

GreenCape

WASTE MARKET INTELLIGENCE REPORT





GreenCape

GreenCape is a non-profit organisation that works at the interface of business, government and academia to identify and remove barriers to economically viable green economy infrastructure solutions. Working in developing countries, GreenCape catalyses the replication and large-scale uptake of these solutions to enable each country and its citizens to prosper.

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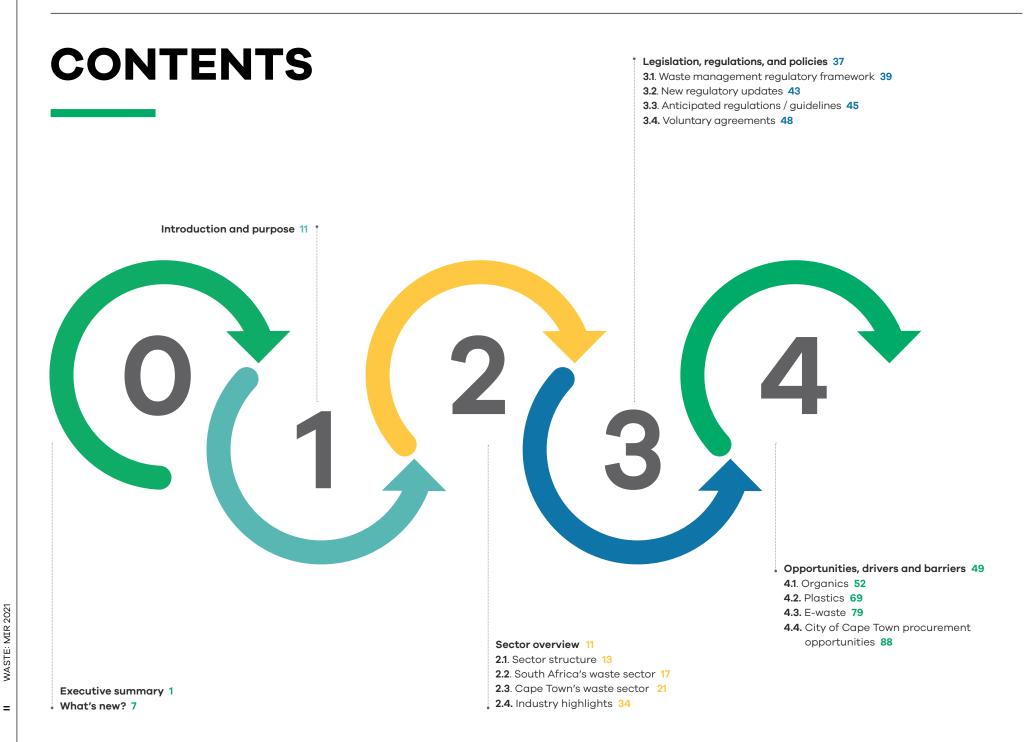
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LIST OF ABBREVIATIONS AND ACRONYMS

AfCFTA	African Continental Free Trade Area
AHP	Absorbent hygiene products
BBF	Biosolids beneficiation facility
ССТ	City of Cape Town Metropolitan Municipality
COPCO	Compostable Plastics Council
CPI	Consumer price index
CPT	Cape Town
CPU	Central Processing Unit
CSIR	Council for Scientific and Industrial Research
DEA&DP	Department of Environmental Affairs and Development
	Planning (Western Cape)
DFFE	Department of Forestry, Fisheries and the Environment
	(National)
DMRE	Department of Mineral Resources and Energy
DST	Department of Science and Technology (National),
	now the Department of Science and Innovation – DSI)
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association
	of South Africa
EIA	Environmental impact assessment
EPR	Extended Producer Responsibility
ERA	E-waste Recycling Authority
EWASA	e-Waste Association of South Africa
FERTASA	Fertilizer Society of South Africa
GDP	Gross Domestic Product
GWIS	Gauteng Waste Information System (Gauteng)
HDPE	High-density polyethylene
IDP	Integrated Development Plan

IndWMP	Industry Waste Management Plan
IPWIS	Integrated Pollutant and Waste Information System
	(Western Cape)
IRP	Integrated Resource Plan
ISWA	International Solid Waste Association
IWMF	Integrated waste management facility
IWMP	Integrated Waste Management Plan
LDPE	Low-density polyethylene
LED	Light Emitting Diode
LPG	Liquefied petroleum gas
MBT	Mechanical biological treatment
MIR	Market Intelligence Report
MRF	Material recovery facility
MSA	Municipal Systems Act
MSW	Municipal solid waste
NEMWA	National Environmental Management: Waste Act
NEMAQA	National Environmental Management: Air Quality Act
NWMS	National Waste Management Strategy
IPPA	Independent Power Producers Association
OPRL	On-pack recycling label
ORASA	Organic Recyclate Association of South Africa
PCB	Printed circuit board
PEDI	Philippi Economic Development Initiative
PET	Polyethylene terephthalate
POP	Persistent organic pollutant
PRO	Producer Responsibility Organisation
RDF	Refuse derived fuel
RTS	Refuse transfer station

LIST OF ABBREVIATIONS AND ACRONYMS

SABIA	Southern African Biogas Industry Association
SADC	Southern African Development Community
SAEWA	Southern African E-Waste Alliance
SAFLWVA	South African Food Loss and Waste Voluntary Agreement
SAPP	South African Plastics Pact
SAPRO	South African Plastic Recycling Organisation
SAWIS	South African Waste Information System (National)
SMME	Small, medium, micro enterprise
SoWR	State of Waste Report (National)
SRI	Sustainable Recycling Initiative
SSEG	Small scale embedded generation
WEEE	Waste electrical and electronic equipment

WWTW Wastewater treatment works

Biogas technology offers a cross-sectoral green economy solution for the beneficiation of organic waste residues. ©GreenCape

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EXECUTIVE SUMMARY

The South African waste management and beneficiation landscape has been bolstered with the publication of South Africa's new National Waste Management Strategy (2020); as well as the implementation of a number of key and progressive regulatory changes. Furthermore, the City of Cape Town as a municipality has made large investments into material recovery. Further large municipal investments are expected in the coming years. The private sector has also played its part with large brands making progressive commitments to voluntary agreements. These should all ultimately unlock opportunities in, among others, the plastics, organics, and electronic waste sectors. These opportunities should be open to not just large established businesses, but SMMEs too.

According to the then Department of Environmental Affairs, the waste economy contributed ±R24.3 billion to the South African GDP in 2016 (DEFF, 2017). It provided 36 000 formal jobs and supported ±80 000 informal jobs/livelihoods. It was estimated that a further R11.5 billion per year could be unlocked by 2023 by diverting up to 20 million tonnes of waste from landfill. The anticipated benefits could include 45 000 additional formal jobs and 82 000 indirect jobs, as well as the creation of 4 300 SMMEs.

In 2015, the Western Cape province generated over 7.7 million tonnes of waste, of which ±2.4 million tonnes (31%) consisted of municipal solid waste, ±2.4 million tonnes (31%) of agricultural and forestry waste/ residues, ±1.7 million tonnes (22%) of construction and demolition waste, and ±0.9 million tonnes (11%) of commercial and industrial waste. The remaining ±0.4 million tonnes (5%) consist of other waste streams.

As the economic hub, the city of Cape Town metropolitan area generates a substantial portion of the Western Cape's waste. In 2015, this includes: ±1.7 million tonnes of municipal solid waste, ±1 million tonnes of construction and demolition waste, ±0.6 million tonnes of commercial and industrial waste, ±0.07 million tonnes of agricultural and forestry waste/ residues, and ±0.3 million tonnes of other waste streams.

Opportunities within the organics, plastic and e-waste sectors have the potential to add between R0.5 and R1.1 billion in value to the Cape Town economy. Furthermore, a there are a number of potential tenders may be open to businesses in the future: Organics: It is estimated that the Western Cape generated between 470 767 and 538 416 tonnes of municipal solid waste (MSW) organics, and between 288 232 and 329 844 tonnes of industrial and commercial organics in 2020. Assuming these organic streams were made available, the MSW and commercial and industrial organics have market value of between R75.9 million and R315.1 million. At a municipal level, the greatest value lies in the CCT with an estimated market value of between R53.8 and R225.0 million

Plastics: The Western Cape generated between 214 307 and 245 103 tonnes of MSW plastics in 2020. The market value is estimated at between R321 million and R2.2 billion. At a municipal level, the greatest value lies in the Cape Town metropolitan area with an estimated market value of between R383.6 million and R1.3 billion.

E-waste: The Western Cape generated between 43 290 and 68 501 tonnes of e-waste in 2020. The market value is estimated at between R55.2 and R109.8 million per year. At a municipal level, the greatest value lies in the Cape Town metropolitan area with an estimated market value of between R36.5 and R77.4 million.

Municipal contracts: The CCT has a number of material recovery contracts that it outsources to the private sector. These opportunities will be further bolstered with large future infrastructure initiatives, investments and expansions. Key **drivers** of these opportunities include:

Legislation and regulation:

New national and provincial legislation and regulations are unlocking a number of key waste streams, notably organics, plastics, and e-waste. These changes will also help to simplify rules and procedures for alternative waste treatment technologies and activities; as well as unlock funds and feedstocks for, among others, the private sector.



Extended producer responsibility:

Producers of paper, packaging and some single-use products, lighting equipment, and electrical and electronic equipment are required by 05 November 2021 to join or develop and implement extended producer responsibility measures. This will support access to feedstock, and support demand for recovered materials in the associated waste streams.

Government initiatives:

The initiatives identified by the national government's fast results delivery programme, Operation Phakisa, should increase access to feedstock and stimulate growth in market demand. These are essentially given through the National Waste Management Strategy published in 2020.

Private sector commitments:

Some of South Africa's largest brands have made progressive voluntary commitments that should increase the supply and demand for plastic waste and organic waste solutions.

Increasing cost of disposal:

Rising waste management costs are pushing up the price of landfilling in the Western Cape, and in the Cape Town metropolitan area in particular. This increases demand from waste generators for alternative waste treatment solutions, which in turn improves the business case for solutions.

Dwindling landfill airspace:

Most of the Western Cape province is experiencing a landfill airspace pressures. Of the 25 municipalities, 22 have less than five years of airspace left. This is expected to continue in the medium term. Pressures like these provide opportunities for municipalities to diversify their waste management models, as is particularly evident in Cape Town.

> 22 of the 25 landfills in the Western Cape have less than 5 years of airspace left. ©GreenCape

Rising landfill gate fees pose a risk to a business's profitability. **©Agriprotein**

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Table 1: Summary of waste value-add opportunities

Stream	Opportunities	Drivers / Enablers	Enablers	Barrier / Risks	Term	Macro-environment
	Solutions to mechanically extracted MSW organics	 Organic waste landfill restrictions by 2027 Decreasing municipal landfill airspace Increasing cost of landfilling Carbon tax liability Market demand for clean dry recyclables Energy security NWMS organic waste related targets 	 Municipal organic waste diversion plans Easing of composting 	 Inadequate source separation Compost registration regulations Confidence in bio-energy projects Competition with livestock farmers Short procurement durations Strict procurement process Lack of bio-based electricity grid Lack of heating grid Sensitive market for by-products Cost of competing landfills (until 2027) 	Medium – Long	
	Contaminated MSW organics		regulations Easing of treatment regulations Carbon credit market Increasing cost of electricity Feeding bio-based electricity onto the grid Food loss and waste commitments: Landfill restrictions Financing appetite Support from industry		Short – Medium	 NWMS focus on organic waste Operation Phakisa focus on organics
Organics	Value-add to low-value digestate from MSW biogas solutions				Short – Medium	 Greenhouse gas reduction commitments CCT envisions generating own
Orgunius	De-packaging technologies for processing packaged organics				Short	 electricity Consumer awareness of the impact of food waste Policy makers awareness of the
	Beneficiation of ±199 tonnes a day of dewatered WWTW work sludges				Short – Medium	impact of food waste
	Beneficiation of 109 to 136 tonnes a day of dewatered biogas digestate				Medium – Long	
	Replacing virgin material with recyclate	 Decreasing municipal landfill airspace Perceived job potential Global / local plastic sentiment 	 Plastic bag regulations Plastic packaging EPR Municipal infrastructure investments South African Plastic Pact South African Initiative to End Plastic Wast 	 Slow growth in end-markets Virgin plastic price variability High levels of contamination Unregulated labelling systems Lack of accurate plastic data Contamination of alternative to plastics Narrow focus of initiatives 	Short	National Waste Management Strategy
Plastics	Material recovery potential				Short	 Operation Phakisa focus on plastics Consumer awareness International commitments
	Municipal material recovery contracts				Medium – Long	 COVID-19 impact on consumption / movement Transboundary movement (Basel Convention)
	PRO support for plastic waste recovery				Short	• African Continental Free Trade Agreement

Table 1: Summary of waste value-add opportunities

Stream	Opportunities	Drivers / Enablers	Enablers	Barrier / Risks	Term	Macro-environment
	National pre-processing and processing		 Electrical and electronic equipment EPR Lighting equipment EPR NWMS focus on e-waste 	 Lack of reliable data Access to feedstocks Licensing of recycling / recovery facilities Cherry-picking of high-value e-waste DFFE view of transbound- ary e-waste movement 	Medium – Long	
	Intercepting e-waste before it reaches landfills	 Precious metal prices National e-waste landfill 			Short – Long	 Operation Phakisa focus on e-waste International commitments /
E-waste	Pre-processing / k processing facility for the • N	bans • National battery landfill bans			Short – Medium	 Transboundary movement (Basel Convention)
	PRO support for e-waste recovery	• Perceived job potential			Short – Long	
	Processing of SADC feedstocks				Medium – Long	
	Sludge disposal / beneficiation	_		_	Medium – Long	_
	Think Twice recyclables recovery	_			Short – Medium	—
	MRF operations	_			Short – Medium	_
Municipal Contracts	Drop-off site operations	_		_	Short – Medium	_
	Garden waste chipping	_		_	Medium	_
	Builders rubble crushing	_		_	Medium	—
	Animal carcass disposal				Medium – Long	_

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WHAT'S NEW?

For investors and business owners who have read GreenCape's 2020 Waste MIR, the following are new developments discussed in this report. Whereas the 2020 report focused on the waste opportunities opened up by industry changes at provincial and national level, this year's report focuses on:

- market trends and opportunities in the beneficiation of organic, plastics, and e-waste in specifically the Cape Town metropolitan area;
- pipeline of existing and future CCT contracts related to material recovery and/or beneficiation;
- South Africa's journey towards extended producer responsibility (EPR) for the paper, packaging and some single-use products, electrical and electronic equipment, and lighting;
- South Africa's State of Waste Report (2018) was launched in 2019;

- South Africa's finalised National Waste Management Strategy (2020); and
- The City of Cape Town's waste sector plan

Builders rubble opportunities have been omitted from this year's MIR as there has been very little change in this sector over the last year and the information in the 2020 MIR remains valid.



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INTRODUCTION AND PURPOSE

This report provides insights into Cape Town's waste sector in particular, but also into South Africa's and the Western Cape's waste sector. The report also outlines market opportunities and barriers to be considered by investors who are active or interested in providing alternative waste treatment and beneficiation solutions. One way GreenCape facilitates the growth of the green economy is through the collection, analysis, and dissemination of market intelligence. This intelligence is gathered and analysed by GreenCape's Sector Desk Analysts. This report is a culmination of years' worth of intelligence gathering, and is the backbone of GreenCape's service offering:

Section 2 provides an overview of the waste sector in South Africa, with a focus on specifically Cape Town, and to some extent the Western Cape. This is followed by an overview in Section 3 of key policies and regulations that guide and affect the sector. Section 4 provides an overview of market opportunities, drivers, barriers, risks and recent developments in a number of strategic sectors. Section 5 provides an overview of available green finance and incentives. The case for the City of Cape Town and the Western Cape as a greentech hub for Africa is covered in Section 6. This is followed by Section 7, which outlines the general work GreenCape does to support the business of green.

For further information or queries, or to access support services offered by GreenCape, please contact GreenCape's Waste Sector Desk at +27 21 811 0250 or via email at waste@greencape.co.za.

> CLICK HERE TO EMAIL GREENCAPE'S WASTE SECTOR DESK





SECTOR OVERVIEW

This section provides investors, businesses and new entrants with a general overview of the waste sector in South Africa, and more specifically Cape Town. This includes how the sector is structured, what some general numbers are, the drivers / enablers and risks / barriers to beneficiation, and lastly the key industry highlights. Since the publishing of GreenCape's first Waste Economy MIR in 2014, the momentum in the waste sector has been building towards a waste economy increasingly characterised by circularity, with much focus on beyond just recycling and taking a more progressive approach of reuse, refurbishment and repair. This focus on landfill diversion, and specifically beneficiation, has accelerated over the last couple of years, and has been evident at all ends, from government through to business, industry, and the general public.

Private sector investments have grown in number and scale; public sector material recovery investments are included in municipal budgets and have broken ground; positive regulatory reforms continue to be considered, drafted and promulgated; and the scope of industry organisations has expanded into the realm of extended producer responsibility (EPR).

Furthermore, growing global and local public concern about plastic in the environment has put an immense pressure on brand owners, retailers, and the general plastics sector to align with local and global trends and initiatives to divert plastic waste from landfills and the environment.

As a result, the South African waste economy continues to experience positive growth. There is growing interest in the uptake of alternative waste treatment solutions and associated value chains. This has resulted in continued and increasing diversion of waste from landfill, both in Cape Town and South Africa. This is likely to accelerate in the medium term.



RECYCLING CREATES JOB OPPORTUNITIES!

Recycling creates a chain of job opportunities including: collection; transport; sorting; cleaning; processing; (re)manufacturing and; (re)distribution!

> Growing global and local public concern about plastic in the environment has put pressure on the plastics sector, leading to the establishment of the global Plastics Pact Network, pioneered by the Ellen MacArthur Foundation. This includes the South African Plastics Pact. ©South African Plastics Pact

2.1. Sector structure

Broadly speaking, South Africa's waste sector comprises the public sector, private sector, and households. There are also a number of industry bodies who have been tasked to support their respective members in ensuring waste does not end up in landfills or the environment. Figure 1 shows the relationship between sectors, and their legal roles and responsibilities.

		Collection / Management				
		Local municipalities	Private sector			
ation	Household	Local municipalities are constitutionally mandated to ensure that household waste is collected and managed. Municipalities can provide the collection service themselves, or appoint private waste contractors to do so.	Waste management companies can be contracted by local municipalities (through a procurement process) to collect household waste, or to manage drop- off facilities open to households. The private sector can also be outsourced by households to provide a desired waste service, such as recyclable collection			
Generation	Organisation	Local municipalities are not obligated to service waste generated by private or public organisations. However, organisations may request local municipalities to collect waste, but this incurs a municipal service fee.	Public and private organisations are responsible for the management and safe disposal of their own waste. Large organisations usually outsource this to private waste management where specialised collection is required			
Treatment / Disposal		Municipalities are mandated to ensure the availability of disposal facilities such as landfills. They can support alternative waste treatment by means of providing material recovery and aggregation. These facilities can be managed by the municipality, or contracted to the private sector.	The private waste sector can either own its own treatment and/ or disposal facilities; or it can be contracted by local municipalities to manage municipal recovery, aggregation, and/or disposal facilities.			

Figure 1: Waste collection and treatment responsibilities in South Africa

Source: GreenCape

2.1.1. Public sector

All three spheres of government are responsible for waste management in South Africa. In general, they are also responsible for upholding the requirements of the Constitution and the National Environmental Management: Waste Act (NEMWA) (Act 59 of 2008), including related regulations.

National: The national Department of Forestry, Fisheries and the Environment (DFFE) is the overarching authority for waste management in South Africa, and is the licensing authority for hazardous waste treatment activities. Investors and businesses developing / expanding waste initiatives that require a waste management licence (Section 3.1) must apply for the licence through the DFFE if hazardous waste is handled, with the provincial environmental authorities engaged as a commenting authority. Engagement with national authorities should be undertaken prior to initiating any licensing applications to ensure clarity in the process, or to confirm whether the activity triggers the need for a waste licence.

Provincial: The provincial environmental authorities are generally responsible for regulating waste management within their respective boundaries. Their functions include: promulgating provincial legislation; providing municipal support; and monitoring municipal and private sector activities. Waste generators and handlers triggering certain thresholds stipulated in the National Waste Information Regulations (R.625 of 2012) must register with and report waste figures to either the national DFFE, through the South African Waste Information System (SAWIS)¹; or a provincial waste information system. There are two provincial waste management information systems in South Africa. In the Western Cape, the Integrated Pollutant and Waste Information System (IPWIS)² is managed by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP). The Gauteng Waste Information System (GWIS) is managed by the Gauteng Department of Agriculture and Rural Development.

Investors and businesses developing / expanding waste initiatives that require a waste management licence (Section 3.1) must apply for the licence through a provincial environmental authority if general waste is handled. Engagement with provincial authorities should be undertaken prior to initiating any licensing applications to ensure clarity in the process, or to confirm whether the activity triggers the need for a waste licence.

¹ SAWIS is South Africa's national waste reporting system established in terms of S60 of the NEMWA.

² IPWIS can be accessed via <u>http://ipwis.pgwc.gov.za</u>

The DEA&DP is the provincial regulating authority for waste management in the Western Cape, and is responsible for waste management licensing, and for maintaining the provincial waste reporting platform known as IPWIS.

Local municipalities: Municipalities are constitutionally mandated³ to provide waste collection, removal, storage, and disposal of waste generated by households within their boundaries. Although local municipalities can also provide waste related services to the private sector, they are not obligated to do so. Waste services can be undertaken either by local municipalities themselves, or they can be outsourced to the private sector.

Local municipalities may also choose to regulate how waste is managed within their boundaries through the promulgation of waste-specific bylaws. The CCT has its own Integrated Waste Management Bylaw that is discussed in Section 3.1.

Although alternative waste treatment is not explicitly required by the Municipal Systems Act (MSA) (32 of 2000), it is considered in the Act to be a municipal support activity (National Treasury, 2008). However, the NEMWA and the 2020 National Waste Management Strategy (NWMS) (Section 3.1.3) do require local municipalities to implement / support alternative waste treatment in order to divert waste from landfill. In some cases, municipalities provide infrastructure for aggregation and/or separation of materials, rather than provide the actual recycling infrastructure. These facilities are either operated by the municipality or outsourced to the private sector. Investors / businesses seeking to render services to local municipalities are required to do so via a highly regulated procurement process⁴.

Municipalities, as a public sector dealing with public funds, must ensure bidding processes are transparent, equitable, costeffective, and affordable, and offer opportunities to all entities competent to deliver the service. The intention is to ensure opportunities to as wide a sector and with wealth spread, rather than it being concentrated in monopolies in the waste sector. There are allowances for longer term tenders beyond three years, where it is financially more appropriate for investors to commit to longer term tenure, but the appetite is not always there from government to engage in the processes to enable this.

It is easier for investors / businesses to partner with companies already providing services to a municipality than the municipality itself, as there are fewer procurement requirements with which to comply.

2.1.2. Private sector

Ultimately the private sector is responsible for the management and safe disposal of their own waste, even when outsourced to service providers. They are bound by various regulatory requirements, whether they are waste generators, and/or waste handlers.

Waste generators: The private sector is responsible for managing their own waste. This can be done themselves, or this can be outsourced to either a private service provider or local government on request, both of which incur a number of service fees. Because of these fees. private service providers are incentivised to explore alternative waste treatment as the cost of landfilling increases. In general, municipalities are not involved with hazardous waste collection from the private sector. Some municipal bylaws, including that of the CCT, contain reporting requirements for waste generators.

⁴ Section 76 to Section 78 of the Municipal Systems Act (32 of 2000) outline the key steps needed before municipalities are able to partner with the private sector.

³ Schedule 5, Part B of the Constitution of the Republic of South Africa, 1996.

Formal waste handlers: Waste management service providers are responsible for the provision of responsible waste management services to their clients, or are contracted to do so by local municipalities. Investors seeking access to waste streams find it easier to work with the private sector rather than with municipalities, as there are fewer procurement requirements with which to comply. Some municipal bylaws, including that of the CCT, stipulate reporting requirements for waste handlers.

Informal waste handlers:

South Africa's informal waste sector plays a principal role in the recovery and diversion of post-consumer recyclables from kerbsides and landfills. However, in most cities and towns in South Africa, informal waste pickers operate at the fringe of formal management systems. Eventually, their materials will enter into the formal waste system via buy-back centres. The full extent of the importance of the informal waste sector is not fully understood, due to the nature of the informality. However, National Government has recognised their importance and has developed waste picker integration guidelines⁵, including requirements for municipalities to integrate the informal sector into municipal plans.

Sections 76 to 78 of the Municipal Systems Act (32 of 2000) outline the key steps needed before municipalities are able to partner with the private sector. The National Treasury has developed a public-private partnership (PPP) manual⁶ to guide the public and private sectors through the various phases regulating the PPP project cycle for national and provincial government.

2.1.3. Household

Households are generally serviced by their local municipalities, or by the private companies contracted by municipalities to collect waste. Some municipalities require households to separate recyclables from non-recyclables, and to ensure that the recyclables are disposed of responsibly. This can be done by either contracting the local municipality (unless the municipality has a recycling collection service), contracting an accredited waste service provider, or delivering the recyclables at a licensed facility. The CCT provides a number of free voluntary dropoffs for households to dispose of recyclables. The CCT also has a free recyclable collection programme called "Think Twice". This is a voluntarily service for strategic areas. For other areas, households can contract recyclable / organic waste collections to the private sector, which is a common practice for households in metropolitans and large cities.

2.1.4. Industry associations

In general, South Africa's recycling sector is largely driven by industry, and supported by industry-funded associations (see Appendix D). These associations can focus on specific materials, particular industry, or industry subsect. There are no regulated distinctions between the roles and responsibilities of the different associations. Each of the associations provides varying levels of support to their members along the respective value chains. Some associations are also operating as Producer Responsibility Organisations (PRO)

2.1.5. Producer Responsibility Organisations

PROs are non-profit companies that have been established either by producers or any person to support the implementation of a relevant extended producer responsibility (EPR) scheme.

⁵https://wasteroadmap.co.za/wp-content/uploads/2021/02/Waste-Picker-Integration-Guidelines.pdf

⁶http://www.gtac.gov.za/Publications/1160-PPP%20Manual.pdf

These PROs are responsible for ensuring that waste materials are diverted from landfill (supply) and to ensure end market development (demand). In the past, producers of specific sectors were not mandated to practise EPR. However, it is expected that by the end of 2021, producers within the paper, packaging and some single-use products, the lighting, and the electrical and electronics sector will be required to register and adhere to the requirements of an EPR scheme (see Section 3.2).

Investors / businesses interested in paper and packaging; e-waste; and/or lighting recycling sector, should engage the relevant PROs once they are established.

2.2. South Africa's waste sector

2.2.1. State of Waste Report

South Africa's 2018 State of Waste Report (SoWR)⁷ was launched 2019 (DEA, 2018). This report provides a snapshot of the state of South Africa's waste generation and management in 2017, and includes an update to the 2011 national waste baseline.

According to the update, South Africa generated an estimated 108 Mt of waste in 2017. An additional 299 788 tonnes were imported into the country, whilst South Africa exported 748 626 tonnes abroad. As such, in 2017, South Africa was responsible for managing a total of 107 Mt of waste. South Africa's recently published State of Waste Report indicates the country generated 108 Mt of waste in 2017, of which only 19% was recovered for beneficiation.

Of the total waste generated in South Africa, an estimated 55.6 Mt consisted of general waste, and a further 521 Mt of hazardous waste. In total, South Africa generated 107.7 Mt of waste. If the 50 MT (46%) of ash waste streams⁸ are excluded from the total waste generated, South Africa generated 57.7 Mt of non-ash waste. Figure 2 illustrates the split between general waste and hazardous waste generated in South Africa, and a couple of noteworthy streams. Appendix C provides a detailed breakdown of the 2017 waste constituents.

Despite an extensive and progressive regulatory environment, South Africa recovered 20.4 MT of waste for recycling, resulting in an input (emphasis on input ⁹) recycling rate of only 19%. If the ash waste generated and recycled is excluded from the equation, South Africa recovers a more favourable 34% (19.5 Mt) of nonash waste for recycling (DEA, 2018).

Figure 3 provides a comparative depiction of the input recycling rate for total waste generated in South Africa, and non-ash waste generated in South Africa.

⁷Website to access state of waste report

⁸ Combined, the fossil fuel reliant monopolies Eskom and Sasol are responsible for a substantial amount of bulk ash generated.

⁹ The input recycling rate is the material entering a recycling facility, and excludes what is actually recycled and subsequently diverted from landfill.



Figure 2: Total waste generated in South Africa in 2017 by classification Source: Modified from South Africa State of Waste Report 2018 (DEA, 2018)

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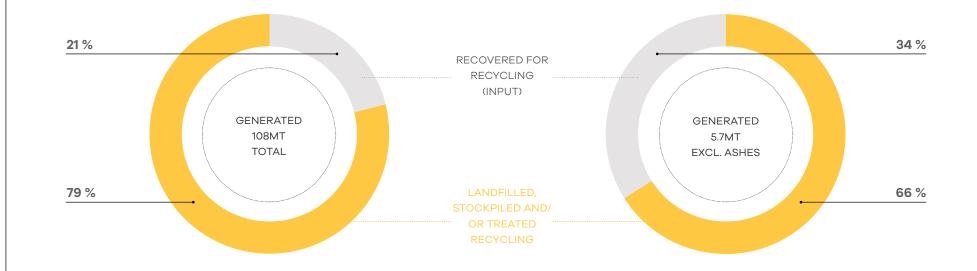
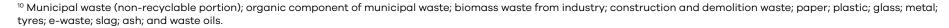


Figure 3: Input recycling rate for total waste generated for South Africa in 2017 Source: Modified from South Africa State of Waste Report 2018 (DEA, 2018)

A note of caution, the main challenge noted when developing South Africa's first SoWR was the lack of waste data. Whilst there are established mechanisms for collecting waste data, they are not fully utilised and/or enforced. Furthermore, few municipalities have functional weighbridges to collect accurate disposal data for landfills, or capacity to accurately record and report the data. Despite these challenges, DFFE is confident that the waste estimates are strong enough to inform high-level policy decisions, which in turn inform the NWMS.

In 2014, the then national DST's Waste Research, Development and Innovation Roadmap sought to determine the economic benefits of shifting South Africa's waste practices towards beneficiation based on four scenarios. At its most progressive, Scenario 4 valued thirteen priority waste streams¹⁰ at R25.2 billion per year if 100% material was recovered. This was R17.0 billion per year more than Scenario 1 (2011 baseline). Further to this, the avoided financial costs of landfilling was estimated at R10.1 billion, and R11.2 billion in avoided externalities of landfilling (DST, 2014). The Department of Science and Innovation (DSI) is in the process of updating these numbers.

6



Waste collection creates economic opportunities and jobs. ©**Unsplash**

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2.3. Cape Town's waste sector

2.3.1. Waste Sector Plan — 2040

The CCT's Solid Waste Department is developing its 20-year sector plan. This is a guiding document on how the CCT will manage waste within its jurisdiction. At the time of finalising this MIR the CCT's sector plan was still being developed. The planning phase was extended into the second quarter of 2022 to align with the **CCT** Integrated Development Plan (IDP). This sector plan will provide a useful guide to investors and businesses investigating potential opportunities in Cape Town, and will also provide certainty for investors already invested in material recovery and beneficiation.

2.3.2. Climate Change Strategy — 2050

In order to address climate change, the CCT is committed to working towards achieving the following goals within this strategic focus area on waste management:

- Goal 22: Develop and implement a sustainable waste management strategy that is financially feasible, and maximises material efficiency by prioritising waste avoidance, reduction, treatment, and recycling in line with provincial targets;
- Goal 23: Reduce organic waste disposal to landfill by 50% by 2030 and 100% by 2050 through better waste separation, treatment, and utilisation;
- Goal 24: Increase diversion of recyclables from disposal to landfill by 40% by 2030 and 85% by 2050 through improved collection, waste separation, and providing support to informal workers; and
- Goal 25: Reduce the climate and environmental impact of disposal facilities by increasing landfill gas collection efficiency, treatment, and utilisation.



2.3.3. Waste Generated — 2015:

The Western Cape generated ±7.7 Mt of waste in 2015 (DEDAT, 2016). The waste profile is largely made up of municipal solid waste (MSW), and agricultural waste and/or residues. This is to be expected, as much of the Western Cape's economy is driven by agriculture value chains, and tertiary services. **Table 2** illustrates the tonnages of waste generated in the Western Cape by broad source for 2015. Appendix A provides a more detailed waste profile for the district municipalities and the Cape Town metropolitan municipality for the year 2015.

The province is not homogeneous, but rather a collection of municipalities of various population sizes and economic activities. Thus it exhibits varying waste profiles. Figure 4 illustrates this phenomenon. Cape Town is the economic hub of the Western Cape, contributing ±72% of the provincial GDP, supporting ±66% of the population, and is characterised as highly urbanised (CCT, 2020a). Figure 5 illustrates the waste profile of the metropolitan area's ±3.7 Mt generated in 2015. The surrounding municipalities are characterised by largely agricultural activities. As such, they resemble a rural waste profile.

Table 2: Total waste tonnages generated per district municipality / metro in 2015

Municipality	Municipal Solid Waste	Agri / Forestry Residues	Construction / Demolition	Commercial / Industrial	Other	Total
City of Cape Town	1 671 146	66 885	1 090 995	637 419	247 248	3 713 693
Cape Winelands	286 482	304 734	272 749	98 976	49 489	1 012 430
Central Karoo	23 874	34 531	17 047	4 308	4 334	84 094
Eden	190 988	501 013	153 421	70 344	34 865	950 631
Overberg	95 495	540 887	85 234	30 540	15 905	768 061
West Coast	119 368	917 734	85 234	39 514	23 544	1 185 394
Western Cape	2 387 353	2 365 784	1 704 680	881 101	375 385	7 714 303

Source: (DEDAT, 2016)

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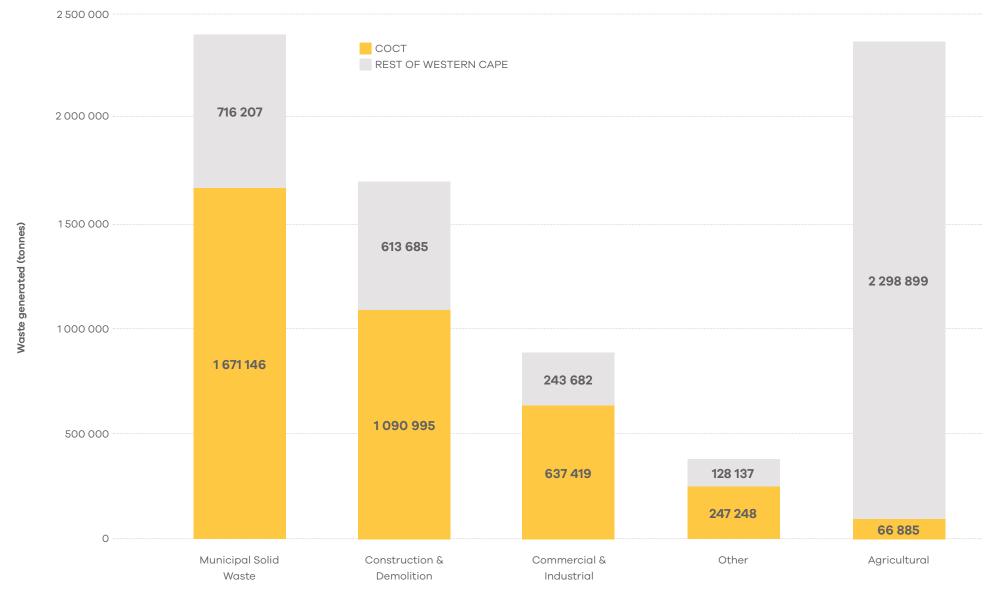
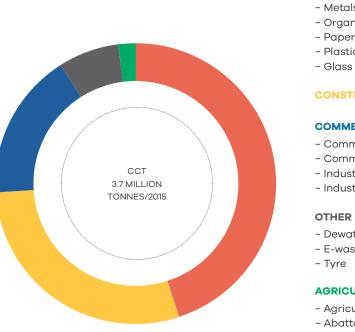


Figure 4: Waste generated in the city of Cape Town and the rest of the province in 2015

Source: (DEDAT, 2016)



MUNICIPAL SOLID WASTE

– Non recyclables	2,9%
- Metals	10,0%
– Organics	9,2%
- Paper	5,6%
- Plastics	4,2%
– Glass	3,1%

45.0%

CONSTRUCTION/DEMOLITION 29.4%

COMMERCIAL/INDUSTRIAL	1 7,2 %
- Commercial Organics	3,8%
- Commercial Non-organics	3,1%
- Industrial Organics	2,1%
– Industrial Non-organics	8,2%
OTHER	6,7 %
- Dewatered sewage sludge	5,1%
– E-waste	1,2%
– Tyre	0,3%
AGRICULTURE	1,8%

AGRICULTURE

- Agriculture residues	1,3%
– Abattoir waste	0,3%
- Forestry residues	0,3%

Figure 5: the city of Cape Town waste generated characterisation in 2015 Source: (DEDAT, 2016)

2.3.4. Waste landfilled

It is difficult to determine accurately how much waste is generated within a municipal boundary. It is, however, possible to determine how much waste is passing over landfill weigh bridges. Cape Town has three well-functioning landfills accepting and recording waste. Coastal Park and Vissershok (municipal) landfill are CCT assets, whilst Vissershok Holdings WMF (private) is privately owned by two prominent waste companies, namely Averda and Enviroserv.

The CCT has a well-functioning data collection and reporting protocol. Up to date municipal waste data is uploaded to an online data portal¹¹, whilst the private landfill figures must be reported monthly to the CCT, as per the Integrated Waste Management Bylaw.

In total, ±1.7 million tonnes of waste was landfilled at Cape Town's municipal landfills and also private landfills in 2020, with a further 244 557 tonnes stockpiled for use for landfill maintenance.

Figure 6 illustrates the waste landfilled at CCT landfills, and an estimate of waste landfilled at Vissershok private landfill.

¹¹ https://odp.capetown.gov.za/

The most recent waste characterisation study for the city's MSW was undertaken in 2018, which focused on waste destined for landfill. More specifically, the study looked at waste that was aggregated at six aggregation facilities: three landfills¹² and three transfer stations. **Figure 7** illustrates the broad profile of this MSW, whilst **Appendix B** provides a detailed breakdown.

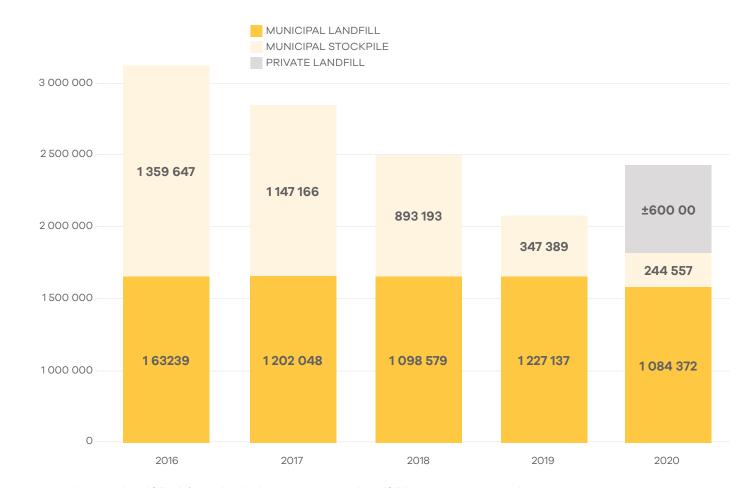
This illustration essentially indicates what MSW materials are still being sent to landfill, and are potentially available for recovery and beneficiation. Businesses looking to establish or expand their material recovery services should consider using this characterisation study as a guide to what is potentially available.

2.3.5. CCT Waste minimisation

In addition to private sector activities diverting waste

Waste Received at Landfills (tonnes)

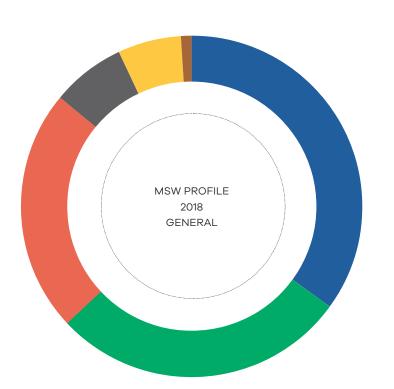
from landfill, the CCT also has its own waste minimisation programmes that seek to recover broadly garden greens, dry recyclables, and builder's rubble for beneficiation. Figure 8 illustrates the breakdown of the materials recovered from specifically CCT



¹² Bellville South landfill has since closed down **Figure 6:** Total waste landfilled / stockpiled at Cape Town landfill between 2016 and 2020 Source: CCT online data portal and engagements with private sector

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programmes and excludes private sector initiatives. Delivery of many of the CCT programmes are outsourced to the private sector but these are recorded as CCT diversion. The CCT is expected to substantially expand MSW recovery programmes in the coming years. See Appendix B for a more detailed breakdown of material recovery.



RECYCLABLES	35,4%
– Plastics	14,3%
– Paper/Cardboard	13,2%
– Glass	3,8%
– Metals	2,0%
– Multilayer	1,6%
– Tetrapak	0,5%
ORGANICS	27,8%
– Food waste	14,5%
– Garden	7,4%
– Residuals	5,9%
OTHER	23,2%
– Residual	18,8%
- Construction	1,7%
– Wood	1,3%
– Other	1,5%
HAZARDOUS	6,8%
– Nappies	6,8%
- Cleaning, toiletries	0,1%
TEXTILES	6,4%
E-WASTE	0,3%

Figure 7: Broad waste characterisation study undertaken on CCT's MSW in 2018 Source: Adjusted from (CCT, 2018)

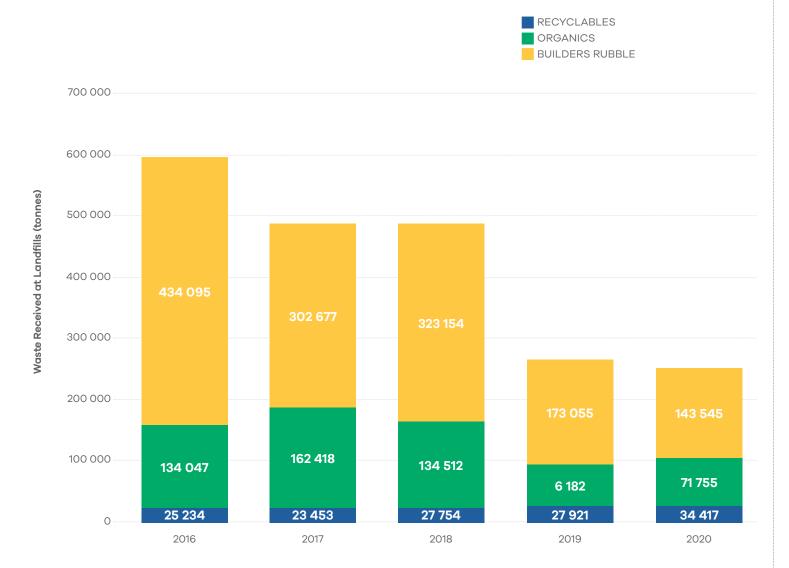


Figure 8: Waste recovered by CCT minimisation programme between 2016 and 2020 Source: CCT online data porta

2.3.6. Landfill gate fees

Disposal to landfill is a competing activity to waste beneficiation and continues to be the prominent waste disposal option in South Africa. Landfill disposal (the gate fee charged per tonne) is relatively low in South Africa compared to developed economies. In spite of this, waste generators still regard landfilling of waste a costly overhead. Figure 9 illustrates the municipal landfill gate fees for general waste across South Africa's eight metropolitan areas.

The CCT has the highest metropolitan landfill gate fees in the country. **Figure 10** illustrates the rising cost of landfilling waste at the CCT's municipal landfills from 2013/14, and also the expected increases for the coming years. **Figure 10** also illustrates the cost of landfilling general waste at Vissershok private landfill for 2020/21, but excludes hazardous waste as the cost of landfilling hazardous waste is wastestream specific. The CCT has the highest metro landfill gate fee in South Africa, which is expected to rise above inflation in the coming years. This should motivate businesses and waste service providers to seek cheaper alternatives to landfilling.

It should be noted that although the cost of landfilling in the Cape Town metropolitan area is expected to increase by 7.5% in 2021/22 and 15.58% in 2022/23, the cost of refuse collection is expected to increase by only 4% and 4.5% over the same period. This suggests a higher reliance on landfill disposal fees for revenue generation.

As the cost of landfill disposal increases, the increasing overheads for waste generators should strengthen the business case and reduce risks for businesses looking to invest and/ or provide landfill alternatives to Cape Town businesses. This makes Cape Town an attractive location for waste beneficiation solutions that rely on gate fees as a source of income.

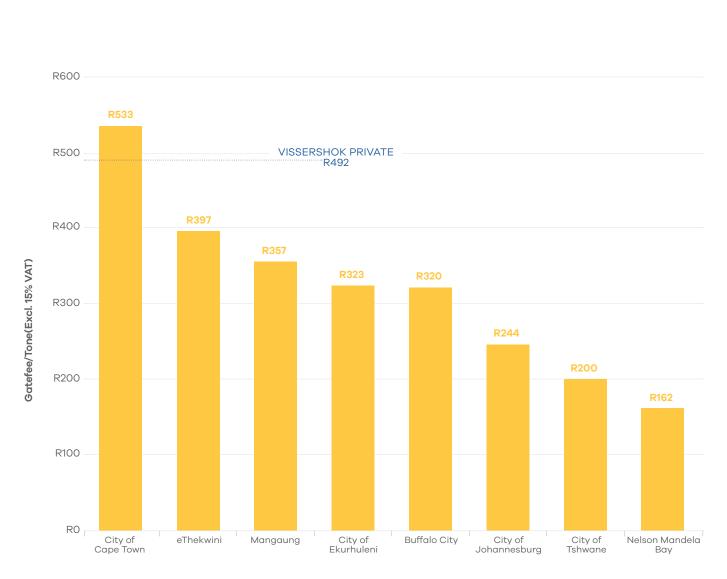


Figure 9: Landfill gate fees for general waste at South Africa's eight metros for 2020/21 Source: Respective metropolitan area tariff books for 2020/21

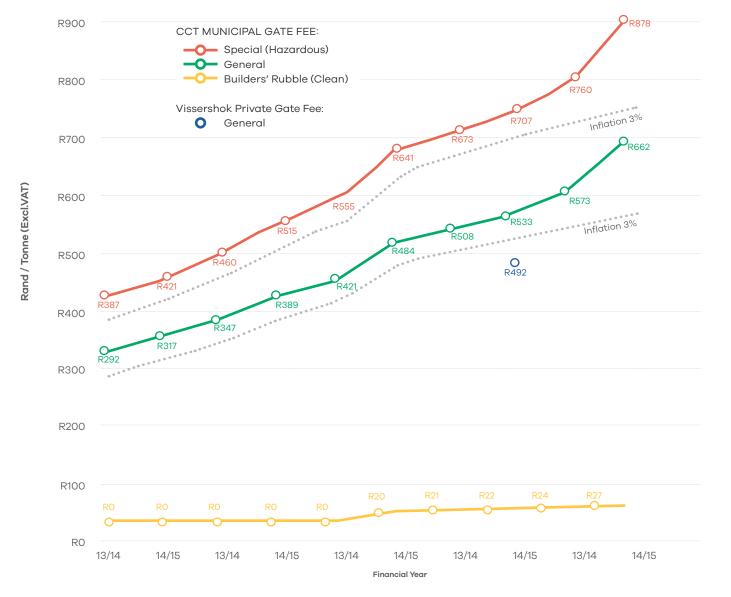


Figure 10: Cape Town municipal and private landfill gate fees since 2013 Source: GreenCape and City of Cape Town (2020b)

The national DFFE aims to implement mechanisms under its own control to fast-track landfill diversion. This includes the investigation into the implementation of a landfill tax, which will increase overall disposal cost across the country. This is still being assessed, along with an adequate tax rate. Such additional overheads to waste generators may further increase the business case for alternatives to landfill solutions.

2.3.7. Landfill airspace

The Western Cape, like many other regions of South Africa, is currently grappling with the availability of landfill airspace to accommodate disposal. Old landfills are closing, operational costs of existing landfills increase annually, and the sighting of new landfills have been challenging. However, some municipalities are in a more precarious situation than others. Figure 11 shows the estimated lifespan of the CCT and other Western Cape based municipalities as of 2020, and the location of intended regional landfills.

Although it is likely that the CCT will be able to handle current waste disposal rates, coupled with the sector plan to increase the landfill lifespan to 2040, the lack of available airspace in neighbouring municipalities will likely result in cross-border movement of waste between municipalities. This would affect the expected lifespan. It will no doubt provide further impetus to support landfill diversion by the CCT and its neighbouring municipalities.

2.3.8. Municipal Budget

Municipalities must annually adopt a budget for operating revenue and expenditure, capital expenditure, and cash flow. The CCT's 2020/21 annual budget took effect on 1 July 2020¹³. These municipal budgets are a great source of insight to understand where a municipality is focusing its attention, and also future projects. For the 2022/23 financial year, the CCT anticipates to raise R2.03 billion (3.8%) of its expected R53.45 billion revenue from waste related services (Figure 12); whilst it plans on spending R2.63 billion (5.2%) of the expected R50.23 billion of its operational expenditure on providing those waste services (Figure 13). Of the R10.64 billion capital expenditure budgeted for, R0.52 billion (4.9%) of this will go directly to waste related infrastructure (Figure 14). Figure 15 breaks down this infrastructure spend further by illustrating that 85% (R480 million) of the Solid Waste Department's waste infrastructure spend is on new infrastructure for 2020/21, with a total of R1.24 billion on new infrastructure over the next three years.

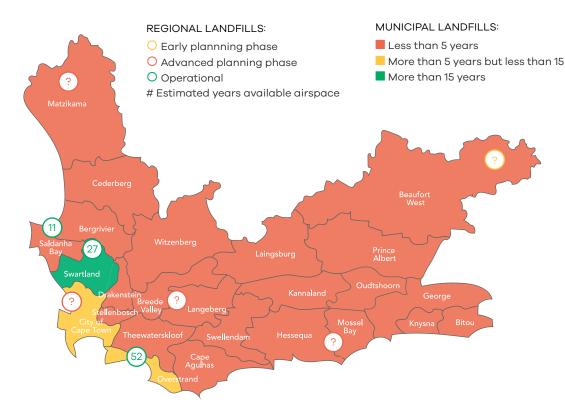


Figure 11: Estimated landfill lifespan for each local municipality in the Western Cape Source: Extrapolated from DEA&DP (2019)

¹³ At the time of finalising the MIR, the budget would have been adjusted. You can find a copy of the adjusted budget at https://www.capetown.gov.za/local%20and%20communities/meet the-city/the-city-budget

R60 Total R53,45 Revenue R49,68 Collected R50 R44,34 R43,65 R42,32 R40 R38,60 Revenue (Rand Bills) R36,62 R30 R22,58 R20 R18,07 R10 Revenue R1,90 R1,58 R1,69 R1,78 R2,03 from waste R1,48 R1,22 services RO

Figure 12: The CCT's revenue source from 2016/17 to 2022/23

Source: CCT (2020b) and CCT (2020c)

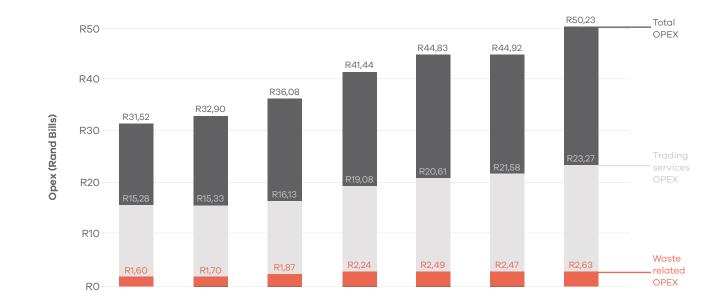
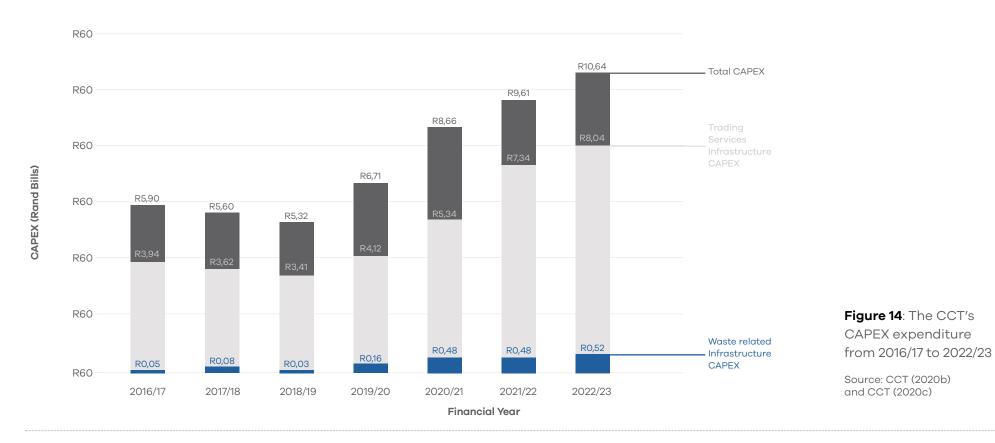


Figure 13: The CCT's OPEX spend from 2016/17 to 2022/23

Source: CCT (2020b) and CCT (2020c)

R60



2.3.9. Key infrastructure / initiatives

To provide constituents with adequate waste services, to align operations to obligations enshrined under the NEMA, NWMS, to adhere to future landfill restrictions, and to ensure landfill airspace security, the CCT has made a number of investments into both waste disposal and material recovery. However, the CCT is seeking to strengthen its waste service provision through investing in the extension of landfill disposal capacity, but also into ramping up material recovery through strategic infrastructure and initiatives.

The Solid Waste Department is expected to invest ±R1.48 billion into large (>R50 million) infrastructure projects. Of this, \pm R0.44 billion will be used to facilitate disposal and extend landfill capacity, whilst \pm R0.78 billion has been planned for material recovery and \pm R0.15 billion for landfill gas recovery.

Further to the investments by the Solid Waste Department, the CCT's Water and Sanitation Department is expected to invest over R3 billion into WWTW expansion. It will include biosolids beneficiation infrastructure to extract bioenergy from wastewater treatment sludge. This includes ensuring the digestate is treated for further beneficiation (see Section 4.1.2).

Section 4.4. provides a list the current and potential future waste beneficiation related

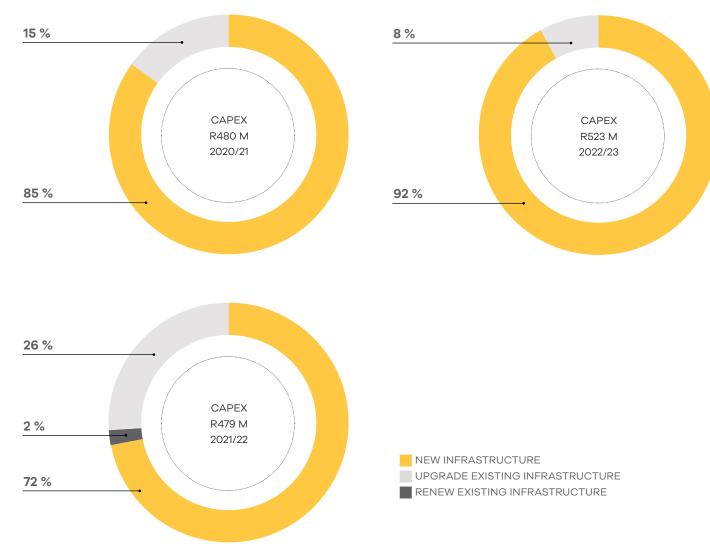


Figure 15: Expected solid waste CAPEX Source: CCT (2020a) and CCT (2020b)

infrastructure and initiatives that the CCT has and will likely establish by 2027. The list includes the expected tender period.

The operation of some of these investments will likely be outsourced to the private sector. Section 4.7 expands on this list by illustrating potential contracting opportunities that waste related investors and businesses may be interested in. The table provides the decision reference number for further investigation.

The commitments made by the CCT will no doubt unlock immediate service delivery opportunities to the private sector, but also result in ensuring long-term supply of material to the private recycling sector. This should bode well for investors / businesses, concerned with security of material supply

2.3.10. Household separation levels

The availability and quality of waste, particularly post-consumer streams, are dependent on the level of material separation

done by households. This in turn is linked to demographics and "recycling culture". Broadly speaking, higher separation levels are more common in provinces with larger urban populations. **Figure 16** and **Figure 17** respectively show the degree of household material separation per province and metropolitan municipality. The Western Cape (20.3%) and the City of Cape Town (23%) have the highest rates of household separation (StatsSA 2018).

2.4. Industry highlights

State of Waste Report

South Africa's State of Waste Report¹⁴ was published in 2020. This report provides not only a snapshot of the state of South Africa's waste landscape for 2017, and includes the most recent national waste figures for the country (see Section 2.2.1.).

National Waste Management Strategy (NWMS)

South Africa's third generation NWMS was published in September 2020.

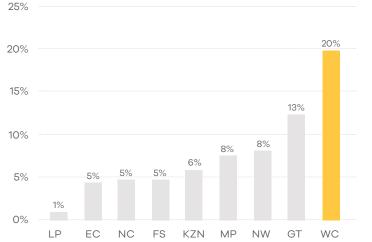
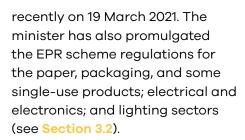


Figure 16: Household separation by province (2015) Source: StatsSA (2018)

This strategy outlines government's policy and strategic approach to waste management for South Africa. The NWMS provides for, among others, a set of key actions to reach strategic outcomes. Many of these actions affect both private sector and municipalities. See Section 3.1.3. for more information.

Extended Producer Responsibility (EPR) Regulations

The EPR regulations were gazetted on 05 November 2020 and have since been amended twice, most



National interest in waste-to-energy

The DFFE has appointed a service provider to conduct a detailed feasibility study and develop a business case for the establishment of refuse derived fuel (RDF) plants throughout South Africa.

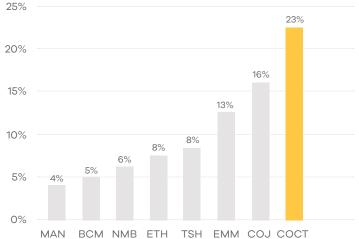


Figure 17: Household separation by metro (2015) Source: StatsSA (2018)

> The intention is to establish at least five plants by 2023 to process ±280 000 tonnes of absorbent hygiene products (AHP) and other residues.

Municipal electricity procurement

In October 2020, the national Department of Mineral Resources and Energy gazettes the amendments to the Electricity Regulations on New Generation Capacity.

¹⁴ Website to access state of waste report

These regulations allow municipalities in good financial standing to procure from independent power producers (IPPS) or generate their own electricity in accordance with an Integrated Resource Plan (IRP). Procurement may unlock the business case for waste-to-energy projects that rely on the sale of electricity to an electricity grid. See Renewable Energy MIR for more details.

Cape Town to host ISWA 2024

Cape Town has been selected by the International Solid Waste Association (ISWA) to host its 2024 congress and general assembly. The annual event brings together waste experts, decision-makers and visitors from around the world to share ideas, knowledge, research, and new technologies. This event will provide South Africa's waste sector, including SMMEs, with great networking opportunities.

CCT Coastal Park MRF breaks ground

The CCT has broken ground on its new R320 million Coastal Park material recovery facility (MRF) investment. The clean MRF will be located at the Coastal Park landfill and is expected to open in 2022/23. The processing capacity is yet to be made public.

CCT invests big into material recovery:

To complement the existing Kraaifontein MRF and the future Coastal Park MRF, the CCT is also investing an additional R277 million into upgrading its existing Athlone refuse transfer station (RTS) into a clean MRF and Mechanical biological treatment (MBT) facility. The CCT is also in the very early stages of planning a fourth MRF and MBT at its future Bellville RTS, which is expected to cost R183 million. In addition to large MRF investments, the CCT is also investing a total of R225 million into the development and upgrading of the Helderberg, Killarney Garden, and Prince George Drive drop-offs.

Stellenbosch material recovery facility (MRF)

Stellenbosch local municipality has opened its doors to its brand new MRF on 01 April 2021.

This R29 million investment is designed to process 450 tonnes a month of throughput and employ up to 40 people. The facility illustrates the municipality's commitment to unlocking recyclables for the private sector to beneficiate.

The Stellenbosch municipality has also reinitiated plans to establish its organic waste aggregation and transfer facility. Commercial, industrial, and MSW organics will be aggregated and processed into a higher quality feedstock for the private sector. The facility design and throughput are still to be finalised.

Compostable Plastics Council

The Compostable Plastics Council (COPCO) was formed in March 2020. The purpose of the council is to promote the use specifically of compostable plastics. The council advocates for responsible import, manufacturing, use management, and post-consumer waste management of compostable plastics. COPCO is also in the process of registering an EPR scheme for compostables.

Wheeling Help Desk

The South African Independent Power Producers Association (IPPA) is in the process of developing a wheeling helpdesk for its members. As a part of the process, they are assessing the current status of wheeling within municipalities and across various energy technologies. Wasteto-energy solutions looking to strengthen the business case by securing offtakes for energy are well advised to engage the association to leverage this wheeling helpdesk.

WastePlan acquires SmartMatta

In 2015, Barloworld logistics acquired the waste management company Re-Ethical. This acquisition gave rise to the SmartMatta brand. As of August 2020, WastePlan, one of South Africa's largest waste management companies, acquired SmartMatta and has integrated the waste company into its ecosystem. SmartMatta will continue to operate as SmartMatta.

The CCT is also investing an additional R277 million into upgrading its existing Athlone refuse transfer station (RTS) into a clean MRF and Mechanical biological treatment (MBT) facility. ©Waste Plan



LEGISLATION, REGULATIONS AND POLICIES

This section provides a brief overview of major legislation and regulations that govern waste management in South Africa. It also highlights draft and anticipated legislation and regulations that are likely to be implemented, and are likely to affect investments.

There are an increasingly wide range of options for the use of builder's rubble and demolition waste as secondary building materials. ©GreenCape

South Africa has a vibrant and progressive regulatory framework for landfill diversion of waste and subsequently waste beneficiation. Over the course of three decades, the regulatory environment has shifted from landfill management to material recovery and recycling, and more recently towards extended producer responsibility. Further regulatory transitions are expected to take place at local, provincial, and national level. However, there are concerns around the enforcement of these regulations, particularly on those who transgress municipal bylaws.

3.1. Waste management

In terms of Section 24 of the Chapter 2 (Bill of Rights) of the South African Constitution, everyone has the right 'to an environment that is not harmful to their health or wellbeing; and to have the environment protected, for the benefit of present and future generations'.

¹⁵ https://eapasa.org/site/

¹⁶ As amended

These fundamental rights underpin the framework that governs environmental legislation in South Africa, this being the National Environmental Management Act (NEMA).

3.1.1. The National Environmental Management Act (Act 107 of 1998)

The NEMA is guided by integrated environmental management principles. These aim to ensure that negative environmental impacts are prevented, mitigated, and/or regulated. They provide an array of instruments to monitor and manage activities that have an impact on the environment. One of these instruments is the environmental impact assessment (EIA) regulations.

The EIA regulations list a number of activities that may have a negative impact on the environment. The 'Listed Activities' require either a 'Basic Assessment' process or an 'EIA Scoping' process to be undertaken before an activity can be authorised. Commencement with any of the 'Listed Activities' prior to obtaining authorisation from competent authorities is prohibited in terms of NEMA and is regarded as an offence. The EIA process requires a third party environmental assessment practitioner (EAP) registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA)¹⁵ to undertake the application.

The EIA regulations do not apply to general activities only, but also include waste management activities that are governed by South Africa's National Environmental Management

Investors / businesses looking to store, recycle or recover, treat, and/or dispose waste, must engage with NEMWA's list of listed activities. If they fall within the thresholds of those listed activities, then those activities must be licensed as per NEMWA's listed activities. Waste Act (NEMWA) (Act 59 of 2008), or more colloquially known as 'the Waste Act'.

3.1.2. National Environmental Management Waste Act (Act 59 of 2008)

NEMWA is a waste-specific act that is guided by integrated waste management principles aimed at preventing negative waste-related environmental impacts. There are a multitude of regulations that are made possible through the NEMWA. Investors and businesses looking to mitigate any investment risks should take into consideration the NEMWA, its regulations and requirements, and the ramifications if it is violated.

Of particular note are the "Listed Activities" regulations. The NEMWA provides a list (GN921 of 2013¹⁶) of waste management activities¹⁷ that must undergo a waste management licensing process if certain criteria / thresholds are triggered.

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These activities are deemed to have, or are likely to have, a detrimental effect on the environment, and are differentiated into three categories that have different approval and licensing requirements:

- Category A activities that require a basic EIA
- Category B activities that require a scoping and full EIA process and
- Category C activities that must adhere to specific norms and standards

3.1.3. National Waste Management Strategy — 2020

The NEMWA is given effect through the execution of the National Waste Management Strategy¹⁸. This strategy outlines government's policy and strategic approach to waste management for South Africa for the coming years. The strategy includes a set of actions to reach strategic outcomes. Section 8 of the NWMS provides targets for each action and associated timelines. These targets and timelines will affect both the private sector and municipalities, and also provides investors and businesses with insights into opportunities and investment certainty. Table 3 illustrates the key interventions and associated actions. It should be noted that the DFFF is in the process of developing its Waste Master Plan. This will provide a roadmap of how the national waste authority will deliver the NWMS.

3.1.4. Municipal waste management bylaws

Local municipalities may choose to regulate how waste is managed within their boundaries through the promulgation of waste specific bylaws.

These bylaws often provide obligations for both waste generators and waste handlers, including accreditation and reporting obligations. Existing waste businesses not vet registered with their respective municipalities, or investors looking to enter the market, must ensure that they engage with the respective solid waste departments of the municipalities where they conduct or plan to conduct their activities to determine whether they need to be registered or accredited (in the case of Cape Town).

The CCT has established its own waste management bylaw (CCT, 2009). Not only does this bylaw require commercial entities producing waste to have a formal integrated waste management plan (IWMP) in place; it also requires businesses performing recycling, reuse or recovery activities, or the sorting of waste, to be accredited before commencing activities. This accreditation also requires the submission and approval of an IWMP. The accreditation process has been made available online¹⁹. For more information, contact the CCT's Solid Waste Department at wastewise.user@capetown.gov.za

> CONTACT THE CITY'S SOLID WASTE DEPARTMENT

¹⁸ https://www.environment.gov.za/sites/default/files/docs/2020nationalwaste_managementstrategy1.pdf

¹⁹ https://www.capetown.gov.za/City-Connect/Register/Business-and-trade/Register-as-an-accredited-waste-services-provider

Businesses performing recycling, reuse or recovery activities, or the sorting of waste, within the CCT boundaries must be accredited with the CCT before commencing activities. Accreditation is an easy process and has many benefits.

3.1.5. Integrated Waste Management Plan (IWMP)

The NEMWA also requires local municipalities to develop an IWMP as part of their Integrated Development Plan. The aim of an IWMP is to give effect to the NWMS and the objectives of the NEMWA; and to include wastespecific operational and support strategies, as well as a schedule of projects and activities. Like the NWMS, the CCT's IWMP provides investors with insight into future opportunities and reduces uncertainty.

Table 3: The NWMS key interventions and associated actions

	Key Intervention		Actions				
Pill	ar 1: Waste Minimisation		40% of waste diverted from landfill within 5 years; 55% within 10 years; and at least 70% within 15 years, leading to Zero-Waste going to landfill.				
		1	Develop and implement EPR schemes for priority wastes (i.e. WEEE, Paper and Packaging, Lighting, and Tyres) that include measures for cleaner production, industrial symbiosis, and extended producer responsibility				
1	Prevent waste generation through cleaner production,	2	Strengthen the capacity and national reach of the NCPC-SA through establishing waste symbiosis programmes in all provinces				
	industrial symbiosis and EPR	3	Minimise the production and retail of single-use plastics for consumption within the country and replace the products with bio-degradable alternatives				
		4	Standardise design and packaging of sustainable products that reduce production of waste, maximise resource recovery for recycling or reuse, and support consumption of materials and products with a prolonged life				
	2 Prevent food waste	5	Develop and implement a strategy for reducing food losses and waste prior to retail, and that is associated with harvesting, processing, and transport of food with food producers and retailers				
2		6	Improve consumer awareness and standards for labelling and marketing of perishable foodstuffs and "ugly" fruit and vegetables				
		7	Develop guidelines, norms and standards for redistributing surplus foods and composting of spoilt foods				
		8	Develop and implement a public procurement framework to support recycling, encompassing requirements for recycled content				
3	Increase re-use, recycling and recovery rates	9	Establish MRFs and recyclate processing plants as public private partnerships based on regionally integrated waste management planning				
		10	Develop and implement industry standards that align technology requirements between primary producers and recyclers of all materials, by ensuring that the design and packaging of products maximise the value of the materials that circulate within the economy				
	Divert organic waste from	11	Develop and implement an enabling environment to produce biogas through anaerobic bio-digestion of organic waste treating sewage and organic domestic waste				
4	landfill through composting and the recovery of energy	12	Develop and implement biogas digester projects linked to the National School Nutrition Programme				
		13	Include and implement organic waste technologies in local government IWMPs				
5	Divert construction and demolition waste from landfill through beneficiation	14	Develop and implement best practice guidelines and standards for the re-use of C&D waste in roads and other building materials, e.g. bricks				

	Key Intervention		Actions
Pil	lar 1: Waste Minimisation	40%	of waste diverted from landfill within 5 years; 55% within 10 years; and at least 70% within 15 years, leading to Zero-Waste going to landfill.
		15	Promote research and innovation in the waste sector
6	Increase technical capacity and innovation for the beneficiation of waste	16	Review and update or develop new legislation / instruments to keep abreast of technical developments and remove unnecessary regulatory barriers to the uptake of new technologies
	beneficiation of waste	17	Increase technical capacity and skills in the waste sector
	lar 2: Effective and Istainable Waste Services	All Se	outh Africans live in clean communities with waste services that are well managed and financially sustainable
		18	Integration of waste pickers into municipal collection services
7	Separate Waste at Source	19	Public online and annually update guidelines, case studies and planning tools on separation at source for municipal managers
		20	National awareness campaign on recycling and waste management
0	Safe and environmentally sustainable disposal of		Develop and implement a strategy for the safe disposal of household hazardous waste that includes a communication and awareness plan and EPR as core components
o	hazardous household wastes	22	Develop and implement a strategy and standards relating to the design and disposal of AHPs such as baby and adult diapers, feminine care products
		23	Development and implementation of 5-year provincial and municipal integrated waste management plans
	Effective integrated waste	24	Improve collection, reporting and dissemination of information on SAWIS
9	management planning	25	Build capacity in integrated waste management planning and provide revised IWMPs guidelines
		26	Municipalities include provisions for recycling drop-off / buy back / storage centres in their IWMPs, supported by fiscal mechanisms / EPR schemes
	lar 3: Compliance, Iforcement & Awareness	Mair	nstreaming of waste awareness and a culture of compliance resulting in zero tolerance of pollution, litter and illegal dumping
10	Reduce Pollution, littering	27	Develop and implement a national awareness campaign about litter and illegal dumping
10	and illegal dumping	28	Establish a micro-grant facility training and purchasing of equipment for community-based clean-up operations
	Enhance capacity to monitor compliance and	29	Agreement between DFFE, SAPS and NPA on increasing enforcement of Waste Act and municipal bylaws relating to pollution, littering and illegal dumping
11	enforce the Waste Act and	30	Increase the number of Environmental Management Inspectors dedicated to monitor compliance and enforce of the Waste Act
	International Agreements	31	Proclamation on import and export of waste
12	Ensure municipal landfill sites and waste management facilities comply with licensing requirements	32	Develop financial mechanisms to enforce compliance to licence conditions

3.2. New regulatory updates

A number of regulatory changes have occurred since the publication of the previous MIR. The following changes are likely to have an impact on the waste investment decisions:

Scheduled landfill restrictions (2020/21) (R.636 of 2013)

The national norms and standards for the disposal of waste to landfill (R.636 of 2013) provide directives for the disposal of waste to landfill. Included in these norms and standards is a list of waste streams that are prohibited²⁰ from disposal to landfill. The following waste streams will be banned from landfilling as of 23 August 2021:

- Brine / waste with high salt content
- All hazardous e-waste
- All batteries
- Persistent organic pollutant (POP) pesticides listed under the Stockholm Convention
- Macro-encapsulation of waste

Industry Waste Management notice withdrawal (GN1659 of 2019)

On 13 December 2019, the Minister of Forestry, Fisheries and the Environment withdrew her predecessor's 2017 "Section 28" (NEMWA) notice (GN1659 of 2019) calling on the paper and packaging industry, the electrical and electronics industry, and the lighting industry to submit industry waste management plans. Instead of IndWMPs, the Minister has made the decision to rather follow a Section 18 (NEWMA) route to implement EPR policy to ensure product stewardship within the respective industries.

Extended producer responsibility regulations (GN400 of 2021)

On 05 November 2020, the Minister published EPR regulations (GN 718 of 2020) as a framework for the development, implementation, monitoring, and evaluation of EPR schemes for identified specific products, and to which "Producers" of those products must adhere. These regulations were subsequently amended in January 2021 (GN20 of 2021), with additional amendments drafted and published in March 2021 (GN239 of 2021) for public comment. These regulations were finalised and gazetted (GN400 pf 2021) on and take effect as of 05 May 2021.

South Africa's extended producer responsibility regulations come into effect on 05 May 2021. EPR is a product stewardship type policy approach under which producers are given a significant responsibility, both financial and/or physical, for its product across that products life cycle, up to and including disposal.

In addition to the EPR regulations, the Minister has also published three accompanying EPR notices (as amended by GN20 of 2021 and GN400 of 2021) relevant to the "paper, packaging and some single-use products", "electrical and electronic equipment", and "lighting" industries. These three notices require "Producers" of certain products as listed to either establish and register an EPR scheme, or sign up to an existing registered EPR scheme. These schemes are responsible for ensuring EPR is implemented for the products listed in Table 4.

These notices also set annual percentage targets for the industry at large to meet in the next five years. These targets will increase the demand for recyclate, but will also ensure adequate supply of recyclables. These targets include:

- % recycled content
- % reuse targets
- % collection targets
- % recycling
- % energy recovery / exports/other.

These EPR schemes will be managed and administered by registered Producer responsibility organisations (PRO).

²⁰ Chapter 5(1) of Regulation 636 of 23 August 2013 stipulates the prohibitions and restrictions on the disposal of waste to landfill that come into effect after the timeframes indicated for each waste from the date of the Regulations coming into operation.

"Producers" will be required to pay levies to the PRO based on tonnages of material consumed. These levies will be administered by the PRO and will be used to facilitate collection and recycling of respective materials. Producers have until November 2021 to register with a PRO.

Plastic carrier bag and flat bag regulations amendments (GN317 of 2021)

The amendments to the Plastic Carriers Bags and Plastic Flat Bags Regulation (R.625 of 2003) were published in 07 April 2021.

Table 4: Broad product classes affected by EPR regulations

Electrical & electronic equipment (GN1185 of 2020)	
Large equipment (external dimensions >100 cm)	
Medium equipment (external dimensions between 50 and 100 cm)	
Small equipment (external dimension <50 cm)	
Batteries	
Lighting (GN1186 of 2020)	
Gas discharge lighting	
Retrofit (o) LED lighting	
LED light sources	
Other light emitting devices	
Luminaires & lighting equipment fixtures / modules / associated electrical compone	nts
Laser, pixel and UGVC lighting	
Off grid solar powered lighting	
Incandescent light bulbs and halogen	
Paper, Packaging & Some Single-Use Products (GN1187 of 2020)	
Glass packaging	
Metal packaging	
Plastic packaging	
Single-use products	
Paper and paper packaging	

These amendments provide a pipeline of specifically postconsumer recyclate content requirements for plastic carrier bags or plastic flat bags manufactured, traded or distributed in South Africa. These amendments require a minimum of 50% post-consumer recyclate from 01 January 2023, 75% post-consumer recyclate from 01 January 2025, and 100% post-consumer recyclate from 01 January 2027. These regulations should result in an increased demand for plastic recyclate.

Exclusion of waste streams from the definition of waste (GN85 of 2020)

The waste exclusion regulations (GN715 of 2019) were published in July 2019. They regulate the application process for the exclusion of certain waste streams / portion of waste streams from the definition of waste. The exclusion will only apply to streams from specific facilities that are being applied for. The DFFE also published a notice in February 2020 (GN85 of 2020) indicating the exclusion of waste streams from a certain facility that had applied for exclusion. These streams broadly cover ash, biomass, dolerite, gypsum, silica aggregates, and slag streams as applied for.

CCT Accreditation Exemptions:

CCT's Integrated Waste Management Bylaw requires, among others, service providers managing / handling waste to be accredited with the CCT's Solid Waste Management department. However, as of November 2020, waste pickers, garages / service stations; schools / Early childhood development centres / educational facilities; and religious organisations within Cape Town are exempt from the requirement to be accredited with CCT.

Source: Extracted from respective notices

3.3. Anticipated regulations / guidelines

There are a number of waste related regulatory items currently being discussed, which are likely to be promulgated in due course:

Scheduled national landfill restrictions (R.636 of 23 August 2013)

The national norms and standards for the assessment of waste for landfill disposal (R.636 of 2013) provide directives for the disposal of waste to landfill, including a list of waste streams that cannot be disposed of at landfill. There are no restrictions expected for 2022; however, 2023 will require 50% garden waste to be diverted from landfill. **Figure 18** illustrates the future landfill restrictions beyond 2023.

Western Cape organic waste landfill restriction

The Western Cape's DEA&DP has implemented an organic waste diversion plan that aims to divert 50% of organic waste from landfill by 2022, and 100% by 2027. This will require Western Cape based municipalities to set

2013		and animal waste	batteries	Risk Waste	generates unacceptable amounts of toxic gases in a landfill	(as defined)	pH of <6 or >12	gases
2013	_							
2014	_							
2015	_							
2016								
2017	Re-usable, recoverable, or recyclable used lubricating mineral oils and oil filters, but not oil containing wastes	Hazardous waste with calorific value of >25 MJ/kg	All pesticide waste listed by the Stockholm Convention except POP					
2018	Hazardous electronic lamps	PCB containing waste of >50 mg/kg or 50 ppm	Re-usable, recoverable, or recyclable used or spent solvents	25% garden waste diversion from landfill				
2019	Hazardous Waste with calorific value of >20 MJ/kg	Liquid Waste						
2020			-					
	Brine / waste							

POP

pesticides

listed under

Stockholm

Convention

All batteries

Non-treated

Health Care

Reactive waste (as defined) or

waste that

generates

Flammable

Waste with a

Waste

compressed

Figure 18: Past and future national and Western Cape landfill disposal restrictions

Lead acid

Infected

animal

carcasses

Whole Waste

Tyres

with high salt

content (as

defined)

and a

leachable

concentration (as defined)

2021

All hazardous

e-waste

2013

Figure 18: Past and future national and Western Cape	
landfill disposal restrictions	

			_
2022	50% organic waste diversion for Western Cape municipalities		
2023	Disposal of garden waste – 50% diversion from the baseline at a particular landfill	Minimum 50% post- consumer plastic recyclate requirements for carrier and flat bags	
2024	Hazardous Waste with calorific value of >10 MJ/kg		
2025	Minimum 75% post- consumer plastic recyclate requirements for carrier and flat bags		
2026			
2027	100% organic waste diversion for Western Cape municipalities	Minimum 100% post- consumer plastic recyclate requirements for carrier and flat bags	
2028	Hazardous waste with calorific value of >6% TOC		

Source: Extrapolated from Chapter 5(1) of R.636 of 2013

annual targets²¹, and to identify and implement procedures to meet these targets. Such restrictions should result in an increased demand for organic waste solutions by private sector and municipalities.

Draft norms and standards for organic waste composting (GN 1135 of 2019)

In September 2019, DFFE released the draft national norms and standards for organic waste composting. These norms and standards are expected to exempt composting facilities processing more than 10 tonnes of organic waste a day from requiring a waste management licence. The purpose of these norms and standards is to provide a "best practice" approach to the composting of organics that will prevent / minimise negative impacts on the bio-physical, social and economy environment. At the time of finalising this MIR, theses norms and standards were being legally vetted and were expected to be published later in 2021.

Draft norms and standards for the treatment of organic waste (GN 275 of 2021)

Where the composting norms and standards mentioned above are focused specifically on composting treatment, the newly published norms and standards for the treatment of organic waste focus on a wider range of treatment technologies, including mechanical, chemical, anaerobic, aerobic, and thermal technologies. The purpose of these norms and standards is to provide a "best practice" approach to the treatment of organics that will prevent / minimise negative impacts on the bio-physical, social and economy environment. At the time of finalising this MIR, these norms and standards were still in the public participation period.

Tyre Industry Waste Management Plan

On 01 October 2017, the then Minister of Environmental Affairs (now DFFE) withdrew South Africa's first IndWMP for tyres²².

²¹The targets will be based on the 2019 baseline

²² Also known as the Integrated Industry Waste Tyre Management Plan of the Recycling and Economic Development Initiative of South Africa (REDISA).

A draft IndWMP for tyres was published in March 2020 (DEFF, 2020) for public comment. It has not yet been finalised. **©Robert Laursoo**

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Since then, the waste tyre stream has been managed by the DFFE's Waste Management Bureau until a suitable IndWMP can be established. Although attempts have been made by industry to establish a new IndWMP, DFFE has rejected these IndWMPs. On 11 September 2019, the Minister issued a notice closing off the Section 28 process of the NEMWA. However, on 29 November 2019, the Minister issued a Notice in terms of Section 29(1) of the NEMWA for the Council of Scientific and Industrial Research (CSIR), an organ of state, to develop an IndWMP for tyres. A draft plan was published in March 2020 (DEFF, 2020) for public comment. At the time of finalising this MIR, the IndWMP was not finalised.

Electricity Regulations on New Generation Capacity (GN500 of 2020)

Municipalities are required to purchase electricity from South Africa's central electricity utility, Eskom. In October 2021, the national DMRE gazettes the amendments to the Electricity Regulations on New Generation Capacity, enabling municipalities in good financial standing to develop their own power generation projects. These regulations may unlock municipal offtakes for waste-to-energy projects that traditionally had a limited offtake to justify a business case.

3.4. Voluntary agreements

Although not necessarily a regulatory mandate, voluntary agreements are key instruments to illustrate to shareholders / stakeholders an organisation's commitment to change. The below commitments provide insights into the actions and demand for waste beneficiation solutions.

SA Plastics Pact

Africa's first plastics pact to join the Ellen MacArthur Foundation's global Plastics Pact network,

Table 5: The SAPP five strategic targets by 2025

Target 1 Target 2		Target 3	Target 4
List of problematic / unnecessary plastic packaging / items and agree to measures to address by 2021	100% of plastic packaging to be reusable, recyclable or compostable by 2025	70% of plastic packaging effectively recycled by 2025	30% average recycled content across all plastic packaging by 2025

the South African Plastics Pact²³ (SAPP), was launched on 30 January 2020. This pact serves to unite South Africa's plastics value chain — businesses, government, NGOs and other organisations - behind a common vision as a new plastic economy founded on circular economy principles. At its heart, the SAPP is a multistakeholder platform to stimulate innovation, dialogue, and collaboration to unlock barriers to circularity, to create new business models, and generate job opportunities. Members of the Pact, comprising some of South Africa's largest consumer brands, commit to meeting four strategic targets (Table 5) set by the Pact by 2025.

Food Loss and Waste Voluntary Agreement

On 29 September 2020, the Consumer Goods Council of South Africa (CGCSA), in partnership with the national department of Trade, Industry and Competition, and co-funded by the European Union, launched the South African Food Loss and Waste Voluntary Agreement (SAFLWVA)²⁴. The voluntary agreement commits core signatories to align operations with the United Nation's Sustainable Development Goal 12.3 to reduce food loss and waste by 50% by 2030. Among the current signatories are some of South Africa's largest food brands, including its largest retailers.

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WASTE: MIR 2021

²³ https://www.saplasticspact.org.za/

²⁴ https://www.cgcsa.co.za/service-offering/food-safety-initiative/food-loss-and-waste/



OPPORTUNITIES, DRIVERS AND BARRIERS

There are opportunities for value-add investors / businesses in organics, e-waste, plastics, and municipal contracts some of which are cross-cutting.

The demand for organic waste is increasing, in particular for clean and homogenous private sector organics. ©Pxhere South Africa's recycling sector is bound to economic principles, and therefore waste processing must make business sense. In other words, the value of material must outweigh the cost of collection and processing. The viability of waste beneficiation hinges on, amongst others:

- characteristics of the waste generated (type, volume, level of homogeneity, degree of contamination, and effort required to extract non-recyclables);
- localities of points of generation and utilisation of beneficiation products and by-products;
- who has ownership of the waste (municipal or private);
- local and national regulatory frameworks; and
- cost of labour.

This is likely to change with the implementation of extended producer responsibility (EPR) schemes for the paper and packaging, e-waste, and lighting sectors (**see Section 3.3**). Table 6 summarises a number ofwaste value-add opportunitieswithin the Western Cape, whilstthe opportunities are discussed inmore detail further on.

It should be noted that it is difficult to estimate the impact that COVID-19 has had on current and future consumption and subsequent waste generation figures. As such, the opportunities identified should be viewed as an indication only.

Organics:

It is projected that the Western Cape generated between 470 767 and 538 416 tonnes of MSW organics, and between 288 232 and 329 844 tonnes of industrial and commercial organics in 2020. Assuming these organic streams were made available. the MSW and commercial and industrial organics have a market value of between R75.9 million and R315.1 million. At a municipal level, the greatest value lies in the city of Cape Town with an estimated market value of between R53.8 and R225.0 million.

Plastics:

The Western Cape generated between 214 307 and 245 103 tonnes of MSW plastics in 2020. The market value is estimated at between R321 million and R2.2 billion. At a municipal level, the greatest value lies in the city of Cape Town metropolitan area with an estimated market value of between R383.6 million and R1.3 billion.

E-waste:

The Western Cape generated between 43 290 and 68 501 tonnes of e-waste in 2020. The market value is estimated at between R55.2 and R109.8 million per year. At a municipal level, the greatest value lies in the CCT metropolitan area with an estimated market value of between R36.5 and R77.4 million.

4.1. Organics

Organic waste²⁵ is a broad stream that exists in various forms and volumes, ranging from small inconsistent household volumes that are mixed and highly contaminated, to large industrial and/or agricultural volumes of consistent, homogeneous, and uncontaminated streams.

Separating organics from the waste system has the potential to unlock the quality and quantity of valuable dry recyclables that otherwise would have a lower value due to contamination. Although it is the stream that has the greatest impact on the overall waste system, it has traditionally been the stream with the lowest value proposition and has been diverted more as a means to reduce business overheads and for environmental considerations, rather than being purchased as a feedstock for value-add solutions. The business case is generally built on the service offering of diverting waste from landfill (cost saving to generator) as opposed to selling an end product such as compost, or heat / electricity / fuel.

²⁵National Waste Information Regulations define organic waste as garden waste, food waste and wood waste

Table 6: Summary of waste value-add opportunities

Stream	Opportunities	Drivers / Enablers	Enablers	Barrier / Risks	Term	Macro-environment
	Solutions to mechanically extracted MSW organics				Medium – Long	
Organics	Contaminated MSW organics		 Municipal organic waste diversion plans 	Inadequate source separation Compost registration regulations	Short – Medium	• NWMS focus on organic
	Value-add to low- value digestate from MSW biogas solutions	 Organic waste landfill restrictions by 2027 Decreasing municipal landfill airspace Increasing cost of landfilling Carbon tax liability Market demand for clean dry recyclables Energy security NWMS organic waste related targets 	 Carbon credit market Increasing cost of electricity Feeding bio-based electricity onto the grid Food loss and waste commitments: Landfill restrictions Financing appetite Support from industry 	 Confidence in bio-energy projects Competition with livestock farmers Short procurement durations Strict procurement process Lack of bio-based electricity grid Lack of heating grid Sensitive market for by- products Cost of competing landfills (until 2027) 	Short – Medium	 waste Operation Phakisa focus on organics Greenhouse gas reduction commitments CCT envisions generating own electricity Consumer awareness of the impact of food waste Policy makers awareness of the impact of food waste
	De-packaging technologies for processing packaged organics				Short	
	Beneficiation of ±199 tonnes a day of dewatered WWTW work sludges				Short – Medium	
	Beneficiation of 109 to 136 tonnes a day of dewatered biogas digestate				Medium – Long	
	Replacing virgin material with recyclate				Short	 National Waste Management Strategy Operation Phakisa focus
	Material recovery potential		 Plastic bag regulations Plastic packaging EPR Municipal infrastructure investments 	 Slow growth in end-markets Virgin plastic price variability High levels of contamination Unregulated labelling systems Lack of accurate plastic data 	Short	on plastics • Consumer awareness • International
Plastics	Municipal material recovery contracts	 Decreasing municipal landfill airspace Perceived job potential 			Medium – Long	COVID-19 impact on
	PRO support for plastic waste recovery	• Global / local plastic sentiment	 South African Plastic Pact South African Initiative to End Plastic Waste 	 Contamination of alternative to plastics Narrow focus of initiatives 	Short	consumption / movement • Transboundary movement (Basel Convention) • African Continental Free Trade Agreement

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Stream	Opportunities	Drivers / Enablers	Enablers	Barrier / Risks	Term	Macro-environment		
	National pre- processing and processing				Medium – Long			
	Intercepting e-waste before it reaches landfills	National e-waste landfill bans National battery landfill bans	Electrical and electronic	 Lack of reliable data Access to feedstocks Licensing of recycling / 	Short – Long	 Operation Phakisa focus on e-waste International commitments / support Transboundary movement (Basel Convention) 		
E-waste	Pre-processing / processing facility for the Western Cape		equipment EPR • Lighting equipment EPR • NWMS focus on e-waste	recovery facilities • Cherry-picking of high-value e-waste • DFFE view of transboundary e-waste movement	Short – Medium			
	PRO support for e-waste recovery				Short – Long			
	Processing of SADC feedstocks	_			Medium – Long			
	Sludge disposal / ben	Sludge disposal / beneficiation						
	Think Twice recyclabl	es recovery	Short – Medium					
	MRF operations		Short – Medium					
Municipal Contracts	Drop-off site operatio	ns		Short – Medium				
	Garden waste chippir	ng	Medium					
	Builders rubble crushi	ing		Medium				
	Animal carcass dispo	sal			Medium – Long			

The demand for organic waste is increasing, in particular for clean and homogenous private sector organics. This is reflected by the private and public sector investments made to date. This reaction is largely driven by rising landfill costs, private sector diversion commitments / targets, and a future national and provincial landfill restriction. The next frontier is how to extract value from potentially highly contaminated MSW organics, and how to increase the value proposition of end products for highly regulated end-markets like biogas, compost, and animal feed.

4.1.1. Market overview

Generated:

Figure 19 shows the distribution of organic waste in the Western Cape for 2015. Although most of the organics produced in the Western Cape are generated by the agricultural sector, the province is not a homogenous entity. **Table 7** provides a detailed breakdown of organic waste streams per district municipality / metropolitan area. Although these figures are dated, they do provide an indication of the types of waste that dominate the landscapes.

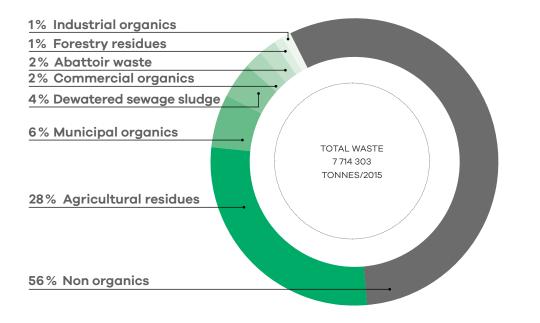


Figure 19: Organic waste relative to total waste generated in the Western Cape Source: (DEDAT, 2016)

 Table 7: Organic waste generated in the Western Cape in 2015

Municipality / Metro	MSW Organics	Industrial	Commercial	Agricultural / Abattoir	Forestry Residues	Dewatered Sewage Sludge	Total Organics
City of Cape Town	342 505	76 490	140 232	57 783	9 102	190 995	817 107
Cape Winelands	58 715	11 877	21 775	300 183	4 551	39 846	436 947
Eden	39 143	8 441	15 476	437 298	63 715	28 436	592 509
West Coast	24 465	4 742	8 693	913 183	4 551	19 525	975 159
Overberg	19 572	3 665	6 719	531 785	9 102	12 691	583 534
Central Karoo	4 893	517	948	34 531	0	3 530	44 419
Total	489 293	105 732	193 842	2 274 763	91 021	295 023	3 449 674

The rest of this section will focus on MSW organic waste, and industrial and commercial organic waste. It will exclude agricultural opportunities, because much of the inherent value of urban organics (and subsequent value of other materials) is lost due to co-disposal and landfill. For agricultural opportunities please see the 2018 Waste Economy MIR. The 2021 Sustainable Agriculture MIR²⁶ also includes biogas opportunities in agriculture.

Municipal Solid Waste:

The Western Cape generated ±489 293 tonnes of MSW organics in 2015. This equates to 20% of the total ±2 387 353 tonnes of MSW generated in the province. For 2020, MSW organic waste generation is estimated to range between 470 767 and 538 416 tonnes, and may increase to ±577 450 tonnes by 2024. he city of Cape Town will continue to generate the bulk (±70%) of MSW organics. **Table 8** shows the projected distribution of MSW organics across district municipalities for 2020 and 2024.

²⁶ <u>https://www.green-cape.co.za/mar-ket-intelligence/</u>

Source: (DEDAT, 2016)

 Table 8: MSW organic waste generated in the Western Cape

Municipality /			2024			
Metro		Generated (t/yr)	Concentration (t/km²/yr)	Per Capita (kg/p/d)	(Projected) ²⁷	
City of Cape Town	342 505	329 537 - 379 580	140 – 155	0,197 – 0,227	409 406	
Cape Winelands	58 715	56 492 - 64 415	2,7 – 3,0	0,165 – 0,188	68 896	
Central Karoo	4 893	4 708 - 4 975	0,1 – 0,1	0,173 – 0,183	5 005	
Garden Route	39 143	37 661 - 40 985	1,7 – 1,8	0,167 – 0,182	42 236	
Overberg	19 572	18 831 - 21 559	1,6 – 1,8	0,173 – 0,198	23 145	
West Coast	24 465	23 539 - 26 902	0,8 - 0,9	0,140 - 0,160	28 761	
Western Cape	489 293	470 767 - 538 416			577 450	

Source: Inferred and projected against DEDAT (2016) using GDP growth and population growth (Quantic 2021)

Table 9: Industrial and commercial organic waste generated in the Western Cape

Municipality / Metro	2015 (Estimated)		2020 (Projected)			2024 (Projected)	
	Ind. (t/yr	Comm. (t/yr)	Ind. (t/yr)	Comm. (t/yr)	Concentration (t/km²/yr)	Ind. (t/yr)	Comm. (t/yr)
City of Cape Town	76 490	140 232	73 594 – 84 770	134 922 – 155 412	85,25 – 98,19	91 431	167 623
Cape Winelands	11 877	21 775	11 427 – 13 030	20 951 – 23 889	1,51 – 1,72	13 937	25 551
Central Karoo	517	948	497 – 526	912 – 964	0,04 - 0,04	529	970
Garden Route	8 441	15 476	8 121 – 8 838	14 890 – 16 204	0,99 – 1,07	9 108	16 699
Overberg	3 665	6 719	3 526 – 4 037	6 465 – 7 401	0,82 – 0,93	4 334	7 946
West Coast	4 742	8 693	4 562 – 5 214	8 364 – 9 559	0,42 - 0,47	5 575	10 219
Western Cape	105 732	193 843	101 729 – 116 415	186 504 – 213 429		124 913	229 008
	299 575		288 232 - 329 844				353 921

Source: Inferred and projected against DEDAT (2016) using GDP growth and population growth (Quantic 2021)

²⁷ Projected tonnages are based on population (Quantec 2021) only and exclude expected GDP.

Industrial and Commercial: The Western Cape generated ±299 575 tonnes of commercial and industrial organics in 2015. This equates to 34% of the total ±881101 tonnes of industrial and commercial waste generated in the province. For 2020, this is estimated to range between 288 232 and 329 844 tonnes, and ±353 921 tonnes by 2024. The city of Cape Town will continue to generate the bulk (±72%). Table 9 shows the projected distribution of industrial and commercial organics across the district municipalities for 2020 and 2024.

Wastewater Sludge: The CCT generates ±199 tonnes a day of dewatered sludge from 12 of its waste water treatment works. Almost half of this, ±97,1 tonnes, is partially stabilised waste activated (secondary) sludge. The remaining 102 tonnes is primary (raw) sludge and blended sludge. Table 10 illustrates the total dewatered sludge generated by the CCT's 17 wastewater treatment works that produce sludge.²⁸

²⁸ Details of the quality can be found at https://www.greencape.co.za/content/cityof-cape-towns-wastewater-sludge-qualityand-quantity/

Table 10: Total sludge generated by the CCT in 2019

Sludge type (dewatered)	Generated (tonnes / day)
Primary Sludge (raw)	43.9
Waste Activated Sludge	97.1
Blend	58.06
Total	199.06

Source: (GreenCape, 2020)

Landfilled

It is difficult to estimate the amount of organic waste generated within municipal boundaries, let alone estimate the impact that COVID-19 has had on consumption and waste generation. However, it is somewhat easier to estimate the amount of organics going to landfill. **Figure 20** illustrates the estimated amount of waste going to the Cape Town landfills (municipal and private). Using the CCT's 2018 waste characterisation study (CCT 2018), it is possible to estimate the types of organics that make up this landfilled waste. Unfortunately, the waste characterisation for the private landfill is not available.

Recycling Capacity

Cape Town hosts a number of organic waste recycling operations. These operations have the combined capacity to process ±333 550 tonnes per year. This is expected to grow to ±539 000 tonnes by 2025 with a number of new public and private facilities coming online. These facilities vary from small-scale private and community based composting operations to large-scale operations.

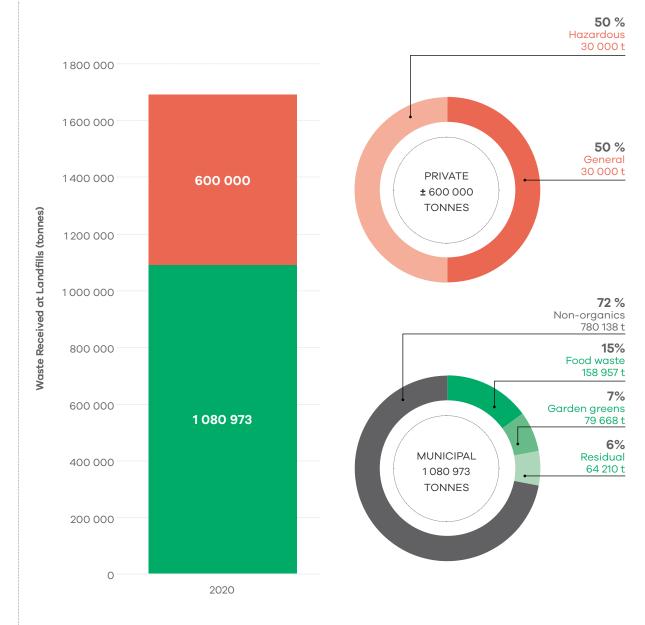


Figure 20: Organic waste landfilled in Cape Town in 2020 relative to total waste landfilled

There are currently only three facilities in Cape Town that are licensed to process more than ten tonnes of post-consumer mixed organics a day. A fourth facility is likely to also receive its waste licence in the next year. The processing capacity of these four facilities equates to 59% of the total process capacity for Cape Town for 2021. The remaining 41% processing capacity is made up of roughly 12 smaller organic waste recycling solutions and a citywide home composting initiative.

Figure 21 shows the capacity of existing and future solutions able to support the commercial, industrial, and MSW organic waste generated in Cape Town²⁹. The processing capacity for agricultural streams excluded.

4.1.2. Opportunities

It is projected that the Western Cape generated between 470 767 and 538 416 tonnes of MSW organics, and between 288 232 and 329 844 tonnes of industrial and commercial organics in 2020. Assuming these organic streams were made available, the MSW and commercial and industrial organics had a low-end market value³⁰ of R75.9 million in 2020, and a high-end³¹ market value of R315.1 million in 2020.

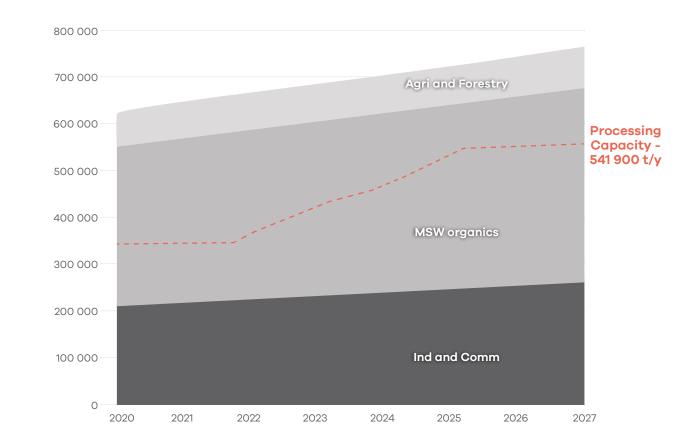


Figure 21: Expected organic waste processing capacity in Cape Town until 2027

Western Cape's real GDP is expected to grow by 4.6% for 2021, and 3.1% in 2022. Beyond 2022, a generous growth rate of 3.1% has been used.

Organic Waste Generated (tonnes)

²⁹ Expected organic waste generation numbers have been projected against expected GDP growth.

³⁰ Estimated R100 / tonne based on R20 per 20 kg of compost (generated from 200 kg of organic waste)

³¹ Estimated R363 / tonne base on update of DST (2014) (where electricity price updated to 116.72c/kWH for 2020)

At a municipal level, the greatest value lies in the CCT metropolitan area (71% of the total waste stream) with an estimated market value of between R53.8 and R225.0 million in 2020. Furthermore, the landfilling of the organic waste costs the commercial and industrial sector ±R138 million in disposal costs for 2020.

Solutions to Mechanically Extracted MSW Organics

The CCT is in the pre-application scoping phase for its envisioned Athlone MBT facility (see Section **2.4.5**). It is too early to confirm the processing capacity of this facility, but the municipal Athlone RTS, not to be mistaken for the private Athlone IWMF (see Section 2.4.5), has a capacity to process 1000 tonnes a day of MSW, which is expected to include ±280 tonnes of organics. This equates to between 100 800 and 102 200 tonnes per year of organics. Two options are being assessed to treat this organic fraction. Both seek to mechanically remove the organic fraction from the in-coming MSW; however, one option seeks to treat the organics onsite, whilst the other seeks to

transfer the organics to either a CCT treatment facility or private facility.

Contaminated MSW Organics

It is too early to determine the amount of organics the CCT's envisioned Athlone MBT (see Section 2.4.5) will treat. The current municipal Athlone RTS has a capacity to process 1000 tonnes a day of MSW, of which ±280 tonnes consists of organics. This means the MBT facility will have access to between 100 800 and 102 200 tonnes per year. However, Cape Town is estimated to have generated between 329 530 and 379 580 tonnes of MSW organics in 2020, and 409 400 tonnes by 2024. As such, the CCT will need to leverage an additional 300 000 tonnes processing capacity by 2024. Until the Waste Sector Plan (see Section 2.3 is finalised in May 2022, it is not clear how the City will achieve this. The City may require private sector support. This would require the CCT to implement solutions that can treat heavily contaminated MSW organics. This opportunity is dependent on the outcomes of the CCT's future Waste Sector Plan.

Value-add to low-value digestate from MSW biogas solutions

Although it is possible to extract value from contaminated organics through anaerobic related solutions, it is difficult to find offtakers for the contaminated digestate. If there is no further value added to this by-product, then the liability falls on the digestate generator to landfill. This would be unlikely because of the 2019 liquid waste ban. In addition, treatment of this liquid waste would not make sense with the future implementation of the Western Cape organic waste landfill 2022 and 2027 restrictions (see section 3.3).

Technologies for processing contaminated / packaged organics

The process capacity of the current and future facilities for Cape Town is expected to reach ±530 710 tonnes in 2024. This is technically sufficient capacity to process all ±354 000 tonnes of industrial and commercial organic waste expected in the same year. More specifically, the highly sought after clean organics will have adequate solutions. It is in the more contaminated organics where the opportunity lies. Commercial streams are generally more contaminated by packaging than industrial organics. MSW organics are traditionally heavily contaminated with packaged organics, packaging in general, and other household items. Furthermore, reducing liability of by-products disposal depends on the actual material in question and the level of contamination. Thus, there will likely be a demand for technologies that clean / reduce contamination of input organics, and output products to ensure contaminants do not compromise the value of the end products. The EPR schemes (Section **3.2**) should reduce the level of contamination by packaging.

Wastewater Treatment Work Sludge

Between 2023 and 2025, the CCT will be in high demand for nonlandfill solutions to its wastewater sludge. The CCT generates ±199 tonnes of wastewater sludge per day. The current disposal service level agreement ends in June 2023. In response to the national landfill ban on liquid waste in 2019 (**Figure 20**), and the future provincial landfill restriction on organics (**Section 3.3**), the CCT is likely to include progressive non-landfill specifications in the future tender process. However, this would be a short- and medium-term demand.

Over the next 15 years, the CCT will seek to establish two regional biosolids beneficiation facilities (BBF), with a third facility in the planning to serve future demand. The first of these regional digestion plants is expected to be commissioned in 2024/25, with the second facility expected in 2034/35. As such, leading up to 2024/25, the CCT will need a short-term solution to all ±199 tonnes of sludge, with application to land for farming likely to be re-specified as the solution for ±97 tonnes of the total.

However, once the first BBF (Cape Flats) is operational, the demand for sludge solutions will be reduced to ±97 tonnes of waste active sludge and by 2035 60 tonnes per day. However, in the long term, the CCT's demand for sludge landfill diversion will be replaced with a demand for landfill solutions for treated dewatered digestate.

Biosolid Beneficiation Facility Digestate:

The opportunity lies in the landfill diversion and further beneficiation of the dewatered digestate cake that is treated. The intention of the CCT is to make the digestate cake available to the private sector to further beneficiate through a tender process that will likely include progressive specifications. By 2024/25, the CCT will need non-landfill solutions to between 65 and 80 tonnes of dewatered and treated digestate cake. This is expected to increase by an additional 65 to 80 tonnes by 2035, and another 65 to 80 tonnes sometime beyond 2040. The CCT is considering opening the future Cape Farms BBF and Zandvliet BBF to both neighbouring municipalities and private sector sludges and organic wastes.

Table 11: Summary of the CCT's three planned BBFs

Facility	Completion Date	CAPEX	Process Capacity	External Sources	Electricity Generation	Digestate Output
BBF 1 – Cape Flats ³² (Southern)	2024/25	R650 mil	145 t/d	No	4.5 MWe	±65-80 t/d (dewatered)
BBF 2 – Cape Farms ³³ (Northern)	2034/35	R1 bil	145 t/d	Yes	4.5 MWe	±65-80 t/d (dewatered)
BBF 3 – Zandvliet ³⁴ (Eastern)	TBD	R1 bil	145 t/d	Yes	4.5 MWe	±65-80 t/d (dewatered)

Source: Engagements with CCT's water and sanitation department

³² Cape Flats BBF will accommodate all the CCT's primary sludge, until Cape Farms BBF is commissioned. Ultimately, once all three BBFs are commissioned, the Cape Flats BBF's donor plants will include: Athlone, Cape Flats, Mitchells Plain, Borcherds Quarry, Wildevoëlvlei.

³³ Cape Farms BBF's eventual donor plants include: Melkbos, Wesfleur, Fisantekraal, Kraaifontein, Scottsdene.

³⁴Zandvliet BBF's donor plants include: Gordon's Bay, Macassar, Zandvliet and Bellville.

4.1.3. Drivers / Enablers

In addition to the broad drivers and enablers mentioned in **Section 2.4**, the main market drivers and enablers for specifically organic waste include:

Western Cape 2027 organic waste landfill restrictions:

The areatest market driver will be the landfill restrictions for organics in the Western Cape (see Section 3.3). The Western Cape's DEA&DP has implemented an organic waste diversion plan that seeks to divert 50% of organic waste from landfill by 2022, and 100% by 2027. This should increase the demand for organic waste solutions for the private sector and municipalities. It will likely only unlock feedstocks in the medium term. The lead-up time provides solution providers time to investigate opportunities, secure feedstocks, and navigate the regulatory landscape.

To achieve the above 2027 target, the DEA&DP has developed a provincial organic waste strategy. Fourteen (14) objectives have been identified to achieve five (5) overarching goals: Waste prevention; recover resources from organic waste stream; support resource recovery infrastructure; promote the beneficiation of organic waste; and improving waste information management.

Cost of Landfilling

Although the cost of landfilling is relatively low in South Africa compared to benchmarks in more developed economies, waste generators still regard landfilling as a costly overhead, especially in the Western Cape. The CCT has the highest landfill gate fees (R533 excl. VAT / tonne in 2020/21) than any of the other metros in the country. This is expected to increase above inflation in the coming years. Before the provincial organic waste landfill restrictions are fully realised in 2027, the cost of landfilling will be a key enabler for an alternative to landfill solutions for private sector organic waste.

City of Cape Town organic waste diversion plan:

At the time of finalising this MIR, the CCT was in the process of developing its Waste Sector Plan for 2040 (Section 2.3.1). This plan is likely to include an organic waste diversion component. This component is largely in response to the DEA&DP's organic waste diversion strategy requirement, and to some extent Action 13 of the NWMS, that requires all municipalities to submit an Organic Waste Diversion Plan. Although the details of this organic waste plan are not public, it should drive organic waste diversion and result in a number of opportunities for organic waste solutions.

NWMS organic waste related targets:

Of the thirty-two (32) targets identified by the DFFE's recently published NWMS (see **Section 3.1.3**), three (3) targets are especially relevant to organic waste solution providers. These targets should drive the demand for organic waste solutions, but also drive awareness of organic waste diversion.

• Action 7: develop guidelines and/or norms and standards for composting of spoilt foods. This is expected to be completed by 2022.

- Action 11: develop and implement an enabling environment for the production of biogas treated sewage and organic domestic waste. This includes developing and implementing a strategy and regulatory framework by 2022.
- Action 13: inclusion and implementation of organic waste technologies into municipal IWMPs. Metropolitan areas are required to meet this target by 2021, district municipalities by 2023, and all municipalities by 2025. The intention is to have 35 projects established nationally by 2025.

Operation Phakisa:

Of the 20 initiatives driven through the Chemical and Waste Operation Phakisa to fast-track waste diversion, three initiatives focus on organic waste:

- The zero sewage sludge to land / landfill by 2023 will focus on facilitating biogas operations at WWTWs.
- The zero meat production waste to landfill by 2023 will focus on driving the diversion of the meat production waste to value-add solutions.

(4)

 The 50% household organic separation at source by 2023 initiative seeks to enforce separation at source requirements on municipalities, in particular metros.

These three initiatives should actively result in or facilitate increasing national demand for organic waste solutions. Finalised plans had not been signed at the time of writing this MIR and as such, further details are still to be made public.

Abattoir waste landfill restrictions: Under the national Norms and Standards for the Disposal of Waste to Landfill (R.636 of 2013), abattoir waste must be disposed of at a Class B landfill. Other than Cape Town based Class B landfills, the local municipalities surrounding Cape Town are obligated to refuse to accept abattoir waste. Abattoirs will have to implement onsite solutions or outsource landfill diversion to alternative solution providers.

Liquid waste landfill restrictions:

The national Norms and Standards for the Assessment of Waste for Landfill Disposal (**R.636 of 2013**) provides directives for the disposal of waste to landfill. Included in these norms and standards is a list of wastes that cannot be disposed of at landfill. As of August 2019, all liquid waste³⁵ is banned from landfills. As such, the banning of liquids strengthens the business case for organic associated liquid waste beneficiation.

Organic Waste Treatment Norms and Standards:

The proposed national norms and standards for the treatment of organic waste (GN 275 of 2021) are expected to reduce the regulatory barriers for a wide range of organic waste treatment in South Africa. **Table 12** illustrates the technologies and feedstocks that fall within the ambit of the draft norms and standards.

Food loss and waste commitments:

A number of external and internal commitments have been announced by some of South Africa's largest brand owners (see Section 3.4). These commitments bode well for not only food loss and waste reduction and recovery solutions, but also for food waste beneficiation solutions. The SAFLWVA commits core signatories³⁶ to reducing food loss and waste by 50% by 2030. Through its 10x20x30 initiative³⁷, Pick n Pay has committed to supporting its 20 priority suppliers to also reduce food loss and waste by 50% by 2030. In addition to external commitments, a number of organisation have made internal commitments to their stakeholders to divert

organics from landfill. GreenCape has identified 33 companies within Cape Town who have officially documented internal and external commitments.

Carbon Tax Act:

Section 13 of South Africa's Carbon Tax Act provides offset allowances for heavy greenhouse gas emitters. These emitters are afforded the opportunity to reduce their carbon tax liability by purchasing carbon credits from approved carbon credit projects. Organic waste solutions may seek to strengthen the

Businesses operating or looking to operate in the organic waste space should consider joining ORASA and/or SABIA as members. Both industrydriven associations promote organic recycling, as well as support their members.

³⁶ As of April 2020, CGCSA secured 19 core signatories

³⁷ Pick n Pay is one of South Africa's largest retailers and a founding member of the 10x20x30 initiative.

³⁵ Technically many forms of organic waste fall within the definition of liquid waste as defined under Section 5.1.q of R636 of 2013: Liquid waste — (i) Waste which has an angle of repose of less than five degrees, or becomes free-flowing at or below 60°C or when it is transported, or is not generally capable of being picked up by a spade or shovel; or (ii) Waste with a moisture content of >40% or that liberates moisture under pressure in landfill conditions, and which has not been stabilised by treatment

Table 12: Scope of the draft organic waste treatment norms and standards

Technology Type	Technology
	Briquetting
	Centrifuge
Mechanical	Chipping
	Pelleting
	Sonification
	Chemical hydrolysis
Chemical	Chemical oxidation
Chemical	Transesterification
	Saponification
Anaerobic	Anaerobic digestion
	Aerobic digestion
Aerobic	Black soldier fly larvae
Aerobic	Composting
	Vermicomposting
	Aqueous phase reforming
	Combustion
	Drying
	Gasification
Thermal	Hydrothermal carbonisation
merma	Hydrothermal liquefaction
	Supercritical water gasification
	Pyrolysis
	Rendering
	Torrefaction

Feedstock Type	Feedstock					
	Manure					
Agriculture	Mortalities					
	Sugar bagasse					
	Agricultural crop residues					
Biomass	Invasive plant species					
Biomass	Plantation residues					
	Sawmill residues					
	Abattoir					
	Food oils					
Food processing	Organic fraction of MSW					
processing	Restaurant					
	Agro-processing					
Sewage	Sludge					

business case by registering their activity as a carbon credit project, and benefit from carbon credits. The climate change component must be built early into the business plan, as most carbon standards do not cover projects that include a climate change component as an afterthought. Furthermore, certain standards allow for the grouping of small projects into a single programme. As such, small organic solution activities may benefit from combining activities under a single programme.

Feeding bio-based electricity onto the grid

Traditional regulatory barriers prevented the sale of electricity to the electricity grid, but also did not allow for the wheeling of electricity. Major changes have taken / are taking place at a local level that may strengthen the business case for bio-based electricity markets:

• The Department of Mineral Resources and Energy (DMRE) gazetted new rules that allow municipalities in good financial standing to formulate energy plans that do not rely solely on the government-run energy utility, Eskom. Some metropolitan municipalities, including the CCT, have undertaken initiatives to purchase electricity directly from independent power producers, and on-sell this electricity to their customers. See Renewable Energy MIR for more information.



- Increasing off-take agreement options for local embedded electricity generators. Electricity wheeling will allow generators to "wheel" their electricity to a willing buyer anywhere within a municipality or country. The release of regulations allowing private sector energy trading has also opened the market to private sector power purchase agreements, and on-sales to private consumers using the national and local distribution networks.
- Country-wide rollout of national small-scale embedded generation (SSEG) rules, regulations and tariffs to promote the safe and legal uptake of SSEG for own use. Small-scale embedded generation already enjoys regulatory implementation in most of the Western Cape municipalities.

These changes at municipal level complement legislative updates, e.g. the gazetted Integrated Resource Plan 2019, on a national level. Together they herald a freer, more 'liberalised' electricity market, in which municipalities and end-users will be more empowered in their energy choices. For further information please see GreenCape's 2021 Energy Services MIR³⁸.

Biogas air emissions licence clarification

The DFFE has provided formal clarification to the biogas industry that biogas production does not fall under Category 10 (animal matter processing) of the NEMAQA (Act 39 of 2004) Listed Activities³⁹ (GN893 of 2013). Furthermore, DFFE has also confirmed that although Subcategory 1.4 (gas combustion installations) of the listed activities is still applicable to biogas, it is unlikely to affect biogas installations as the capacity is normally below the listed activity threshold. This means that biogas installations of less than 50 MW thermal input do not require an air emissions licence. This should reduce the cost, delays, and risks associated with the EIA process for smaller biogas facilities.

Industry associations

A number of organic waste beneficiation related associations have been established to provide support to their members and associated industries. New and existing organic waste solutions should consider leveraging this support. The Organic Recycling Association of South Africa (ORASA) promotes organic waste recycling in South Africa, the Fertiliser Association of South Africa (FERTASA) represents the fertilizer industry of South Africa, the Southern African Biogas Industry Association (SABIA) promotes specifically biogas in South Africa, and the Compostable Plastics Council (COPCO) promotes

the growth, development, and education of compostable plastics in South Africa. See **Appendix E** for contact details.

4.1.4. Risks / barriers Inadequate source separation

Contamination of organic waste by non-organic dry waste streams or hazardous streams is a major barrier that limits the available value-add solutions. This is particularly the case for MSW organics. This limits the marketability of both end-products (compost for example) and byproducts (digestate) of solutions. Until separation either at source or outside source is actively and aggressively implemented and enforced in South Africa and the Western Cape, it is unlikely that sensitive organic solutions will thrive, or that the business cases for solutions that rely on end products will be strong.

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³⁸ https://www.green-cape.co.za/market-intelligence

³⁹List of activities which result in atmospheric emissions that have or may have a significant detrimental effect on the environment, including health, social, economic, and ecological conditions, or cultural heritage.

Compost certification of post-treated organics

Organic waste traditionally requires a great deal of preprocessing if not separated at source. This is more complex when dealing with MSW organics as contamination is very high, with inconsistencies and variability in volumes and the character of feedstocks. In order to secure viable markets for compost or digestate to be used to fortify soils, the end products need to be certified as such. This certification is heavily regulated⁴⁰. The benefits of certification are that the certified by-products can be sold at a higher price than non-certified by-products, thus improving the business case. The FERTSA is well placed to assist composters with navigating this certification⁴¹.

Competition with unregulated pig farmers

Organic waste solution providers are competing with livestock farmers, mainly pig farmers, for access to organic waste feedstocks such as food waste. Feeding organic waste to livestock is not recognised as an organic waste treatment. As such it is not governed by the NEMWA and the associated regulations. However, the practice is governed by the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947) and associated amendments This act governs the sale of farm feed and stipulates when organics can be fed to livestock. Waste generators are often unaware of the regulations governing farm feed, and often give or sell their waste to farmers. There could also be waste generators who flout the regulations wilfully, for example some farmers themselves, or third party logistics entities.

Cost of Landfilling

Although landfilling waste is regarded as an overhead for private organic waste generators, it is still relatively low compared to more developed economies. As such, organic waste solutions should have cheaper gate fees than landfill. This is often difficult when markets for end products are limited, and gate fees are the major source of income. Nevertheless, with future landfill restrictions, this will no longer be relevant.

Confidence in bio-energy projects

GreenCape's engagements indicate that some financial institutions and investors are losing confidence in bioenergy projects. However, it should be noted that this is shifting owing to a united effort by SABIA and its members. Various factors have affected the viability of biogas projects in South Africa, including:

- types and security of feedstock;
- availability of realistic revenue streams;
- the cost of managing digestate;
- the project/stakeholder structure;
- the choice of technology;
- the conditions of contract agreements; and
- a lack of skills to operate facilities.

Access to and sale via the electricity grid

The South African electricity market is currently managed on a "single-buyer" model by the state-owned entity, Eskom. Eskom is responsible for the generation and transmission of electricity, and also controls a minority share of the distribution market. Current regulatory barriers prevent the sale of electricity to the electricity grid, nor do they allow the wheeling of energy that enables third parties to utilise distribution grids to sell to willing buyers. However, there are movements to a more liberalised energy system. See 2021 Energy Services MIR⁴² for more details.

Lack of heating grid

The business case of waste-toenergy projects, especially in European context, is often pegged to not just the sale of electricity but also through heating. This business case is often more attractive in colder climates with district heating infrastructure. However, South Africa does not host a central heating market, other than in very specialised cases. As such, selling heat to a grid is an unlikely market opportunity.

⁴⁰ Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 1947, as amended.

⁴¹<u>http://www.fertasa.co.za/legislation-regulations/fertilizer-regulations/</u>

⁴² https://www.green-cape.co.za/market-intelligence



Saturation of solutions:

Cape Town has a wealth of organic waste solutions. This includes a divers spectrum of solutions from highly sensitive solutions like biogas, to more forgiving solutions like composting. However, most of these companies are focused on commercial and industrial organics. Based on engagements, Cape Town has sufficient solutions to cater for its commercial and industrial organics. It is for the highly contaminated MSW organics where solutions are needed.

Furthermore, at present many of Cape Town's existing organic waste solutions are limited to the amount of waste they can process (10 tonnes per day) due to waste management licences. However, with the promulgation of new norms and standards (see **Section 3.3**), expansion of existing capacities can be expected. Although this is an enabler for existing small-scale composters, it is problematic for new and largescale solution providers.

4.1.5. Recent developments

There have been a number of recent developments within the organic waste space that investors and businesses may find interesting. These include the following:

Municipalities submit organic waste strategies

As part of DEA&DP's organic waste strategy, all municipalities within the Western Cape are required to develop organic waste diversion plans that meet the organic waste diversion targets. These plans are to be submitted to the DEA&DP. At the time of finalising this MIR, these plans were not yet public. The plans are key for investors / businesses investigating opportunities in the respective municipalities.

Cape flats BBF breaks ground:

The CCT is expected to break ground on its Cape Flats (Southern) BBF in 2022 for commissioning in 2024/25. This is the first of three proposed regional wastewater sludge treatment facilities planned for construction over the coming years. These facilities are expected to treat all ±199 tonnes per day of the CCT's wastewater sludge. Each facility will be implementing thermal hydrolysis to release additional organics from the micro-organism cells in the thickened sludge to feed into on-site anaerobic digesters. The biogas produced will be collected, stored, cleaned, and used on-site to fuel steam boilers and to produce power and/or heat. The gas will be treated to meet boilers and combined heat and power specifications. Surplus bioenergy will be used to supplement power supply. The digestate from all three facilities will be dewatered and made available to the market. The intention of these investments is to meet the regulatory landfill restriction on liquid waste and the future Western Cape organic waste landfill restriction in 2022 and 2027.

City of Cape Town organic waste drop-off pilot

The CCT launched its organic waste drop-off pilot in February 2021, which ends on 30 June 2021. The pilot seeks to investigate the feasibility of citizens dropping off organic food waste at strategic sites. This pilot is in reaction to the provincial organic waste landfill restrictions. Depending on participation rate and total tonnages of food waste diverted, the CCT will assess whether this has the potential for further rollout.

PEDI organic waste facility revamp

The Philippi Economic Development Initiative (PEDI) has taken over operations of the composting site from where Waste2Food used to operate (Philippi Fresh Produce Market closed in 2020). The site is being refurbished and upgraded to process no more than 10 tonnes a day of organic waste. The facility is geared to process a wide range of feedstocks including: preconsumer and post-consumer food waste; compostable packaging; abattoir wastes; manures; chipped timber; and garden waste. The site integrates a combination of in-vessel composting, vermicomposting and windrow composting.

Nutrihumus established

Nutrihumus has been awarded authorisation, and waste management licence to operate its Philippi composting facility. The site is licensed to process 100 tonnes / day but in the short term will only process ±50 tonnes / day of organics, including: chipped garden waste, manures, abattoir wastes, and food waste. The site will utilise integrating windrow composting techniques and vessel composting technology. If / until the draft composting norms and standards are finalised, Nutrihumus will be one of only two composters in Cape Town that are legally able to receive more than 10 tonnes of organic waste a day.

Urban farms recycling launches in Cape Town

Urban Farms Recycling is an organic waste solution which expanded its footprint into Cape Town in early 2020. Their service offering includes processing of organic waste at its Philippi commercial composting and vermiculture facility. The facility is equipped to process no more than 10 tonnes a day of organic waste from a wide range of sources.

Athlone private sector integrated waste management facility

The Athlone private sector IWMF, previously referred to as the New Horizons Energy Athlone facility, was Africa's first attempt to extract value from mixed MSW at scale, but was met with a plethora of challenges resulting in its closure. The private IWMF cost R400 million to construct and had a design capacity to process 600 tonnes per day of mixed MSW. The facility has since closed down with the Industrial Development Corporation of SA (IDC) taking over 100% equity. At the time of writing this MIR, the IDC had accepted an unsolicited bid from a consortium of stakeholders and was conducting due diligence. The organic component is expected to process 200 tonnes a day. It is anticipated that the facility may be reopened and accepting material in the late 2021 / early 2022.

Athlone municipal mechanical biological treatment facility

The CCT will be making large infrastructure investments into organic waste beneficiation. According to the 2020/21 medium-term budget, the Solid Waste Department plans on upgrading its existing Athlone Refuse Transfer Station (ARTS) to include a clean MRF (Phase 1), and also an MBT plant (Phase 2). The expansion is currently in its pre-application phase. Details of the expected construction is not public.

Stellenbosch organic waste aggregation facility

As indicated in Section 2.4, Stellenbosch municipality has also reinitiated the establishment of its organic waste transfer facility. Commercial, industrial, and MSW organics will be aggregated and processed into higher quality feedstock for the private sector. The facility design and throughput is still to be finalised. This will be the first such municipal facility in South Africa. This investment will be located adjacent to the newly established MRF.

Compostable Plastics Council Launched

Early 2020 saw the launch of the COPCO. This industry established council is focused on supporting specifically compostable plastic members and excludes broader biodegradable plastic sectors. The aim is to promote the growth, development, and education of compostable plastics in South Africa. This includes the advocacy of responsible importing, manufacturing, use, management and postconsumer waste-management of compostable plastics.

Agriprotein closes South African operations

To ensure the smooth running of the overall group, the Insect Technology Group has made the decision to cease its AgriProtein operations in South Africa. Its initial site in Philippi, Cape Town has been actively contributing to future project designs, as well as trialling and refining new equipment, and processing prior to their deployment of more advanced sites. However, as advancements have been made in its offshore partnerships and future projects, the need for the Philippi facility has significantly reduced. Coupled with continued coronavirus headwinds, this has led to the decision to close its South African operations.

Shopping centres invest in organics:

The Canal Walk shopping centre is one of the largest in Cape Town. The centre has installed a 40 tonnes per month Heron IVC in-vessel food waste composter within its newly constructed waste recovery yard. Probiotic has instilled other units at Sandton City, Emperors Palace, and Eastaate Mall. This is Probiotic's first installation of its mallscale food waste composter in the Western Cape. In-vessel composters are gaining traction for onsite treatment for large facilities. This is largely to reduce volume and transport logistics.

V&A Waterfront continues to recover 30 tonnes per month of post-consumer organic from its 80 eateries at its onsite MRF. These organics are received at an onsite MRF and managed by the waste management company, Don't Waste, who diverted this stream to various Cape Town based organic waste solutions.

In 2018, the property management company Growthpoint Properties implemented a modulated biogas unit at its N1 City Mall. The unit has since ceased operation and is lying dormant. Bayside Mall had also invested in biogas in 2015. This facility also decommissioned its biogas unit in 2016 due to economic viability. However, both facilities have shown interest in reviving their biogas operations.

Zandam revives biogas

Zandam Cheese & Piggery are looking to revive their biogas project with the assistance of the company Zero Waste Technologies. The business model, similar to Elgin Biodigestion, will look to replace its electric and coal based boilers with biogas based boilers. The agreement for progression of the project is expected by the end of September 2020.

Pay gas launched:

PayGas⁴³ is a Cape Town based start-up that has partnered with Afrox to supply township residents with affordable pay-as-you-go natural gas. PayGas has three stations established in Cape Town, with a rollout plan of 52 stations across the country over the next three years. Although liquefied petroleum gas (LPG) is its main product, it is investigating the sale of bio-methane. This may be an alternative offtake opportunity for non-grid dependent biogas solutions.

⁴³ https://paygas.africa/

Wheeling help desk

As indicated in **Section 2.4**, the South African Independent Power Producers Association is in the process of developing a wheeling helpdesk for its members. As a part of the process, they are assessing the current status of wheeling within municipalities and across various energy technologies. Biogas companies would be well advised to join the association to leverage this wheeling helpdesk.

SABIA biogas market potential

The biogas industry body, SABIA, launched its market position paper in March 2021. According to SABIA, the theoretical generation potential of biogas across various industries / sectors is estimated at 10 297 MW, of which 1 254 MW is feasible within five years. The investment potential is estimated at between R52 billion (next five years) and R250 billion (total), and those sites feasible within five years have the potential to support 30 177 direct jobs.

Branson centre food waste innovation challenge

The Branson Centre for Entrepreneurship⁴⁴ seeks to provide business development support to innovative SMMEs. This is done through their "Ignite Business Accelerator Programme". This is a free business development programme providing various levels of support to SMMEs. One of their primary focus areas is food waste. Through their Food Waste Innovation Challenge, they provide business development support to SMMEs providing solutions for preventing food loss and waste, or solutions to beneficiation / upcycling food waste.



(4)

4.2. Plastics

South Africa has a wellestablished plastic collection and recycling industry. The success is largely due to the South African industry associations facilitating the material supply for recycling and market demand for recyclate. Plastic recycling is still largely operating within classic economics (supply and demand) and has a stronger business case in South Africa. This viability can be attributed to South Africa's relatively cheap labour and a highly active but marginalised waste picker sector.

However, recycling rates have shown slow growth over the past couple of years and do not align with the efforts undertaken to increase these rates. This is expected to change in the coming years with the implementation of progressive regulations, commitments to industry-driven agreements, and investments into large municipal material recovery infrastructure and initiatives, most notably in Cape Town. The various initiatives and levers should see further support for plastic recycling in South Africa in the next five years.

4.2.1. Market overview Plastics produced

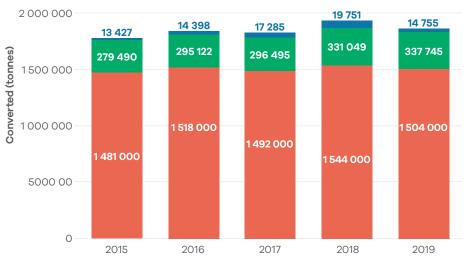
South Africa consumed +1.84 million tonnes of plastic polymers in 2019. This is 2% lower than the previous vear's ±1.88 million tonnes. However, the polymer market is still highly dominated by virgin polymers, which make up 82% of polymer consumption in South Africa. This is down 2.6% from 2018 — from ±1.54 million tonnes to ±1.50 million tonnes. The remaining 18% local consumption was made up of recyclate. An additional 14 755 tonnes of recyclate was exported. The local dependence on virgin polymers is illustrated in Figure 22. Figure 23 illustrates this dependency in more detail for each of the major polymers for 2019 only.

⁴⁵ The geographical distribution range of plastic for each province is estimated based on the population distribution of provinces, and the gross domestic product (GDPR) per region distribution of provinces, as they relate to each other.

Plastic waste generated

Determining the amount of plastic waste generated by South Africa is extremely difficult. This is largely because it is not fully understood how much material is entering South Africa, for example as packing for imported products. However, what is known is the amount of overall virgin polymer consumed in the country, coupled with the recyclate produced by recyclers per province. Combining the two sets of figures provides an indication of the material used for manufacturing. **Figure 24** illustrates the extrapolated distribution of plastic waste generated and plastic recycling across South Africa⁴⁵. **Table 14** provides an indication of plastic fraction of MSW for Western Cape municipalities.







Source: Plastics|SA (2020)

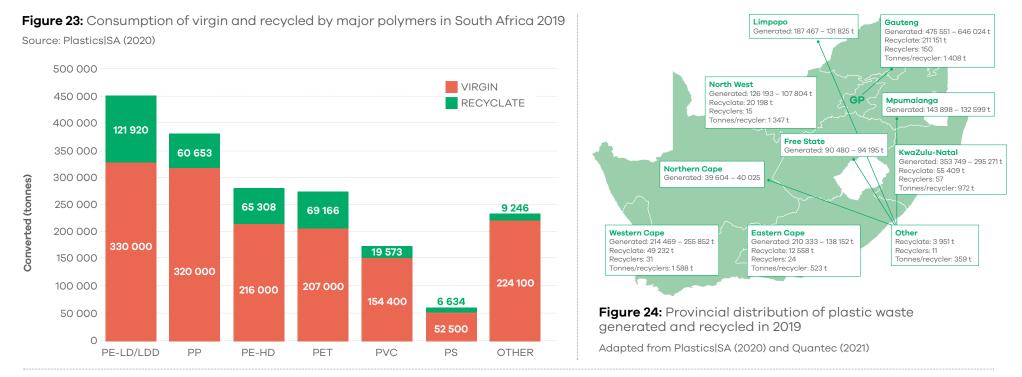


Table 13: MSW plastic generated in the Western Cape

Source: Inferred and estimated against DEDAT (2016) using GDP growth and population growth (Quantic 2021)

Municipality /	2015	Concentration (t/yr) Concentration (t/km²/yr) 155 919 150 016 - 172 797 63,7 - 70,6 26 729 25 717 - 29 324 1,2 - 1,4 2 227 2 143 - 2 264 0,1 - 0,1 17 819 17 144 - 18 657 0,8 - 0,8 8 910 8 573 - 9 815 0,7 - 0,8 11 137 10 715 - 12 246 0,4 - 0,4	2020 (Projected)											
Metro	(DEDAT [2016])			Per Capita (kg/p/d)	Value (R's million)⁴⁵	(Projected)								
City of Cape Town	155 919	150 016 - 172 797	63,7 - 70,6	0,09 - 0,10	225 023 271 - 1 555 169 570	186 375								
Cape Winelands	26 729	25 717 - 29 324	1,2 - 1,4	0,08 - 0,09	38 575 459 - 263 912 737	31 364								
Central Karoo	2 227	2 143 - 2 264	0,1 - 0,1	0,08 - 0,08	3 214 020 - 20 379 736	2 278								
Garden Route	17 819	17 144 - 18 657	0,8 - 0,8	0,08 - 0,08	25 716 492 - 167 916 931	19 227								
Overberg	8 910	8 573 - 9 815	0,7 - 0,8	0,08 - 0,09	12 858 967 - 88 331 858	10 537								
West Coast	11 137	10 715 - 12 246	0,4 - 0,4	0,06 - 0,07	16 072 988 - 110 217 335	13 093								
Western Cape	222 741	214 307 - 245 103				262 873								

⁴⁶ Value range is based on the price recyclers are paying: lowest price of R1.50 / kg of very dirty loose LDPE, to highest price of R9.00 / kg of cleaned bailed clear white HDPE.



Plastic landfilled

It is difficult to estimate the amount of plastic waste generated within municipal boundaries, let alone estimate the impact that COVID-19 has had on consumption and waste generation.

However, it is somewhat easier to estimate the amount of plastics disposed of at landfill.

Figure 25 illustrates the estimated amount of waste going to Cape Town's landfills (municipal and private). Using the CCT's 2018 waste characterisation study (CCT, 2018a), it is possible to estimate the broad types of plastics that make up this landfilled waste. A total of ±154 500 tonnes of plastic was landfilled in CCT's landfills in 2020. Unfortunately, the waste characterisation for the private landfill is not available. As such, an estimate of plastic landfilled at the private landfill is not possible.



Plastics recycled

South Africa's robust collection and aggregation network is driven by a strong and competitive processing and recycling sector made up of 288 identified recyclers. **Figure 26** illustrates the number of recyclers per province, aggregated tonnage of recyclate manufactured per province, and average recyclate produced per recycler for each province. Although the Western Cape's 31 recyclers produce less recyclate in total than their Gauteng and KwaZulu-Natal counterparts, they have the highest average amount of recyclate manufactured per recycler.

Despite a surge in the number of recyclers established in the last couple of years, the sector is still highly concentrated. In 2019, 20% of the recyclers manufactured 70% of the recyclate, and the top 10 recyclers manufactured 32% of the recyclate. Of the top 30 recyclers in South Africa, Gauteng hosted 17, whilst the Western Cape hosted five (**Plastics|SA**, 2020).

Furthermore, the recycling sector is well supported by a strong and proactive industry body called the South African Plastic Recycling Organisation (SAPRO). This body has been highly influential in developing the South African Plastics Pact (SAPP), and has made a substantial contribution to policy development for EPR.

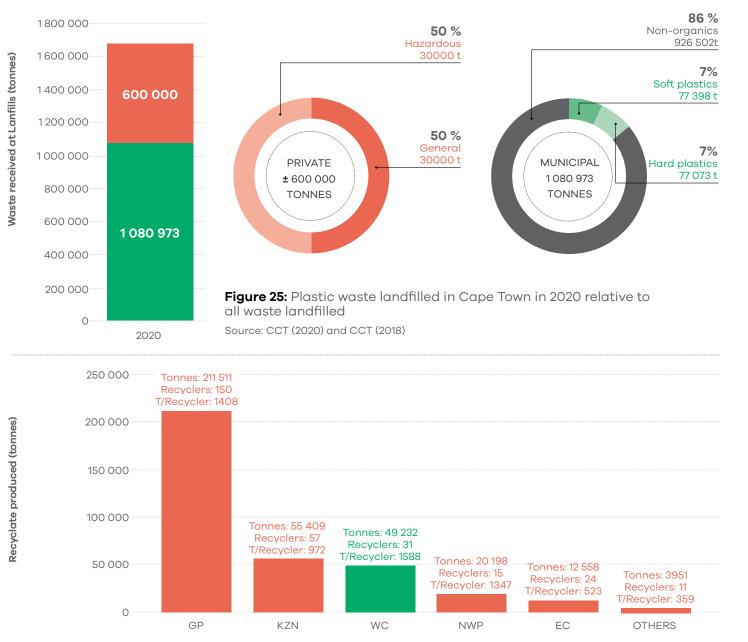


Figure 26: Plastic recyclers per province and total recyclate produced in 2019 Source: Plastics|SA (2020)

Sources of plastic material for recycling

Almost 70.4% of plastic that is recycled is obtained from landfills and/or post-consumer sources. The remaining 29.6% is sourced from pre-consumer sources. **Figure 27** illustrates the types of feedstocks in 2019, whilst **Figure 28** illustrates the source of feedstocks from the supply chain in 2019.

Although much of the waste is procured from the waste collectors, this is not the source of material. It is worth noting that due to practical and system barriers, it is difficult for small-scale collectors and waste pickers to supply plastic recyclers directly. Waste collectors and buyback centres are often entry points for informally collected waste. This can be attributed to a well-established collection and consolidation network of highly active informal waste collectors.

According to Plastics|SA (2020), this includes ±58 750 waste pickers and employees of the smaller entrepreneurial collectors. Furthermore, it was reported that informal collectors supplied between 80% and 90% of plastic packaging for recycling (**Plastics|SA**, 2015).

It should be noted that in the past, waste pickers were not permitted onto Western Cape landfills. As such, much of the materials sourced by waste pickers is sourced prior to refuse collection and cleansing. This is expected to change in the coming years as the NWMS requires all local municipalities to develop waste picker integration plans. The CCT is preparing to co-develop a waste picker integration plan with the various stakeholders, including the informal sector.

Plastic recyclate end markets:

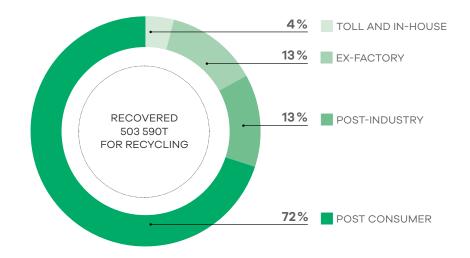
South Africa's strong processing and recycling sector is driven by market demand for plastic recyclate. **Figure 29** provides the end market breakdown for recyclate in South Africa. As shown, packaging (flexible and rigid) continues to dominate with 34% of the market. The agriculture and building / construction sectors absorb a combined 25% of the market, whilst clothing / footwear absorbs 11% of recyclate.

Unfortunately, total growth in demand has been low between 2018 and 2019. This should change, particularly in the packaging end markets, as a number of key regulatory changes in South Africa are to be introduced in the coming years, most notably the implementation of the EPR regulations.

For more detailed information on the plastics market in South Africa, contact PlasticsISA or SAPRO for a copy of their annual recycling survey.

4.2.2. Opportunities

It is projected that the Western Cape generated between 214 307 and 245 103 tonnes of MSW plastics in 2020.





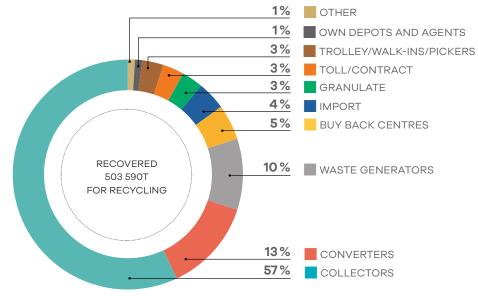


Figure 28: Source of procured plastics by recyclers in South Africa for 2019 Source: Plastics|SA (2020)

Assuming these plastics streams were made available, the plastics would have a total low-end recycling value of R321 million in 2020 and a high-end recycling value of R2.2 billion in 2020⁴⁷. At a municipal level, the greatest value lies in the Cape Town metropolitan area (71% of the total waste stream) with a projected estimated recycling value of between R225 million and R1.5 billion in 2020. However, based on actual landfilled numbers provided by the CCT, this value is between R383.6 million and R1.4 billion.

Virgin replacement

South Africa consumes ±1.84 million tonnes a year of polymer plastics. The polymer market is dominated by 82% of virgin material, with 18% consisting of recyclate. This indicates a high dependency on virgin polymers. The focus of the major plastic recyclers is to manufacture virgin replacement. As such there is an opportunity for technology providers to assist the major plastic recyclers with quality assurance solutions to increase the marketability of their recyclate. It is expected that the end-market demand will be further driven by SAPP targets, and through the implementation of the paper, packaging and some single-use products EPR scheme (see Section 3.2). The EPR regulations include annual targets for recyclate content in various products / packaging. Furthermore, the SAPP will publish annual targets towards the 2025 targets, which are more ambitious that the EPR targets. These targets will incentivise the use of recyclate, and disincentivises the use of virgin materials.

Material recovery potential

A total of ±154 500 tonnes of plastic was landfilled in municipal landfills in 2020. This equates to between R383.6 million and R1.4 billion of value landfilled. It is unlikely that all plastics are practically recyclable, and as such have little value / demand.

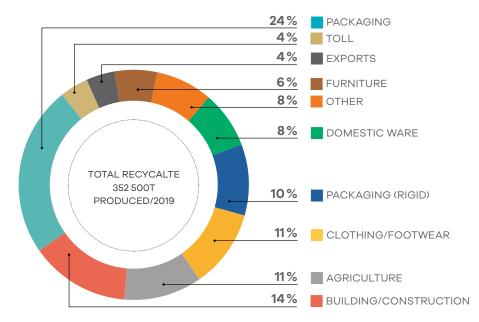


Figure 29: End market of plastic recyclate in South Africa for 2019 Source: Plastics|SA (2020)

However, with the regulations and private commitments made, this does provide an indication of tonnages of plastic that could be expected once the outcomes of the regulations are realised.

Material recovery through municipal contracts

As indicated above, a total of ±154 500 tonnes of plastic was landfilled in municipal landfills in 2020. As noted in **Section 2.3.9**, the CCT is investing heavily into material recovery in the coming years. This includes two (potentially a third) large-scale MRFs, new dropoffs and mini-MRFs. The operation / implementation of some of these investments/services is likely to be outsourced to the private sector. Securing tenders ensures access to material feedstocks and subsequently reduces risk for access to material. Municipal tenders are typically three-year contracts.

⁴⁷Value range is based on the price recyclers are paying: lowest value of R1.50 / kg of very dirty loose LDPE to highest value of R9.00 / kg of cleaned bailed clear white HDPE



Table 3 provides waste handlers,most notably SMMEs, a timelineto plan towards securing short-term (three-year) tenders. Many ofthese opportunities are expectedin the second quarter of 2022.Advertising of these opportunitiestake place several months beforethe opportunity period.

Material recovery through PRO support:

Irrespective of enterprises servicing the private sector or applying for municipal contracts, securing PRO support (financial, infrastructure, or training) in material recovery will increase both the likelihood of securing contracts and strengthening the business case for recovery.

4.2.3. Drivers / enablers

NWMS focus on plastics

Through the NWMS, the DFFE has committed to facilitating the diversion of 40% of waste from landfills within five years; 55% within 10 years; and at least 70% within 15 years. To achieve this, the NWMS (see **Table 3** in **Section 3.1.3**) includes a number of key actions that are directly related to plastic recycling.

These actions should facilitate supply and stimulate demand for plastic recyclate.

Plastic bag regulations

The amendments to the plastic bag regulations (see Section 3.2), plastic carrier bags, and plastic flat bags must be made from a minimum of 50% post-consumer recyclate as of 1 January 2023, 75% from 01 January 2025, and 100% from 01 January 2027. These regulations should stimulate the demand for specifically post-consumer low-density polyethylene (LDPE) plastics, with some high-density polyethylene (HDPE) plastics.

Plastic packaging EPR

Market demand for recyclate, and subsequent demand for collected recyclables, will be driven through the implementation of the EPR scheme for paper, packaging, and some single-use products (see **Section 3.2**). The EPR regulations will support education and awareness, increase collection and supply of recyclable plastic packaging, increase the market demand for recyclate, and ensure better quality feedstocks and subsequently lower processing overheads for recyclers.

The FPR schemes will be administered by registered PROs, who will be responsible for the collection, management and disbursement of FPR levies. These levies will be used, amongst others, to subsidise collection and recycling of plastics. Investors / businesses should contact the PROs to understand how to leverage their support and EPR levies to secure feedstocks, derisk investments and increase competitiveness. Businesses / investors looking to de-risk investments or to strengthen business cases should engage the PROs to understand how best to leverage support.

The South African Plastic Pact

The SAPP (see Section 3.4) commits its signatories to four targets aimed at stimulating the further development of a circular economy for plastic in South Africa. These targets will stimulate both the supply of plastics for recycling and the demand for plastic recyclate. They will seek to eliminate problematic plastics and facilitate growth in circular business models, such as those involving reusable packaging. Signatories to the SAPP will be implementing various initiatives to meet these targets.

The South African Initiative to End Plastic Waste

The South Africa Initiative to End Plastic Waste was formed in 2019. Six working groups were established, and have representation from industry, government and civil society: 1) Product standards and certification; 2) Product design developmen

- 2) Product design, development and innovation;
- 3) Integration of the informal waste economy;
- 4) Biodegradable and compostable plastics;
- 5) Infrastructure; and
- 6) Consumer education and awareness.

A plastics colloquium was hosted by DFFE in November 2020, in partnership with the SA Initiative to End Plastic Waste. It resulted in a recommendation that the structure of the Initiative be formalised and expanded to include all key stakeholders in South Africa, and that specific strategic focus areas be identified through a stakeholder mapping exercise to synergise with existing initiatives. Furthermore, the working groups will then be re-constituted around these focus areas, allowing the development of funding proposals to deliver on projects prioritised by the working groups.

4.2.4. Risks / barriers

Recycling has an important role in South Africa's economy. However, whilst plastic waste is technically recyclable, it is not always feasible or practical, and as such not all plastics are being recycled in South Africa. This is largely due to a number of practical and complicated reasons, including:

Slow growth in end-markets

As the recycling industry in South Africa is still largely reliant on classic economic principles, with some voluntary EPR, there must be a market demand for material. In the past, the recycling sector sustained itself through growth in end-markets for recyclate. However, South Africa has experienced low economic growth over the past few years, even prior to the COVID-19 outbreak. However, this is expected to change in the coming years with a number of progressive regulatory and private sector commitments that will shift the liability from consumers and government to producers.

Virgin plastic prices

Plastic recyclate must compete with virgin material. Because plastic is produced from crude oil, the price of virgin material is directly related to the price of crude oil. As a result, the demand for recyclate reduces with a drop in oil prices, and subsequently a drop in virgin material prices. When oil is below US\$65/barrel, the business case for recycling plastic mechanically becomes challenging (McKinsey & Company, 2018). Just before the COVID-19 outbreak, in February 2020, the price of crude oil was around US\$59/ barrel. By April 2021, the price had dropped to US\$19/barrel⁴⁸.

Further to this, even though the price of crude oil has increased above pre-COVID-19 levels to \$67/barrel in May 2020, due to the oil price volatility, and even when oil prices drop temporarily with a concurrent drop in virgin plastic prices, this can have a devastating long-term impact on recyclers and their supply chains who are not able to weather short-term crises. Once a recycler shuts down, and with it their supply chain, it is extremely difficult to re-establish itself.

High levels of contamination

It is estimated that 70.4% of plastic that is recycled is sourced from post-consumer sources, including landfill. Furthermore, South Africa in general has a low level of separation at source. As a result, recycling feedstocks are often of poor quality due to heavy contamination by other materials, including organics. Process related wastage could be as high as 40% for post-consumer films (Plastics|SA, 2020). This increases the pre-processing and disposal overheads, and subsequently reduces the business viability.

Unregulated labelling systems

Currently there is a great amount of confusion by consumers about what plastic materials / products are recyclable. As such, even when collection services for recyclables are available, and separation at source is undertaken, consumers often dispose of non-recyclable plastics into their recyclables bin thinking these materials are recyclable. This shifts the burden of disposal onto the collectors who either dump or pay for disposal, thus reducing the business viability.

Although some brands have developed on-pack recycling labels (OPRL) to communicate recyclability to consumers, this is not regulated or standardised, and as such brands provide inconsistent and misleading recycling information. However, the SA Plastics Pact is in the process of developing standardised OPRLs across all packaging streams, building on the OPRLs developed by Woolworths, and subsequently the Sustainable Retailers' Forum and WWF South Africa.

⁴⁸ <u>https://markets.businessinsider.com/commodities/oil-price</u>

True plastic numbers

Although there is an understanding on the amount of virgin and recycled resin being converted into products, there is no visibility on the amount of plastic packaging that is imported and exported on products. The import and export of plastic as packaging or products can be gauged from trade data, providing the items are appropriately coded. The plastics sector's assumption is that the unknown imports are offset by the unknown export, and as such is not considered a blind spot by the industry. However, there is no certainty about the quality / recyclability of the plastics imported and the plastic exported. For example, South Africa could be exporting high quality recyclable packaging offshore, but importing low quality and difficult-to-recycle packaging. This should be resolved with the implementation of future EPRs, which will require importers to report on plastic packaging on products placed on the market in South Africa.

Alternative plastic contamination

A key requirement for ensuring an end-market for recyclate is to secure confidence in the material as a viable alternative to virgin plastics. However, a growing concern for the plastics recycling sector is the rising interest / use of biodegradable / compostable and oxo-degradable materials as an alternative to plastic packaging. The plastic industry believes these alterative materials affect the long-term integrity of the recyclate for long-use plastics products.

Narrow focus of initiatives

There are several key industry initiatives and associations driving landfill diversion. However, many of the initiatives are disjointed and are not collaborating. This is largely because many of the initiatives are funded by members and are focused on specific plastics or stakeholders along the value chain. This is not a fault of the initiative / associations, but rather the source of funding that determines focus.

⁴⁹ https://www.capetown.gov.za/Family%20and%20home/Meet-the-City/the-city-budget/ the-citys-budget-2021-2022 **4.2.5. Recent developments** There have been a number of recent developments within the plastic waste space that investors and businesses may find interesting.

Refuse derived fuel feasibility Study

The national DFFE has appointed a consultant to undertake a feasibility study and business case for the establishment of at least five RDF plants across the country, including Cape Town. This is to address "absorbent hygiene product waste and other related residual waste streams". It is a likely opportunity that is relevant to the energy team and waste team.

ExtruPET Commissions its third food-grade line

ExtruPET has expanded its post-consumer polyethylene terephthalate (PET) bottle recycling capacity. Its Johannesburg plant commissioned its third food-grade recycling line in December 2020. This resulted in a total capacity of 30 000 tonnes per month, and now also includes wash plants to enable the processing of PET edible oil packaging, such as vegetable oils, mayonnaise, and peanut butter packaging.

CCT Coastal Park MRF

The CCT has established material recovery infrastructure and services. Material recovery capacity is expected to increase in the coming years. This includes establishing two (potentially a third) new large MRFs to complement its existing Kraaifontein MRF. The Coastal Park MRF has broken ground. Its Athlone RTS will also be upgraded into a clean MRF (and MBT). This facility is currently going through its EIA process.

CCT adds a fourth MRF to its budget

The CCT has included a fourth MRF to its draft 2021/22 budget⁴⁹. Annex 23 of this budget includes individual projects that have a total project cost of more than R50 million. The development of an additional MRF has been included. No further details are provided, other than that project spending will commence only in the 2023/24 financial year.

Aluminum can recycling at a material recovery facility. ©GreenCape

4.3. E-waste

The term e-waste refers to electrical and electronic equipment that have reached end of life, or perceived end of life. In South Africa, e-waste is classified as both general and hazardous waste depending on what materials are included / extracted. In general, it is hazardous as it contains materials (e.g., minerals, plastics, metals, and precious metals) that vary in toxicity and are integrated into equipment in ways that vary in levels of complexity. The Western Cape province is an important e-waste aggregation node for the Eastern Cape and Northern Cape, and a key source of e-waste for Gauteng's preprocessors and processors. Although the Western Cape hosts formal and informal businesses that refurbish and/or dismantle consolidated e-waste, it lacks formal pre-processing and processing capacity. Dismantled materials and components, and aggregated materials from other provinces are transported to Gauteng for processing, or are exported.

South Africa has a welldeveloped network of formal and informal collectors and consolidators, with some e-waste reaching pre-processors and refurbishers. However, there is a lack of accurate national data concerning the specific type, rate, and the volume generated, circulated, processed and exported. This should change with the implementation of the EPR regulations for the electric and electronic equipment sector, and the lighting sector.

4.3.1. Market overview

E-waste generated

Determining the generation rates of e-waste in South Africa is challenging. **Table 12** provides a summary of the various reported tonnages for South Africa and the Western Cape, with projected tonnages for 2020 based on population growth as estimated by Quantec (2021). For the purpose of this MIR, the range has been determined from the tonnages as reported by the Western Capespecific study by DED&T (2016), and ERA's (2018)⁵⁰ estimated tonnages.

⁵⁰ The EPR scheme for electrical and electronic equipment uses the ERA (2018) figures as its reference



		Reference Ye	ar	Per	20 (proje		2024 (projected)								
Data Source		Generat	ed (t/yr)	Per (p (ky/) capita (kg/) Gene Western Cape yr) South Africa - 6,21 370 3 62 251 9,83 585 9 - 5,81 346 3 - 1,31 78 2	Generat	ed (t/yr)	Generat	ed (t/yr)							
	Year	South Africa	Western Cape		South Africa	Western Cape	South Africa	Western Cape							
ERA (2018)	2018	360 000	-	6,21	370 301	43 290	390 189	46 385							
DEDAT (2016)	2015	-	62 251	9,83	585 953	68 501	617 424	73 399							
EWASA (2016)	2015	322 000	-	5,81	346 353	40 491	364 955	43 385							
Lydall et al. (2017)	2017	74 923	-	1,31	78 202	9 142	82 403	9 796							
StEP (2013)	2012	339 310	_	6,41	382 047	44 664	402 566	47 857							
UNU (2018)	2016	321 000	-	5,71	340 087	39 758	358 352	42 600							

 Table 14: Reported tonnages of e-waste by various data sources

Source: as per data source

Table 15: Distribution of e-waste generation in the Western Cape

	2015 (DEDAT, 2016)		2020 (Projected)		2024
Munic/Metro	Generated (t/yr)	Generated (t/yr)	Concentration (t/km²/yr)	Value (R's million)	(Projected)
City of Cape Town	25 661 - 43 575	28 439 - 48 292	11,6 - 19,7	R36.5 - R77.4	30 673 - 52 086
Cape Winelands	5 314 - 7 470	5 829 - 8 195	0,3 - 0,4	R7.5 - R13.1	6 235 - 8 765
Central Karoo	454 - 623	462 - 633	0,0 - 0,0	R0.6 - R1.0	465 - 637
Garden Route	3 666 - 4 980	3 839 - 5 214	0,2 - 0,2	R4.9 - R8.4	3 956 - 5 374
Overberg	1 683 - 2 490	1854 - 2743	0,2 - 0,2	R2.4 - R4.4	1 990 - 2 945
West Coast	2 608 - 3 113	2 868 - 3 423	0,1 - 0,1	R3.7 - R5.5	3 066 - 3 660
Western Cape	39 386 - 62 251	43 290 - 68 501		R55.2 - R109.8	46 385 - 73 467

Source: Using (Quantec, 2021) to project and infer (DEDAT, 2016) and (ERA, 2018)

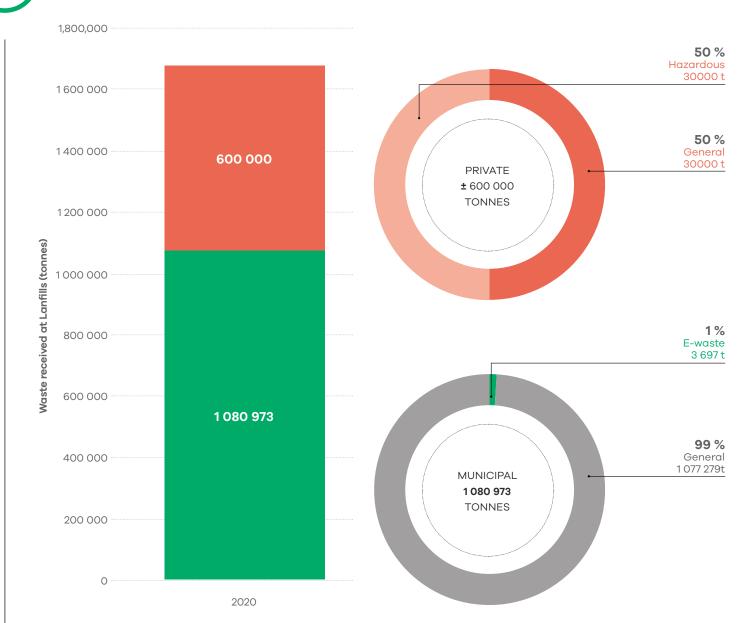


Figure 30: E-waste landfilled in Cape Town in 2020 relative to all waste landfilled Source: CCT (2020) and CCT (2018)

Growth of e-waste generation is generally linked to population growth (and to some extent affluence). The Western Cape population is expected to grow by 7% between 2020 and 2024, and the Cape Town metropolitan area by 8% (Quantec, 2021). By 2024, the Western Cape is estimated to generate an additional 3 095 to 4 966 tonnes of e-waste per year. As the most populous municipality, Cape Town will also have the largest concentration of e-waste, which is expected to increase to between 2 235 and 3 795 tonnes by 2024. Table 15 illustrates the provincial distribution of e-waste, estimated values⁵¹, and the estimated tonnes per square kilometre.

E-waste landfilled:

It is difficult to estimate the amount of e-waste generated within municipal boundaries, let alone estimate the impact that COVID-19 has had on consumption and waste generation.

⁵¹The low value was for the price of scrap CPU, printers, and photocopiers, whilst the high value was for large white scrap. The prices were based on the Wasteroad map and a CPI increase was applied.

However, it is somewhat easier to estimate the amount of waste disposed of at landfill. Figure 32 illustrates the estimated amount of waste going to Cape Town's landfills (municipal and private). Using the CCT's 2018 waste characterisation study (CCT, 2018a), it is possible to estimate the amount of e-waste landfilled. A total of ±3 697 tonnes of e-waste (computers, phones, appliances, and some batteries and lighting) was landfilled in the CCT's landfills in 2020. Unfortunately, the waste characterisation for private landfill is not available and as such, an estimate of e-waste landfilled on private land is not possible.

E-waste sources

South Africa has more than 100 formally registered e-waste businesses and service providers along the e-waste supply chain (Lydall, et al., 2017). These companies are mostly involved in the early stages of the supply chain, with a few companies acting as points for consolidation or processing for export. Informal collection: There are over 10 000 informal waste pickers across South Africa engaged in e-waste collection, 2 000 of whom are regular collectors, who in total collect a total of ±11 250 tonnes per year (ERA, 2018), which is about 25% of e-waste collected, based on Lydall et al. (2017). This e-waste is sold to either formal and/or informal scrap dealers / buy-back centres.

Formal collection: There are ±25 formal small- to medium-sized businesses engaged in e-waste collection. Each on average collects between 80 and 200 tonnes of e-waste per year. This amounts to between 2 000 and 5 000 tonnes per year (ERA, 2018).

Consolidation: Aggregated e-waste is either refurbished⁵² and/or dismantled and sold to larger pre-processors to be liberated, or for export. In addition to collectors, there are ±600 drop-off sites / buy-back centres (formal and informal) across South Africa. Collectively, they consolidate an estimated 3 600 tonnes a year (ERA, 2018). **Pre-processing:** There are currently seven known largescale pre-processors in South Africa handling an estimated combined total of 17 500 tonnes per year of e-waste (ERA, 2018). These companies function as e-waste consolidators. collectors, and dismantlers, but are primarily concerned with liberating material from e-waste. The liberated streams are either exported or sent for further processing, including Gauteng based Desco, SA Precious Metals, Sindawonye, Universal Recycling Company, and KwaZulu-Natal based Javco, Sibanye Recycling, and Sims Recycling.

Processing: South Africa hosts only two local processors in Gauteng: SA Precious Metals and Rand Refinery. Both are focused on printed circuit boards (PCBs). These companies currently have a combined process capacity of 2 730 tonnes per year, and a total future capacity of 7 460 tonnes per year (Lydall, et al., 2017). They export recovered materials from the pre-processed components to offshore electronic manufactures. In total, ±25 100 tonnes of e-waste is intercepted before landfill in South Africa.

4.3.2. Opportunities

If a conservative range of between R1 283 (low-value CPU, printers, photocopiers) and R1 603 (high value for large white e-waste) per tonne of scrap e-waste is applied, then the low value of e-waste in the Western Cape is between R55.2 and R109.8 million per year, with the Cape Town metropolitan area holding the largest value of between R36.5 and R77.4 million. Opportunities include:

Intercepting e-waste before it reaches landfills

According to ERA (2018), of the ±425 000 tonnes of electrical and electronic equipment entering South Africa in 2018, ±360 000 tonnes were discarded as e-waste. Of this, only ±25 100 tonnes are intercepted before landfill.

Applying the extraction numbers of the 2020 projection of 370 204 to 585 953 tonnes, this leaves 345 204 to 560 853 tonnes of e-waste to be collected,

⁵²Refurbishment makes up ±60% of revenue

aggregated, and processed nationally. This equates to between R442 and R900 million that can be extracted, assuming it is accessed.

The five largest handlers of Western Cape e-waste source ±1 024 tonnes per year (excluding what is intercepted by the scrap-metal industry). Of this, 824 tonnes (80%) are information and communications technology, and consumer electronics, whilst the remaining 200 tonnes (20%) are small and large appliances. This equates to only 1.5% to 2.4% of the total e-waste generated in the Western Cape in 2020. The amount reaching scrap-metal dealers, the volumes stockpiled, and the amount collected by the informal sector are unknown.

What is known is that an estimated ±3 697 tonnes of computers, phones, appliances, were landfilled in the CCT's landfills (excluding private landfill) in 2020.

Table 16: E-waste generated for SADC in 2016

			Generated in 2016
Country	Per Capita (kg/person)		Total (Tonnes)
Angola	3.3	92 000	
Madagascar	0.5	14 000	
Malawi	0.5	9 500	
Mauritius	8.6	11 000	Non-Neighbours 180 600
Seychelles	11.5	1100	
Tanzania	0.8	38 000	
Zambia	0.9	15 000	
Botswana	7.6	16 000	
Eswatini	5.1	5 700	
Lesotho	0.9	1800	SA's neighbours
Mozambique	0.6	17 000	67 500
Namibia	6.0	14 000	
Zimbabwe	0.9	13 000	
South Africa	5.7	321 000	
Total	SADC	569 100	

Source: United National University (2018)

At R1 283 per tonne of scrap e-waste, this equates to a material value of ±R4.7 million worth of e-waste that is being landfilled annually in municipal landfills.

National pre-processing and processing

Of the ±25 100 tonnes of e-waste intercepted in South Africa, only 2 730 tonnes are processed. With the planned expansion capacity by the SA Precious Metals and Rand Refinery to reach only 7 460 tonnes a year, this leaves 22 370 tonnes that are presumably exported (notably to Germany, China and India). As there are no processing facilities in Cape Town, all pre-processed materials must be transported to Gauteng. This creates an opportunity for local pre-processing and processing, if materials can be accessed and unlocked through the electrical and electronic equipment, and the lighting EPR schemes.

A licensed pre-processing / processing facility for the Western Cape

The Western Cape does not host a licensed large-scale preprocessing / processing facility as yet. Existing players (consolidators and dismantlers) are reluctant to diversify and expand in this sector, primarily due to regulatory requirements. They will be affected when the EPRs are implemented, and subsequent volumes enter into the network, as only licensed facilities will be able to recycle/ recover more than 500 kg a day. New and existing players have an opportunity to capitalise on the void in the province and to apply for a waste licence. Once they have waste licences, they will be able to accept large volumes of e-waste.

The Cape Town metropolitan area is well placed to host a processor, for five reasons:

- There are no processing facilities in the Western Cape, and as such material travels across South Africa to Gauteng;
- It is already an aggregation hub for e-waste for the Western Cape and surrounding provinces;

- It generates between 66% and 70% (28 439 to 48 292 tonnes) of the Western Cape's annual e-waste, which equated to 11.6 to 19.7 tonnes per square kilometre in 2012;
- It plays host to the Atlantis SEZ for Green Technologies (see Section 6); and
- It hosts an international shipping port.

E-waste recovery through PRO support:

Irrespective of enterprises servicing the private sector or applying for municipal contracts, securing PRO support (financial, infrastructure, or training) in electrical and electronic equipment, and lighting waste recovery will increase both the likelihood of securing contracts and strengthening the business case for recovery.

Processing of SADC feedstocks

South Africa is surrounded by a number of e-waste generating countries and potential sources of e-waste for processing. According to the United Nations University (2018), the Southern African Development Community (SADC) countries collectively generated 569 100 tonnes of e-waste in 2016, of which 67 500 tonnes were generated by South Africa's immediate neighbours. Table 17 shows per capita generation and total estimated tonnages of e-waste generated by SADC countries and South Africa's immediate neighbours.

4.3.3. Drivers / enablers

National e-waste landfill ban

The national norms and standards for the assessment of wastefor-landfill disposal (R. 636 of 23 August 2013) provides a list of waste streams to be banned from landfill at certain dates (see **Figure 20**). This list required hazardous lighting lamps to be banned in August 2016, and as of August 2021, all hazardous e-waste, including batteries, will be banned. These landfill restrictions should stimulate growth in alternative solutions to landfilling.

NWMS focus on e-waste

Through the NWMS, the DFFE has committed to facilitating the diversion of 40% of waste from landfills within five years; 55% within 10 years; and at least 70% within 15 years. To achieve this, the NWMS (see **Table 3** in **Section 3.1.3**) includes a number of key actions that are directly related to e-waste recycling. These actions should facilitate supply and stimulate demand for e-waste recyclate.

Extended Producer Responsibility

The electrical and electronic equipment EPR (see Section 3.2) focuses attention on recovery, collection and mandatory takeback schemes for a wide range of equipment as listed in Table 5. This includes batteries. The scheme seeks to increase collection and recycling rates by 30% year on year, with a collection and recycling target of 103 000 tonnes in the next five years. Amendments (GN400 of 2021) include a mandatory take-back requirement for batteries, electrical goods, electrical consumer goods, and electrical industrial goods.

The lighting EPR scheme (see Section 3.2) covers a wide range of lighting as listed in Table 4, and seeks to increase recovery and collection of such lighting products.



Furthermore, the recent amendments (GN400 of 2021) also include a mandatory takeback requirement for lighting equipment producers.

EPR is expected to inject investment into education and awareness, growth of existing collectors, consolidators, liberators, pre-processers, and processors, and into the establishment of new ones. The EPR approach should also facilitate the development of local end-markets for liberated material. Lastly, the EPR approach will result in better data collection of both local and imported e-waste. The EPR schemes will be administered by registered PROs, who will be responsible for the collection, management and disbursement of EPR levies paid by producers. These levies will be used to subsidise collection, recycling of e-waste. Investors / businesses should contact these PROs to understand how to leverage their support and EPR levies to secure feedstocks. de-risk investments, and increase competitiveness.

Investors / businesses within the e-waste sector should contact EWASA and SAEWA for information on electrical and electronic equipment related support, and LightCycleSA for lighting related solutions.

4.3.4. Risks / barriers

Lack of reliable data

There is still a lack of reliable data on the types, rates, and tonnages of e-waste generated in South Africa, E-waste data collection is in its infancy, and is largely based on assumptions and extrapolations. Only when the EPRs are implemented will a more effective system be available to ensure valid and updated numbers. Further to this, scrap-metal dealers often intercept e-waste derived materials, which can often be misreported. This makes it difficult to provide accurate e-waste numbers, as they are recorded as generic scrap metal.

Access to feedstock

South Africa has extensive collection and aggregation networks, as well

as the technological means and capacity to process e-waste. Due to the lack of access to feedstock, these facilities are generally not running at capacity. This can be attributed to insufficient dropoff points and accessibility of collection points, no separation of e-waste from other solid waste streams at source, and low public awareness of the need to dispose responsibly. Emotional attachment to equipment and concerns about data safety are also regarded as key factors in the low supply of e-waste (Lydall, et al., 2017).

Expensive licensing of e-waste recycling / recovery

E-waste is defined as a hazardous waste and is regulated accordingly. These regulations limit recycling and recovery of hazardous e-waste to less than 500 kilograms per day, otherwise an EIA process is required to obtain a waste management licence. This process has financial implications (especially in terms of affordability by SMEs) and could lead to time delays, depending on the EIA process (see Section 3.1).

Cherry-picking of high value e-waste

Certain e-waste streams cost more to collect and recycle than the income that can be generated. As such, many collectors focus on high-value streams, such as ICT and consumer electronics, whilst ignoring low-value streams. This should change with the introduction of EPR levies, as these low-value streams will likely be subsidised by the more high-value streams. In the meantime, it is an ongoing issue for many collectors.

As indicated earlier, according to ERA (2018), South Africa generates roughly 7 000 to 10 000 tonnes a year of Printed circuit boards (PCBs). With SA Precious Metals and Rand Refinery having a combined future processing capacity of 7 460 tonnes per year for PCBs, it is unlikely that there is space in the market for an additional processor of PCBs.

DFFE view of transboundary e-waste movement

Concerns are expressed nationally that South Africa may become a "dumping ground" for e-waste.

Table 17: Current and expected waste beneficiation related tenders for the CCT

_Infrc	astructure / Service	2018		2019		1	2020		20	21		202	2		20	23	2	2024		202	5	2	2026		202
		Q1 Q2 Q3 Q	4 Q1 (Q2 Q:	3 Q4	Q1 (Q2 Q3	Q4 Q1	Q2	Q3 Q4	Q1	Q2 (Q3 Q	4 Q1	Q2	Q3 Q4	Q1 C	2 Q3	Q4 Q1	Q2 (Q3 Q4	Q1 Q1	2 Q3 C	4 Q1	Q2 0
	WWTW sludge disposal									SCN	NB 8	32/11/	20												
Sludge disposal /	WWTW sludge beneficiation																			Un	know	n com	mence	ment	date
	Cape Flats BBF digestate beneficiation																			Un	know	n com	mence	ment	date
beneficiation	Cape Farms BBF digestate beneficiation																								
	Zandvliet BBF digestate beneficiation																								
	Northern Area						SC	CMB 18	3/09/	19															
	Hout Bay – Camps Bay						SCM	/IB 51/0	06/19																
Think Twice recyclables collection	Helderberg Area	SC							06/19)															
ecyclables collection	North-Eastern Area					S	CMB 14	4/02/1	9																
	Two Oceans Area						SC	CMB 66	6/07/	19															
	Sea Point Area						SCM	1B 55/0	06/19)															
	Kraaifontein MRF					S	CMB 14	4/02/1	9																
	Coastal Park MRF																		Unk	nown	comm	hencer	ment d	ate	
MRF operations	Athlone MRF (Phase 1)																								
	Athlone MBT (Phase 2)																								
	Bellville MBT																								
	Athlone			SC	CMB 5	8/07	/18																		
-			S																		_				
								1B 50/0	06/19)											_				
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	Simons Town Blue Waters													-							_				\vdash
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	Vissershok																				'		+	_	\vdash
	Wegelegen		+			_							_		+		+	+		+	'	\vdash	++	_	\vdash
	Woodstock		+								_		_	_	\square						-	\vdash	++	_	\vdash
	Wynberg		+				SCM	IB 50/0	06/19	,			1.1	lun =:::	10						-	\vdash	++	_	\vdash
	Prince George															_			_		<u> </u>	\vdash	++	_	\vdash
	Parkwood										المرا								alia a	6					
arden waste chipping	Various Drop-offs		+		+						JNK	nowr	1 COR	nmer	ncer							ids be	en app	ealec	1
ilders rubble crushing	TBC															Unkno	wn cc	mmer	nceme	ent da	te				

Source: CCT awarded tenders and expected infrastructure

Thus, there is some uncertainty as to what the regulatory response may be. Consequently, it is as yet uncertain what the likelihood is of transboundary movement of e-waste, and hence South Africa's ability to access foreign e-waste to enable economies of scale.

4.3.5. Recent development

Sustainable Recycling Initiative Programme Launches in South Africa

The Sustainable Recycling Initiative (SRI)⁵³ is a funded initiative that seeks to build capacity for sustainable recycling in developing and transitioning countries by supporting national initiatives and implementing pilot projects. In February 2021, the SRI launched its South Africa participation. The overall development objective of the SRI programme is to create favourable framework conditions that will enable the development of a sustainable recycling industry for e-waste and any related waste streams. This includes:

- developing local and national e-waste policies, norms and standards to define minimum working conditions for formal e-waste value chain partners and facilitate informal sector integration;
- supporting PROs and other voluntary industrial organisations;
- assisting with the development of auditing skills and capacity to assess e-waste value chain operators;
- developing a national e-waste learner curriculum; and
- establishing pilot projects.

The programme is funded by the Swiss State Secretariat of Economic Affairs and is implemented by the Swiss Institute for Materials Science & Technology and the World Resources Forum.

E-waste research

The Council for Scientific and Industrial Research (CSIR) is currently funding a number of research and demonstration projects focused on extracting value from e-waste⁵⁴. This research provides investors / businesses key insights into highly specific e-waste recycling opportunities.

The research topics include:

- Amino acid leaching of metals from PCB waste;
- Recycling rare earth elements from fluorescent lamps;
- Development of an environmentally friendly lithium ion battery recycling process;
- Investigating options for thermal treatment of printed circuit board waste;
- The use of PCB leach residue as reductant in pyrometallurgical operations;
- Co-processing PCB leach solutions with effluent streams from PCB manufacturing; and

• Technology landscape report and business case for the recycling of Li-ion batteries in South Africa.

4.4 City of Cape Town material recovery contracts

One way the CCT has chosen to support a circular economy is through facilitating the recovery of materials for beneficiation. This will be done through sizeable investments into key recovery infrastructure and collection services. The delivery of these material recovery services has and is likely to be outsourced to the private sector via regulated procurement⁵⁵.

Businesses looking to secure reliable income sources and sizable material feedstocks are well advised to consider tendering for contracts. **Table 17** provides a pipeline of existing and potential future tenders related to material recovery and/or beneficiation⁵⁶ for businesses, especially SMMEs, to work towards.

⁵⁵https://www.capetown.gov.za/Work%20and%20business/Doing-business-with-the-city/Tenders-RFQs-and-supply

⁵⁶ Although there are mechanisms to do so, it is unlikely that CCT will award tenders for longer than three years, and even more unrealistic to award tenders beyond five years.

⁵³<u>https://www.sustainable-recycling.org/</u>

⁵⁴ <u>https://wasteroadmap.co.za/research/</u>



FUNDING AND INCENTIVES

South Africa ranks as one of the top 15 nations in the world in terms of driving the green growth agenda (ahead of Australia, Singapore and Finland). This drive is on the back of a range of funding solutions and tax incentives available to green technology manufacturers and service companies, as well as those who use or procure such goods and services.

Builder's rubble is increasingly being used as a secondary material in road construction, as was seen on the N2 near Borcherd's Quarry in Cape Town. ©City of Cape Town

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10.0

The South African Climate Finance Landscape looks at detailed project-level data, understanding in detail the source, disbursement, instrument and use. The insights can support public and private role-players with information to shape sectoral strategies and selected policies and improve coherence and coordination between public and private level spending in the sectors. The South African Climate Finance Landscape has tracked R62.2 billion in annual climate finance invested in SA. Find out more here.

5.1. General database web page

The GreenCape Finance Desk hosts a web page with a number of Green Finance resources that cover funding and incentives available to companies operating in the green economy. A few of the available database are highlighted below.

The Green Finance Desk (GFD) primarily acts as a facilitator in the financing of green projects and green business. The GFD works across all sector desks at GreenCape. For more support please contact **jack@greencape.co.za**

5.1.1. Green Finance Database

In conjunction with the Western Government Department of Economic Development and Tourism, GreenCape maintains a database of funding sources and incentives that may be relevant to green economy investors. The database contains information on more than 150 funding opportunities, including an overview of the opportunity and relevant contact details and links. It is ideal for any entity seeking a broad range of funding solutions and financial incentives, with South African institutions being the main source of opportunities. The database is available to view and download online⁵⁷.

5.1.2. Government funding and incentives database

An updated document focused on South African government funding and incentives is available to view and download online⁵⁸. These incentives cover local manufacturing, critical infrastructure grants, small enterprise development and a diverse set of sector specific incentives (i.e. Aquaculture Development and Enhancement Programme).

⁵⁸https://www.greencape.co.za/assets/Uploads/Government-Funding-and-Incentive-Booklet.pdf

⁵⁷ https://www.green-cape.co.za/content/focusarea/green-finance-databases

5.1.3. Finfind database

Finfind⁵⁹ is an innovative online finance solution that brings together SMME finance providers and finance seekers. With a focus on finance readiness, Finfind has more than 200 lenders and over 350 loan products available to SMEs. The database is ideal for South African SMMEs who are seeking funding and/or business advisory services, and those who want to improve their understanding of finance.

5.1.4. AlliedCrowds database

AlliedCrowds⁶⁰ is the first complete aggregator and directory of alternative finance providers in the developing world. Sign-up is free and allows users to access a global database where one can filter for sector (including greentech, agriculture and social impact), type of capital (equity, lending, grant), and type of funding (crowdfunding, angel investing, venture capital,impact investing).

In addition:

- Themed databases around the Sustainable Development Goals (SDGs) and the World Green Economy Organisation (WGEO) are available.
- Reports, including a number specifically about African funding sources, can also be downloaded for free.
- Businesses / organisations can also contact Allied Crowds to create a customised funding database. This resource is ideal for any entity seeking a broad range of financial solutions on a global scale.

Click the buttons below to access the relevant content

⁵⁹ https://www.finfindeasy.co.za/

⁶⁰ https://alliedcrowds.com/



THE WESTERN CAPE: AFRICA'S GREEN ECONOMY HUB

The City of Cape Town provides businesses and investors with prime locations, modern infrastructure, a skilled workforce, low operational costs and an abundance of natural resources. It is also a sought-after place to live, with unrivalled natural beauty, vibrant culture, excellent schools and universities, and an outstanding quality of life.

The City of Cape Town provides businesses and investors with prime locations, moderninfrastructure, a skilled workforce, low operational costs and an abundance of natural resources. It is also a sought-after place to live, with unrivalled natural beauty, vibrant culture, excellent schools and universities, and an outstanding quality of life. ©Tobias Reich In 2017, Cape Town was ranked among the top 21 global investment destinations by Foreign Direct Investment (fDi) Intelligence, a division of the Financial Times.

A great place for green business

There are compelling reasons why the Western Cape Province and Cape Town is viewed by many as Africa's green economy hub. Coupled with a strong and rapidly growing market for green technology and services in South Africa and beyond, the Cape Town offers:

- Africa's renewable energy and cleantech hub, with a critical mass of leading companies present.
- Local presence of major professional services and financiers.
- Significant market opportunities for businesses and investors in agriculture, energy services, utility scale solar and wind, waste, water, bioeconomy and resource efficiency.

- A supportive government that has made ease of doing business and the green economy key priorities, with the City of Cape Town ranked first in South Africa for two World Bank Ease of Doing Business indicators.
- Five universities with comprehensive R&D capabilities and dedicated green economy skills programmes.
- A range of investment incentives in the Atlantis Special Economic Zone (SEZ) for Green Technologies, and investment support and incentives offered by the City of Cape Town.

Supporting businesses and investors

The Investment Facilitation branch within the City's Enterprise and Investment Department, provides facilitation services and processes for investments exceeding R20 million or which are deemed strategically important. This departmental branch manages the Atlantis Investment Facilitation Office (AIFO), which provides facilitation services mainly in the industrial area of Atlantis. For more information, contact Tim Hadingham (Manager – Investment Facilitation, Department of Enterprise and Investment) via **Timothy.Hadingham@ capetown.gov.za**

It also manages and administers the City's investment incentives programme; works with line departments to identify and address systemic bottlenecks in City processes in order to make it easier for all investors to make their investment; and provides aftercare and business retention services to investors.

During the 2019/20 financial year, the Investment Facilitation branch engaged with 247 companies and organisations interested in Cape Town as an investment destination. These facilitation efforts resulted in breaking ground on investment projects valued close to R15 billion. Additional dedicated support for businesses and investors focusing on greentech and services, includes:

- Western Cape Department
 of Economic Development
 & Tourism: Driving the
 green economy policy
 landscape in the Province.
- InvestSA One Stop Shop: Offers convenient investor support on permits, licensing and registrations - all under one roof.
- City of Cape Town Department of Enterprise and Investment: Creates an enabling environment to attract investment that generates economic growth and job creation in Cape Town.
- GreenCape: Provides dedicated support and market intelligence to green economy sectors.
- Wesgro: The official investment and trade promotion agency for the Western Cape.
- **SAREBI:** A business incubator providing nonfinancial support to green entrepreneurs.
- **SARETEC:** Offers specialised industry-related and accredited training for the wind and solar industries.

R&D capabilities and skills

The region's five universities – University of Cape Town, Stellenbosch University, University of the Western Cape, the Cape Peninsula University of Technology and the George campus of the Nelson Mandela Metropolitan University – underpin all of this with comprehensive research and development (R&D) capabilities and dedicated green economy skills programmes.

Atlantis special economic zone for green technologies

The Atlantis SEZ is a zone dedicated to the manufacturing and provision of services in the green technology space - technologies that reduce or reverse the impact of people on the planet. Wind turbines, solar panels, insulation, biofuels, electric vehicles, materials recycling and green building materials are all examples of green technologies that will be welcomed to the zone. The zone welcomes manufacturers, service providers, suppliers and other players in the value chains of different green technologies. The SEZ is situated in the Atlantis industrial area north of Cape Town, south of Wesfleur, east of Dassenberg Road, and west of the Witsand community.

Why invest in the Atlantis SEZ?

There are strong and growing South African and African markets for greentech. The South African greentech manufacturing market is worth at least R30bn; with a growing greentech market in the neighbouring countries. South Africa has opportunities in energy, waste, agriculture, transport and other sectors and is a great entry point for the whole of Africa, in particular the SADC region.

Atlantis is a great location and development ready. 94 hectares of zoned development-ready land is available for leasing to investors. Bulk infrastructure is in place and Atlantis has new public transport and shipping links, whilst boasting fibre connectivity too. Atlantis is also close to major ports, roads, universities and greentech markets.

Investors have access to extensive investment support through

the One Stop Shop for investor support and the rest of the investor support ecosystem, which includes InvestSA, GreenCape, the City of Cape Town, and Wesgro. Together the ecosystem provides information and advocacy; market intelligence; facilitated access to permits and licenses, planning and development approval; and skills training.

Investors and tenants are accessing attractive incentives in the form of tax relief and allowances, employment tax incentives, fast-tracked development approvals, fee exemptions and subsidies.

There is an attractive, wideranging skills base to recruit from with five universities and many more colleges in the province, and a large range of unskilled, semiskilled, technical and professional candidates. For more information, contact Jarrod Lyons (Business Development Executive Atlantis Special Economic Zone for Green Technologies) on jarrod@atlantissez.co.za

atlantis



GREENCAPE'S SUPPORT TO BUSINESSES AND INVESTORS

GreenCape is a non-profit organisation that works at the interface of business, government and academia to identify and remove barriers to economically viable green economy infrastructure solutions. Our vision is a thriving prosperous Africa, mobilised by the green economy.

The Western Cape Industrial Symbiosis Programme, delivered by GreenCape, is a free facilitation service which forms mutually beneficial synergies between businesses; improving the profitability and sustainability of businesses, and helping to build a circular economy in Cape Town. ©GreenCape Working in developing countries, GreenCape catalyses the replication and large-scale uptake of green economy solutions to enable each country and its citizens to prosper. We work with businesses, investors, academia and government to help unlock the investment and employment potential of greentech and services, and to support a transition to a resilient green economy.

We assist businesses by removing barriers to their establishment and growth and provide our members with:

- free, credible and impartial market information and insiahts
- access to networks of key players in government, industry, finance and academia
- an advocacy platform to help create an enabling policy and regulatory environment for green business

We assist local, provincial and national government to build a resilient green economy by providing:

- support on the development of standards, regulations, tools and policies
- expert technical knowledge on key sectors in the green economy access to networks of key players across business, academia, and internationally

Since inception in 2010, GreenCape has grown to a multi-disciplinary team of over 40 staff members, representing backgrounds in finance, engineering, environmental science and economics.

Our market intelligence reports form part of a working body of information generated by sector desks and projects within GreenCape's three main programmes – energy, circular economy and resources.

Benefits of becoming a GreenCape member We currently have over 2 500 members, and offer free membership. Becoming a member of GreenCape will give you access to the latest information regarding developments in the various sectors; access to tools, reports, and project information; and offer you the opportunity – through our networking events - to meet and interact with various stakeholders in the green economy.

We have facilitated and supported ~R41bn of investments in renewable energy projects and manufacturing. From these investments, more than 19 000 jobs have been created.

Through our WISP (industrial symbiosis) programme, by connecting businesses with waste / under-used resources:



309 200 fossil GHG emissions saved (equivalent to the electrical usage of 39 800 households in SA);



Over R120 million generated in financial benefits (additional revenue, cost savings and private investments);



69 permanent jobs in member companies, as well as 25 temporary

positions, and 218 economywide jobs in supply chains have been created.

Sorting at a material recovery facilities. ©Waste Plan

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APPENDICES



In 2016, the Western Cape's DEDAT appointed a team of specialists (Urban-Econ Development Economists, JPCE and EScience Associates) to investigate the status of the waste economy within the Western Cape. This includes waste generated figures per district municipality / metropolitan city in 2015.

Material	Western Cape	ССТ	Cape Winelands	West Coast	Overberg	Central Karoo	Eden
Municipal Solid Waste	2 387 353	1 671 146	286 482	119 368	95 495	23 874	190 988
- Organic	489 293	342 505	58 715	24 465	19 572	4 893	39 143
- Paper	295 214	206 649	35 426	14 761	11 809	2 952	23 617
- Plastics	222 741	155 919	26 729	11 137	8 910	2 227	17 819
- Glass	163 370	114 359	19 604	8 168	6 535	1634	13 070
- Metals	531 258	371 880	63 751	26 563	21 250	5 313	42 501
- Non-recyclable	685 477	479 834	82 257	34 274	27 419	6 855	54 838
Agricultural	2 365 784	66 885	304 734	917 734	540 887	34 531	501 013
- Agricultural residues	2 125 083	46 557	277 731	885 118	507 462	15 821	392 394
- Volatile Animal Waste	149 680	11 226	22 452	28 065	24 323	18 710	44 904
- Forestry residues	91 021	9 102	4 551	4 551	9 102	0	63 715
Commercial	352 441	254 968	39 591	15 805	12 216	1 723	28 138
- Organics	193 842	140 232	21 775	8 693	6 719	948	15 476
- Non-organics	158 598	114 735	17 816	7 113	5 497	775	12 662
Industrial	528 660	382 451	59 385	23 709	18 324	2 585	42 206
- Organics	105 732	76 490	11 877	4 742	3 665	517	8 441
- Non-organics	422 928	305 961	47 508	18 967	14 659	2 068	33 765
Construction & Demolition	1704 680	1 090 995	272 749	85 234	85 234	17 047	153 421
Other	375 385	247 248	49 489	23 544	15 905	4 334	34 865
- E-waste	62 251	43 575	7 470	3 113	2 490	623	4 980
- Tyres	18 111	12 678	2 173	906	724	181	1449
- Dewatered wastewater sludge	295 023	190 995	39 846	19 525	12 691	3530	28 436
Total	7 714 303	3 713 693	1 012 430	1 185 394	768 061	84 094	950 631

Source: (DEDAT, 2016)

Appendix B: CCT waste figures — 2018

In 2018, JG Afrika was appointed by the CCT to undertake a waste characterisation assessment of MSW at six of its waste aggregation sites over a given period and subsequently extrapolate this across all CCT facilities.

	Waste Stream / Ma	terial	Fraction		
	Paper	Paper			
	Cardboard		13,23%		
	Glass	Glass			
Dev De svelak las	Direction	Soft	7,16%		
Dry Recyclables	Plastics	Hard	7,13%		
	Tetrapack		0,53%		
	Multilayer		1,60%		
	Metals		1,97%		
	Electronics		0,34%		
E-Waste	Batteries	Batteries			
	Fluorescent bulbs	Fluorescent bulbs			
	Cleaning, toiletries	Cleaning, toiletries			
Hazardous	Nappies	Nappies			
		Mixed	8,51%		
		Liquids	0,44%		
		Starches	0,56%		
	Food Waste	Dairy	0,03%		
Organics		Fruit / Veg	4,45%		
		Meat	0,53%		
	Residual Organics	Residual Organics			
	Garden	Garden			
Textiles	Textile	Textile			
	Construction	Construction			
011	Wood	Wood			
Other	Other	Other			
	Residual	Residual			

These tables provide expected waste numbers for waste handled by the CCT and its contractors. This information is available on the CCT Open Date Portal⁶¹. The waste characterisation for the general waste landfilled comes from a 2018 waste characterisation study undertaken by JG Afrika on behalf of the CCT. The total general waste landfilled was extrapolated against the waste characterisation study to provide estimate materials landfilled.

				2016	2017	2018	2019	2020
General Wo	iste Landf	filled						
	Paper		10.000/	150.057	150 507	144405	101 500	140.010
	Cardboard	d	13,23%	150 357	156 597	144 105	161 560	143 013
	Glass		3,78%	42 936	44 718	41 151	46 135	40 839
Description	Direction	Soft	7,16%	81 372	84 749	77 989	87 435	77 398
Recyclables	Plastics	Hard	7,13%	81 031	84 394	77 662	87 069	77 073
	Tetrapack	· ·	0,53%	6 023	6 273	5 773	6 472	5 729
	Multilayer		1,60%	18 184	18 938	17 428	19 539	17 296
	Metals		1,97%	22 389	23 318	21 458	24 057	21 295
	Electronic	s	0,34%	3 864	4 024	3 703	4 152	3 675
E-Waste	Batteries		0,001%	11	12	11	12	11
	Fluorescer	nt bulbs	0,001%	11	12	11	12	11
	Hazardous Cleaning, toiletries		0,07%	796	829	762	855	757
Hazardous			6,75%	76 713	79 897	73 523	82 428	72 966
		Mixed	8,51%	96 715	100 729	92 694	103 921	91 99 [°]
		Liquids	0,44%	5 001	5 208	4 793	5 373	4 756
	Food	Starches	0,56%	6 364	6 628	6 100	6 839	6 053
. .	Waste	Dairy	0,03%	341	355	327	366	324
Organics		Fruit / Veg	4,45%	50 574	52 673	48 471	54 342	48 103
		Meat	0,53%	6 023	6 273	5 773	6 472	5 729
	Residual C	Drganics	5,94%	67 507	70 309	64 700	72 537	64 210
	Garden		7,37%	83 759	87 235	80 276	90 000	79 668
Textiles		6,38%	72 508	75 517	69 493	77 910	68 966	
	Construction		1,68%	19 093	19 885	18 299	20 516	18 160
	Wood	Wood		14 206	14 796	13 615	15 265	13 512
Other	Other		1,50%	17 047	17 755	16 338	18 317	16 215
	Residual 1		18,80%	213 659	222 527	204 776	229 578	203 223
			Total:	1136 485	1 183 652	1 089 232	1 221 161	1 080 973

⁶¹ http://web1.capetown.gov.za/web1/opendataportal/



Special / Hazardous Waste						
Special / Hazardous	Special / Hazardous 26 754 18 396 9 347 5 976 3 399					
Total:	26 754	18 396	9 347	5 976	3 399	

Stockpiled						
Builders Rubble (stockpiled)		1 348 247	1 138 195	887 574	334 243	235 089
Garden Greens (chipped)		11 401	8 971	5 619	13 146	9 468
	Total:	1 359 647	1 147 166	893 193	347 389	244 557

Waste Minimization						
Organics 134 047 162 418 134 512 64 182 71 755						71 755
Recyclables		25 234	23 453	27 754	27 921	34 417
Builders Rubble 434 095 302 677 323 154 173 055					143 545	
	Total:	593 376	488 549	485 420	265 158	249 717

Appendix C: Key Industry Contacts

Organisation	Focus of Support	Email	Website
ARO	Waste reclaimers / pickers	africanreclaimers@gmail.com	www.facebook.com/africanreclaimers
CGCSA	Retail and manufacturers	fsiservices@cgcsa.co.za	www.cgcsa.co.za
Collect-a-Can	Metal can recycling	jenette@collectacan.co.za	www.collectacan.co.za
COPCO	Compostable plastics	info@copco.co.za	_
ERA	E-waste recycling	erainfo@eranpc.co.za	www.eranpc.co.za
EWASA	E-waste recycling	info@ewasa.org	www.ewasa.org
FERTSA	Fertilizer / compost	general@fertasa.co.za	www.fertasa.co.za
IWMSA	Waste sector	info@iwmsa.org	www.iwmsa.co.za
LightCycleSA	Lighting waste recycling	info@lightcyclesa.org	www.lightcyclesa.org
MetPac	Metal packaging	info@metpacsa.org.za	www.metpacsa.org.za
ORASA	Organic waste recycling	Info@orasa.org.za	www.orasa.org.za
Packaging SA	Packaging	liza@packagingsa.co.za	www.packagingsa.co.za
PASA	Polystyrene recycling	info@polystyrenesa.co.za	www.polystyrenesa.co.za
Petco	PET beverage bottle recycling	info@petco.co.za	www.petco.co.za
Plastics SA	Plastic sector	Karen.Wichman@plasticssa.co.za	www.plasticsinfo.co.za
Polyco	Polyolefin recycling	lisl@polyco.co.za	www.polyco.co.za
RecyclePaperZA	Paper / cardboard recycling	info@pamsa.co.za	www.recyclepaper.co.za
SABIA	Biogas	secretary@sabia.org.za	www.sabia.org.za
SAEWA	E-waste recycling	envirosense@xsinet.co.za	www.sa.ewastealliance.co.za
SAPP	Plastics	info@saplasticspact.org.za	www.saplasticspact.org.za
SAPRO	Plastic recyclers	lisa@plasticrecyclingsa.co.za	www.plasticrecyclingsa.co.za
SAWPA	Waste reclaimers / pickers	-	www.facebook.com/SAWPAZA
SAVA	PVC recycling	info@savinyls.co.za	www.savinyls.co.za
TGRC	Glass recycling	info@tgrc.co.za	www.theglassrecyclingcompany.co.za





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