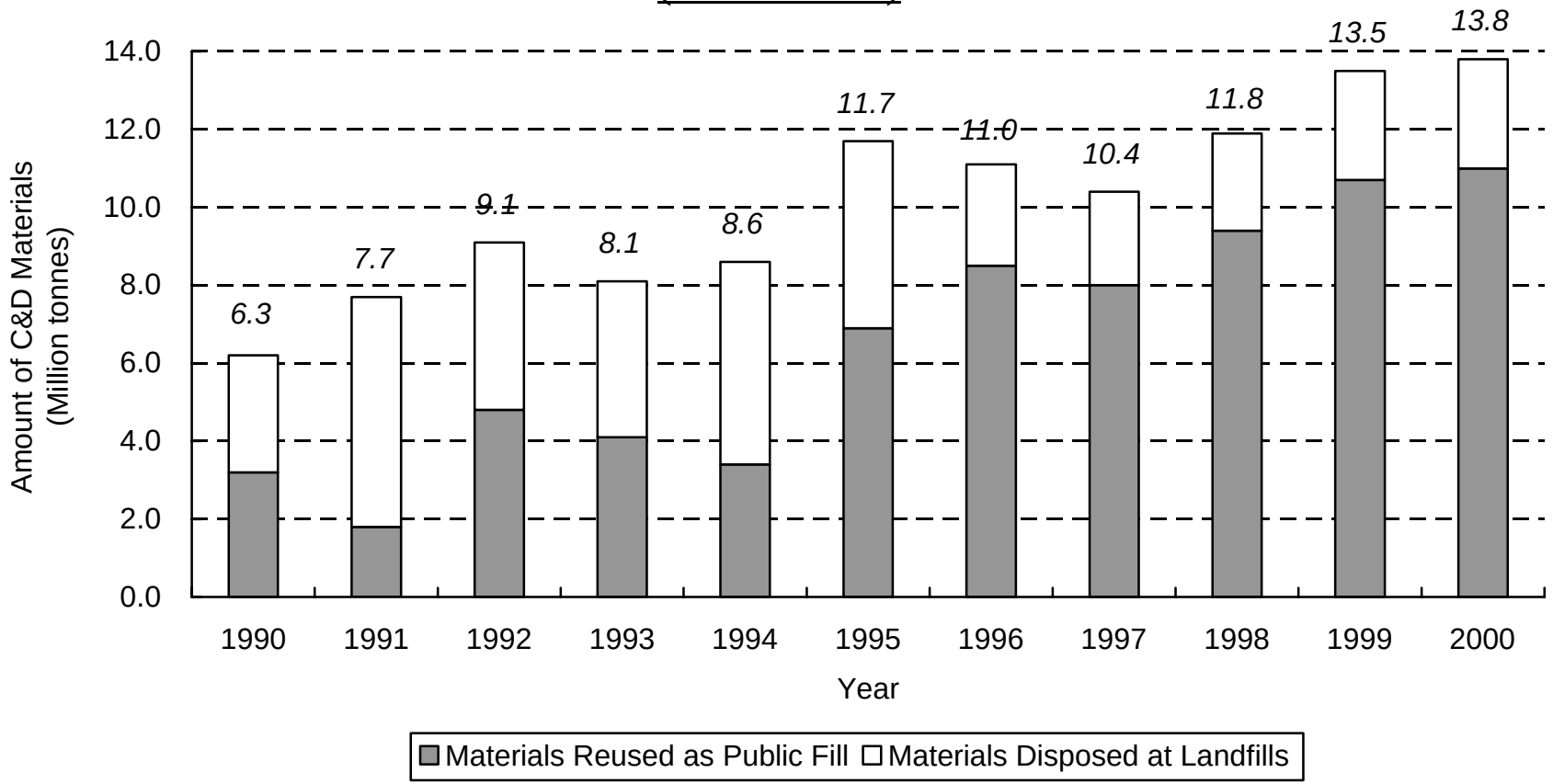
17. To examine the long-term arrangements to accommodate inert C&D materials in the next three decades, we have commissioned a study. The study will examine all possible options to tackle the problem, their pros and cons, as well as their environmental benefits and impacts. The study has just started and will be completed by mid-2002.

CONCLUSION

18. The above is a brief account of our actions in managing the huge amount of C&D materials that construction activities generate each day. There is no single solution to the problem. A whole series of measures have to be applied. Each of these measures has an important part to play in the strategy. We look forward to developing a close partnership with the Council and relevant industries in implementing these measures.

Environment and Food Bureau
June 2001

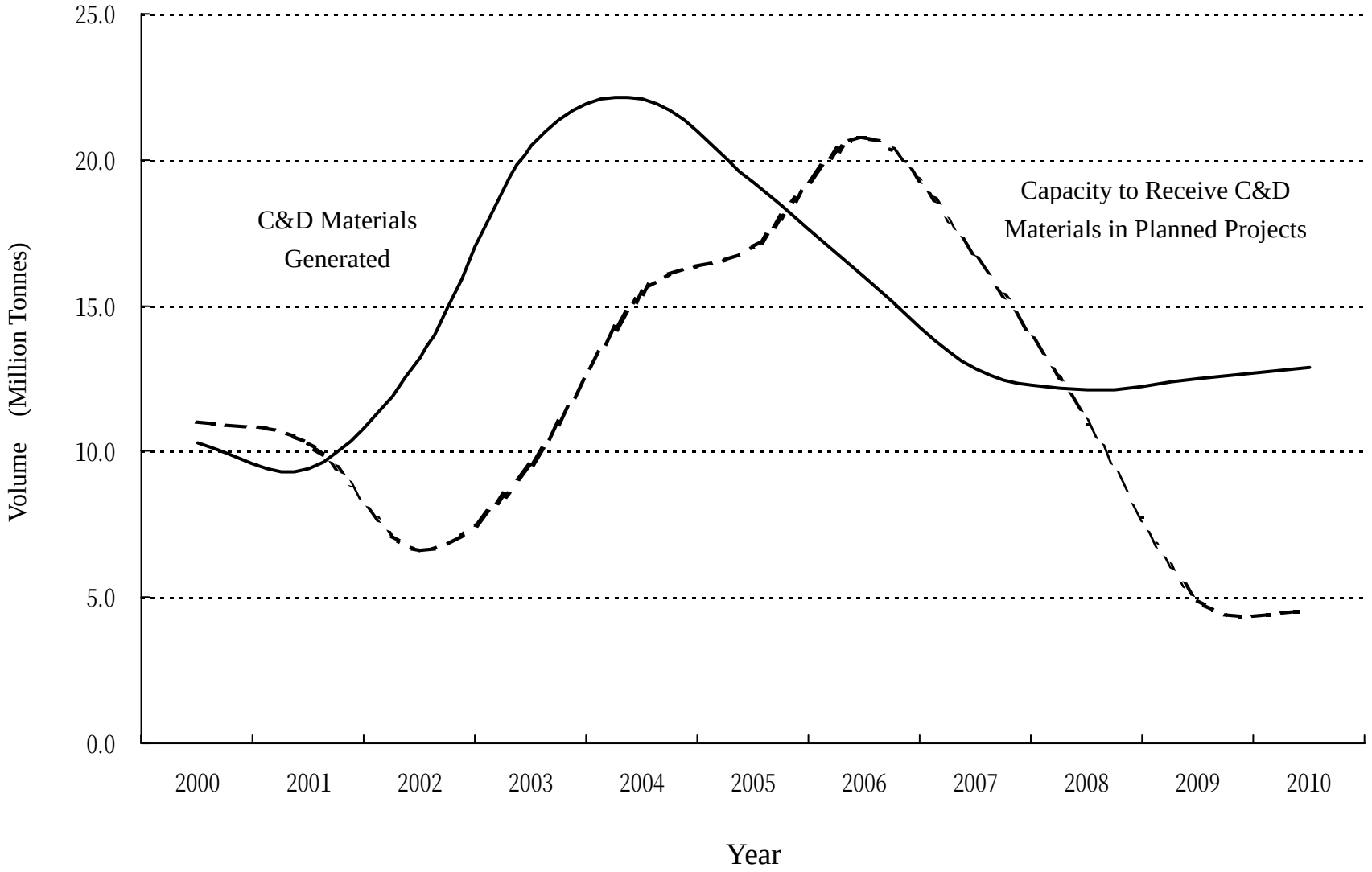
Historical Data for C&D Materials Produced and Reused (1990 - 2000)



Annex A

Capacity to Receive C&D Materials Between 2000 – 2010

(Best-case Scenario: Assuming all planned projects without delay or reduction in scale)



Annex B