

11

Solid waste services

■ Introduction

Solid waste management and service delivery systems can make critical contributions to public health, environmental sustainability, economic development and poverty reduction.

Effective solid waste management systems can contribute to improving public health outcomes through reducing opportunities for disease spreading vermin to thrive, such as occurs at unregulated local dumpsites. They contribute to enhancing environmental quality by protecting watercourses, ground water and preventing illegal dumping and littering. Well-designed solid waste management systems support both higher levels of economic activity and can contribute directly to poverty alleviation through job creation. Conversely, a failure to provide effective solid waste systems is felt most severely by poor households.

The National Environmental Management: Waste Act (2008) uses the waste hierarchy as its overarching principle for waste management. This hierarchy focusses on waste minimisation, reuse, recycling and recovery in preference to waste disposal. The Act also provides tools to implement the waste hierarchy through integrated waste management planning, providing for the development of integrated industry waste management plans, the identification of priority waste, waste licencing and the development of regulations to manage specific waste streams. Managing waste in line with the waste hierarchy has the potential to provide jobs as recycling requires infrastructure and opens new markets. The Department of Environmental Affairs and Tourism's Waste Management Strategy seeks to address the backlog in the provision of waste services particularly to urban informal settlements and rural/tribal areas.

Effective solid waste management systems can contribute to improving public health outcomes

This chapter gives an overview of:

- institutional arrangements for solid waste services
- access to solid waste services
- financing solid waste services
- waste minimisation, recycling and energy recovery.

■ Institutional arrangements for solid waste services

Solid waste management in South Africa is primarily a local government function

Solid waste management in South Africa is primarily a local government function. Section 156(1)(a) of the Constitution, read with Schedule 5, assigns responsibility for refuse removal, refuse dumps, solid waste disposal and cleansing to local government. The Waste Act outlines the roles of both national and provincial government in waste management. National government's competence to legislate is established in line with section 44 of the Constitution on the grounds of the need to maintain essential national standards, establish uniform norms and standards, and to promote and give effect to the right to an environment that is not harmful to health and well-being. Provincial governments are tasked with the implementation of the national waste management strategy and national norms and standards, and may set additional, complementary provincial norms and standards. Local governments are required to ensure the sustainable delivery of services, subject to national and provincial regulations and standards.

The National Environmental Management: Waste Act promotes the regionalisation of solid waste management services

The most innovative feature of the National Environmental Management: Waste Act is the preference for the regionalisation of solid waste management services. The Act also places considerable emphasis on the development of an integrated waste planning system, through the development of interlocking integrated waste management plans by all spheres of government and industry waste management plans for specified waste generators. This planning system is the primary tool for cooperative governance within the sector. While the requirement for these plans is new for national and provincial governments, and for waste generators, this is not the case for local governments, which previously included waste management plans within their integrated development plans.

Other focal areas of the Act include provisions for the development of norms and standards, financial management systems, standard by-laws and tariffs. These aspects of the Act largely repeat existing national or provincial powers that are provided for in other legislation. The key change is that the Minister of Environmental Affairs and Tourism now assumes these powers in terms of the Act, albeit concurrently with other ministers, notably in the local government and finance portfolios.

The assignment of solid waste functions

Table 11.1 shows the assignment of solid waste functions, following the generic schema of waste management responsibilities outlined

by the Department of Environmental Affairs and Tourism in 2007⁷ and in terms of current practice.

Table 11.1 Current allocation of solid waste functions between roleplayers

| Area | Broad Function | Activity | Current assignment | | | | Issue |
|-------------------------|------------------|---|--------------------|------|-------|-----|------------------------------------|
| | | | Nat | Prov | Local | Pvt | |
| Policy-making | Standard Setting | Norms and standards | X | X | | | What is to be provided |
| | | Access targets | X | | X | | |
| | Planning | Plans for service expansion | | X | X | | Adequate facilities and services |
| | | Plans for service improvement | | X | X | X | |
| Service Provision | Asset creation | Social capital | | | X | | Adequate facilities and services |
| | | Physical capital | | | X | X | |
| | Financing | Tariffs | | | X | | Financial sustainability |
| | | Subsidies to Consumers Grants to Service Providers | X | | X | | |
| | Operation | Consumer selection | | | X | | Effective and sustainable services |
| | | Recurrent expenditures | | | | | |
| | | - General area cleansing | | | X | X | |
| | | - Waste minimization | | | X | X | |
| | | - Waste collection | | | X | X | |
| | | - Waste transport | | | X | X | |
| | | - Waste disposal | | | X | X | |
| Maintenance Staffing | | | X | X | | | |
| Regulation | M&E | Economic | X | X | X | | Quality of service delivery |
| | | Financial | X | X | X | | |
| | | Operational | X | X | X | | |
| | | Monitoring & Evaluation | X | X | X | | |

Source: Department of Environmental Affairs and Tourism (2007)

Policy making functions

To date, the focus of government has been on creating an overarching legislative framework to regulate waste management. Since the promulgation of the Waste Act in 2009, attention is now being given to implementation and the provision of basic refuse removal services. To this end, the Minister of Environmental Affairs and Tourism has issued the following regulations and standards:

- The national domestic waste collection standards, which came into effect on 1 February 2011. These standards seek to ensure uniformity in relation to the frequency of collections, transportation, receptacles and storage. The standards promote the separation of waste at source; meaning domestic waste should be sorted into recyclable and non-recyclable materials.
- The municipal waste sector plan that requires municipalities to indicate how they are going to address the backlogs in waste services and the associated infrastructure.
- Regulations prohibiting the use, manufacture, import and export of asbestos and asbestos containing materials which is aimed at phasing out the use of asbestos in products in the country.
- Regulations providing for the management and financing of the disposal of waste tyres

The Minister of Environmental Affairs and Tourism has also determined that the lighting, tyre, paper and packaging and

⁷ Department of Environmental Affairs and Tourism. Assessment of the status of waste service delivery and capacity at the local government level. Directorate: General Waste Management, August 2007, Draft 3

veterinary industries must develop industry waste management plans that indicate how their products will be managed once they become waste, as well as how the waste management system for their products will be financed.

Government has attached comparatively greater importance to the development of integrated waste management plans by all spheres of government. These plans are seen as the primary tool for strengthening cooperative governance in the sector.

Establishing service standards in solid waste management

The Department of Environmental Affairs has sought to provide substantive guidance on the establishment of standards in the waste sector. The emerging approach recognises that differing service standards are appropriate in different settlement types and densities. Moreover, issues of affordability, municipal capacity, the quality and nature of waste generated, climate, availability of storage, topographic conditions, road conditions (width and quality) all impact on the nature of the service that can be provided in an area.

Importantly, standards are not limited to collection services alone, but must also deal with waste regulation, minimisation, storage, transport and treatment. Perhaps the most important finding of the research is that municipalities themselves must accept and take ownership of the appropriate set of standards for their areas. Although a single set of national standards is desirable, they will need to differentiate between the levels and kinds of service expected in different areas of the country. Household waste generation characteristics vary considerably by settlement type and income. A comparison of the waste generated by urban residents in different settlement types demonstrates the point that wealthier consumers are predominantly located in low density suburbs.

Production of waste by urban settlement type

| Settlement | Waste |
|---------------------|--------------------------------|
| Suburban | 0.8 - 3kg per capita per day |
| Township | 0.2 - 0.8kg per capita per day |
| Informal settlement | < 0.2kg per capita per day |

Sources: Mbande, 1996; Lombard in Palmer Development Group, 1996; Benting, 2000.

The department also suggests that municipalities should adopt a mixture of geographic targeting and self-targeting approaches in the implementation of their free basic refuse services, and that subsidies should cover both regular service provision and the provision of waste receptacles.

Planning systems are intended to guide an integrated waste management approach and ensure that waste management systems contribute to socio-economic development

The Department of Environmental Affairs and Tourism reports that, in 2009, 177 municipalities submitted integrated waste management plans. This accounts for 75 per cent of municipalities authorised to perform solid waste functions. The quality of the plans is highly variable across municipalities and reflects lack of clarity about what constitutes an integrated waste management plan. This will change going forward given that the Waste Act now clearly outlines the minimum information to be included in such plans.

Cooperative governance is also pursued through the appointment of waste management officers in all spheres of government. Section 10 of the Act requires that the national minister, provincial members of the executive councils (MECs) and each local government must designate in writing a waste management officer from its administration to be responsible for coordinating matters pertaining to waste management. This role encompasses both policymaking roles (specifically in terms of planning and standard setting

activities) and regulatory roles. Waste management control officers, with enforcement responsibilities, are also recognised in section 58 of the Act. This system is still in its infancy and thus, while it explicitly intends to improve coordination between spheres of government, its performance cannot be assessed.

Regulatory functions

The Waste Act empowers the Minister of Environmental Affairs and Tourism to set norms and standards for the planning and provision of waste management services, as well as standards for the storage, treatment and disposal of waste, including the planning and operation of waste treatment and disposal facilities. The provisions in the Act dealing with the economic and financial management of the sector are largely aligned to existing municipal finance legislation. It is envisaged that the Department of Environmental Affairs and Tourism will play an important role in providing technical waste management support.

The National Environmental Management: Waste Act empowers the minister to set norms and standards for the planning and provision of waste management services

Service provision functions

It is important to note that the Act provides municipalities with an effective legal monopoly over the provision of solid waste services. The Act specifically requires that private waste service providers have the approval of municipalities before they begin any waste collection activities, and may also be required to register with national or provincial governments.

Statistics South Africa reports that 239 municipalities performed solid waste management functions in 2009, up from 226 in 2005. The data since 2005 suggests that solid waste functions are increasingly being assigned to local municipalities even in predominantly rural areas. This is in marked contrast to the stated policy preference for the regionalisation of solid waste service provision that is contained in the Act.

Table 11.2 Municipalities performing solid waste functions, 2005 and 2009

| | With function | With infrastructure | Provide service | Outsource service |
|------------------|---------------|---------------------|-----------------|-------------------|
| 2005 | | | | |
| Metros | 6 | 6 | 6 | 1 |
| Secondary Cities | 20 | 21 | 21 | 5 |
| Large towns | 28 | 29 | 29 | 8 |
| Small towns | 107 | 108 | 109 | 6 |
| Mostly rural | 55 | 49 | 51 | 9 |
| Districts | 10 | 12 | 10 | 1 |
| Total | 226 | 225 | 226 | 30 |
| 2009 | | | | |
| Metros | 6 | 6 | 6 | 3 |
| Secondary Cities | 21 | 21 | 21 | 1 |
| Large towns | 29 | 29 | 29 | 3 |
| Small towns | 111 | 111 | 111 | 1 |
| Mostly rural | 63 | 58 | 56 | 8 |
| Districts | 9 | 9 | 9 | – |
| Total | 239 | 234 | 232 | 16 |

Source: StatsSA, P9115 (2007, 2008, 2009, 2010)

Almost all municipalities that have been assigned solid waste functions report having infrastructure available to perform the

function. This figure is lowest in mostly rural municipalities, with 92 per cent reporting that this was the case in 2009.

In most municipalities, a municipal solid waste department is responsible for implementation (and therefore the associated expenditure), while revenue and financial management functions related to the function are undertaken by the budget and treasury office. Exceptions to this arrangement do exist, such as Pikitup, which is a municipal entity owned by the City of Johannesburg.

Outsourcing and commercialisation are mostly used by metropolitan and district municipalities, with 50 per cent reporting such arrangements

Outsourcing and commercialisation are mostly used by metropolitan and district municipalities, with 50 per cent reporting such arrangements. There are also indications that municipalities are moving away from outsourcing the solid waste function. Most municipalities thus deliver these services in-house. Similarly, the use of community-based delivery mechanisms is limited, despite the potential for creating jobs in this way. National government has begun piloting labour intensive approaches to the expansion of solid waste services, but these have yet to be rolled out at scale. Initial estimates suggest that this approach has the potential to create over 3 000 permanent, non-public sector jobs in waste collection.

Challenges with current institutional arrangements

A number of weaknesses exist in the current institutional arrangements of the solid waste function:

Vagueness or overlap in the assignment of responsibilities can undermine accountability for service delivery

- *Division of roles between district and local municipalities:* Vagueness or overlap in the assignment of responsibilities tend to undermine accountability for service delivery. In instances where district and local municipalities share responsibilities, a clear contracting framework is required to ensure that a single authority remains politically and administratively accountable for the service. However, such contracts are not the norm.
- *Regionalisation of service delivery:* The trend has been towards greater decentralisation rather than regionalisation, because policy on the regionalisation of the function remains vague.
- *Ring-fencing of solid waste finances:* This is an important but insufficient step to improving efficiencies in the sector. Additional organisational reforms to combine revenue and expenditure authority and accountability in municipal solid waste functions may also be required. It is also not practical to ring-fence the function in all contexts, especially in smaller municipalities.
- *Effective systems of cooperative governance:* This is complicated by an inadequate distinction between the policy-making, regulatory and service provider roles across spheres of government. This can lead to private service providers playing regulators off against each other which weakens enforcement.

Access to solid waste services

Statistics South Africa reports that 64.5 per cent of households had access to some form of solid waste management service in 2007. The number of served consumer units has risen by 6 per cent per year since 2005. Access to services is greatest in metro areas (92.5 per cent) and small towns (73.5 per cent), while it is lowest in rural municipalities (16 per cent). Access levels are lowest in Limpopo (25.5 per cent), followed by Eastern Cape (46.6 per cent) and Mpumalanga (46.7 per cent).

The number of served consumer units has risen by 6 per cent per year since 2005, with 8.4 million units served in 2009

Table 11.3 Access to refuse removal services, 2005 - 2009

| Category | Total number of households | Consumers receiving services | | | | | % of all households 2007 |
|------------------|----------------------------|------------------------------|------------------|------------------|------------------|------------------|--------------------------|
| | 2007 | 2005 | 2006 | 2007 | 2008 | 2009 | |
| Metros | 4 714 022 | 3 421 122 | 4 029 732 | 4 358 630 | 4 355 942 | 4 548 979 | 92.5% |
| Secondary cities | 2 207 003 | 1 232 347 | 1 253 940 | 1 389 260 | 1 393 949 | 1 596 674 | 62.9% |
| Large towns | 1 095 456 | 564 322 | 587 670 | 628 276 | 643 503 | 696 636 | 57.4% |
| Small towns | 1 637 412 | 983 981 | 1 066 597 | 1 204 108 | 1 071 349 | 1 118 202 | 73.5% |
| Mostly rural | 2 824 259 | 493 226 | 413 560 | 453 061 | 388 900 | 408 704 | 16.0% |
| Districts* | 22 482 | 6 357 | 28 906 | 29 531 | 27 224 | 27 379 | |
| Total | 12 500 634 | 6 701 355 | 7 380 405 | 8 062 866 | 7 880 867 | 8 396 574 | 64.5% |

Sources; Stats SA 2007, 2008, 2009, 2010

Note: District figures reflect only additional households served and DMA areas

Levels of service differ markedly by type of municipality. The bulk of those consumers with basic services are receiving at least a weekly collection service. Yet 19 per cent (or 1.3 million) of households in metros and secondary cities do not receive weekly refuse services, with 23 per cent of households in secondary cities making use of their own refuse dumps. Outside of these areas, 13 per cent (or 726 000) of households do not receive any refuse service or make use of on-site disposal.

Levels of service differ markedly by type of municipality

Table 11.4 Households with inadequate access to services by municipal context¹

| | Less than weekly | Communal refuse dump | Own refuse dump | No rubbish disposal | Other | Underserved HH | | Total households |
|------------------|------------------|----------------------|-----------------|---------------------|---------------|------------------|--------------|-------------------|
| | | | | | | Total | % | |
| Metros | 81 558 | 113 496 | 255 026 | 133 474 | 17 861 | 601 415 | 12.8% | 4 714 022 |
| Secondary cities | 30 313 | 54 398 | 512 993 | 113 776 | 3 448 | 714 928 | 32.4% | 2 207 003 |
| Large towns | 22 316 | 23 665 | – | 70 639 | 4 662 | 121 282 | 11.1% | 1 095 456 |
| Small towns | 41 947 | 39 372 | – | 124 337 | 4 418 | 210 074 | 12.8% | 1 637 412 |
| Mostly rural | – | – | – | 449 004 | 9 130 | 458 134 | 16.2% | 2 824 259 |
| Districts* | – | – | – | 1 379 | 141 | 1 520 | 6.8% | 22 482 |
| Total | 176 134 | 230 931 | 768 019 | 892 609 | 39 660 | 2 107 353 | 16.9% | 12 500 634 |

Source: Community Survey, 2007, adjusted (see footnote)

1. This assumes basic service levels to be (i) a weekly collection service in metropolitan municipalities and secondary cities; (ii) that own refuse dumps in large and small towns and rural municipalities are predominantly used outside of urban settlements and thus constitute an appropriate basic level of service delivery; (iii) that less than weekly services and communal refuse dumps are found in urban areas of large and small towns, and do not meet basic service standards.

Comparing the data in tables 11.3 and 11.4 highlights some of the difficulties in obtaining reliable information on backlogs and access to services. The data from the Community Survey 2007 (table 11.4) indicates the backlog in the provision of solid waste services is 2.1 million households, with some 892 000 households not receiving any service. Whereas the information gathered by Statistics South Africa in its annual service delivery survey (table 11.3) indicates that

some 4.1 million households do not have access to solid waste or refuse removal services.

Extending access to basic refuse removal services

In 2001, government set itself the target of providing all households access to refuse removal services by 2012. Significant progress has been made in expanding access, but significant challenges remain.

Lack of access to services remains highest in rural municipalities

Lack of access to services remains highest in rural municipalities, where consumers either dispose of waste themselves or dump it in an unregulated manner. But domestic waste collection services are often neither necessary nor viable in many rural areas, with households producing mostly organic waste that can be disposed safely on-site.

The failure to provide services in informal settlements and other underserved areas leads to the unregulated dumping of solid waste

Extending access to basic solid waste collection services remains a critical policy priority, even in large cities. Table 11.4 shows that over 1.3 million households in metros and secondary cities currently receive below basic levels of service. This amounts to 62 per cent of the total number of underserved households.

Smaller municipalities can also make significant strides in improving access through encouraging and regulating appropriate on-site disposal. 645 000 households have no access to waste disposal in these areas, constituting over 30 per cent of the total number of underserved households.

The failure to provide services in informal settlements and other underserved areas leads to the unregulated dumping of solid waste, the volume of which is increased by home-based enterprises. The burning of waste on such dumps is also relatively common, contributing to both air and soil pollution.

Sustaining access to basic services

Municipalities have shown a commitment to addressing backlogs in domestic solid waste collection services. However, as services have been expanded, average revenues per consumer have fallen as more poor households are serviced. This disjuncture between access levels and revenues has been most severe in the metros, which have seen the most rapid expansion of services.

Most municipalities have introduced free basic refuse services. This means the service is being subsidised by the municipality. Most municipalities report using a self-selection system for targeting solid waste subsidies. This typically involves either a tariff-based subsidy or a beneficiary applying for access to the subsidy on a means-tested basis. The aim of the latter approach is typically to reduce leakage of the subsidy outside of the target group. Metros report the use of varying subsidy systems. Geographic targeting effectively occurs in informal settlements in both Ekurhuleni and Cape Town. Tariff-based systems, based on staggered tariffs relative to property values, are applied in Cape Town, eThekweni and Johannesburg. Nelson Mandela Bay operates an application based system, while Tshwane does not offer any subsidies for refuse services.

Municipalities reported a declining number of consumers receiving subsidies for basic refuse services between 2005 and 2009. 1.9 million consumers benefited from subsidies for the costs of receiving solid waste services in 2009. This represents a decline of over 37 per cent since 2005, when over 3.1 million consumers were reported to have benefited. This decline is probably due to a shift from geographic targeting of subsidised services to application based targeting approaches.

Municipalities reported a declining number of consumers receiving subsidies for basic refuse services between 2005 and 2009

In 2010, cabinet approved the national policy for the provision of basic refuse removal services to indigent households, which aims to facilitate the delivery of these services.

■ Financing solid waste services

Information on operating revenues and expenditures for the solid waste function is generally weak, with many municipalities only beginning to report on these areas separately, in accordance with the formats required in terms of the Municipal Budget and Reporting Regulations.

Solid waste revenues

The following table shows operating revenue for the solid waste function.

Table 11.5 Operating revenue for the solid waste function by category of municipality, 2006/07 – 2012/13

| R million | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | % Average annual growth | |
|--------------------------|--------------|--------------|--------------|----------------------|-----------------------|--------------|--------------|-------------------------|-------------------|
| | Outcome | | | Preliminary Estimate | Medium-term estimates | | | 2006/07 - 2009/10 | 2009/10 - 2012/13 |
| Operating revenue | | | | | | | | | |
| Metros | 1 280 | 2 465 | 2 965 | 2 841 | 4 909 | 5 343 | 5 794 | 30.4% | 26.8% |
| Local municipalities | 673 | 731 | 1 268 | 2 256 | 3 050 | 2 895 | 3 064 | 49.6% | 10.7% |
| <i>Secondary cities</i> | 467 | 506 | 737 | 1 115 | 1 540 | 1 396 | 1 522 | 33.6% | 10.9% |
| <i>Large towns</i> | 142 | 142 | 311 | 444 | 640 | 655 | 644 | 46.0% | 13.3% |
| <i>Small towns</i> | 50 | 57 | 130 | 581 | 653 | 628 | 662 | 126.7% | 4.4% |
| <i>Mostly rural</i> | 14 | 25 | 90 | 116 | 217 | 217 | 235 | 104.0% | 26.6% |
| Districts | 8 | 11 | 9 | 34 | 37 | 37 | 35 | 65.3% | 0.9% |
| Total | 1 960 | 3 206 | 4 243 | 5 131 | 7 996 | 8 275 | 8 893 | 37.8% | 20.1% |

Source: National Treasury local government database

The above table indicates that municipal income from solid waste services has been growing very rapidly. Most of this growth can be attributed to more complete reporting of this category of revenue as municipalities move to identify the streams of revenue associated with the respective trading services. Metros' revenue related to solid waste services is budgeted to grow by 26.8 per cent over the medium term.

Table 11.6 shows increases in user charges for a typical large and small household. Smaller households pay a larger share of their total municipal bill in refuse charges, though the tariff itself is lower.

Table 11.6 Monthly account for an average household, 2009/10

| Rand | Property rates | Electricity | | Water | | Sani-tation | Refuse removal | Other | VAT on services | Total | Refuse as % of total |
|------------------------------------|----------------|-------------|-----------------------|------------|-----------------------|-------------|----------------|-------|-----------------|--------------|----------------------|
| | | Basic levy | Consump-tion (per Kw) | Basic levy | Consump-tion (per Kl) | | | | | | |
| Large household¹ | | | | | | | | | | | |
| Metros | 660 | 75 | 669 | 46 | 191 | 104 | 73 | – | 133 | 1 952 | 3.7% |
| Local municipalities | 324 | 106 | 645 | 41 | 151 | 81 | 75 | – | 163 | 1 587 | 4.7% |
| Small household² | | | | | | | | | | | |
| Metros | 304 | 59 | 318 | 146 | 148 | 98 | 50 | – | 83 | 1 206 | 4.1% |
| Local municipalities | 86 | 77 | 291 | 36 | 96 | 63 | 55 | – | 98 | 802 | 6.8% |

1. Use as basis 1000m² erf, 150m² improvements, 1000 units electricity and 30kl water.

2. Use as basis 300m² erf, 48m² improvements, 498 units electricity and 25kl water.

Source: National Treasury local government database

This under-recovery of costs requires subsidies from the municipal rates account

A striking feature of most municipalities' budgets for solid waste is that budgeted revenues (see table 11.5) do not cover budgeted expenditures (see table 11.7). This is even evident at the aggregate level, where total operating revenue in 2009/10 was 43 per cent less than total operating expenditure on solid waste services. Although the aggregate figures show a surplus over the medium term, this is largely due to the metros, while most of the remaining municipalities continue to show deficits. This under-recovery of costs means municipalities have to subsidise the service from other revenue sources, most notably rates revenues. Deficits are particularly prevalent among the smaller municipalities

On aggregate, municipalities are under-pricing their solid waste services

This means that, in aggregate, municipalities are under-pricing their solid waste services. This under-pricing is likely to be significant as the full costs of service delivery are not necessarily properly recorded for the sector due to current accounting practices, nor are current or historical capital costs necessarily fully apportioned to the sector. This under-pricing sends inappropriate signals to households and other waste generators about the cost of their activities, resulting in limited incentives for waste minimisation.

Tariff setting approaches for solid waste

Most municipalities charge for refuse removal through a fixed monthly rate. This is based either on the nature of the service, property values or property sizes. At the household level this direct charge to consumers does not vary by the amount of waste generated. This system is administratively easy to manage. These tariff structures provide no incentives for waste minimisation by consumers, as they seek to reflect the average cost of service for all customers, irrespective of the amount of waste each customer produces.

Property-based tariff structures are based on the assumption that the size and / or value of a property influences the amount of waste produced. Service based tariff structures vary by the size of bin, but typically without encouraging households to reduce bin sizes.

Tshwane has recently introduced a volumetric charge for refuse services. This is intended to provide strong incentives for consumers to reduce the amount of waste set out for collection. Volumetric charging is administratively more complex, requiring recording and billing of individual household waste disposal. This scheme is new, and its impacts on household waste management behaviour (in particular their sensitivity to price) still needs to be evaluated.

However, in addition to refuse removal charges, there are a range of other potential revenue streams in the management of solid waste that municipalities need to explore: landfill dumping fees, hazardous waste disposal fees, fines for littering and illegal dumping, recycling concessions, sale of compost produced from organic waste, revenues from using waste for electricity generation and the earning of carbon credits. Generally, municipalities need to pay more attention to optimising their revenues from these other sources.

Solid waste expenditures

The following table shows budgeted operating expenditure for the solid waste function.

Table 11.7 Budgeted operating expenditure for the solid waste function by category of municipality, 2006/07 – 2012/13

| R million | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | % Average annual growth | |
|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------------------|-------------|
| | | | | | | | | 2006/07 - 2009/10 - | 2009/10 |
| Operating expenditure | | | | | | | | | |
| Metros | 2 837 | 3 412 | 3 908 | 4 639 | 3 219 | 3 619 | 4 029 | 17.8% | -4.6% |
| Local municipalities | 715 | 806 | 1 510 | 2 584 | 3 128 | 3 126 | 3 357 | 53.4% | 9.1% |
| <i>Secondary cities</i> | 523 | 588 | 965 | 1 404 | 1 548 | 1 544 | 1 709 | 39.0% | 6.8% |
| <i>Large towns</i> | 133 | 133 | 341 | 434 | 709 | 718 | 743 | 48.4% | 19.7% |
| <i>Small towns</i> | 43 | 51 | 117 | 565 | 704 | 698 | 729 | 136.1% | 8.9% |
| <i>Mostly rural</i> | 16 | 35 | 87 | 181 | 166 | 166 | 175 | 122.8% | -1.1% |
| Districts | 9 | 10 | 56 | 82 | 20 | 23 | 25 | 111.4% | -32.5% |
| Total expenditure | 3 561 | 4 228 | 5 474 | 7 305 | 6 367 | 6 768 | 7 411 | 27.1% | 0.5% |

Source: National Treasury/Local government database

As with revenue, the above table indicates that municipal expenditure on solid waste services has been growing very rapidly. Again, most of this growth can be attributed to more complete reporting by municipalities. Metros' budgeted expenditure for solid waste services grew by 17.8 per cent between 2006/07 and 2009/10, but is set to decline by 4.6 per cent over the medium term, driven by a sharp decline in budgets in 2010/11. The erratic budgets for the districts are largely due to incomplete reporting, and poor quality budgeting.

Very few municipalities are setting aside funds (in dedicated cash-backed reserve funds) for the rehabilitation and management of their landfill sites once they reach the end of their useful lives.

The main cost drivers in solid waste management are labour, transport and repairs and maintenance.

Labour costs

10 per cent of the municipal workforce, or 25 450 people, were employed in solid waste management activities in 2007, of which 34 per cent were employed in the metros. Over 75 per cent of personnel were in full-time positions. Municipalities reported 20.9 per cent vacancies against established posts in the sector in 2007. Over a quarter of vacant posts (2 259 positions) were reported in metros. These figures exclude the staff employed in instances where the function has been outsourced. Consequently the total number of people employed in this function is higher than the above figures indicate.

10 per cent of the municipal workforce, or 25 450 people, were employed in solid waste management activities in 2007

According to information from the Department of Environmental Affairs and Tourism in 2007 municipalities employed on average 4.8 staff per 1 000 customers. This figure varies significantly between municipalities, with metros employing on average 1.5 staff per 1 000 customers, and rural municipalities employing 6.5 staff. A strong negative correlation exists between the size and density of settlement and the number of staff employed. This can be attributed to economies of scale and efficiencies associated with servicing denser settlements.

The absence of adequate managerial capabilities in smaller municipalities is a significant concern

The Department of Environmental Affairs and Tourism⁸ also noted that local municipalities tend to have much smaller ‘intermediate’ staff complements than metros, and that the proportion of labourers in the total staff complement rises as settlements become more dispersed. While differing operational requirements may partially explain this trend, the absence of adequate managerial capabilities in smaller municipalities is cause for concern.

Waste transportation and disposal

Significant costs are associated with the transport of waste

Significant costs are associated with transporting waste from collection points to disposal sites. Information collected by Statistics South Africa indicates that annual capital expenditure on specialised vehicles in the refuse sector averages R127 million between 2005/06 and 2010/11, accounting for nearly 20 per cent of total capital spending in waste sector.

Industry experts estimate that transport costs amount to 45 per cent of total operating costs of the function. This estimate includes transport costs associated with collection and excludes disposal costs, and is composed of truck costs of 26 per cent and fuel costs of 19 per cent. However, current data from municipalities indicate that expenditures that can be associated with transportation activities account for less than 10 per cent of the function’s operating expenditures. This suggests significant under-reporting of these expenditures.

The Department of Environmental Affairs and Tourism reports that the total municipal waste fleet amounts to 44 225 vehicles. Over 50 per cent of these vehicles are owned by secondary cities, with another 29 per cent stationed in large towns. Unsurprisingly, these municipalities also record the lowest productivity per vehicle in terms of consumers served, with secondary cities serving 62 consumers per vehicle and large towns 49.

Table 11.8 Municipal waste fleets, 2007

| | Total Waste Fleet function | Consumers per vehicle |
|------------------|-----------------------------------|------------------------------|
| Metros | 5 546 | 786 |
| Secondary cities | 22 522 | 62 |
| Large towns | 12 935 | 49 |
| Small towns | 3 208 | 375 |
| Mostly rural | 14 | 32 362 |
| Total | 44 225 | 182 |

Source: Calculated from DEAT (2007)

Transport costs are ultimately a function of the distance travelled between the point of waste collection and disposal. As distance rises, fuel and maintenance costs also rise, while additional staff and fleet are needed to accommodate expanded travel times. A conservative

⁸ Department of Environmental Affairs and Tourism. Assessment of the status of waste service delivery and capacity at the local government level. Directorate: General Waste Management, August 2007, Draft 3

estimate of the cost implications of expanding transport distances to disposal sites from 20km to 100km indicates that costs may rise by 50 per cent, while costs to households may rise by over 25 per cent. This suggests that the regionalisation of waste services, and particularly the location of dump sites, requires careful cost-benefit evaluation.

Table 11.9 Cost implications of increased distance to disposal sites

| | 20 km | 100 km | % change |
|---|---------|---------|----------|
| Number of trips | 3 | 2 | -33.3% |
| Monthly km travelled | 3 140 | 13 700 | 336.3% |
| Monthly bulk transport cost (Rand) | 143 939 | 215 909 | 50.0% |
| Monthly total cost per household (Rand) | 24.67 | 30.96 | 25.5% |

Source: Scenarios based on cost evaluation of Mafikeng domestic solid waste services pilot, which provided services to 35 000 households

Capital expenditure

Solid waste services do not require network infrastructure such as electricity, water and sanitation services. Therefore the level of capital investment required to provide the service is far lower than for the other basic services, consisting largely of specialised vehicles (dump trucks) and equipment to compact and cover the waste at landfill sites (mainly bulldozers). Where a municipality invests in, say, a methane driven generation plant, that investment would be classified under electricity infrastructure. It is therefore to be anticipated that capital spending on solid waste services will only represent a relatively small percentage of overall municipal capital budgets. Nevertheless, among small municipalities the purchase of a single dump truck can represent a very significant capital outlay, given the limited size of their capital budgets generally.

Overall, municipalities place little priority on solid waste investments in their capital budgets

The following table shows capital budgets for the solid waste function grew very rapidly between 2006/07 and 2009/10 – at average annual rates of over 100 per cent. This growth can largely be attributed to more complete reporting, but there is no doubt that it has also been driven by municipalities expanding access to solid waste services.

Table 11.10 Capital budgets for the solid waste function by category of municipality, 2006/07 – 2012/13

| | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | % Average annual growth | |
|--|----------------|----------------|----------------|----------------|------------------|------------------|----------------|-------------------------|-------------------|
| | | | | | | | | 2006/07 - 2009/10 | 2009/10 - 2012/13 |
| R thousand | | | | | | | | | |
| Budgeted capital expenditure | | | | | | | | | |
| Metros | 102 430 | 174 093 | 513 795 | 523 963 | 650 985 | 720 647 | 651 183 | 72.3% | 7.5% |
| Local municipalities | 16 137 | 52 284 | 270 624 | 407 943 | 366 241 | 301 692 | 256 884 | 193.5% | -14.3% |
| <i>Secondary cities</i> | 13 976 | 43 856 | 128 771 | 222 442 | 170 369 | 145 229 | 100 234 | 151.5% | -23.3% |
| <i>Large towns</i> | 351 | 7 690 | 36 340 | 48 055 | 61 740 | 65 609 | 82 335 | 415.3% | 19.7% |
| <i>Small towns</i> | 1 810 | 738 | 76 210 | 77 530 | 86 288 | 71 568 | 55 232 | 249.9% | -10.7% |
| <i>Mostly rural</i> | – | – | 29 303 | 59 916 | 47 844 | 19 286 | 19 083 | - | -31.7% |
| Districts | – | – | 23 | 18 909 | 62 596 | 62 895 | 60 028 | - | 47.0% |
| Total expenditure | 118 568 | 226 377 | 784 443 | 950 815 | 1 079 822 | 1 085 234 | 968 095 | 100.2% | 0.6% |
| <i>Percentage of total municipal capital expenditure</i> | | | | | | | | | |
| | 0.6% | 0.8% | 1.9% | 2.3% | 2.6% | 2.8% | 2.4% | | |

Source: National Treasury local government database

Over the medium term capital spending on solid waste services grows at a far more moderate pace, and even declines in certain

categories of municipality. Among the metros, growth stabilises at 7.5 per cent per year.

Financing requirements for municipal solid waste services

The Department of Environmental Affairs and Tourism has estimated financing requirements for the provision of solid waste services at the municipal level using a municipal services financial model. The model projects capital and operating costs associated with the provision of municipal services. This helps to assess the appropriateness and affordability of addressing municipal infrastructure investment needs, such as extending services or rehabilitating assets.

The model projects an average annual capital expenditure requirement of between R1.4 billion to R1.6 billion, or a total of R14.2 billion to R16.4 billion over the 10-year period. In 2010/11, budgeted capital expenditure levels were about 75 per cent of the lower of these target levels. However, capital spending may not be taking place in the municipalities where it is most required. In these municipalities the capital investment requirements of the function need to be re-evaluated and raised in priority relative to other areas of capital spending, especially projects that do not relate to the provision of basic services.

The funding model developed by the Department of Environmental Affairs highlights the critical state of financing in the solid waste sector

The model also highlights the critical state of financing in the solid waste sector, relative to policy intentions. Capital and operating expenditures are both lower than the levels estimated to ensure high levels of access. The model suggests there is substantial subsidy leakage to non-poor consumers, and user charges are too low. As with other municipal functions, there is an urgent need to assess the sustainability of the solid waste services, and ensure tariffs and revenue management strategies cover the cost of the service.

Waste minimisation, recycling and energy recovery

South Africa has experienced rapid growth in waste volumes, associated with a prolonged period of economic growth

South Africa has experienced rapid growth in waste volumes, associated with a long period of economic growth. About 42 million cubic metres of general waste required collection and disposal in 1997. Gauteng, which generates 42 per cent of South Africa's waste, reported a growth in waste volumes of over 365 per cent between 2004 and 2008, averaging 79 per cent per year. In 1997, it was predicted that total general waste generation would be 68 million cubic metres in 2010,⁹ however it would seem this is a serious under-estimate. It is envisaged that the waste information regulations will improve the future availability of data on waste management.

⁹ Department of Water Affairs and Forestry. Waste generation in South Africa (Baseline study in preparation for the national waste management strategy for South Africa). 2001.

Table 11.11 General waste generation by province in 1997 (estimated) and 2010 (projected)

| Province | 1997 | | 2010 | | Total growth % | Annual average growth % |
|----------------|-------------------|---------------|-------------------|---------------|----------------|-------------------------|
| | m ³ | % of total | m ³ | % of total | | |
| Eastern Cape | 2 281 000 | 5.4% | 3 105 989 | 4.5% | 36.2% | 2.6% |
| Free State | 1 674 000 | 4.0% | 3 877 380 | 5.6% | 131.6% | 7.3% |
| Gauteng | 17 899 000 | 42.4% | 26 085 304 | 38.0% | 45.7% | 3.2% |
| Kw aZulu-Natal | 4 174 000 | 9.9% | 5 749 959 | 8.4% | 37.8% | 2.7% |
| Limpopo | 3 831 000 | 9.1% | 11 200 387 | 16.3% | 192.4% | 9.4% |
| Mpumalanga | 733 000 | 1.7% | 956 369 | 1.4% | 30.5% | 2.2% |
| Northern Cape | 1 470 000 | 3.5% | 2 374 864 | 3.5% | 61.6% | 4.1% |
| North West | 1 625 000 | 3.8% | 2 296 489 | 3.3% | 41.3% | 2.9% |
| Western Cape | 8 543 000 | 20.2% | 12 979 785 | 18.9% | 51.9% | 3.5% |
| Total | 42 230 000 | 100.0% | 68 626 526 | 100.0% | 62.5% | 4.1% |

Source: DWAF, 2001 and own calculations

Economic growth and demographic change have quickened the pace at which waste is being generated. Urban residents typically generate more waste than their rural counterparts. Urban household waste also is less conducive to on-site disposal, due to settlement density, and thus these households contribute greater volumes to the waste stream.

There have been few efforts to encourage households to minimise the generation of waste. The Department of Environmental Affairs and Tourism (2007) reports that 87 per cent of municipalities lack capacity and infrastructure to pursue waste minimisation strategies. Some municipalities do provide incentives for waste minimisation, though this is neither widespread nor effective. Johannesburg theoretically limits each household to two bags of waste per week, though for reasons of public health, this is not enforced. As noted, Tshwane has recently introduced volumetric user charges that discriminate between households on the basis of the volume of waste produced. Cape Town metro reports that, in 2006/07, 14 per cent of waste was diverted from landfill sites, and was recycled or reused.

There have been few efforts to encourage households to minimise the generation of waste

Waste management services rely heavily on landfills for the disposal of waste, which account for 80 per cent of currently licensed waste facilities. In Gauteng, waste going to landfills comprises the vast majority of all waste disposed or recycled, and has grown at an average annual rate of 66 per cent since 2004, while waste generated has grown at an average of 37 per cent a year. This is despite the existence of a range of alternative disposal technologies, including waste incineration and recycling.

The Department of Environmental Affairs and Tourism reported in 2007 that there are over 2 000 waste handling facilities nationally, of which only 530 are licensed. Licensing of dump sites in mostly rural municipalities and secondary cities is limited, at 13 per cent and 68 per cent respectively. Landfills differ markedly in size, with larger landfills typically being operated by the large cities.

About 95 per cent of all South Africa's waste is disposed of in landfill sites. This reliance on landfills has limited the incentive to devise alternative methods of dealing with waste. In Gauteng, it is estimated that only 2.2 per cent of waste collected is sent for recycling. It is estimated that only approximately 20 per cent of household waste is recycled in South Africa (presumably mainly

prior to collection from households). It is envisaged that the move towards making industries responsible for their products once they become waste will improve recycling rates in future.

An estimated 18 recycling facilities have been permitted nationwide

Only 18 recycling facilities have been licensed nationwide, ranging from the 5 Buyisa-e-Bag plastic bag recycling facilities in Gauteng to multi-purpose privately owned facilities. Many additional facilities appear to exist, although these are not recorded on the permit database. One large South African firm reports collecting in excess of 1.5 million tons of recyclables each year.

Some municipalities have begun waste-to-energy schemes

Some municipalities have begun waste-to-energy schemes. eThekweni is extracting landfill gas and generating electricity from the Marian Hill and La Mercy landfills. More recently, Johannesburg has piloted energy generation from incinerating waste. Energy recovery schemes are strongly incentivised by the potential to generate carbon credits and their associated revenues. Eskom estimates that landfill energy plants can have a capacity of between 20 and 50 megawatts, with a life-of-plant of 30 years.

Conclusion

Municipalities are facing the challenge of rising unit costs and falling per capita revenues associated with expanded access to services. This may slowdown the pace at which services are expanded to unserved households and a growth in uncontrolled dumping, and littering that will inflate operating costs for municipalities or exacerbate environmental damage. It is also possible that efforts to bring down the unit cost of the service will result in greater mechanisation that may reduce jobs in the sector. Already there is evidence that larger municipalities have significantly mechanised their operations. Municipalities are also seeking ways to reduce subsidy leakage through improved targeting.

Municipalities and industries currently do not give sufficient attention to waste minimisation. This impacts negatively on their operating and capital cost structures associated with collection, transport and disposal. It also militates against the achievement of the waste minimisation targets of the Polokwane Declaration on Waste Management (2001). The introduction of volumetric user charges by Tshwane, however, offers some prospect of reversing this situation and may provide a precedent for other municipalities to follow. In addition the move towards producer responsibility seeks to place greater responsibility for promoting recycling on industries in line with the producer responsibility approach.

There is a need to establish differentiated targets on basic access to services that take account of varying municipal contexts and capacities. Greater differentiation and improved specification of the targets for municipal service provision will provide an important focus to their strategies to expand access and improve the quality of service delivery.