

Diverting Household Waste from Landfill: Best-Practice Separation-at-Source Recycling amongst some Western Cape Municipalities

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ABSTRACT

Municipalities are under pressure from recently enacted legislation including the NEMWA (National Environmental Management Waste Act) and National Domestic Waste Collection Standards to provide recycling services to residents. However, designing and implementing successful source-separation recycling programmes is a relatively new and complex operation.

This presentation reports on the results of a qualitative research survey into source-separation practices amongst ten municipalities in the Western Cape which are diverting various recyclates including plastics away from landfill. The research has been sponsored by PlasticsSA under their 'Zero Plastic Waste to Landfill' vision.

The purpose is to highlight best-practices and lessons learnt with a view to helping expand efficient source-separated diversion of recyclable materials by municipalities in the Western Cape, and South Africa.

1. INTRODUCTION

Municipalities are obliged to provide recycling services to residents. The National Environmental Management: Waste Act of 2009 and in particular, the National Domestic Waste Collection Standards which states: "The municipality must provide an enabling environment for households to recycle domestic waste" (National Domestic Waste Collection Standards (October 2010: para 4.2) and also that "Community involvement in recycling must be encouraged" (Ibid, para 4.1).

The design and implementation of separation-at-source recycling programmes is still a new and fairly complex operation and most municipalities are inexperienced in this field. Low participation, inadequate volumes and low value recyclate collections are likely if a programme is not wisely designed and implemented.

The need was expressed at a Western Cape provincial waste managers' forum in August 2011 for more information on which systems are working best and what lessons can be learnt so more municipalities can design and implement efficient recycling programmes to promote optimum diversion from landfill.

At the same time, industry is demanding greater volumes of higher value plastic recyclate, while the packaging industry's proposed waste management plan recommends "the development of new collection systems for packaging and paper, in particular from households." (PACSA ., 2011)

One of the plan's aims is to "help to ensure that pilot models in areas such as Cape Town, are taken into account, to avoid repeating earlier mistakes." (Ibid. p 121)

For reasons above, a research survey was initiated by GreenEdge and funded by PlasticsSA to undertake research amongst a number of programmes in the Western Cape Province to identify key principles and practices which offer optimum diversion of recyclates.

2. METHODOLOGY

Various municipalities are running separation-at-source programmes which provide kerbside collection of co-mingled domestic recyclables while some also offer drop-offs where residents can take recyclables, green waste, builder's rubble, etc.

The kerbside services mostly target residents in middle and upper-income suburbs as their higher income results in greater volumes of recyclable items in the waste stream. In lower-cost housing areas and informal settlements, a variety of community-based and non-profit initiatives operate buy-back / swop-shop operations. As these are not overseen by municipalities, they fall outside the scope of this survey.

The research was based on a questionnaire focusing on a variety of topics including: when and why programmes were started; collection, sorting and other infrastructure systems; tender specifications and contractor relationships; public education and behaviour change programmes; quantities of materials being diverted; landfill airspace values; skills capacities and training needs; best-practice principles and recommendations.

A draft questionnaire was tabled for discussion at a meeting with the director and colleagues of the waste management department in the Western Cape provincial government who gave inputs as well as recommendations regarding which municipalities to include in the survey.

The waste management officers of the selected municipalities were then contacted and emailed the questionnaire. A telephonic interview was set up and later conducted, and the responses are outlined in brief below.

3. MUNICIPALITIES' SURVEY RESPONSES

3.1 Bergrivier Local Municipality

The Bergrivier Municipality on the West Coast includes Piketberg, Velddrif, and Porterville. At the 2011 census, the area comprised 16,275 urban and farming households. The municipality began source-separated kerbside collections in 2011, as it had no licensed landfill. Refuse had to be transported to Saldanha and Moorreesburg landfill sites many kilometres away, so diversion through kerbside recycling was implemented.

The service is currently available to some 8,500 households. The participation rate of these households averages 20%. Public education for recycling has been done through schools, leaflets in post boxes and community newspapers.

Householders separate into three bags – clear bag for recyclables, green bag for garden trimmings and black bag for refuse. Greens go to the unlicensed landfill as cover material, while most recyclables are collected by a contractor and taken to a simple materials recovery facility (MRF) in Piketberg owned and operated by the contractor, sorted manually and baled for transport to Cape Town.

Jaco Breunissen, senior civil engineer in the Bergrivier Local Municipality (personal communication, May 2014), believes thorough awareness programmes for householders is most important for source separation. These should also be aimed at lower income groups with household's visits. He hopes the National Department Environmental Affairs 'Youth Jobs in Waste' programme can assist. Education and training of local recycling contractors should also be done.

3.2 City of Cape Town Metropolitan Municipality

The City of Cape Town is the largest municipality in the Western Cape with some 830,000 formal households. The introduction of at-source separated, dry waste kerbside collection gave effect to its waste minimisation strategy, and was further motivated by the draft National Waste Management Strategy.

The first pilot service of collections in formal residential areas began in 2001, followed by a round of pilots in other middle and upper income suburbs. The programme became branded as "Think Twice".

Lessons were learnt and tender specifications tightened, including a minimum budget for public education and a minimum participation rate to be achieved, below which financial penalties would apply. By 2011, over 120,000 households were receiving kerbside collections. Currently the overall average household participation rate is estimated by the municipality at more than 60%.

Contractors are required to produce and distribute educational leaflets to householders and place adverts in community newspapers following the City's branding guidelines. 1.3 ton caged trucks and trailers collect recyclables from kerbsides either in clear bags or where provided, in 130L wheeled recycling containers, usually on the same day as refuse removals.

Recyclables are mostly taken to the City's large MRF at Kraaifontein where they are sorted on a conveyor system by mechanical and other technical means as well as by hand. Materials are baled and sold off to re-processors and converters in nearby industrial areas.

The City also operates 25 drop-off sites in and around the metropole where residents can take recyclables, as well as garden greens and builders' rubble. Private (Small Micro Medium Enterprise) SMME contractors there receive, sort and sell the recyclables for their own account. Their viability depends on having access to all recyclables including old furniture and resalable items, as the volume of packaging waste alone is financially insufficient.

During the 2012/3 financial year, 17,353 tons of recyclables were diverted from landfill by kerbside collections, 6,109 tons from drop-offs, and 3,603 tons from the City's 'dirty' MRF in Athlone.

Funding is a barrier to expansion as recycling comes at a cost to the City. Future considerations include setting tariffs or related levies to assist with funding. Public-private partnerships and 'Section 33' tenders could also help with financial viability. A main barrier to expansion is the lack of enabling legislation at national level, and particularly the promulgation of aggressive Extended Producer Responsibility (EPR) legislation.

In terms of best-practice, City officials see proper measuring of household recyclables collected as important. This assists accurate reporting and payment of contractors as well as with participation rates. Some 43,000 formal households have been issued with 130 L recycling containers fitted with RFID technology to improve measurement and billing. This is part of a process to tag 240L refuse containers with RFID devices, while fitting compactors with lift loggers. This system can in future lead to the pay-as-you-throw approach where the 240L refuse bins and 130L recycling bins are separately logged and weighed and only refuse going to landfill is charged for.

Recycling-at-source tenders should include comprehensive pricing schedules to ensure adequate budgeting for efficient implementation of the contract (i.e. transport, fuel, vehicles, bags, equipment, staff, and public education). A full breakdown of costs should be required upfront in the bid. These are then worked into a final price per lift. Longer duration of tenders would make investment in equipment more viable and if volumes are high, the contractor could build his/her own licensed MRF.

Public education and behaviour change marketing by the contractor to increase residents' participation must be compulsory and meet a minimum budget, be integrated across media and underpinned with municipal branding. Models for financial waste management and recycling should be grounded on life-cycle assessment and full-cost accounting of services, moving from a risk to a resource-based approach.

Partnerships and trust should be fostered between municipality, contractors and the recycling industry. In general, municipalities need to be adaptable, to try new approaches and methodologies for different income and cultural groups, and to work with contractors in resolving challenges that come with new projects.

3.3 Drakenstein Local Municipality

Drakenstein Local Municipality includes Paarl and Wellington with some 40,000 households. Two-bag co-mingled separation-at-source kerbside recycling began in 2011. This was motivated by a ward councillor and was part of the municipality's integrated waste planning.

Started in a single ward with 800 residents, it was rolled out over the next two years and now serves 10,700 household of which 2,560 (24%) are participating. Public education and marketing was managed by an outside service provider. Information leaflets and fridge cards on what to do and how to do it were given to householders. Feedback and articles on progress went into the local newspaper.

Initially the system was managed by a private contractor who operated her own vehicle for collections and also managed the municipal-owned MRF, selling off the proceeds. With its capacity at 12 tons per month, the MRF runs a conveyor belt, with balers and a metal press. Most materials are delivered to a buyer in Paarl. The municipality has also sited bottle banks along main streets whose contents go to the MRF.

During 2013, 1,541 tons of recyclables were diverted from landfill, while total waste to landfill was 20,280 tons per annum. Landfill airspace is estimated at R634 per cubic metre, (Karen Fredericks, personal communication, May 2014),

When the recycling company's contract ended, the municipality took over, and as there were insufficient funds for a new contract, brought in EPWP (Extended Public Works Programme) workers to assist with collections and operating the MRF. Coupon-based buy-back centres are planned for the lower income areas using EPWP workers and partnering with local retailers.

Karen Fredericks, senior technician in the waste management department. (personal communication, May 2014), sees public education and motivation as key to success of a separation-at-source programme, but this must be balanced with the capacity of the local MRF.

3.4 George Local Municipality

Between Mossel Bay and Knysna is the town of George, the largest on the Southern Cape coast with 43,000 households. It is a commercial and agricultural centre with tourism and retirement components. The municipality began a kerbside collection service in 2010 with pressure from the provincial government to implement diversion from landfill. No drop-off sites are in place.

At the start of the programme, a blue bag for recyclables together with an educational pamphlet was delivered to all houses by the contractor. Those who wanted the service got in touch with the municipality who informed the contractor from which houses to collect. Bags with leaflets continue to be delivered quarterly to households not yet on the programme. The contractor also places articles in the local newspaper to encourage residents to join in. An estimated 6,000 households are now using the service.

The contractor's two-ton caged truck follows the daily beats of the municipal refuse truck through the suburbs during the week, collecting bags of mixed recyclables from households and swapping them for fresh ones. Bags are taken to the contractor's recovery facility, sorted by hand, and baled for transport to Cape Town. On average, 115 tons per month is diverted from landfill by kerbside recycling, while the total municipal refuse to landfill is approximately 3,083 tons per month.

Giel Goosen, waste management officer for George Local Municipality, (personal communication, May 2014) sees it as important to extend collections to lower income households. He believes a minimum tonnage to be collected (below which penalties should be incurred) is recommended, as well as a minimum budget for education and promotion. These he intends including in a new tender.

3.5 Knysna Local Municipality

One of seven within the Eden District Municipality, Knysna Local Municipality is mainly a tourism resort and retirement area and includes Sedgefield, Karatara and Buffalo Bay. Households number some 22,000.

Separation-at-source recycling began in 1989 when residents started their own system, taking recyclable materials to a centre run in the town by a local recycling company for sorting and sale.

Collection of recyclables from homes to the centre was later taken over by the municipality and is now done with a six-ton truck and caged trailer. The company owns the premises and is contracted to sort and sell household recyclables, and handles most of the town's commercial waste recycling.

Public education is activated through local media, while the mayor's quarterly newsletter carries information on progress and achievements. The percentage of households participating in those areas being provided the kerbside service is estimated by the municipality at 55%.

From January to December 2013, 1,259 tons of recyclables were taken out of the waste stream and diverted from the PetroSA landfill, 106 km away at Mossel Bay. Air space cost there is calculated at R280/m². Total waste to landfill during 2013 amounted to 15,358 tons.

John Jafta, Knysna waste management officer, (personal communication, May 2014) attributes their source-separation recycling achievements to high levels of environmental awareness amongst residents. Public events and exhibitions such as at their town hall are also seen as effective. He believes in working closely with schools: in Sedgefield, learners swap recyclables for items at a nearby container-shop.

3.6 Mossel Bay Local Municipality

One of the larger municipalities under the Eden District Municipality, Mossel Bay is located near the PetroSA gas refinery and commercial complex. It includes Hartenbos, Little Brak, and Great Brak River. In 2011, households numbered 28,025.

As part of integrated waste management planning, the municipality launched separation-at-source kerbside recycling in 2005. Household holders are given blue bags for recycling at-source which a private recycling company collects from kerbside and takes to its own sorting plant. Here they are sorted, baled and sold to buyers in Cape Town, Johannesburg or Port Elizabeth.

The kerbside collection service is available to over 25,000 households, of whom 13% (on average) participate. The amount recycled per month varies between 130 -170 tons. This is 10-12% of total waste to landfill which varies from 1,500 to 1,900 tons per month.

While there is no tender contract with the recycling company, a council decision allows the company to be paid the equivalent of the value of air space saved at the PetroSA landfill by recycling diversion.

The municipality has two waste transfer stations, but does not operate general waste drop-off sites. It has however installed facilities for holiday tenants to drop recyclables and refuse bags on their way out.

Lanese Hesselman, waste management officer for the municipality, (personal communication, May 2014) is satisfied with the recycling programme. She emphasises ongoing communication is essential with households about what, why and how to recycle to increase participation. She also considers a close relationship with the recycling company partner to be vital to success.

3.7 Overstrand Local Municipality

Overstrand Local Municipality includes Hermanus, Kleinmond, Stanford and Gansbaai. A holiday and retirement area, it is a conservation-minded community. Households number some 31,800. A private company began recycling and by public demand a two- bag system has been run by the municipality since 2004. Residents are given clear bags for their dry mixed recyclables to be collected at the kerbside. Free bags are available during holidays at municipal offices.

In November before the holiday season, an educational leaflet is posted to owners/ratepayers. Municipal staff also hands out bags and leaflets if the house is occupied or has a post box. Articles in the local newspaper and leaflets in rates bills encourage participation, as do promotions at schools and the annual Whale Festival. Permanent residents' participation rates average 55 to 60%. Participation increases in season when most houses are occupied.

Weekly collections are done by truck and trailer and compactor trucks. Week-end drop-offs for holiday tenants are prominently located and manned. Bags are transported to two sorting facilities owned by the municipality and managed on contract by a recycling company.

One at Gansbaai operates manual sorting while the larger MRF at Hermanus has a conveyor and takes clear bags as well as refuse black bags which are sorted for additional recyclables. Next to this MRF, on land leased from the municipality a buy-back centre is sited and run by the contractor which services the nearby lower-income community, general public and businesses.

On average, 127 tons of household materials per month are recycled. An additional 172 tons per month is handled separately by the contractor collecting recyclables from businesses and buying in from private and business sector.

The contractor sells recycled materials to Cape Town and further afield. Some 3,800 tons of refuse per month go to landfill whose per cubic metre airspace is costed at R25.57/m³. Operational savings to divert waste from landfill by recycling is R35.54 per ton.

Waste management officer Johan van Taak's main challenge is increasing holiday recycling rates, (personal communication, May 2014). He plans to extend collections to lower-income suburbs, which were not viable earlier. His advice is to ensure refuse and recyclables are collected on the same day each week, regardless of public holidays. The contractor and personnel should be experienced in the business of recycling, and public-private partnership arrangements should assist the economic viability of recycling programmes.

3.8 Saldanha Bay Local Municipality

Saldanha Bay Local Municipality falls under the West Coast District Municipality and includes the towns of Vredenburg, Langebaan, Paternoster, and St Helena Bay. Tourism, fishing and iron ore exporting are the area's main economic activities. In 2011 there were 28,835 households.

Currently there is no separation-at-source or kerbside collection of household recyclables. Some years ago, the municipality built a basic MRF at its landfill site, being a roofed-over concrete slab. This now operates as a 'dirty' MRF by a private contractor with black refuse bags delivered to it by the municipality. When the current contract ends in April 2015, a new tender will go out.

Waste management officer, Cliff Carelse, (personal communication, May 2014) recommends obtaining other separation-at-source tender documents from a range of municipalities to tap on their experience, as well as talking to recycling companies and consultants on what should be included.

Over-mechanisation is not necessary in rural areas although managing many manual workers calls for good people skills. A large area should be available for storing sufficient baled recyclables to make it economical for transport to city buyers and so increase the viability of the overall operation.

3.9 Stellenbosch Local Municipality

Stellenbosch is the second largest municipality in the Western Cape and falls under the Cape Winelands District Municipality. It is a large university town and wine-growing agricultural centre. At the 2011 census, there were just over 43,000 households.

The municipality began a small separation-at-source kerbside collection programme in 2011, partly due to provincial government expectations for greater diversion from landfill. Minimal budget, staff and equipment was allocated to it, so it has run on a low-key basis thus far.

Residents (mainly in middle/upper income suburbs) joining the programme are provided with clear bags at municipal offices, where a record of distribution is kept. In this way routes and participation numbers are tracked.

The municipality collects bags of co-mingled recyclables weekly in a 3t tipper truck with compaction mechanism removed. Recyclables are taken to two destinations. One is 'Huis Horison', a home for mentally-challenged people, who sort and sell the recyclables for their own upkeep. The balance is transported to City of Cape Town's Kraaifontein MRF, 25km from Stellenbosch.

At present, household waste being recycled monthly averages 75 tons. The tonnage of all waste going to landfill is estimated at between 9,000 and 11,000 tons per month. The estimated nearest landfill airspace cost is approximately R400 per cubic metre.

The municipality is planning an upgrade of the separation-at-source system. A 12-month pilot will be implemented at a newly licensed waste minimisation facility next to its landfill site. A 12 x 10m concrete slab will be laid, with three-phase power supplied so a contractor can process co-mingled recyclables for own gain. Certain residential areas will be outsourced to the contractor to issue clear bags to participants, collect recyclables and separate and sort for off-sale at the new facility.

Based on data gathered from phase one, the next phase will include a general upgrade of the programme as a whole, and the construction of a purpose-built MRF. Best practice principles will be included in the design of phase two.

The municipality has no formal drop-off sites, but three are planned in future. Alternate disposal options are considered, and a strong focus on waste beneficiation and treatment of organic waste is currently considered by the municipality.

Saliem Haider, waste management officer for Stellenbosch Local Municipality, (personal communication, May 2014) sees best-practice as coming from greater efficiencies through understanding all the elements of a separation-at-source programme as a whole system. Contractors with adequate knowledge and experience in the recycling business is essential. Thorough public education for behaviour change is vital and unwanted creation and generation of waste must be viewed as "money down the drain" by all residents.

3.10 Witzenberg Local Municipality

Located inland in the central Western Cape, the main towns included in the municipality are Ceres, Wolseley, and Tulbagh. The estimated number of households is 16,500. The municipality decided to implement separation-at-source recycling following national legislation, and it was part of their integrated waste management planning.

Residents can put out three bags for kerbside collection – black for refuse, green for garden waste and clear bag for source-separated recyclables. The municipality picks up the first two while a private contractor collects the recyclables and takes them to its own MRF for sorting, baling and selling off.

Public awareness and education is done both by the municipality and is outsourced and to date some R60,000 has been allocated to it. Schools are also involved in waste and recycling education programmes. The total average waste to landfill is estimated at 20,000 tons annually. The source-separation kerbside collection programme diverts some 3,500 tons per annum or 18% away from landfill.

Johnny Jacobs, waste management officer and assistant Martin van Wyk, (personal communication, May 2014) are satisfied with the source-separation programme but feel there is room for improvement. For them the important principles of a successful programme are sourcing and allocating sufficient budget, informed and comprehensive educational and behaviour change programmes, and a punctual and effective collection service.

What they see also helping is support with restructuring the broader economics of recycling to enable private contractor companies to manage fluctuations in recycle material prices, as well as costs of transport.

4. CONCLUSIONS

Responses from this qualitative survey show a range of municipalities in various localities dealing with complex public/private relationships that rely on a variety of factors for success. Table 1 provides a shortlist of recommendations for best-practice by the various municipalities.

Table 1: Best-practice recommendations by municipalities

Best-practice recommendations	Municipality mentions
Minimum budget in tender for effective public awareness and education	Knysna, Drakenstein, George, Mossel Bay, Cape Town, Witzenberg, Stellenbosch, Bergrivier
Close working relationship with contractor	Mossel Bay, Overstrand, Cape Town
Create buy-back centres for lower income areas	Drakenstein, Overstrand, Knysna
Extend collections to lower income households	George, Overstrand, Bergrivier
Education of recycling companies	Bergrivier, Cape Town
Contractor experienced in the business of recycling	Stellenbosch, Overstrand
Talk to recycling companies and consultants	Saldanha, Cape Town
Understand elements of a programme as a whole system	Stellenbosch
Set minimum tonnages for collection in tender	George
Source relevant tender documents from other municipalities	Saldanha Bay
Low-tech mechanisation in rural areas	Saldanha Bay
Rural MRFs to have large area for storing baled material	Saldanha Bay
Life-cycle assessment and full-cost accounting approach	Cape Town
Longer duration of tenders	Cape Town
Proper measuring of household recyclables	Cape Town
Same day each week regardless	Overstrand
High environmental awareness among residents	Knysna
Punctual and effective collection service	Witzenberg

Many separation-at-source programmes were started by municipalities as a response to provincial and national government pressure, and as part of their ongoing waste minimisation planning and the necessary diversion of waste from landfill.

All are managing the transference of a 'free' commodity (temporarily owned by the municipality) into the hands of private commercial companies whose economic viability is largely dependent on maximum quantities of that commodity being supplied by means of the voluntary participation of rate-paying householders.

This is why the most common principle which comes up for best practice is educating and motivating residents to participate. This goes beyond handing out leaflets and involves actively encouraging residents take up recycling using behaviour change methodologies.

It further emphasises that separation-at-source recycling is an interlinked system of disparate elements - which need to be aligned and in harmony for it to work best. Thus a close and supportive relationship between municipality and contractor (who should well understand the business of recycling) is often highlighted.

Other useful guidelines have been offered for consideration when starting or improving an at-source programme. There is insufficient concise, accessible information or training material available in this important area.

Overall, the responses help fill a gap in knowledge, assist diversion and recovery of valuable re-usable material and support the long-term aim of zero waste to landfill.

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Disclaimer: The author states that this paper and the conclusions drawn are those of his and not those of the municipalities concerned.

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