Chapter 6

FINANCING OF WASTE MANAGEMENT IN SOUTH AFRICA

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6.1 Introduction

In terms of the Money Bills Amendment Procedure and Related Matters Act (No. 9 of 2009), the Financial and Fiscal Commission (the Commission), is required to undertake research and make annual recommendations on the equitable sharing of nationally raised revenues among the three spheres of government. The Commission has, both internally and through stakeholder engagements, identified the financing mechanisms of waste management in South Africa as a key service and a sector that needs to be addressed in the 2013/2014 Annual Submission to Parliament.

Numerous studies have been undertaken on waste management in South Africa, but most have largely focused on operational management, environmental aspects and the legislative framework. Very little research has been dedicated to addressing the funding mechanisms and policies affecting and influencing the financing of waste management projects in municipalities across South Africa. The Commission has identified and highlighted a number of key and critical policy issues and other factors, which include:

- The implications of classifying waste management as a free basic service (FBS).
- The lack of a standardised approach for setting appropriate and equitable tariff structures for waste management services.
- ‘Ring fencing’ funds from the Municipal Infrastructure Grant (MIG) for capital expenditure on specific infrastructure.
- The distribution of funding for waste management across the three tiers of government – (national, provincial and local government).
- Ambiguous functions, powers and institutional arrangements across government, which affect access and budgetary control of waste management projects.
- Poor optimisation of operational and maintenance costs of waste management projects in municipalities.
- Poor costing of capital, operational, maintenance and environmental implications of waste management projects in municipalities.
- The lack of and/or poor implementation of proper financial and asset management systems for waste management assets and infrastructure within municipalities.
- Failure to operate waste management services with sustainable cost recovery models, especially in indigent municipalities.
- Lack of clear guidance on sources and requirements for alternative financing of waste management projects.
- Lack of will to develop and implement innovative waste management projects in municipalities that will provide for job creation, improved service delivery, cost reduction and revenue creation.

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### 6.1.1 Aims and Objectives of this Research

The aim of this research is to explore how waste management can be a viable, sustainable service with the potential to generate revenues and create jobs. From the research will emerge policy recommendations for possible and practical funding mechanisms for waste management.

In order to do this, the Commission has set out the following research questions:

1. **What institutional, policy and legislative fragmentations are giving rise to inadequate and inequitable funding of waste management in South Africa? Is the funding mechanism adequate and effective in addressing waste management? What are the challenges related to the setting of tariffs?**

2. **What incentive measures can be used to make waste attractive to municipalities as another way of raising revenue? What would be the impact on municipal revenue of classifying waste management as a FBS?**

3. **What are other feasible, alternative funding mechanisms for waste management in South Africa? Can these alternative funding mechanisms be another way for municipalities to raise revenues?**

Further to the above, the research must address the following key themes:

1. Institutional, policy and legislative framework
2. Waste management and climate change linkages in the green economy
3. Current funding mechanisms
4. Alternative funding mechanisms.

### 6.1.2 Emerging Issues and Concerns of Key Stakeholders

As part of this research, the Commission held an initial key stakeholder consultation at which a number of important issues and concerns were raised. Stakeholders were drawn from various organisations and institutions including national, provincial and local government, National Treasury, waste management units of some metropolitan municipalities, and Commissioners. Future consultation will involve a much wider and broader representation of stakeholders. The issues and concerns identified at this initial workshop are summarised in the Table 6.1.

**Table 6.1. Key issues from stakeholder workshop**

<table>
<thead>
<tr>
<th>Commentator/stakeholder</th>
<th>Issue of concern</th>
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</table>
| Commissioner Krish Kumar (municipal manager eThekwini): | • What are the cost drivers of waste management?  
• Job creation versus free basic services.  
• Regionalisation of waste management.  
• Collection of tax on waste management services. |
| Commissioner: David Savage | • There is volume of work done where are we adding value?  
• Waste management as a free basic service.  
• Enforcement is a challenge where tariffs need to be collected. |
| Commissioner Lucienne Abrahams | • Use of knowledge and technologies in waste management for cost saving.  
• How do we encourage innovation? |
| Commissioner Tania Ajam | • What are the financial vs. environmental costs  
  • What is the implication on compact cities vs. incinerators  
  • What is the scope of cross-subsidisation between industrial and domestic waste?  
  • EPWP on social grants in terms of job creation, are there replications?  
  • Use of new technology and biotechnology routes in waste management. |
| Ekurhuleni Metropolitan Municipality | • There seems to be lack of understanding of what municipalities want and broader market legislation inhibits progress in this area – A need for creation of a market and long term financing?  
  • Recycling and job creation  
  • The market for recyclable material is extremely volatile e.g. demand for plastic fluctuates drastically.  
  • Explore levy on plastic to guarantee fixed price. Mechanism of use of recyclables to have a stable price structure.  
  • Legislation on use of PPP needs to follow Systems Act 76 inhibits progress.  
  • MFMA investment is deterred by the requirements not to keep contracts beyond 3 years. Private sector see no guarantee if it was to invest in Waste Management (WM). Thus there is not enough budget to invest in waste to energy (incinerators) hampered by MFMA. In Italy contracts run up to 15 years and provide good security.  
  • On the funding model, tariffs should be cost reflective.  
  • Willingness to pay for recycling at source is not successful.  
  • There is a need to look at a case study where recycling was a success.  
  • The allocated budgets should be geared towards long-term sustainable (buy-back centres) that create jobs in return.  
  • In principle there is a need to increase recycling activities and not budgets.  
  • Separation at source is a potential for revenue as recyclables are carrying value.  
  • FBS zero-rated for informal settlements  
  • Removal of illegal dumping, carcasses, street sweeping are not covered anywhere.  
  • What about a cost reflect tariff and implementation thereof?  
  • Waste minimisation – recycle at source, should not be looked at as potential revenue, but a saving because there are serious transport costs.  
  • People who cannot afford the service are located further away from the service |
| Gauteng Department of Agriculture, Conservation and Environment (GDACE) | • Challenges for the province include waste collection standards.  
  • Waste at local municipalities is not properly resourced both in terms of financing and human capacity.  
  • The capacity to manage waste as a science – from finance to landfill to recycling – is not properly understood.  
  • Job creation (workfares) – use of unemployed labour/graduates subsidised through social development grant EPWP link and offer training to manage waste, policing and creation of awareness.  
  • Recycling cooperatives receive income benefiting the poor, unlike using the industry, thereby protecting livelihoods throughout the value chain.  
  • Informal recyclers are not interested in being registered.  
  • Indigent register (SALGA) needs to be kept up to date.  
  • All positions on waste should be filled with qualified people. |
There is a need for cost reflective tariff “volumetric based”.
Is it possible to merge and cross-subsidise services?
Green economy job funds EPWP funds.
Pikitup remodeling
Waste plant processing
Training and decision makers – informing councillors without empowering them.
Life-cycle approach
By-law enforcement-illegal dumping. What enforcement powers do we have? How much capacity do we have to enforce?
There is a need for internal capacitation, and not outsourcing to international companies will build capacity.
JHB spend R100 million for cleaning up after illegal dumping. What is the cost of fines and cleaning?
Greening: roads cooperation is hampered by unsustainable budgets.
Education awareness
School greening
Buy-back centres
Office recycling
Waste pickers formalisation (cooperatives)
High-density building recycling
Waste events
Electronic waste

Landfill air space depletion means only 8 years left, therefore alternatives need to be considered e.g. home-based composting
Municipalities should continue being creative without creating a burden on ratepayers.
Community-based initiatives vs. those where municipalities are forced to incur the cost.
Waste management jobs compete with a choice for increased wage bill.
Absorption of output-based contractors.

Regulation and enforcement.
Recycling and collusion (KZN)
Equitable shares allocations are not for the benefit of the poor exclusively, therefore, under funding of the service.
Job creation and influence of unions
Working co-operatives in KZN and Limpopo
There is a need for skills in municipalities to properly cost the service.
There is a need for cross subsidisation.

Norms and standards
What is the cost of waste management?
Role of SALGA in waste management.
Levies for industry
Job creation.

A number of other issues were identified, including:
- Municipal councils, which are responsible for budget allocations, do not recognise waste management as a priority service. As a result, waste management budgets tend to be relatively low compared to those of other services.
Centralised tariff systems for all services mean little relationship between waste revenue and waste expenditure.

Generally tariffs are not linked to the volume of waste generated. While considered best practice, this linking is generally very difficult to implement and requires sophisticated weighing equipment and revised billing system, which translates into increased technical costs.

Collection rates are low, and municipalities generally struggle with enforcement.

Rural municipalities often fail to account for the waste service function.

Budget increases do not mirror waste volumes handled.

Using the Municipal Infrastructure Grant (MIG) to fund solid waste-related capital investments is a challenge because of the MIG funding restrictions. For example, the MIG cannot be used to fund vehicles, which municipalities consider to be capital assets.

Capital investment in landfill sites and transfer stations is typically very ‘lumpy’, which implies difficulties financing as part of annual Capex allocations via MIG or other facilities.

Direct financial recovery of certain waste services, such as litter picking and removal of illegal dumping, remains. For example, at the City of Johannesburg, the funding for non-income generating waste services comes from the grant for social services managed by the Office of the Mayor. At the eThekwini Metropolitan Municipality, the costs for non-income generating services are recovered from the ratepayers via the property assessment rate.

Rate collections do not fund regional waste disposal sites operated by district municipalities, as rates are typically collected by the affected local municipalities that manage waste collection and transportation.

Available airspace on existing facilities is diminishing because of increased waste volumes.

Public access to landfill sites is often difficult because of distances, restricted operating hours etc., resulting in illegal dumping of waste within suburbs.

The permitting requirements for landfill facilities are stringent and require a high level of engineering skills.

Insufficient landfill operating budgets result in inefficient on-site operations and maintenance. Increased crime and vandalism further exacerbate the situation.

Few municipalities are planning ahead for new landfill sites in the future.

Complex land acquisition procedures make identifying new sites a lengthy and tedious process.

The provincial environmental department’s capacity for compliance monitoring and enforcement is low.

### 6.1.3 Relationship to Research Strategy and Past Commission Work

The proposed project is in line with the Commission’s *Five-Year Research Strategy* (FFC, 2008), within the themes of accountable institutions and equitable growth and distribution of resources. In this instance, accountability is about municipalities making sure that their budgeting and planning is in line with the demand for their waste management activities. In respect of equitable growth and distribution of resources, municipalities are expected to raise their own revenue, so that they can provide services to their constituencies on an equitable basis. Municipal services can contribute to growth through their potential to have a high impact on job creation, which is important in the current environment.

### 6.1.4 Foundations of a Knowledge-based Economy

South Africa’s policies are aimed at creating inclusive economic development, but a policy review shows that only a few measures have been used towards such development (FFC, 2011/12).
Therefore, this study looks at innovative, alternative financing and incentives for sustainable waste management. In particular, it examines the financial planning methods used (i.e. proper budgeting and accounting), clean development mechanisms (CDM), waste minimisation and reduction, recycling initiatives, clean technologies, the ‘polluter-pay’ principle (both for producers and consumers using variable fees) and public-private financing. In addition, the developmental role of sub-national governments, especially the local government, is examined, ensuring that waste management activities are part of their integrated development plans and that the by-laws and regulations are enforced and implemented.

6.2 Literature Review

6.2.1 International Perspective

Internationally, municipal solid waste is defined as including refuse from households, non-hazardous solid waste from industrial, commercial and institutional organisations (hospitals), market waste, yard waste and street sweeping. Semi-solid wastes (sludge and night soil) are considered the responsibility of liquid waste management systems, while sustainable solid waste management systems should be designed to fit the socio-economic circumstances and locality (Schübeler, Wehrle and Christen, 1996).

The principles of sustainable waste management strategies are to minimise waste generation, to maximise waste recycling and reuse, and to ensure the safe and environmentally sound disposal of waste. The National Waste Management Strategy (NWMS) acknowledges these principles and identifies initiatives (DEAT, 1999). Effective municipal solid waste management (MSWM) needs to include the following (Schübeler et al., 1996):

i) Planning and management, taking into account the strategic planning, legal and regulatory framework, public participation, financial management (cost recovery, budgeting and accounting), institutional arrangements including private sector and disposal facility siting.

ii) Waste generation relative to waste characterisation (source, rates and composition) and waste minimisation and source separation.

iii) Waste handling regarding waste collection, waste transfer, treatment and disposal and special waste (medical and small industries). From the local government perspective, the criteria for successful solid waste management need to include financial viability, the by-laws and regulations, political interests and approval by higher government authorities. Its effectiveness depends upon the adaptation to political, social, economic and environmental contexts.

In the South African context, waste is defined as any “undesirable or superfluous by-product, emission or residue of any process or activity which has been discarded, normally accumulated or stored for the purpose of discarding or further processing through treatment” (DEA, 2000). In 2007, the country generated 533 million tonnes per annum (MT/a) of waste, comprising mining waste (at about 88%), domestic and trade waste (1.5%) and sewage sludge (0.1 %) (DEA, 2011). In 2006/07, general waste (domestic and trade) disposed at landfill sites amounted to 24.1 MT/a (Purnell, 2009). The six largest metropolitan municipalities – the City of Johannesburg, Cape Town, City of Tshwane, Nelson Mandela, Ekurhuleni, and eThekwini – disposed of about 8.9 MT/a of municipal solid waste (Von Blottnitz et al., 2006).

In comparison to mining waste, domestic waste generation is arguably insignificant. However, a comparison of households showed that middle-class households produce about 2.7 MT/a of waste (Greben and Oelofse, 2008), indicating that municipal waste generation differs according to per capita income. The State of the Environment Report identified population growth accompanied by increased economic development as one of the main drivers of waste generation (DEA, 2010).

Of the 1 203 general waste landfill sites in the country, only about 524 are registered (the rest are not legally permitted), which results in backlogs for landfill sites (DEA, 2011). Both the licensed and unlicensed landfill sites are not being operated and maintained according to the required regulatory standards (Purnell, 2009). Other pressing challenges faced by municipalities in the waste management sector range from illegal dumping and illegal dumping sites, to the use of unpermitted landfills, inadequate waste collection service, lack of recycling initiatives by municipalities, inadequate waste minimisation, and regulation and enforcement (DEA, 2010; GDACEL 2004).
Financial and Fiscal Commission

CHAPTER 6

Financing of municipal waste

Three financing mechanisms are used for financing MSWM: municipal taxes (property tax), user charges and grants, including in countries such as India, Malaysia, Thailand, Japan and Indonesia. In urban areas in India, solid waste management accounts for 25–50% of the municipal budget of which 70–85% is spent on salaries. Similarly, in Malaysia about 50% of the municipal’s operating budget is spent on MSWM, of which 70% is spent on collection. Cost-recovery methods are increasingly being used, in the form of deposit refund systems and volume-based methods. For MSWM in Bangkok, Singapore, Tokyo and Jakarta (UNEP, [Sa]). The laws in place encourage recycling, by specifying mandatory deposits and returns, with the aim of shifting the burden back to manufacturers. The scenario also applies to the volume-based system, where levies are either charged directly (based on waste volume) or indirectly through property tax, although these methods have only just been able to cover operating costs. If capital costs have to be taken into account other alternative financing mechanisms are required. This is why subsidies and grants are used in India, where the Indian Finance Commission allocates funds for solid waste management. The federal state then uses a different allocation formula to fund local cities to balance out the different economic circumstances across the country.

In respect of waste management as a source of potential revenue, most households are willing to pay for the services, but they normally do not pay the full cost of solid waste management, while estimating the actual cost is a challenge (Appasamy and Nelliyatt, 2007). Expenditure on proper disposal is similar to pollution abatement policies; if not regulated or properly enforced, municipalities will emulate industries and save money by under-investing in disposal technologies (Appasamy and Nelliyatt, 2007).

Other financing options have recently been sought, including public-private partnerships (PPPs) and carbon taxing with the intention of promoting efficiency through better technologies (Appasamy and Nelliyatt, 2007). In line with the UNEP, a combination of government and privately run services is needed for effective, efficient and accountable MSWM services – in India, successful PPPs have been replicated elsewhere in the country. Other options are the use of carbon financing (which needs to be explored further), transforming waste at landfill sites into compost to generate greenhouse gases, and promoting the use of clean developmental mechanisms (CDM).

Of the 20 case studies reviewed (including the Financing and Incentive Schemes for Municipal Waste Management conducted by the European Commission), most concluded that, although the approaches were innovative, no ‘one size fits all’ exists, as specific methods are needed for specific areas. For instance, in Belgium, municipal waste is financed through a household waste tax or environmental tax, which is fixed and payable annually. The payment is for waste bags or containers used and charged by the frequency of waste collected (called variable household levies). In Denmark, households pay a fee differential collection scheme, i.e. weight-based and volume-based. Small- or medium-sized and rural municipalities use weight-based for domestic waste from households, smaller companies and institutions. In Italy, the ‘tagged bag’ scheme is used, where waste is separated at source and bags are distributed free to the households – the fee is either variable (depending on weight) or fixed (collection or recyclables and bio-waste).

Lessons learnt from these financing mechanisms are: estimating the actual cost of solid waste management is difficult, as components of the MSWM are not known; no one size fits all; tax evasion is rife; collection rates are low; administrative costs are high, especially when the property tax financing is used; when using PPPs, roles between parties involved need to be thoroughly clarified in order to reduce the potential for conflict. On the other hand, charging a fee creates an economic incentive to reduce waste and encourages recycling and separation of waste at source, and where PPPs have been successful, the results have been remarkable. However, caution needs to be exercised when adopting an equitable policy in developing countries where the majority of households are poor.

Some of the different financing options for solid waste management are (Koller, 2010):

- Tax system (or special purpose tax such as for using landfill)
- User fee system (where municipalities set certain fee and charges residents for residual waste per household, per square metre living space), which is used in Vienna and for specific purposes (e.g. integrated disposal fee)
- Deposit system (for certain waste types such as glass or plastic bottles)
- The full cost-recovery system (which covers all services and certain waste types and the producer responsibility system for packaging, where municipalities partly pay and the system pays part of the cost)
The additional cost system (for certain waste types where the stakeholders share costs involved in packaging waste).

6.2.2 South African Institutional Frameworks on Waste Management

Chapter 2 of South Africa’s Bill of Rights states that “everyone has the right to an environment that is not harmful to their health or well-being”. This right includes the need to have a protected environment “for the benefit of present and future generations, through reasonable legislative and other measures”, including prevention and sustainable measures. Government has the duty to ensure these rights are upheld. The notion of a healthy environment is further entrenched by Sections 152(1) (b) and (d) of the Constitution, which assigns a variety of functions to the local government sphere (South Africa, 1996).

A number of pieces of legislation are in place to manage and govern waste: the Environment Conservation Act (South Africa, 1989), National Environmental Management Act (South Africa, 1998b), Health Act (South Africa, 1977), and Air Quality Act (South Africa, 2004). The revised National Environment Management Act: the Waste Act (South Africa, 2008), addresses institutional arrangements and planning fragmentation in the waste management sector. It advocates integrated waste management planning by all spheres of government and role-players in the sector. Most importantly, it provides national regulating norms and standards, licensing and control of waste management activities and, lastly, compliance and enforcement of the national waste information system.

The NWMS is an integrated waste management framework, whose approach is ‘from cradle to grave’, or from waste generation to waste disposal. Waste management processes need to adopt the principles of reducing waste at source, recycling and reuse, treatment and handling, with disposal of waste seen only as a last resort. The White Paper on Integrated Pollution and Waste Management (DEAT, 2000) deals holistically with pollution and waste management, including pollution prevention and minimisation at source.

Government’s commitment to waste management strategies can be traced back to the Polokwane Declaration (DEAT, 2001), whose vision is “to reduce waste generation and disposal by 50% and 25% respectively by 2012 and develop a plan for zero waste by 2022”.

Government recently tabled the Draft Municipal Waste Sector Plan “to develop, implement and maintain an integrated waste management system which contributes to practical, sustainable waste service delivery and a measurable improvement in the quality of life of all people and environment” (DEA, 2011). The focus of the sector plan is more on shifting the paradigm, from dumping waste in landfills to minimising and reducing waste, and to providing domestic collection services to all. The National Domestic Waste Collection Standards (South Africa, 2011a) aims to correct the imbalances in the waste collection services, with the objectives of ensuring that the level of service is equal across the country, extending waste collection to areas where no services were before, and encouraging separation of waste at source, recycling initiatives and community involvement.

In 2011, the National Policy for the Provision of Basic Refuse Removal Services to Indigent Households was tabled (South Africa, 2011b), in line with the Free Basic Services Policy adopted in 2001 that aims to provide a basket of free basic services to citizens, including solid waste, water, sanitation and electricity (South Africa, 2001). Its purpose is to ensure that poor, disadvantaged households have access to basic waste removal services, recognising that these households do not adequately benefit from refuse removal services because of their locations. It also sets out basic refuse removal standards, which municipalities need adhere to when providing those services and include in their budgets. A key component is the need to keep an up-to-date registration and record of the indigent, which is currently a challenge.

All three spheres of government (and the private sector) have roles and responsibilities related to waste management activities, as summarised in Table 6.2 (full details can be found in Appendix 6A). National government, through the DEA, has to set policy, legislate, coordinate, enforce, monitor and build capacity. The responsibility of the provincial government is to develop environmental implementation plans, monitor compliance with those plans, develop and enforce provincial regulations for general waste collection and support local government in implementing waste management activities. Local government is assigned waste management (refuse removal, refuse dumps and solid waste disposal), and the Municipal Systems Act (South Africa, 1998a) provides the framework for local government functions (including matters related to service delivery). Powers at local government are split between district and local municipalities.
Table 6.2. Functional roles and responsibilities for solid waste management in South Africa

<table>
<thead>
<tr>
<th>Component</th>
<th>Broad Function</th>
<th>Activity</th>
<th>Current Assignment</th>
<th>Issue</th>
</tr>
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<tbody>
<tr>
<td>Policy Making</td>
<td>Standard Setting</td>
<td>Norms &amp; Standards</td>
<td>X</td>
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<td>Access Targets</td>
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<td>Plans for service expansion</td>
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<td>Plans for service improvement</td>
<td>X</td>
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<td>Regulation</td>
<td>Planning</td>
<td>Social Capital</td>
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<td>Physical Capital</td>
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<td>Tariffs</td>
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<td>Subsidies to Consumers</td>
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<td>Grants to Service Providers</td>
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<td>Consumer selection</td>
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<td>Recurrent expenditures</td>
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<td>Service Provision</td>
<td>Asset Creation</td>
<td>General Area cleansing</td>
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<td>Waste minimisation</td>
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<td>Maintence</td>
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<td>Operation</td>
<td>M &amp; E</td>
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<td>Quality of Service deliver</td>
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Source: Savage, 2009

The Amended Municipal Structures Act (South Africa, 2000) lists the district municipalities’ waste functions, which are limited to solid waste disposal: the districts need to determine a waste disposal strategy and regulation, and establish, operate and control waste disposal sites, bulk waste transfer facilities and waste disposal facilities for more than one local municipality in the district.

Local and metropolitan municipalities are responsible for providing holistic waste management activities, such as compiling and implementing general waste management plans, collecting data for the Waste Information System, providing waste collection services and managing waste disposal facilities within their jurisdiction, implementing public awareness campaigns and implementing and enforcing appropriate waste minimisation and recycling initiatives (DEA, 2011).

Linked to Table 6.2 is the waste hierarchical structure in Figure 6.1 that was adopted in the NWMS (DEAT, 1999). The waste hierarchy is a shift from traditional methods of treating and disposing waste to methods that prevent and reduce waste. Avoidance and minimisation are the founding principles and encompass the use of cleaner methods to waste management activities as the first choice. Where waste cannot be avoided, a second choice is to recycle or reuse. The third choice is to treat the waste prior to disposing of the waste in accordance with regulations and standards – only as the last resort is waste disposed in landfills.

The implementation of the waste hierarchy requires a concerted effort by both the private and public sectors involved in waste management activities. Table 6.2 clearly states the role of both the local government (municipalities) and the private sector (industries and business) in relation to service provision – the waste hierarchical structure in Figure 6.1.
6.2.3 Classification of Waste Management as a Free Basic Service

One of the key features of a developmental state is to ensure that all citizens – especially the poor and other vulnerable groups – have access to basic services. These ‘free basic services’ (FBS) can be defined as municipal services provided at no charge by the government to poor indigent households. South Africa’s Constitution places the responsibility on government to ensure that such services are progressively expanded to all, within the limits of available resources.

For poor households, the current basket of municipal services includes water, sanitation, electricity and energy, and refuse removal. Over the past 15 years, South Africa has seen a continuous paradigm shift in policy and thinking around the implementation of municipal services. The basic services approach has progressively developed – from government-funded capital costs for new services infrastructure and the user (households) paying for the operation and maintenance of that infrastructure – to the current situation where the need for FBS has become more apparent and pressing. Abject poverty, unemployment and the high running costs of many schemes has meant that poorer people cannot afford to pay the full cost of essential municipal services. The consensus is that municipalities, especially the indigent municipalities and those with low gross domestic product (GDP), cannot sustain and equitably continue to provide these basic services.

Of great concern is the inclusion of refuse removal in the package of municipal FBS, with many questioning the ability of municipalities to sustainably provide this service. Free refuse removal services are intended mainly for the rural population and poor households in informal settlements on the outskirts of the cities, which are classified as indigent in terms of the indigent persons policy.

Municipalities in South Africa finance the provision of services (water, sanitation, refuse removal and electricity) through revenue collected from payment of fees, or tariffs. The provision of FBS is a form of subsidisation of indigent persons, and the burden rests unequally on the citizens of the municipalities. Therefore, the intergovernmental fiscal transfers have to be consistent with the increased demand placed on municipal revenue as a result of the FBS and the indigent policies. The transfer of funds to local government must ensure that services are provided equitably and deal with both the capital and operating costs of providing services and infrastructure as illustrated in Figure 6.2.
Additional resources will have to be provided in order to meet the huge backlogs and to make the access to FBS reliable and really beneficial. The biggest challenge faced by many (especially poorer) municipalities is that the revenue received from indigents does not generally meet the cost of delivering the services.

The growing list of FBS that municipalities need to provide has decisively changed the sustainability of municipal services, and the current allocation of state expenditure between national and local government needs to be reassessed. Free refuse removal for indigent populations results in revenue loss, which has a direct bearing on budgets for developing infrastructure, operations and maintenance of municipal assets for waste management services. Therefore, adequate funding for this FBS must be devolved to local municipalities.

### 6.2.4 Economic Instruments for Waste Management

Like most developing countries, South Africa’s environmental policy has been predominantly based on a command-and-control (CAC) approach. This involves direct regulation, and monitoring and enforcement systems, and relies primarily on applying regulatory instruments, such as standards, permits and licenses, and land and water use controls. The CAC approach gives the regulator a reasonable degree of predictability about by how much pollution levels will be reduced. Strategies have been partly successful in meeting environmental objectives but have not addressed the economic sustainability of providing equitable services to the poor, especially in the current economic downturn.

In recent years, many (primarily industrialised) countries have adopted economic instruments (EIs) that bring more flexibility, efficiency, and cost-effectiveness into resource, environmental and waste management. These important tools can reinforce and implement the CAC strategies while simultaneously contributing to sustainable development. Specifically, EIs for solid waste management promise to lessen the size of the solid waste management problem and do improve the delivery of solid waste collection and disposal services. Although prevailing social and economic issues and conditions vary from country to country, the growing consensus is that using CAC and EIs can have significant positive results.

South Africa will have to workshop and analyse which permutations and choice of EIs will have a long lasting sustainable impact on the financing of waste management and meeting the social needs and objectives of the country’s waste management legislation.

**Objectives of EIs for waste management**

In general, EIs introduce more flexibility, efficiency and cost-effectiveness into solid waste management. Furthermore, EIs can stimulate the development of pollution control technology and expertise in the private sector; provide government with a source of revenue to support waste management programmes; and eliminate requirements for larger amounts...
of detailed information needed to determine the feasible and appropriate level of control for each plant or product. Specifically, in solid waste management, EIs can be used as a tool to:

- Reduce the amount of waste generated
- Promote waste minimisation
- Promote recycling, re-use, recovery of waste streams
- Reduce the proportion of hazardous waste streams generated.
- Promote more efficient and cost-effective integrated waste management systems and waste hierarchies for the collection, transfer, transportation, recycling, treatment, and disposal of waste.
- Minimise the adverse environmental impact related to solid waste management, including pollution and climate change impacts.
- Generate revenues through cost recovery mechanisms.
- Create jobs and alleviate poverty
- Incentivise innovation and technological advances in waste management.

**Legal mandate for EIs for waste management**

The *National Environmental Management: Waste Act* (South Africa, 2008) provides a legal framework for the use of various EIs for waste management. These EIs are to be applied within the context of the overall fiscal and taxation policy established by National Treasury and the specific measures for environmental fiscal and taxation reform announced by the Minister of Finance in the annual budget tabled to Parliament. The selection and use of EIs, including pricing, taxation, subsidies, incentives and fiscal measures will also be aligned with the principles established by *National Environmental Management Act*, including the ‘polluter pays’ principle. The EIs highlighted by the *National Waste Management Strategy* that need further research include, but are not limited, to the following:

- Deposit refund schemes
- Waste disposal taxes
- Product taxes
- Tax interventions for hazardous waste disposal
- Tax rebates and benefits
- Wastewater discharge levies
- Levies of specific waste streams
- Landfill taxes at municipal level
- National Remediation Fund
- Solid waste project development and finance
Research on the introduction and application of EIs suggests that policy could be designed in such a way that instruments are implemented incrementally, beginning with relatively simple instruments and becoming increasingly sophisticated as institutional capacity grows (Pearce and Turner, 1994; Bell and Russell, 2002; Russell and Vaughan, 2003). Components of EIs could be implemented as part of an integrated waste management framework, in progressively more institutionally demanding stages, with the focus on gradually developing capacity (Pearce and Turner, 1994; Bell and Russell, 2002; Russell and Vaughan, 2003). It is also important to develop a culture where compliance is the norm and illegal dumping is socially unacceptable (Russell and Vaughan, 2003). Placing a tax on products at the point of manufacture or sale, or monitoring waste entering landfill sites or generated by large producers, should initially be easier than attempting to monitor the quantity of waste generated by individual households and illegal dumping. It may also be possible to implement deposit-refund schemes, or expand existing schemes to cover other types of products (Bell and Russell, 2002).

**Typologies of EIs for waste management**

The literature review revealed that three broad typologies are used to describe the wide range of applicable EIs in waste management:

- Revenue-generating instruments,
- Revenue-providing instruments, and
- Non-revenue instruments.

Table 6.3 provides a summary of the EIs employed globally in waste management.

**6.2.5 Knowledge Gaps**

Research into the use and applicability of EIs in waste management South Africa needs to answer the following questions:

1. What is the current status of solid waste management services among South African municipalities?
2. What is the current situation regarding charging for waste collection services?
3. Is there a need for EIs to be implemented in the field of solid waste management in South Africa?
4. Over what timeframe should the EIs be implemented?
5. Which actors (producers, households, municipalities or private waste management companies) and which waste streams should EIs target?
6. Should EIs aim to change incentives or to generate revenue, or both?
7. What should be done with the revenues that are generated, and how should they be channelled toward this use (i.e. full, partial or no earmarking)?
8. What are the opportunities – and constraints – associated with implementing EIs for solid waste management in South Africa?
9. Which specific EIs are likely to be appropriate?
Table 6.3. Taxonomy of economic instruments for waste management

<table>
<thead>
<tr>
<th>Typologies of Economic Instruments</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Revenue-raising instruments        | These include the various kinds of user charges (levies or taxes) for the provision of collection, transportation and final disposal services. These are directed at ‘internalising’ the externalities associated with the production, transportation and disposal of wastes. The revenue raised from such charges may then be earmarked for solving the specific problem for which the charge was levied. | • Pollution charges, based on pollutant loading  
• Waste generation charges, based on waste quantities and degree of waste hazard  
• Waste user charges, based on collection and disposal services received  
• Waste tipping charges, to unload at transfer or disposal facilities  
• Product charges or fees to handle disposal of problem products, such as batteries, tyres and refrigerators  
• Disposal taxes, added to disposal charges to influence disposal choices  
• Pollution taxes, added to user charges to influence pollution reduction choices  
• Eco-taxes, added to non-renewable energy production or fuels to influence energy demand and fuel choices  
• Presumptive taxes, based on presumed levels of pollution  
• Renewable resource taxes, on virgin materials to influence demand for their use and motivate recycling of secondary materials. |
| Revenue-providing instruments      | These include different kinds of subsidies that seek to reward directly desired behaviour (waste reduction, improved management, or recycling) rather than penalise the behaviour to be discouraged. Subsidies can be direct payments, reductions in taxes or other charges, preferential access to credit, or in-kind transfers such as the provision of land or other resources. These instruments tend to reduce revenues available to the authorities. | • Tax credits and tax relief, allowances on property taxes, customs duties, or sales taxes to motivate investment in waste management improvements  
• Charge reduction, based on proof of recycling or reuse, for reducing wastes requiring collection or disposal  
• Tax rebates, for pollution savings or energy efficiencies  
• Environmental improvement funds, established to support pollution reduction, resource protection, energy efficiency  
• Research grants, to stimulate technology development  
• Carbon sequestration funds, to encourage purchase of lands that rejuvenate air quality, sometimes as a trade-off by polluters  
• Host community compensation, i.e. incentives given by host communities to accommodate waste transfer or disposal facilities  
• Development rights, long-term leases of land and development rights provided to private companies building waste treatment and disposal facilities, or to those finding remedy to and reclaiming old disposal sites. |
| Non-revenue instruments            | These EIs are unlike traditional EIs, as they do not provide revenue. However, they are particularly important for motivating consumers and producers to recycle. They also provide powerful motivators for the private sector to invest in solid waste service delivery and provide the tools that most influence their performance. Non-revenue instruments include trade-off arrangements, deposit-refund systems, take-back systems, product and production change incentives, liability law, performance disclosure, and procurement policies. | • Product life cycle assessment, which predicts overall environmental burden of products and can be used in certification programmes  
• Deposit-refund, deposit paid and refund given upon product return for reuse  
• Take-back systems, where manufacturers take back used products or packaging  
• Procurement preferences, evaluation criteria adding points for products with recycled content or reduced resource demand  
• Eco-labelling, which notes product’s recyclable content and whether product is recyclable  
• Recycled content requirements, laws and procurement specifications noting the precise recycled content required  
• Product stewardship, which encourages product designs that reduce pollution, include the full cost of solid waste recycling and disposal, reduce wastes and encourage recycling  
• Disclosure requirement, in which waste generators are required to disclose their pollution  
• Manifest systems, precise cradle-to-grave tracking of hazardous wastes  
• Blacklists of polluters, published lists enable consumers to consider whether to buy from polluting companies  
• Liability insurance, liability assurances by contractors and private operators  
• Bonds and sureties, guarantees for performance by contractors and private operators  
• Performance-based management contracting where oversight contractors commit to overall service improvements  
• Clean City competitions, which reward neighbourhoods and cities that have improved cleanliness. |
In order to address some of the key issues and challenges facing the financing of waste management in South Africa, detailed research into the above EIs will need to be undertaken.

### 6.2.6 Financing Waste Management from Climate Change Adaptation

The main causes of increased concentrations of ‘greenhouse gases’ (GHG) in the atmosphere are known to be human activity, the unrelenting explosion of populations, the drive for industrialisation and urbanisation. The expected result is a significant warming of the earth’s surface and irreversible changes in climate. The GHGs that contribute the most to global warming are carbon dioxide (CO$_2$), methane (CH$_4$) and nitrous oxide (N$_2$O), which are all produced during the management and disposal of wastes (Friedrich and Trios, 2011). The post-consumer waste sector is said to contribute 3–4% of the total global man-made emissions of GHG, ranging from 50x10$^9$ to 60x10$^9$ tonnes of CO$_2$ equivalent/year (e/year) (Bogner, 2003; Christensen, 2009).

Previous studies on the contribution of waste management to GHG emissions has mainly focused on emissions of methane (CH$_4$) released from landfill sites. Little research has looked at the negative and positive net contributions from components of the entire waste management system and cycle.

These basic contributing factors are necessary to fully understand and exploit the potential of waste management contribution to GHG. There is a direct relationship between the quantities of greenhouse gases generated from waste, the type of waste, its composition, and the socio-economic profile of the area where it is generated (Bogner, et al., 2008; Cointtreau, 2006).

#### Waste generation and waste stream analysis

Studies have shown that developed countries and affluent areas generally generate high quantities of waste (kg/capita/day) compared to developing countries and less affluent or poor areas. An OECD study determined that developed countries in the European Union (EU) and United States (USA) generally produce 1.51 kg/capita/day and 2.08 kg/capita/day respectively, while developing countries (including China, Brazil and India) produce an average of 0.58 kg/capita/day (Troschinetz and Mihelcic, 2009).

In South Africa, the high disparity in the socio-economic profile of cities and towns means that the quantity of waste varies from 0.3 to 1.2 kg/capita/day. The composition of waste also varies: waste streams in less affluent areas and countries contain more biodegradable or organic waste, while in more affluent areas and countries a higher content of recyclable material, such as paper, plastics, aluminium cans, glass and rubber, is found. In most African countries, average waste contains as much as 60% of biodegradable waste. The implication of these findings is that poor or less affluent areas not only face the challenge of higher GHG emissions from biodegradable waste, but also have less material available for potential cost recovery through recycling.

#### Waste collection and transportation and climate change

Although very low compared to landfill emissions, the contribution of waste collection and transportation to GHG emissions is important for estimating the overall GHG contribution of a waste management system. Collection and transportation emissions are generally from nitrous oxide, carbon monoxide and sulphur dioxide and can be indicators of the efficiency and optimisation of waste collection and transportation routes (Salhofer, Schneider and Obersteiner, 2007).

Low emissions from collection and transportation also indicate the level of service delivery for refuse removal: areas with higher collection rates generally have higher carbon footprint from collection vehicles than poorer areas with lower collection rates. The environmental and social cost of poor collection far outweigh the GHG emissions contribution from transporting the waste (Shimura, Yokota, and Nitta, 2001).

The most important factors to consider regarding GHG emissions when collecting and transporting refuse include:

- **Mode of transport**: compared to rail, road transport generally contributes more per tonne of waste (Salhofer, Schneider, and Obersteiner, 2007). In South Africa, East London, Knysna and Cape Town have investigated but not fully implemented the waste-by-rail (WBR) option, where transfer stations and waste disposal facilities are located along railway routes. The WBR option not only is a climate change adaptation option, but also provides a comprehensive waste transfer system that links waste management facilities (transfer stations, recycling centres and regional landfill sites) using the existing Spoornet/Transnet railroad grid. The advantages of a WBR system are a safer, more environmentally sustainable and economical revolutionary bulk waste transportation system (Joynes and Dean, 2011). Municipalities can reduce waste transportation costs using the rail option where practical and possible.
• Distance travelled: the longer the distance vehicles travel to waste management facilities, the higher contribution of GHG emissions. Furthermore, in the long term, the cost of wear and tear and maintenance of refuse trucks becomes unaffordable for municipalities. An optimisation study is required into the financial and environmental cost of the regionalisation option of landfill sites, where a number of municipalities can use a single regional landfill versus the cost effectiveness of transportation of waste over long distances.

• Population densities: transportation of waste from densely populated areas is more efficient, economical and contributes less GHG emissions than collections from sparsely populated rural areas (Larsen et al., 2009). The implication is that spatial planning of South African towns should take into account the financial and environmental cost of waste management and service delivery.

Waste recycling and climate change

Recycling fractions of municipal waste offers the highest benefit with regard to GHG savings from waste management (USEPA, 2006; Christensen, 2009; Smith et al., 2001). Economic and technical data shows that the effect of recycling on GHG emissions presents definite advantages for all municipalities in all countries, regardless of the social and economic disparities (e.g. van Beukering and van den Bergh, 2006 and Uiterkamp, Azadi, and Ho, 2011).

Table 6.4. GHG savings from recycling of municipal waste (tonnes of CO₂/MT of waste)

<table>
<thead>
<tr>
<th>Waste Fraction/Material</th>
<th>EU Countries</th>
<th>USA</th>
<th>Developing Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper (Mixed)</td>
<td>-0.60</td>
<td>-3.19</td>
<td>-0.58</td>
</tr>
<tr>
<td>Plastic (HDPE)</td>
<td>-0.49</td>
<td>-1.26</td>
<td>-0.44</td>
</tr>
<tr>
<td>Plastic (PET)</td>
<td>-1.76</td>
<td>-1.40</td>
<td>-1.74</td>
</tr>
<tr>
<td>Glass</td>
<td>-0.25</td>
<td>-0.27</td>
<td>-0.23</td>
</tr>
<tr>
<td>Metal (Iron)</td>
<td>-1.48</td>
<td>-1.63</td>
<td>-1.25</td>
</tr>
<tr>
<td>Aluminium</td>
<td>-9.07</td>
<td>-12.31</td>
<td>-5.06</td>
</tr>
</tbody>
</table>

According to the Paper Recycling Association of South Africa (PRASA), in 2009, South Africa imported 73 tonnes of recycled paper and exported 17 tonnes of recycled paper. South Africa remains a very small contributor to the global recycling market compared to other countries. For example, in the same period the United Kingdom (UK) exported 4.7x10⁶ tonnes of paper and 0.5x10⁶ tonnes of plastic to China (WRAP, 2010).

Composting and climate change

Composting uses micro-organisms to oxidise biodegradable wastes into carbon dioxide and water vapour (oxygen in the air is the oxidising agent). The humus-like residue can then be used as a soil conditioner in agriculture or land reclamation, or possibly as a growing medium in gardening or horticulture. Use of compost may have beneficial effects on GHGs fluxes, by replacing other products such as fertiliser and peat and may also lead to increased storage of carbon in the soil (carbon sequestration).

In many developed and developing countries, composting is used to deal with the biodegradable fraction of their municipal waste (Bogner et al., 2008). Composting offers real advantages for saving landfill airspace, which is at a very high premium in most of South Africa’s metros and cities, and for improving food security through increased production. Since the decomposition process is aerobic, composting also generates less GHG than landfilling. Europe contains about 2 000 composting facilities for household organic waste (Boldrin et al., 2009) and has a successful policy to divert organic wastes from landfilling into composting.

Composting is a viable alternative for South Africa because of the high biodegradable content in waste streams from most municipalities. However, many of the large-scale, earlier composting initiatives failed in some countries, whereas the smaller, decentralised operations seem to be currently more successful (Coffi e et al., 2009).

The clean development mechanism (CDM), part of the United Nations Framework Convention for Climate Change (UNFCCC), has a programme for certified emission reduction (CER) projects. These projects include AM0025 (large-scale projects), which use alternative waste treatment processes to avoid emissions from organic waste, and AMS-III.F
(small-scale projects), which avoid methane emissions through composting. For South African municipalities, these programmes are a way of reducing both waste management emissions and costs.

**Anaerobic digestion and climate change**

Similar to composting, anaerobic digestion has huge potential for GHG emission savings and for cost recovery. Anaerobic digestion is a biological process, which takes place in sealed vessels in the complete absence of air. The process converts biodegradable waste to a biogas containing methane (CH\(_4\)) and carbon dioxide (CO\(_2\)). The biogas is then used as a fuel, potentially displacing fossil fuels. Anaerobic digestion is essentially a controlled and accelerated decomposition process using the same types of micro-organisms that produce methane in landfills. The volume-reduced solid residue (digestate) is used as compost, usually after a period of maturation. However, clean source-segregated feedstock is essential if the compost is to be suitable for marketing.

The CDMs projects AM0025 and AMS-III.F are applicable to AD and represent opportunities that South Africa should explore further.

**Incineration and climate change**

Incineration accounts for over 130x10\(^6\) tonnes of waste per year in over 600 plants worldwide (Bogner et al., 2008) and is becoming a major energy source and fuel replacement. Although the policy seems to favour controlled incineration, this process is not widely used in South Africa because of the authorisation of incinerators and the very high costs of operation. Another negative factor is the high composition of organic fraction, high moisture content and lower calorific value in local waste streams (Barton, Issaias, and Stentiford, 2008). GHG emissions from incineration are considered small at around 40x10\(^6\) tonnes CO\(_2\) per year, or less than one-tenth of the emissions from landfills (Bogner et al., 2008).

**Waste disposal by landfill and climate change**

The majority of studies investigating GHG emissions from waste management systems have focused on landfills and their methane emissions as the major contributing component. In 2004–2005, about 1.4x10\(^9\) CO\(_2\) e/year, or approximately 18% of the global anthropogenic methane emissions, were estimated to be from landfills and wastewater treatment processes (Bogner et al., 2008). The amount of landfill gas generated from these sites depends on a number of factors, including the type and composition of waste deposited, the biodegradability of the waste and the age of the waste body (Komilis, Harn, and Stegmann, 1999; Thompson et al., 2009).

**6.2.7 The Cost of Waste Management**

An important question raised by the DEA during the stakeholder engagement was the cost of waste management in South Africa.

In South Africa, municipalities (and in some instances industry) are mandated by law to develop and implement sustainable, integrated management plans and systems. In most cases the responsibility of municipalities to provide waste management services are in line with the hierarchy illustrated in Figure 6.1 and include collection, sorting, transportation, recycling, and treatment\(^3\) and disposal of waste.

In order to meet these obligations and services, municipalities have to develop sufficient waste management systems, institutional capacity, enabling policies and legal requirements, administrative budgets, environmental awareness and, importantly, a full cost accounting (FCA) system.

Studies of the development and effectiveness of accounting systems for MSWM, or cost benefit analysis (CBA) agree that, for a municipal waste management system to be cost effective, the level of service or performance must be maximised and the environmental impact of the services must be minimised (Haddix, 1975; Goddard, 1995; Bel and Warner, 2008).

A narrow view of cost-effectiveness focuses on the monetary values of the service or product in the markets. However, a broader approach considers South Africa’s socio-economic challenges, equity policy, the Bill of Rights and the environmental

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\(^3\) Although waste treatment is a higher priority in the South African waste hierarchy, municipalities have not relegated this option to the private sector. Reasons for this could be the high technology, skills and intensive capital and operational requirements of waste treatment technologies.
cost and impact of waste management, all of which may result in significant costs and impacts that are not counted in the current financial accounting systems for waste management in most municipalities.

To address these challenges and deficiencies, an integrated CBA or FCA for municipal waste management should be encouraged and implemented. The FCA encompasses both internal (i.e. financial) and external (e.g. macro-economic, environmental and social) items simultaneously with a variety of environmental applications (ADB, 1997; Costanza et al., 1997, 1998; USEPA, 1997; Pearce, Atkinson and Mourato, 2006; Moutavtchi et al., 2008; TEEB, 2010).

**Full cost accounting (FCA) of waste management**

FCA is an accounting and decision support tool that refers to the process of collecting and presenting information for the available alternatives, in order to arrive at a decision. It recognises, quantifies and allocates cost-related items to a process, or a product, by counting the environmental and social cost (USEPA, 1996; Higgins, 1999; Shore and Duchesne, 1997). FCA is an accounting practice that can help local governments identify and manage the actual costs of waste management systems and services. It differs from other common government accounting practices because it facilitates decision making by assigning value to the direct and indirect operating costs along with upfront (past) and back-end (future) expenses (USEPA, 1996).

FCA can help municipal solid waste and financial planners to (USEPA, 1996; Hogg, 2002; Miranda et al., 1994):

- Plan and analyse future budgets for waste management;
- Identify the costs of acquiring equipment and materials, siting and constructing new infrastructure, rehabilitating ageing infrastructure, collecting, processing and marketing of recyclables, and transportation.
- Identify and evaluate the operating and maintenance costs of waste management facilities (e.g., transfer stations, landfills, and materials recovery facilities).
- Identify the costs and benefits of waste management programmes, such as clean-up campaigns of illegal dumping and littering.
- Identify and evaluate the cost and impact of closing waste management facilities (e.g. landfill closure and post closure).
- Identify and evaluate the cost of awareness programmes and waste-wise promotions.
- Identify the costs of administration/overheads and any other hidden cost.
- Trace and reform the inefficiencies of a waste management system, project or service;
- Evaluate scenarios financially and the potential impact on the quantity and quality of the waste.
- Investigate the potential for implementing new and/or innovative systems for waste minimisation, collection, recycling, treatment and related charges for these services;
- Investigate and analyse the impact of free basic services, tariffs for waste management and financial incentives for reducing waste generation.

**Benefits of full cost analysis**

FCA offers municipalities short-, medium-, and long-term benefits, including the following:

- Transparency and better explanation of costs: the Municipal Finance Management Act (MFMA) Act No. 56 of 2003 (South Africa, 2003), called for accounting officers of municipalities to maintain systems for sustainable quality financial statements and accounting management information for the various municipal assets, functions and roles. Each year, a number of municipalities receive ‘qualified’ audits for reasons that include poor accounting for waste management, obscuring the cost of providing solid waste services in the general fund, lack of financial resources dedicated to operating and maintaining waste management facilities and closing illegal dumpsites. The
Financial and Fiscal Commission

CHAPTER 6

FCA allows for all waste management costs to be revealed, enabling solid waste managers and decision-makers to explain budgets to the Auditor-General and to the public.

- **Ability to learn the full costs of MSW services in communities.** FCA provides a systematic approach to isolating MSW costs, so that they do not get lost among other expenditures. Knowing what drives waste management costs will enable local officials to make more informed decisions about how to manage their services.

- **Accurate picture of total waste management programme costs.** Using depreciation and amortisation, the FCA reveals peaks and valleys in expenditures rather than focusing solely on cash flow.

- **More cost-efficient waste management.** By assessing the actual cost of services, FCA allows local government to identify a more systematic approach to waste management.

- **Improved negotiating power.** Municipalities that understand the costs involved in providing waste management services are in a stronger position when negotiating with vendors and the private sector (especially if seeking to privatise services). FCA can also help municipalities that run their own operations to determine whether their costs are competitive with the private sector.

- **Accurate costs of managing waste.** The FCA can help municipalities to achieve important solid waste management goals, by identifying actual costs and potential cost savings, thereby providing a sound basis for deciding whether to provide services in-house or to privatise.

- **Benchmarked waste management financing.** The use of FCA can aid financial planners at national, provincial and local government levels by documenting current benchmarks for financing and CBA of waste management services.

Other key benefits include assisting municipalities to:

- Make decisions
- Set tariffs, rates and tipping fees
- Defend budget requests
- Evaluate options and alternatives
- Evaluate privatisation decisions
- Communicate cost information
- Plan new facilities
- Determine actual programme costs
- Make investment decisions
- Target cost reductions.

**CBA of waste management services**

Although the benefits of FCA are undisputed, some have argued that the original model of FCA emphasises cost estimates rather than benefits (USEPA, 1996) and internalities rather than externalities (Weng and Fujiwara, 2011). External costs and benefits (e.g. environmental and social benefits) appear to be considered only when the environmental costs are prevented in the FCA framework. Studies of the externalities and CBA of landfill sites in Sweden and South Africa concluded that, although the external (environmental and social) costs of waste management facilities or activities such as landfill operations are difficult to quantify in monetary terms, they are not generally reflected in municipalities’ accounting systems for waste management (Moutavtchi et al., 2008; Nahman, 2011).
The result is a bias against alternative waste management options, such as recycling, composting and treatment, all of which may be more expensive and require high initial capital outlays and skills than traditional dumpsite or landfill sites, if looked at from a purely financial perspective (Nahman, 2011). However, these alternatives are often preferable from an environmental and social perspective.

Given the above, municipal waste management and financial planners need to take into account external aspects (environmental and social benefits) when quantifying costs. The alternatives and options can then be compared based on their overall costs to the user, as well as the financial and external costs.

A study estimating the external costs of landfill sites in the City of Cape Town found that they are currently R111 per tonne of waste. However, these costs could decline if energy is recovered, or if the existing urban landfills are replaced with a new regional landfill (Nahman, 2011).

Table 6.5, although not exclusive, outlines some of external environmental and social cost benefits that can be explored in waste management systems planning and accounting.

Table 6.5. Externalities/cost benefits of waste management options

<table>
<thead>
<tr>
<th>Externality</th>
<th>Description</th>
<th>Cost Benefit Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste reduction</td>
<td>• Waste generation reduction</td>
<td>• Less environmental degradation because of the increased waste quantity (benefit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Landfill air space saving (benefit)</td>
</tr>
<tr>
<td>Resource recovery</td>
<td>• Recycling of resources</td>
<td>• Lower environmental costs of raw resources excavation (benefit)</td>
</tr>
<tr>
<td></td>
<td>• Recovering energy</td>
<td>• Lower environmental costs of pollutions from high-polluted energy production processes (benefit)</td>
</tr>
<tr>
<td>Air pollution</td>
<td>• Pollution from truck fleets, landfills, stacks and other waste facilities</td>
<td>• Medical spending because of effect on human health (cost)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recovery costs of the global warming mitigation (cost)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Changes in the values of neighbouring real estate (cost)</td>
</tr>
<tr>
<td>Water pollution</td>
<td>• Leachate and contaminated run-off pollution of water resources</td>
<td>• Remediation costs of polluted soils and waters (cost)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recovery costs of the affected ecosystems (cost);</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Medical spending because of effect on human health (cost)</td>
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<tr>
<td></td>
<td></td>
<td>• Changes in the values of neighbouring real estate (cost)</td>
</tr>
<tr>
<td>Landscape</td>
<td>• Visual intrusion on the neighbouring area</td>
<td>• Changes in the values of neighbouring real estate (cost)</td>
</tr>
<tr>
<td></td>
<td>• Remediation of a decommissioned landfill</td>
<td>• Recreation values of the remediated site (benefit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ecosystem service values of the remediated site (benefit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Changes in the values of neighbouring real estate (benefit)</td>
</tr>
<tr>
<td>Traffic</td>
<td>• Traffic impact of refuse trucks</td>
<td>• Changes in the values of neighbouring real estate (cost)</td>
</tr>
<tr>
<td>Social and macro-economic</td>
<td>• Creation of job opportunities, infrastructure, level of service</td>
<td>• Economic impacts owing to the increases of job opportunities (benefit)</td>
</tr>
<tr>
<td></td>
<td>• Urban safety risks</td>
<td>• Changes in the values of real estate (benefit)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Changes in the values of neighbouring real estate (cost)</td>
</tr>
</tbody>
</table>
Most municipal Integrated Waste Management Plans clearly show a huge gap in considering the externalities of the various alternatives and options for waste management.

### 6.2.8 Job Creation from Waste Management

Waste recycling can create three forms of jobs, direct, indirect and induced (Friends of the Earth, 2010). For example, direct jobs can be created in public and private waste recycling facilities, while indirect jobs can be created through businesses that purchase recyclable commodities, such as brokers and processors (compost manufacturers and scrap metal dealers). Induced types of jobs include remanufacturers or reusers of recyclable materials and charity shops that sell used merchandise.

Creating jobs within the waste management sector is about creating valuable and sustainable ‘green jobs’, or jobs in sectors that demand less excessive carbon emissions. As landfi lling – the traditional source of waste disposal – has become more expensive because of closures and stricter operating requirements, recycling is becoming an alternative for waste disposal (Halstead, 1994)

Even through the data has gaps, internationally, especially in the USA, UK and EU, recycling has been shown to contribute significantly to the economy through gross value add (GVA), tax revenue and job provision. The value-add studies looked at the difference between the value of goods and services produced and the cost of materials and supplies used to produce them (Halstead, 1994). The studies caution against jobs displacement within this sector, as waste and resource allocation policies too often overlook employment and social dimensions. The Friends of the Earth (2010) suggest that these challenges can be met through creating opportunities for valuable and sustainable ‘green jobs’. In the USA, recycling generates more than twice the revenue of the landfill and incineration industry. Recycling also produces 10 times more jobs because it recovers greater economic value bound up in discarded products and equipment.

In South Africa, the 2011 Local Government Budget and Expenditure Review indicates a potential to create jobs through community-based delivery mechanisms, which are unfortunately limited (National Treasury, 2011). National government has begun piloting labour-intensive approaches to expand the solid waste services, which has the potential to create an estimated 3 000 permanent jobs in the non-public sector.

Goal 1 of the South African National Waste Management Strategy (NWMS), as prescribed by the National Environmental Management: Waste Act (Act no. 59 of 2008), is “securing ecologically sustainable development while promoting justifiable economic and social development” (South Africa, 2008). The objectives are to: ensure the protection of the environment through effective waste management measures; protect the health and well-being of people by providing an affordable waste collection service; grow the contribution of the waste sector to GDP; increase the number of jobs within waste services, recycling and recovery sectors; and promote small, medium and micro enterprises (SMMEs) in the waste sector.

Three of the six objectives are directly linked to employment, job creation and creating opportunities for generating income and improving livelihoods, particularly for the poor and previously disadvantaged communities. The NWMS goes further and sets out key performance indicators (KPI) and targets for these objectives as shown in Table 6.6.

#### Table 6.6. Employment, job creation and GDP indicators from waste sector

<table>
<thead>
<tr>
<th>Externality</th>
<th>Description</th>
<th>Cost Benefit Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste reduction</td>
<td>Waste sector as a % of GDP</td>
<td>Waste sector to contribute 2% to GDP</td>
</tr>
<tr>
<td></td>
<td>% increase in jobs within waste services, recycling and recovery sectors</td>
<td>10% increase in employment within waste services, recycling and recovery sectors</td>
</tr>
<tr>
<td></td>
<td>Number of SMMEs operating sustainably in waste sector</td>
<td>20% increase in SMMEs within waste sector</td>
</tr>
</tbody>
</table>

*Source: DEA, 2010*
The above targets may be ambitious and unrealistic, but the consensus is that jobs and employment need to be created and SMME activity promoted in the waste sector.

Within the waste industry, the effect of the current and ever-changing policy and regulatory framework in South Africa has been much debated. Alternative waste management options, such as recycling, reuse and recovery, can trigger and create opportunities for employment particularly for the poor and previously disadvantaged and/or the low skilled. At the same time, the increased cost of waste management services may lead to the loss of (potentially higher quality) jobs in other sectors of the economy.

More debate is needed, and further research is required to explore all potential avenues that can unlock the latent potential for job creation and employment within the waste sector. This study does not go into the detail but highlights key areas of the waste management sector that can unlock employment and job creation in South Africa.

The literature review revealed a number of hypotheses that support the linkage between employment, job creation and waste management, including:

- Evidence that well-designed policies can offer opportunities to create positive effects on employment.
- The demand for low-skilled labour is high because of the labour-intensive nature of waste management services e.g. street cleansing, refuse collection, sorting and recycling of wastes, especially in less industrialised countries with less mechanised systems; hence the opportunity for job creation and employment.
- Waste management services in municipalities should create such jobs and employment opportunities for the poor and previously disadvantaged through community-based waste collection systems and recycling programmes.
- The lack of skilled personnel in South Africa may hamper other opportunities, as handling of certain types of (e.g. hazardous) wastes may pose higher occupational health and safety risks and require semi-skilled, skilled and higher qualified labour. This gap needs to be addressed within the education sector, where higher learning institutions and FET colleges provide very limited training in waste management.
- Waste management measures can give rise to costs and related impacts that influence the competitive position of industry, which can in turn affect employment levels.
- Advanced technologies and waste minimisation measures, which may be encouraged through implementing high standards for waste treatment, can have significant business benefits.

A review of statistics on employment from different regions around the world paints a good picture of the waste management sector’s potential for job creation and employment. (ECOTEC, 1997; OECD, 1997) The overall level of employment in the environment industry in Europe totals between one and three million people, or between 0.4% and 1.2% of overall employment.

### Table 6.7. Employment from waste collection, treatment and disposal services

<table>
<thead>
<tr>
<th>Year</th>
<th>Employment</th>
<th>% Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996–1997</td>
<td>9107</td>
<td></td>
</tr>
<tr>
<td>2002–2003</td>
<td>14386</td>
<td>7.90%</td>
</tr>
<tr>
<td>2004–2005</td>
<td>26617</td>
<td>36.00%</td>
</tr>
<tr>
<td>2005–2006</td>
<td>26492</td>
<td>-0.50%</td>
</tr>
<tr>
<td>2006–2007</td>
<td>27347</td>
<td>3.20%</td>
</tr>
</tbody>
</table>

Source: ABS, 2008
Job creation from recovery, reuse and recycling of waste

The recycling industry in South Africa is growing: from 2006 to 2009, the tonnes of plastic recycled rose by approximately 32% (SAPRO and PFSA, 2011). Recycling (rather than disposing in a landfill) one additional tonne of waste would pay R1,095 per tonne more in salaries, produce R4,905 more in goods and services, and generate a further R1.3 million in sales. South Africa has an estimated 200–220 plastics recycling manufacturers, employing approximately 4 800 people and creating over 35 000 indirect jobs, which translates into an annual payroll of R250 million (SAPRO, 2011). The DEA estimates that the country’s recycling industry provides approximately 90 000 jobs (DEA, 2010). Most of these jobs are in the collection and sorting phases of recycling, as well as informal recycling activities such as ‘waste-picking’ on landfills. Government is keen to expand and promote the involvement of SMMEs, co-operatives and EPWP projects, through implementing separation at source and establishing buy-back centres and materials recovery facilities.

Is community-based waste management a solution?

The general consensus is that South Africa faces serious challenges in waste management, including inadequate waste services for low-income communities and inequalities in the provision of waste services and unemployment. Inadequate and inequitable waste services involve poor to no collection, recycling, treatment and waste disposal services and infrastructure.

As no single solution can meet all these challenges, a multi-faceted and integrated approach needs to be adopted. Community-based waste management (CBWM) is a possible solution to some of these problems. Low-income and rural communities suffer from inadequate solid waste services, as narrow lanes and unpaved roads hamper the access of conventional refuse collection vehicles. Other concerns include the low-income communities’ lack of political power, unauthorised and unplanned character of their areas, and lack of technical and financial means of local governments to serve low-income communities.

Case studies, in South Africa and internationally, provide insights into the role community participation can play in solving some of these challenges. Community-based structures can (Barrientos, 1989; Hawkins, 1989; Panneer Selvam, 1993):

- provide local administrative structures,
- participate in planning appropriate waste management systems,
- participate in decision making,
- participate in financial control and treasury,
- participate in awareness and education for training,
provide voluntary, paid or subsidised labour for waste collection, recycling and disposal systems,

communicate about the coordination of primary and secondary collection systems,

exercise political pressure on the municipality,

forward complaints about performance service,

act as community watchdogs for behavioural change,

mobilise the community for waste management activities e.g. clean-up campaigns,

provide an opportunity for women and youth to participate equitably in waste management and job creation.

Examples of active participation of women and youth in waste management are found in Nelson Mandela Bay Metro Municipality in the Eastern Cape and many developing countries, including India, Pakistan, Indonesia, Ivory Coast, Zambia, Peru, Columbia and in the Caribbean.

A number of different configurations of community-based solid waste management organisations are employed in South Africa and around the world. Table 6.8 describes three common organisational structures.

### Table 6.8. Typologies of community-based waste management organisations

<table>
<thead>
<tr>
<th>Typologies of CBWM Organisation</th>
<th>Description</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community-based micro-enterprises.</td>
<td>Micro-enterprises are cooperative businesses with 8–25 members who share responsibilities and income and who operate together a waste collection scheme, street sweeping, etc. Sometimes (but not always) members of a micro-enterprise live in the community where they operate a service. They are included as part of community management only when community members have some control over the service. Community-based organisations (CBOs) derive their members from and operate in a specific community (township or village, in a rural context).</td>
<td>• These CBO and micro-enterprises may work together to manage and operate a solid waste service in a community, sometimes with separate objectives. A CBO usually works more from the operational perspective, while a micro-enterprise will generally focus more on generating income. • Generally the CBO has management and supervision tasks, while the micro-enterprise is responsible for operating the service.</td>
</tr>
<tr>
<td>Municipality or local government working together or facilitating community-based organisations.</td>
<td>Local governmental and governmental institutions assist the CBOs. These institutions may be the governmental agency responsible for solid waste management or, more commonly, the local governmental authorities, either administrative bodies or government-led development committees. Usually these governmental institutions have relative autonomy from the central government and are motivated by their need to control all community services.</td>
<td>• Such institutions are usually involved in the overall supervision of the solid waste service, but in some cases their participation extends to financial control or technical support, e.g. the provision of a refuse collection vehicle. In this organisational structure, the service is operated and managed by several CBOs, which are either motivated by income generation or by the interest in clean communities. • Examples of this structure, whereby local municipalities intentionally establish and support CBWM are in Nelson Mandela Bay Metro Municipality: Buyisa e Bag and Indhalo Yethu, which are section 21 companies established by the DEA to fund and support CBWM, especially recycling projects. • Examples of such CBWM structures have been found to work effectively in many developing countries around the world.</td>
</tr>
</tbody>
</table>
### Chapter 6

#### Non-governmental organisations and community-based organisations

Community-based solid waste services can also be managed by a cooperation of non-governmental organisations (NGOs) and community-based organisations (CBOs). The clearest difference is that NGOs usually operate on a larger geographical scale, at city, regional, national or even international level. NGOs usually set up community-based solid waste management as a development project and work together with CBOs only in operating and managing these services.

- The role of NGOs is confined to overall supervision, but very frequently also includes financial assistance and control, training and recruitment of management committee members and of operators, and other technical support.
- CBOs play several roles in operation and management, similar to when cooperating with governmental institutions.
- A number of NGOs support and fund waste management projects in South Africa and other countries.

#### Funding and donor agencies, local government and community-based organisations (CBO)

Funding agencies and international donor agencies also form funding contracts and agreements with structures to support community-based solid waste services. Funding agencies typically use local government (municipalities) as the vehicle for funding the CBWM projects.

- The role of funding and donor agency is confined to overall financial assistance and monitoring and evaluation of the projects.
- The funding agency may use the municipality as the vehicle for control, training and recruitment of management committee members and of operators, and other technical support.
- CBOs play several roles in operations and management, similar to when cooperating with governmental institutions.
- Examples of these include projects funded by agencies such as Development Bank of Southern Africa (DBSA), DANIDA, SIIDA World Bank /IFC.

### 6.3 Methodology

After the literature review, an analysis of the existing funding arrangements captures the budget and expenditure patterns, to determine the extent of expenditure that has been properly channelled and determine areas where funding mechanisms have worked.

The status quo was established by sending survey questionnaires to a sample of municipalities. Secondary data on municipal waste management data was gathered from the General Household Survey, the Municipal Demarcation Board (MDB) and other government departments and institutions.

### 6.4 Findings and Discussions

#### 6.4.1 Municipal Budget and Expenditure Trends in South Africa

The revenues and expenditures of municipalities determine their ability to deliver services (National Treasury, 2008). Waste management has become significant to the metros’ revenue-raising potential (National Treasury, 2011). Ensuring that waste management is both environmentally and financially sustainable could contribute significantly to the financial sustainability of the municipalities.
Table 6.9 shows that municipalities spent R7.3 billion on waste management in 2009/10. The total recorded net deficit of R2.17 billion implies that municipalities are under budgeting for this service. Across provinces, the big difference in total expenditure to total revenue reflects the extent to which this service is under budgeted for in municipalities and its urban bias. Rural-based provinces, such as Limpopo, Mpumalanga and the Northern Cape, trail behind urbanised provinces such as the Western Cape, Gauteng and KwaZulu-Natal. One challenge for rural provinces with relatively high populations, for example, Limpopo and Mpumalanga, is pollution that may affect the livelihood of communities if not managed.

Among municipalities, waste management budgets vary considerably and are inconsistent from year to year. The situation is more pronounced in rural municipalities, which could be because the service is classified as basic, therefore subsidised. This means that, even though municipalities receive compensation to offer the service to communities at a reduced rate, rural municipalities do not have a sufficient tax base and so choose not to impose a surcharge on waste management.

Table 6.10. Metros’ operating revenue, 2003/04–2009/10

<table>
<thead>
<tr>
<th>Apr-03</th>
<th>May-04</th>
<th>Jun-05</th>
<th>Jul-06</th>
<th>Aug-07</th>
<th>Sep-08</th>
<th>Oct-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>R million</td>
<td>Outcome</td>
<td>Estimate</td>
<td>Medium-term-estimates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Revenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property rates</td>
<td>9 967</td>
<td>11 531</td>
<td>12 157</td>
<td>12 725</td>
<td>14 844</td>
<td>15 832</td>
</tr>
<tr>
<td>Service charges</td>
<td>23 268</td>
<td>24 477</td>
<td>25 456</td>
<td>28 506</td>
<td>30 522</td>
<td>32 311</td>
</tr>
<tr>
<td>Regional Service Levies</td>
<td>3 341</td>
<td>5 031</td>
<td>5 401</td>
<td>115</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Investment revenue</td>
<td>1 081</td>
<td>1 388</td>
<td>1 558</td>
<td>1 940</td>
<td>2 703</td>
<td>2 735</td>
</tr>
<tr>
<td>Government grants</td>
<td>2 371</td>
<td>4 513</td>
<td>4 019</td>
<td>11 425</td>
<td>12 487</td>
<td>13 004</td>
</tr>
<tr>
<td>Public contributions and donations</td>
<td>33</td>
<td>474</td>
<td>495</td>
<td></td>
<td>598</td>
<td></td>
</tr>
<tr>
<td>Other own revenue</td>
<td>3 603</td>
<td>4 511</td>
<td>4 875</td>
<td>6 496</td>
<td>10 539</td>
<td>10 920</td>
</tr>
<tr>
<td>Total revenue</td>
<td>43 665</td>
<td>51 926</td>
<td>54 961</td>
<td>61 804</td>
<td>71 115</td>
<td>74 802</td>
</tr>
</tbody>
</table>
As Table 6.10 shows, in 2003/04 service charges (including refuse removal) contributed 53% of municipal operating revenue, but declined to 44% in 2009/10. Reasons for this drop can be attributed to the non-payment of water and electricity accounts, increasing consumer debt and the under-pricing of utility services (of which solid waste is one), coupled with non-collection of revenue on available sources including municipal solid waste.

Mobilising financial resources has always been a challenge for municipalities and hampers service delivery. Most budget allocations do not reflect waste management because it is seen as low priority. Furthermore, tariff structures are not uniform, as Table 6.11 shows. Compared to other metros, the City of Cape Town has a much more uniform tariff structure (R79.59/property/per month). The City of Johannesburg uses the property value to differentiate between consumers, ranging from R77.89 for properties worth R150,000–R300,000 to R189.93 for properties of R1.5 million and above. Both Nelson Mandela Bay and Johannesburg distinguish consumers who qualify for the free service. The Nelson Mandela Bay Metro also offers the service to non-domestic customers, such as trade and special waste. The lowest tariff for Nelson Mandela Bay is R14.02 for informal households, which is comparable to Tshwane’s tariff of R14.48 for 85 litres of waste per week.

Like Ekurhuleni, the City of Tshwane has the most comprehensive tariff structure and pricing range for solid waste collection on a weekly or monthly basis. Unlike the other metros, Tshwane is able to deliver the service to households up to seven days a week, although at a higher rate of R1,312.08. In Tshwane and Ekurhuleni, the municipality is responsible for purchasing the correct size of the rubbish bin. The only difference between the two metros is that Ekurhuleni uses a range of volumes to be collected.

Comparing tariffs across metros is difficult, apart from the weekly 240 litre bin service, which is offered by the metros of Cape Town, Tshwane and Ekurhuleni. Using this service as a benchmark, Tshwane offers the cheapest rate (at R40.90), followed by Cape Town and Ekurhuleni at twice the rate, of R79.59 and R82.77 respectively.

Table 6.11. Tariff structures of the six metros (2011)

<table>
<thead>
<tr>
<th>Rand millions</th>
<th>Level of service</th>
<th>Tariff structure &amp; monthly rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Town</td>
<td>Weekly 1 X 240l bin</td>
<td>R 79.59</td>
</tr>
<tr>
<td></td>
<td>Weekly 85l bin/bag: 1 X 85 l bin or 3 bags</td>
<td>Account to property owner. Basic bag service (weekly service is equivalent to a maximum of 3 bags/85L bin)</td>
</tr>
</tbody>
</table>
### CHAPTER 6

#### Table: Tariff structure & monthly rate

<table>
<thead>
<tr>
<th>Rands millions</th>
<th>Level of service</th>
<th>Tariff structure &amp; monthly rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R150,000 and less (including Indigent Households)</td>
<td>Free</td>
</tr>
<tr>
<td></td>
<td>R150,001 to R300 000</td>
<td>R 77,89</td>
</tr>
<tr>
<td></td>
<td>R300,001 to R500 000</td>
<td>R 90,70</td>
</tr>
<tr>
<td></td>
<td>R500,001 to R700 000</td>
<td>R 103,50</td>
</tr>
<tr>
<td></td>
<td>R700,001 to R1 500 000</td>
<td>R 136,58</td>
</tr>
<tr>
<td></td>
<td>Greater than R1 500 000</td>
<td>R 189,93</td>
</tr>
<tr>
<td>Johannesberg</td>
<td>85lx1 per week</td>
<td>R 14.48</td>
</tr>
<tr>
<td></td>
<td>85lx2 per week</td>
<td>R 28.96</td>
</tr>
<tr>
<td></td>
<td>240lx1 per week</td>
<td>R 40.9</td>
</tr>
<tr>
<td></td>
<td>240lx5 per week</td>
<td>R 204.5</td>
</tr>
<tr>
<td></td>
<td>240lx6 per week</td>
<td>R 245.5</td>
</tr>
<tr>
<td></td>
<td>240lx7 per week</td>
<td>R 286.3</td>
</tr>
<tr>
<td></td>
<td>1100lx1 per week</td>
<td>R 187.44</td>
</tr>
<tr>
<td></td>
<td>1100lx5 per week</td>
<td>R 937.2</td>
</tr>
<tr>
<td></td>
<td>1100lx6 per week</td>
<td>R 1,124.64</td>
</tr>
<tr>
<td></td>
<td>1100lx7 per week</td>
<td>R 1,312.08</td>
</tr>
<tr>
<td>Tshwane</td>
<td>Domestic waste collection charge per month in formal households</td>
<td>*R 55.23</td>
</tr>
<tr>
<td></td>
<td>Domestic waste collection charge per month in informal households</td>
<td>*R 14.02</td>
</tr>
<tr>
<td></td>
<td>Trade waste per tonne</td>
<td>*R 67.43</td>
</tr>
<tr>
<td></td>
<td>Special waste per tonne</td>
<td>*R 67.43</td>
</tr>
<tr>
<td></td>
<td>Domestic and general waste per tonne</td>
<td>*R 67.43</td>
</tr>
<tr>
<td>Nelson Mandela Bay</td>
<td>Data not available at the time</td>
<td></td>
</tr>
<tr>
<td>Ekurhuleni</td>
<td>0 to 300m2</td>
<td>R 70.85</td>
</tr>
<tr>
<td></td>
<td>301 to 600m2</td>
<td>R 82.77</td>
</tr>
<tr>
<td></td>
<td>601 to 900m2</td>
<td>R 91.94</td>
</tr>
<tr>
<td></td>
<td>901 to 1200m2</td>
<td>R 101.14</td>
</tr>
<tr>
<td></td>
<td>1201 to 1500m2</td>
<td>R 116.46</td>
</tr>
<tr>
<td></td>
<td>1501 to 2000m2</td>
<td>R 131.78</td>
</tr>
<tr>
<td></td>
<td>2000m2 +</td>
<td>R 147.09</td>
</tr>
<tr>
<td></td>
<td>240l bin</td>
<td>R 82.77</td>
</tr>
<tr>
<td></td>
<td>1x per week Flat/town houses</td>
<td>R 77.94</td>
</tr>
<tr>
<td></td>
<td>2 x per week</td>
<td>R 147.92</td>
</tr>
</tbody>
</table>

Source: Various municipalities, 2011

There is a lack of consistent data for waste management (National Treasury, 2011), which does not help with providing insight into solid waste management in South Africa.

### 6.4.2 Extent of Solid Waste Management Provision in South Africa

Waste generation often reflects the economic status of society: the more affluent the society, the greater the waste (Bronberg Enviro Waste, 2012). The waste management baseline study (DEA, 2010) gave waste generation per province. As Figure 6.4 shows, waste generation is highest in Gauteng, at 2.44 tons per capita per annum, the result of high economic activities in the province. Gauteng is followed by Western Cape and Mpumalanga respectively.
Table 6.12 analyses the trends in refuse removal. In 2001 South Africa had 11.7 million households, of which 52% were provided with refuse removal services (StatsSA, 2003). By 2007, the number of households with refuse removal services had risen to 748,000, or a 6% improvement, given the 6% increase in number of households (to 12.5 million). Between 2001 and 2007, nearly a million more households (962,000) had access to refuse removal services (StatsSA, 2007).


<table>
<thead>
<tr>
<th>Province</th>
<th># of households 2001</th>
<th># of households 2007</th>
<th>change in # of households</th>
<th>Access to refuse removal 2001</th>
<th>Access to refuse removal 2007</th>
<th>% of HH with access to refuse removal 2001</th>
<th>% of HH with access to refuse removal 2007</th>
<th>% improvement in access to refuse removal 2001-2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>1505029</td>
<td>1586742</td>
<td>5%</td>
<td>574035</td>
<td>587330</td>
<td>38%</td>
<td>37%</td>
<td>-1%</td>
</tr>
<tr>
<td>Free State</td>
<td>757244</td>
<td>802871</td>
<td>6%</td>
<td>442260</td>
<td>597254</td>
<td>58%</td>
<td>74%</td>
<td>16%</td>
</tr>
<tr>
<td>Gauteng</td>
<td>2887365</td>
<td>3175578</td>
<td>10%</td>
<td>2363932</td>
<td>2691367</td>
<td>82%</td>
<td>85%</td>
<td>3%</td>
</tr>
<tr>
<td>KwaZulu Natal</td>
<td>2231328</td>
<td>2234123</td>
<td>0%</td>
<td>1080769</td>
<td>1125311</td>
<td>48%</td>
<td>50%</td>
<td>2%</td>
</tr>
<tr>
<td>Limpopo</td>
<td>1193138</td>
<td>1215925</td>
<td>2%</td>
<td>187236</td>
<td>214602</td>
<td>16%</td>
<td>18%</td>
<td>2%</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>830254</td>
<td>940403</td>
<td>13%</td>
<td>298798</td>
<td>372576</td>
<td>36%</td>
<td>40%</td>
<td>4%</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>259092</td>
<td>264653</td>
<td>2%</td>
<td>154700</td>
<td>185131</td>
<td>60%</td>
<td>70%</td>
<td>10%</td>
</tr>
<tr>
<td>North West</td>
<td>897806</td>
<td>911121</td>
<td>1%</td>
<td>364421</td>
<td>478840</td>
<td>41%</td>
<td>53%</td>
<td>12%</td>
</tr>
<tr>
<td>Western Cape</td>
<td>1209007</td>
<td>1369181</td>
<td>13%</td>
<td>1057292</td>
<td>1233166</td>
<td>87%</td>
<td>90%</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>11770263</td>
<td>12500597</td>
<td>6%</td>
<td>6523443</td>
<td>7485577</td>
<td>52%</td>
<td>57%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Source: Stats SA, 2007

As Table 6.12 shows, refuse removal services are unevenly delivered across provinces. In 2007, the highest access to refuse removal was in the Western Cape (90%), Gauteng (85%) and the Northern Cape (70%). Between 2001 and 2007, the provinces that improved most the provision of these services were the Free State (by a significant 16%), followed by the North West (12%) and the Northern Cape (10%).
Limpopo has only 9.7% of all the households in South Africa, but only 18% of these have access to refuse removal, making it the least serviced province. Furthermore, the province has not improved significantly since 2001, as only 2% more households received the service in 2007. In Mpumalanga and Gauteng, where numbers of households increased considerably between 2001 and 2007, there has been no significant jump in access to the provision of these services. This trend is also a concern, especially for Mpumalanga which started on a low base of 40%, compared to 85% for Gauteng.

Between 2005 and 2009, the number of municipalities providing solid waste management services increased from 226 to 239, mainly in small towns and mostly rural municipalities. In the main metros, 92.5% of consumers receive this service compared to 16% in rural centres. The overall national picture shows that on average 64.5% of households in all municipalities were already accessing the service in 2009.

Given the current institutional arrangements, challenges to financing waste management remain. Solid waste management funds need to be ring-fenced in order to protect spending on the service. However, this is acknowledged to be impractical in much smaller municipalities. Organisational reforms are also needed, to allow revenue and expenditure authority and accountability to be combined (National Treasury, 2011).

Figure 6.5. Extent of refuse removal by municipality in 2007

Figure 6.5 reflects the extent of municipal refuse removal in 2007 and shows that the service differs widely, from zero collection to 1.5 million households per municipality. Most serviced households (between 212,462 and 1,051,079 households per metro) are found in five metros: Cape Town, Johannesburg, Ekuruleni and Tshwane and eThekwini, followed by Buffalo City and Nelson Mandela, Mangaung and Emfuleni, where between 117,000 and 212,461 households per municipality are serviced. Other towns, such as Rustenburg, Moses Kotane, Newcastle and Mogale each provide refuse removal services to between 48,000 and 117,000 households. The next cluster are mainly township-based municipalities, servicing 14,000–48,000 households per municipality. The remaining municipalities are mostly poor and rural-based, providing refuse removal services to between zero and 14,000 households.
6.4.3 Case Studies of Waste Disposal in South Africa

KwaZulu-Natal

A 2004 study had difficulty finding municipal-level data on waste disposal sites in the province. In some instances municipalities were unable to determine the life expectancy of their disposal sites and thus plan appropriately for future demand. Ninety-five waste disposal sites were visited, of which 55% did not have permits because they were not registered. Over and above the compliance issue, some of the sites were found to be inappropriately located on high water tables and streams, posing a threat of run-off for informal communities located downstream. Other problems included locating of sites close to human settlements, improper disposal and poor management practices. Recycling initiatives were lacking and, where they existed, were illegal.

eThekwini Metro Municipality waste-to-energy projects

eThekwini recorded a total of 4 784 tons of domestic waste and 1 191 tons of grade refuse per month. Commercial waste disposal is handled at landfill sites, where landscaping companies are contracted to provide the service. However, payment for the disposal of waste is reflected on electricity tariff accounts, making it almost impossible to detect.

The CDM viable projects include GHG mitigation strategies for landfills, such as capturing landfill gas for flaring and energy recovery, oxidising methane by using compost landfill cover, pretreating waste and aerobic landfilling. Funding for implementing these technologies at South African landfill sites is possible through the CDM. A good example to study is the eThekwini Municipality landfill gas-to-electricity CDM project at the Bisasar Road site and Mariannhill landfill, the only project of its kind in South Africa. The project produces 7.5 MW of electricity through a purpose-built one megawatt (MW) engine that generates 6.5 MW and a further one MW engine at the Mariannhill landfill site. The capital cost was approximately R100-million, and projected revenue is about R4.5-million per month, recovered from the sale of carbon credits and electricity. According to data from the UNFCCC (Cofie et al., 2009) the eThekwini Municipality CDM projects offset approximately 68 833 metric tonnes of CO₂e/year at Mariannhill and La Mercy landfill Sites and 342 705 tonnes CO₂ year at the Bisasar landfill site.

Table 6.13 compares the capital cost and estimated cost of generation per unit of energy from renewable sources. It shows that waste-to-energy sits below some of the other sources. However, the table does not take into account the environmental cost saving of waste-to-energy. In South Africa, the National Energy Regulator has encouraged the private sector to invest in independent power production through the REFIT programme, but most emphasis has been put on wind and solar energy. However, Table 6.13 suggests that waste-to-energy could provide a better opportunity than solar energy.

Table 6.13. Capital and estimated cost of power generation from renewable sources

<table>
<thead>
<tr>
<th>Source</th>
<th>Capital cost (’000 $/MW)</th>
<th>Estimated cost of generation per unit ($/kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>generation per unit ($/kWh)</td>
<td>890–1100</td>
<td>0.07–0.09</td>
</tr>
<tr>
<td>Small hydro (&lt;25MW)</td>
<td>1100–1300</td>
<td>0.06–0.07</td>
</tr>
<tr>
<td>Bagasse cogeneration</td>
<td>665–775</td>
<td>0.04–0.07</td>
</tr>
<tr>
<td>Biomass</td>
<td>890</td>
<td>0.07–0.09</td>
</tr>
<tr>
<td>Biomass gasifier</td>
<td>555–665</td>
<td>0.07–0.17</td>
</tr>
<tr>
<td>Waste-to-energy</td>
<td>110–2225</td>
<td>0.09–0.17</td>
</tr>
<tr>
<td>Solar PV</td>
<td>5555–6665</td>
<td>0.33–0.44</td>
</tr>
</tbody>
</table>
**Gauteng**

In the Gauteng province, the Mogale City local municipality is faced with solid waste management service delivery backlogs and has difficulty sustaining the operation. According to the Gauteng Department of Agriculture, Conservation, Environment and Land Affairs (GDACEL, 2004), the challenges are increased volumes of domestic growth because of rapid population growth; a lack of adequate refuse removal services in rural municipalities and informal settlements; fragmented waste management plan and delivery system; low priority afforded to waste management by municipalities and other spheres of government (national and provincial); a culture of non-payment for services by the communities and businesses; illegal dumping and littering in open spaces; unmanaged parks; increased costs of waste disposal because of stringent legislative requirements; and a lack of community awareness about prevention, minimisation, reuse and recycling of waste.

**Eastern Cape**

The Nelson Mandela Bay Metro in the Eastern Cape generates about 300 000–350 000 tons of general domestic waste per annum. Using its contractors, the municipality collects daily this waste, which is dumped at landfill sites.

In general, waste generation lacks controls, as shown by households’ generated waste being less than that from industrial and business sectors. The absence of laws allows manufacturers to package their goods in an uncontrolled manner, while the consumer pays for packaging and disposal. Currently only about 1% of the total waste in the metro is recycled. Legislation that introduces a ‘producer pays policy’ might encourage manufacturers to use recyclable materials. Alternatively, PPPs seem to work well in some cases.

As Table 6.14 shows, the amount of general waste generation in Nelson Mandela Bay is expected to increase in the coming years.

**Table 6.14. Projected waste generation**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic growth</td>
<td>3,7%</td>
<td>4,0%</td>
<td>4,3%</td>
<td>4,7%</td>
<td>5,0%</td>
<td>5,0%</td>
<td>5,0%</td>
</tr>
<tr>
<td>Waste generation (tons per annum)</td>
<td>325 000</td>
<td>337 025</td>
<td>350 506</td>
<td>365 578</td>
<td>421 993</td>
<td>538 582</td>
<td>687 382</td>
</tr>
</tbody>
</table>

Source: Nelson Mandela Bay Municipality, 2007

The Nelson Mandela Bay Metro has a waste management division that is responsible for waste management activities: awareness, collection and transport of waste, disposal of waste, development and recycling schemes. Management is financed from levies, surcharges, municipal budgets and external funding.

**6.5 Conclusion**

Broad policies relating to pollution and waste management are in place, and the government is committed to ensuring that the policies and legislative requirements are in line with international policies and agreements. However, the lack of enforcement of regulation and compliance means such policies not effectively implemented. In smaller and rural municipalities, the challenge is accessing the services and making sure services are expanded to previously unserviced areas.

The functional responsibilities between district and local municipalities are unclear and create confusion. These unresolved issues are hampering the government’s commitment to achieving the rights stated in the Constitution and other related legislation, including meeting international commitments to which South Africa is a signatory.

Furthermore, these findings suggest that implementing EIs for solid waste management is a complex issue. In municipalities and private companies across South Africa, almost all respondents felt that EIs should be used to reduce waste generation and increase the diversion of waste from landfill to recycling.
6.6 Recommendations

With respect to financing of waste management, the Commission recommends that:

- By the end of the 2015/2016 financial year, government should phase in full cost accounting (FCA) for solid waste management within municipalities. To achieve this goal:
  
  - Government should develop specific FCA guidelines for integrated municipal solid waste management that addresses the specific and inter-related environmental and service delivery needs of the sector, within the framework of activity-based costing that the National Treasury is introducing.
  
  - Government should develop a capacity-support programme to implement the guidelines that allows a phased introduction of FCA starting with high-capacity municipalities that face major solid waste management challenges.

- Government should take greater advantage of the opportunities for job creation in the solid waste sector, by incentivising municipalities to create ‘green’ jobs through labour-intensive service delivery. In particular:
  
  - The Department of Public Works should review the Expanded Public Works Programme (EPWP), which may negatively impact on the ability of municipalities to support job creation in the sector due to the comparatively higher capital costs associated with solid waste collection and recycling activities;
  
  - The Department of Cooperative Governance (DCoG) should review the funding conditions of the Municipal Infrastructure Grant (MIG) to ensure that local-level municipal waste management assets are eligible for financing.
  
  - A portion of resources from the recently established Green Fund should provide transitional financial support to municipalities that introduce innovative, labour-intensive waste collection, reduction and recycling mechanisms to areas where services are currently inadequate. These might include developing small waste collection and recycling contractors, or community cooperatives to manage waste buy-back centres and materials recovery facilities;
  
  - The DEA should develop municipal guidelines and regulations that support community involvement in waste management activities through community-based trusts and partnerships.

- The DEA should delay implementing the regionalisation of solid waste landfills policy until the fiscal risks and benefits for municipalities are better understood, and adequate decision-support measures for municipalities are in place. In particular:
  
  - The DEA should commission a full cost benefit analysis of regionalisation options, to ensure appropriately scaled projects within a fiscally sustainable licencing and service delivery framework;
  
  - The DEA should develop adequate decision-support tools to guide municipal choices on appropriate investments and the associated governance frameworks, including the use of multi-jurisdictional Municipal Service Districts where appropriate.
  
  - The Commission notes its availability to assist the DEA, on request, to explore further the policy options and risk mitigation tools associated with regionalisation proposals.

- Government should emphasise the expansion of access to solid waste services to poor communities, while strengthening the policy framework for the provision of refuse removal free basic services (FBS). In particular:
  
  - The DCoG should review the MIG guidelines to ensure that (i) adequate funding for solid waste assets is available to municipalities with weaker fiscal capacity; and (ii) expenditures on specialised vehicles and equipment required for solid waste management services are eligible for financing;
  
  - The DEA should prioritise support to municipalities seeking to expand services to poor communities using labour-intensive service delivery, including investigating potential fiscal instruments that might be incorporated with the EPWP or Green Fund;
The DEA should commission a review of the refuse removal FBS policy, with a specific focus on its impacts on (i) expanding and sustaining services to poor households, (ii) the affordability and quality of service to poor households; (iii) environmental impacts, such as the extent of reduction in illegal dumping.

### Appendix 6A. Government, Civil Society and Their Roles in Waste Management

<table>
<thead>
<tr>
<th>Sector</th>
<th>Department</th>
<th>Roles &amp; Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Government</strong></td>
<td>Environmental Affairs</td>
<td>Policy Development</td>
</tr>
<tr>
<td></td>
<td>Traditional Affairs</td>
<td>Setting of National Standards and targets</td>
</tr>
<tr>
<td></td>
<td>Health</td>
<td>Advisory</td>
</tr>
<tr>
<td></td>
<td>Transport</td>
<td>Regulation and</td>
</tr>
<tr>
<td></td>
<td>Trade &amp; Industry</td>
<td>Inspection</td>
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<tr>
<td></td>
<td>Water Affairs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agriculture, Forestry &amp; Fisheries</td>
<td></td>
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<tr>
<td></td>
<td>Mineral Resources</td>
<td></td>
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<tr>
<td></td>
<td>Energy</td>
<td></td>
</tr>
<tr>
<td><strong>Provincial Government</strong></td>
<td>All Provincial departments dealing with Environmental Affairs</td>
<td>Standards and Targets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Authorisations</td>
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<tr>
<td></td>
<td></td>
<td>Advisory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Regulation (permitting of all general waste sites)</td>
</tr>
<tr>
<td><strong>Local Government</strong></td>
<td>Metropolitan municipalities</td>
<td>Waste Service delivery</td>
</tr>
<tr>
<td></td>
<td>District Municipalities</td>
<td>Planning and</td>
</tr>
<tr>
<td></td>
<td>Local Municipalities</td>
<td>Waste Disposal</td>
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<tr>
<td></td>
<td>South African Local Government Association (SALGA)</td>
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<td><strong>Associations and Organisations</strong></td>
<td>Institute of Waste Management of South Africa (IWMSA)</td>
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<td>National Recycling Forum</td>
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<td>Health Care Waste Forum</td>
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<td>Packaging Council of South Africa</td>
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<tr>
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<td>Recycling Actions Group</td>
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<td>Plastics Federation</td>
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<td>Paper Recycling Association of South Africa</td>
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<td>Electronic Waste Association of South Africa</td>
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<td>PET Plastic Recycling South Africa</td>
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<td></td>
<td>Buy- e-Bag</td>
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<td>The Glass Recycling Company</td>
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<td>Collect a Can</td>
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<td>Responsible Packaging Management in South Africa</td>
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<td>Earthlife Africa</td>
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<td><strong>Waste Contractors</strong></td>
<td>Vary in size</td>
<td>Re-claimers</td>
</tr>
<tr>
<td></td>
<td>Collectors</td>
<td>Recyclers</td>
</tr>
<tr>
<td></td>
<td>Recyclers</td>
<td>Operators of waste management facilities</td>
</tr>
</tbody>
</table>

*Source: Department of Environmental Affairs, 2011*
References


