Chapter 8
CONCLUSIONS
Conclusions

Municipalities face a number of choices when deciding on whether or not to move from the business as usual scenario (i.e. landfill) to implementing AWT technologies. Cost is a key decision-making factor. Introducing AWT will usually entail an increase in cost to the municipality, but the scale of that increase will depend on the specifics of the AWT project. The relative cost component for investment in the full specific costs increases with the complexity of the technology options.

The business case for an AWT project may become compelling when the social and economic benefits are factored in. Labour intensity, in particular, is an important decision-making factor when selecting AWT options, and this means that those technologies that create sustainable employment opportunities are the most attractive options for implementation in South Africa. Multi-dimensional advanced integrated solid waste management (AISWM) systems have the potential to generate significantly greater business and employment opportunities compared to one-dimensional systems that depend solely on landfill.

According to recent research, the economic cost of landfill in South Africa is somewhere between 31.49 to 110.59 ZAR per tonne of waste. Tailored analysis should be carried out for specific situations, but it is clear that even factoring in the lower band estimate of economic cost of landfill into financial analysis of AWT projects would have a significant effect on the business case.

There are currently no economic instruments (such as landfill taxes/levies) in place that enable municipalities to take the economic costs of landfill into consideration in budget planning or project decision taking. Decisions must be taken on the basis of an assessment of the financial costs and benefits of an AWT project.

The document has modelled the costs of different AWT technologies. The cost ranges being presented, should be regarded as indicative and not definitive. Internationally, there are few authoritative sources of consolidated cost information, and assumptions need to be made to adapt these cost profiles to the South African context.


The promising technologies are those that:

- are relatively inexpensive;
- have a readily accessible market demand for outputs; and
- are labour-intensive.

Promising technologies for the short-term include windrow composting of green waste, construction and demolition waste recycling, and materials recovery facilities (MRF) for municipal solid waste. For these technologies, there are existing facilities operating in the South African market to learn from, replicate and scale up. The cost ranges for these technologies are within range of the full cost of landfill (currently estimated at 200-400 ZAR/tonne):

- Windrow composting: 300 - 400 ZAR/t
- Construction and demolition waste recycling: <300 ZAR/t
- Materials recovery facilities: 300 – 400 ZAR/t

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Potential technologies applicable in the medium-term include mechanical biological treatment (MBT), anaerobic digestion (AD) and in-vessel composting (IVC). Application of these advanced waste treatment technologies in the South African market is at the early stages. The cost ranges for these technologies are above the full cost of landfill, but in certain cases, in particular where there is a secure and stable local demand for the outputs from these AWT processes, the business case for these facilities may be compelling. The cost ranges are:

- Simple mechanical biological treatment (MBT): 300-500 ZAR/t
- MBT with intensive decomposition and fermentation: 700-900 ZAR/t
- Anaerobic digestion: 700-800 ZAR/t
- In-vessel composting: >600 ZAR/t

Potential technologies applicable in the long-term include incineration with energy recovery, mechanical heat treatment (MHT), and advanced thermal treatment (ATT) including pyrolysis and gasification. These are all thermal treatment processes, and in the South African market context will be significantly more costly than landfill. However, in major metropolitan cities where it may be difficult to secure sufficient landfill capacity, there may be a business case. The cost ranges for these technologies are:

- Incineration with energy recovery: 1,200-1,500 ZAR/t
- Mechanical and heat treatment: 600-700 ZAR/t
- Advanced thermal treatment – gasification: 1,300-1,700 ZAR/t
- Advanced thermal treatment – plasma gasification and pyrolysis: 1,300 - 1,700 ZAR/t

Several AWT technologies are tailored for specific waste fractions, and therefore require collection systems to be adapted potentially increasing costs further. However, it may be possible to locate an AWT facility at closer proximity to the main centres of waste generation than landfill, therefore making savings on the costs associated with transport.

Several AWT technologies, in particular fluidised bed incineration, and advanced thermal treatment (pyrolysis and gasification), require a pre-processing stage to prepare the input feedstock for use. This introduces further costs, which are not reflected in the specific cost ranges presented.

For all AWT projects, it is essential to undertake a detailed options analysis within planning and feasibility studies, in order to determine the most appropriate and financially sustainable option. This should take into account cost as well as other socio-economic criteria, and be specific for each case. As costs are very location specific, they are best analysed within the framework of a feasibility study.

Environmental protection and mitigation measures represent an important part of the costs. Certain technologies require very close attention to ensuring that the environmental impacts from the AWT process meet emission standards.

Since most municipalities have limited financial and operational capacity for AWT investments, private - public partnerships (PPP) are an attractive option. Financing could be stimulated through launching governmental tenders for the treatment of specific waste streams, with the condition that the cost of treatment to the municipality will not be more than the cost of legally compliant landfill - BAU. However, such contracts would need to be carefully vetted to ensure that the operator is fulfilling their landfill diversion commitments.

The avoided cost of landfilling and airspace plus revenues from recovered materials and energy may, in certain cases, tip the balance in favour of AWT. The difference between the Full Costs and the Avoided Costs represents the ‘cost jump’ the municipalities need to calculate when evaluating the business case for AWT. The cost jump to the municipality can be calculated by subtracting the costs of landfilling and airspace, cost of cleaning up illegal dumps, and revenues from the sale of materials from the full cost of treatment.
Under the current financial framework, AWT projects will often require a public financing component or subsidy in order for them to be financially sustainable. This may be justifiable where a strong economic case is demonstrated, taking into account the employment benefits.

Certain industrialised countries that have succeeded in establishing higher treatment intensity, and diverting larger percentages of municipal waste away from landfill, have done so when policy instruments have been introduced to shape the market conditions. The prospects for implementing advanced waste treatment technologies in South Africa will greatly benefit from an enabling policy environment, fiscal system and from incentives delivered through economic instruments.

In view of the need to advance on meeting the National Waste Management Strategy targets, municipalities need to consider how best to divert significant quantities of municipal solid waste from landfill. With increased use of policy instruments that shape the market over time, the bottom line for introducing AWT is set to improve.