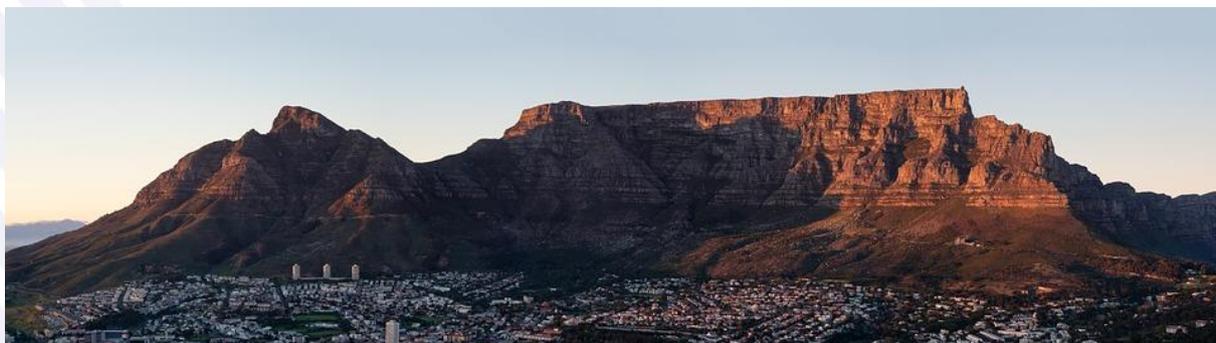




Circular Economy in Africa-EU Cooperation

Country Report for South Africa



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CONTENTS

List of figures.....	i
List of tables.....	ii
Abbreviations.....	iii
Executive Summary	v
1 Introduction	1
1.1 Scope and methodology of the report	1
1.1.1 Methodology.....	1
1.1.2 Reading guide.....	2
1.2 South Africa and the circular economy	2
2 Status of the circular economy in South Africa	3
2.1 Economic Structure	3
2.2 Impact of Covid-19	4
2.3 Circular economy-related trends	4
2.3.1 Trends in agriculture, and food loss and waste.....	5
2.3.2 Trends in waste management, with a focus on plastics.....	8
2.3.3 Mining, with a focus on urban mining and Waste Electronic and Electric Equipment (WEEE).....	12
2.3.4 Construction.....	14
2.4 Key enablers for a circular economy transition in South Africa	15
2.4.1 Policy framework supporting circular economy activities.....	15
2.4.2 Existing awareness and capacities on circular economy in South Africa.....	18
3 Impacts and benefits of the circular economy in South Africa	23
3.1 Existing impacts and benefits	23
3.1.1 Economic impacts and benefits.....	23
3.1.2 Social impacts and benefits.....	23
3.1.3 Environmental impacts and benefits.....	23
3.2 Future impacts and benefits	25
3.2.1 Modelling approach and framework.....	25
3.2.2 Modelling inputs for the CE scenario.....	26
3.2.3 Modelling results.....	27
4 Mapping of the CE-related cooperation between the EU and SA	32
4.1 Policy dialogues	32
4.2 Development cooperation projects and programmes, including by the EU Member States	35
4.3 Activities by the European Investment Bank (EIB) and other European Development Finance Institutions (DFIs)	39
4.4 Trade and investments in environmental goods and services	40
4.5 EU companies with circular economy operations in the country	42
5 Recommendations	49
5.1 General findings and recommendations	49

5.1.1	Governance for implementation of national roadmaps	49
5.2	EU - South Africa Cooperation	49
5.3	Sector-specific recommendations	52
6	Conclusions.....	55
6.1	Circular economy trends in South Africa	55
6.2	Policy framework supporting circular economy activities.....	55
6.3	Trade and investments in the circular economy in South Africa	55
6.4	Existing awareness and capacities on circular economy in South Africa.....	56
6.5	Existing and future economic, environmental and social impacts and benefits...	56
6.6	Mapping of circular economy-related cooperation activities between the EU and South Africa	57
6.7	Sector-specific conclusions	58
6.7.1	Agriculture and food loss and waste	58
6.7.2	Plastic and the informal sector	58
6.7.3	Urban mining and WEEE	58
6.7.4	Construction.....	59
Annex A	- Looking beyond	61
Trends in Information Communication Technology (ICT).....		61
Textiles		61
Waste tyres		62
Annex B	- Stakeholders interviewed.....	63
Annex C	- Waste generation	65
Annex D	- Policy Framework	67
Annex E	- Trade and investments in the circular economy in South Africa.....	71
Overview of ongoing trends in trade and foreign direct investment		71
Opportunities and barriers for trade		75
Opportunities and barriers for investments		77
Annex F	- Method for modelling of impacts	81
Part 1 Methodological details of the modelling approach		81
Part 2 - Detailed modelling results		88

List of figures

Figure 2-1 Contribution of the primary sector, industry and services to the South African economy.	3
Figure 2-2 Fertiliser use intensity in South Africa compared to regional average	6
Figure 2-3 Resource extraction in South Africa by type for the period 2000-2017	13
Figure 3-1 Absolute employment changes in CE scenario in most strongly impacted sectors (relative to the baseline scenario)	29
Figure E-0-1 Share of total trade (Imports+exports) in GDP (%) in South Africa compared to regional averages for the period 2010-2018.....	71
Figure E-0-2 imports and exports of environmental goods and services in South Africa for the years 2010, 2013 and 2016.	72
Figure E-0-3 Share of Foreign Direct Investment (inflows) as share of GDP (%).....	73
Figure E-0-4 Mean of the tariff rates applied to all products in South Africa (%).....	75
Figure E-0-5 Score on cross-border trade costs for exports and imports in South Africa in comparison to global and regional averages.	76
Figure E-0-6 Score of South Africa in the Quality of trade and transport-related infrastructure compared with global and regional averages.....	77
Figure E-0-7 Historical GDP growth and growth outlook until 2024 for South Africa, compared to global and regional averages.	77
Figure E-0-8 Historical trends in inflation (GDP deflator %) in South Africa compared to global, regional and continental averages.	79
Figure E-0-9 South Africa's score (0-100 scale) for the ease of getting credit compared to global and regional averages.....	80
Figure F-0-1 E3ME linkages - flow diagram	86

List of tables

Table 2-1 Food waste on Waste Roadmap, activities across the value chain	7
Table 2-2 Local projects and initiatives aimed at addressing food surplus:	7
Table 2-3 Recycling initiatives that embrace the informal sector	9
Table 2-4 Selected examples plastics recycling in South Africa.....	11
Table 2-5 Nationally-driven pricing strategies.....	17
Table 2-6 Nationally-driven financial programmes.....	17
Table 2-7 Examples of circular economy awareness creation initiatives in South Africa	20
Table 3-1 Economic, social and environmental outcomes and benefits.....	24
Table 3-2 Circular economy activities and corresponding modelling inputs.....	27
Table 3-3 Macro-economic impacts of the CE scenario.....	28
Table 4-1 Opportunities and Barriers for future CE-related policy dialogues between South Africa and the EU	34
Table 4-2 Member State funded development cooperation programmes in South Africa, with identified priorities	36
Table 4-3 Opportunities and Barriers for future circular economy related development cooperation and programmes between South Africa and the EU.....	38
Table 4-4 Activities by the EIB and other European DFIs in South Africa	39
Table 4-5 Opportunities and barriers for future CE-related DFI-activities in South Africa	40
Table 4-6 Opportunities and barriers for trade and investments in environmental goods and services between the EU and South Africa.....	41
Table 4-7 Selected EU companies with CE operations in South Africa	42
Table 4-8 Opportunities and Barriers for future CE-related operations of EU companies in South Africa.....	43
Table 4-9 CE-related research and technical cooperation between South Africa and the EU	44
Table 4-10 South African research institutions active in CE-related research	46
Table 4-11 Opportunities and Barriers for future CE-related research cooperation between South Africa and the EU	47
Table 5-1 Cooperation areas and recommendations between the EU and South Africa cooperation	49
Table 5-2 Sector-specific recommendations	52
Table A-0-1 Selected mobile and online platforms that support circular economy approaches.....	61
Table B-0-1 Interviewed stakeholders	63
Table C-0-1 General waste (tons) by management option (2017).....	65
Table C-0-2 Hazardous waste (tonnes) by management option in 2017.....	65
Table D-0-1 Policy frameworks	67
Table E-0-1 IDZ/SEZs in South Africa.....	74
Table E-0-2 Most recent credit ratings (2019) by Standard & Poor's for African countries and their outlook (N=20) (In orange: South Africa's rating).....	79

Abbreviations

Artificial Intelligence	AI
buy-back centres	BBC
Clothing and Textiles Competitiveness Programme	CTCP
Consumer Goods Council South Africa	CGCSA
Council for Scientific and Industrial Research	CSIR
Department of Environmental Affairs	DEA
Department of Science and Innovation	DSI
Department of the Environment Forestry and Fisheries	DEFF
Department of Trade Industry and Competition	the dtic
Deposit return schemes	DRS
Development Cooperation Instrument	DCI
Economic Development Department	EDD
Environmental Sector Skills Plan	ESSP
EU-SADC Economic Partnership Agreement	EU-SADC EPA
Extended Producer Responsibility	EPR
Food Safety Initiative	FSI
Food Safety Initiative	FSI
Higher Education Institute	HEI
human capital development	HCD
Industrial Development Zones	IDZ
Industrial Symbioses Programme	ISP
Information Communication Technology	ICT
Integrated Waste Management Plan	IWMP
International Labour Organization	ILO
Medium Term Strategic Framework	MTSF
multi-annual indicative programme	MIP
National Cleaner Production Centre South Africa	NCPC-SA
National Curriculum Vocational	NCV
National Development Plan: Vision for 2030	NDP
National Environmental Management: Waste Act	NEM:WA
National Environmental Management: Waste Amendment Act	NEM:WAA
Partnership for Action on Green Economy	PAGE
Partnership for Action on Green Economy	PAGE
personal protective equipment	PPE
platinum-group metals	PGM
printed paper and packaging	PPP
producer responsibility organisations	PRO

Public-Private Partnership	PPP
Quarterly Employment Survey	QES
Quarterly Labour Force Survey	QLSF
resource efficient and cleaner production	RECP
Sector Education and Training Authority	SETA
Separation at Source	S@S
Special Economic Zone	SEZ
Sustainable Development Goal	SDG
Technical Vocational Education and Training	TVET
The clothing, textiles, footwear and leather	CTFL
The Glass Recycling Company	TGRC
Trade, Development and Co-operation Agreement	TDCA
United Nations	UN
United Nations Development Programme	UNDP
United Nations Industrial Development Organization	UNIDO
United Nations Institute for Training and Research	UNITAR
Voluntary Agreement	VA
Waste Electronic and Electric Equipment	WEEE
Water Research Council	WRC

Executive Summary

South Africa plays a leading role in promoting a green economy agenda on the African Continent. The well-established policy framework for a green economy strategy supports the country's emergent shift to circular economy approaches.

A green recovery post-Covid, that prioritises the Green Economy as one of the four sectors to assist with economic recovery, is envisioned, if not yet institutionalised. The initial challenges faced concerning economic recovery in the wake of Covid-19 were focused on mitigating risks to livelihoods. However, as we navigate the economic recovery, National government is seeing the opportunity that the pandemic offers to pivot to a circular economy that is inclusive of economically marginalised population segments.

In South Africa, waste management presents an unmissable opportunity. Ongoing prioritisation of the plastics industry (see Plastics Pact, Plastics Colloquium) highlight opportunities for a CE transition that builds on the already well-established recycling industry. Expanding on anchor industries, such as the recycling industry, can ease a circular economy shift. This could have particular value for marginalised communities, who stand to benefit from the jobs created and the businesses established from waste recycling. This is being enabled by the newly gazetted 2020 National Waste Management Strategy that provides government policy and strategic interventions for the waste sector and is aligned and responsive to the Sustainable Development Goals (SDGs). It is also aligned and consistent with South Africa's National Development Plan (NDP): Vision 2030 is South Africa's specific response to, and integration of the SDGs into the overall socio-economic development plans.

The sectors identified as those with the most potential for CE and for EU-SA cooperation, are agriculture, plastics, mining and construction. The selection of these sectors is based on their relatively high contribution to GDP, an enabling national policy framework, and alignment with the EU's circular economy action plan.

Agriculture and food waste

There is an opportunity to embrace circular economy principles for resilience in the agricultural sector, which is faced with mounting pressures due to climate-related impacts, with knock-on effects impacting economic growth and transformation. Agriculture can be a catalyst for employment, especially for youth-lead innovative solutions, typically focused on precision agriculture. EU engagement for technical expertise and exchange with such start-ups can scale up their efforts.

South Africa is struggling with the volume of food waste generated as well as food loss in a number of places within the value chain. Value-generation and localised beneficiation activities in the sector can be explored in addition to solutions for minimising waste generation. Of strategic importance is agroprocessing, potentially adding value to unavoidable waste by production of oils, extractions and non-food application such as natural body-care. EU member states and businesses with best practice examples and appropriate technology solutions / models can help accelerate this transition. A key driver for food loss and waste interventions is the support from EU for the development of the Voluntary Agreement on Food Waste and Loss.

Plastics

The plastics recycling industry offers a vehicle for EU engagement. There is opportunity for knowledge and experience sharing regarding guidelines and regulation, as well as for the inclusion of technologies obtained from abroad, modified for an African context. South Africa is emulating European models (Extended Producer Responsibility, the Plastics Pact) but there is a need to actively engage and interpret models through an African lens. Key in the South African context is the important role the informal sector plays in waste management. For a model to be successful, this needs to be taken into account. The same applies to the uptake of European technologies for recycling - this applies to both the technology and finance models.

There are numerous ongoing initiatives that focus on upliftment and empowerment, with specific focus on strengthening female and youth-led projects. Opportunities for job creation exist in diverting waste from landfill (which will gain prominence over time as many municipalities currently struggle with landfill airspace) towards alternative waste treatment and beneficiation across the entire waste hierarchy.

Mining, including urban mining and secondary raw materials, WEEE

The declining gold extraction has led to exploration of urban mining and secondary resource extraction from waste electric and electronic equipment (WEEE). South Africa's mining sector needs to be engaged to pivot to circular approaches in favour of linear resource extraction. Of note in South Africa is a shift in the platinum group metals (PGMs), exploring secondary resources and recycling.

- With support from the Global Knowledge Partnerships in e-Waste Recycling programme, projects have been initiated successfully in three South African provinces
- Gauteng Refineries in collaboration with Mintek: Urban Mining - the recovery and recycling of precious metals from autocatalysts, e-waste and other consumer wastes.
- Sibanye and Northam Platinum, entered the platinum-group metals (PGMs) recycling market in 2017. Platinum recovered from spent automotive catalytic converters is forecast to rise 2% year-on-year to above 1.25-million ounces.

Integration of the informal sectors seems to be key to a successful multi-pronged approach to e-waste recycling. (e.g. skills transfer, infrastructure support, incubation support, partnerships in value chain development, employment of best practices, and assurance that informal suppliers adhere to decent work criteria).

The Covid-19 pandemic has highlighted the ongoing need for access to ICT infrastructure, including data-enabled devices. The refurbishment of WEEE, particularly for the ICT sector, will enable economic participation while contributing to the minimisation of waste. ICT projects impact products across their life-cycle and can be a key enabler for the transition to a circular economy.

Construction

A sector with potential for promoting a circular economy in South Africa is the building sector, where waste materials can be reused in new buildings and constructions. There are already a few projects embracing this principle. This becomes particularly relevant in a post-COVID recovery as the South African government has announced plans for infrastructure development.

The construction industry is responsible for producing large amounts of building-related waste which is often disposed of in landfills. Current drivers of the construction and demolition waste economy include rising virgin material prices, cost of transporting materials, regulation of waste flows, and increasing disposal cost due to limited landfill airspace. South Africa has to-date focused on approaching construction waste in terms of prevention and minimisation, while managing the waste that cannot be prevented. DEFF is in discussion with sister departments on utilising alternative building materials consisting of repurposed ash, construction and demolition waste as well as organic waste. New building standards in this regard can improve circularity.

Key sectoral recommendations:

Agriculture

- Best practice exchanges, lessons learned and case studies showcasing successful, cost effective adoption are needed. This can be identified by reviewing existing programmes such as Switch Africa Green for relevant case studies to showcase in detail;
- Engagement with experienced EU practitioners can support scaling of existing initiatives for food security, irrigation solutions, and biomass beneficiation. A number of these pilots already exist but may need guidance for next stage development;

- EU member states and businesses with best practice examples and appropriate technology solutions / models can help accelerate this transition to mitigate food loss and waste.

Plastics Industry

- South Africa can leverage the existing Industrial Symbiosis Programme, a resource efficiency approach where unused or residual resources of one company are used by another. The programme is driven by the National Cleaner Production Centre (NCPC) which forms part of an international community. This creates an opportunity to introduce international best practice ;
- The industry's circular economy shift can be bolstered by interventions across the value chain, starting with clear guidelines on designing for recycling and the inclusion of recycled content specifications, including materials specifications, engineering specifications, compliance systems, and supply chain requirements. The plastics industry needs to engage with designers and developers across the product value chain, to ensure full product lifecycle is considered during design, in order to pivot from "waste to worth" at end of lifecycle. A number of these designers work in multinationals outside South Africa. A pathway for engagement needs to be developed;
- Establish the economic viability of chemical recycling as it poses several advantages such as being able to process several unsorted materials at the same time. This currently occurs to a very limited extent, mainly due to cost and a relatively small market for recovered chemicals.

Urban mining and WEEE

- Integration of the informal sectors seems to be key to a successful multi-pronged approach to WEEE recycling. Efforts are being made by PROs to include the informal sector in Industry Waste Management Plans and this should be extended to the mandated EPR programme(s). Potential priority focus areas for industry development have been identified;
- Companies must partner effectively with the entire circular supply chain to optimise collections, efficiently process material and find sustainable homes for the recovered commodities. These partnerships will reduce the amount of e-waste in landfills and unlock potential value through a circular economy.

Construction

- Establish reuse / second-hand material specifications: Although an interest has been expressed in re-use of second-hand materials there is some reluctance based on concerns that this may compromise the integrity of future buildings;
- Leverage existing platforms such as Master Builders and Green Building Council South Africa for further development of certification and rating systems;
- Material access for both disposal and reuse (building centres/ banks): An opportunity exists to engage with buy-back centres to include construction waste for re-use. These value chains need to be mapped and key support areas identified to encourage both collection and use of the materials;
- Leverage previously developed platforms such as The Better Living Challenge to support innovations with construction waste.

Future impacts modelling:

In this study we have also done a forward-looking assessment, where a macro-economic model was used to estimate the impact of a (limited) set of circular economy measures in the identified priority sectors Agri-food, plastics, construction, EEE products and E-waste and general waste. Overall, the circular measures assessed could lead to an increase in economic activity and create additional jobs, while leading (on the short term) to a small related increase in national CO₂ emissions. The key findings are the following (for more detail see section 3.2):

- **Economic benefits:**
 - A 0.8% increase of GDP (+ €3.7 bn) compared to business as usual;

- Consumer spending would be the biggest driver of the positive economic impact of the circular economy activities, alongside a slightly smaller contribution from investment.
- **Social benefits:**
 - 226,000 additional jobs would be created compared to business as usual, which is equivalent to an increase of 1.3%;
 - Most of additional jobs in the CE scenario relative to the baseline would be seen in the waste management.

SA-EU cooperation

Policy dialogues

Although the circular economy is not yet institutionalised within bilateral agreements between the EU and SA, circular economy already is and increasingly will have a prevalence in future bilateral policy dialogues. However, a joint strategic approach is yet to be developed.

In order to support a transition to a circular economy, by leveraging existing green economy strategies, it is recommended that the EU engages with South Africa via policy dialogues that endeavour to establish frameworks for implementation of locally developed strategies and policies. Knowledge sharing and exchange will benefit both parties as lessons learned and best practice are developed for highly implementable local applications.

The exchange on circular economy related issues between the EU and South Africa has been very productive in recent years:

- The Mogôbagôba Dialogue, a framework for cooperation activities, provides additional arrangements of partnership dialogue going beyond trade policies;
- The revised EU-SA Forum on Environment, Climate Change, Sustainable Development and Water launched in 2016, annual meetings have specifically addressed CE as a priority area for cooperation;
- EU Circular Economy Mission to South Africa, which took place in 2017 and that was followed up by a formal CE Dialogue funded by the EU-SA Dialogue Facility;
- South Africa is part of the global programme Partnership for Action on Green Economy (PAGE). PAGE partners with the South African government, through DEFF, the Economic Development Department (EDD), the Department of Trade and Industry and Competition (dtic) and the Department of Science and Innovation (DSI) to implement sustainability in economic policies and practices to advance the 2030 Agenda;
- South Africa (DEFF) hosted a National Networking Event under the EU-funded SWITCH Africa Green programme. The forum was intended to facilitate collaborative meetings between participants from the private and public sector, civil society, development partners, as well as project grantees and beneficiaries.

An instrument of bilateral political exchange between the EU and South Africa is the multilateral EU-SADC Economic Partnership Agreement. Although the EPA does not feature direct references to Circular Economy, it has a few articles that refer to sustainable development and thus could provide a basis for circular economy relevant actions.

Development Cooperation

As one of the most influential countries of the Southern African Development Community, South Africa is involved in various CE-related development cooperation projects with individual EU member states. However, none of the Development Finance Institutions (DFIs) financed projects is specifically targeted to foster a transition towards a circular economy.

Although circular economy related activities in the sphere of development cooperation are still not mainstream in South Africa, there has been progress, most notably with SWITCH Africa Green that acts in policy dialogues and development cooperation projects. South Africa is a trade partner and development cooperation is not a priority area for EU engagement.

SA-EU Trade

SA-EU trade is governed by the SADC-EPA, which does not currently include specific reference to improved trade of environmental goods and services (EGS) to support a transition to a circular economy. The revision of the EPA and inclusion of such provisions can bolster trade in EGS, potentially with the inclusion of South Africa's SEZ/IDZs as a growing opportunity for investment. Further, South Africa has been able to attract many EU companies that engage in circular economy-related activities. The areas in which EU companies are operating in the country are relatively diverse.

Research and technical cooperation

In terms of research and technical cooperation, circular economy does not yet play an explicit role in joint scientific undertakings within the research landscape shared between the EU and South Africa. However, it has evidently become more prevalent. Additional research and technical cooperation activities between South Africa and the EU which overlap with CE might in the future play an increasingly important role.

Key recommendations and conclusions regarding SA-EU cooperation:

Policy dialogues

- Existing circular economy related SA-EU policy dialogues offer the potential to extend multilateral dialogue on circular economy. This also applies to events hosted under Switch Africa Green. Pooling existing expertise by linking the circular economy related dialogue efforts in a dedicated work stream or think tank might improve coordination of the joint efforts;
- The EU must be ready to debate on tangible value that the circular economy brings and how it can benefit South Africa's economy, as well as offer examples of where it is demonstrated that it can work;
- 'Voluntary business initiatives' (from EU and from South African business organisations) can further support engagement on policy to strengthen green employment within the circular economy;
- Fact-finding missions can offer platforms for policy dialogues informed by on-the-ground experience from local stakeholders.

Successful development cooperation projects and programmes

- To have real impact, development cooperation projects and programmes need to extend beyond reporting and feasibility studies (pilot phase) to include implementation. A holistic approach with this end goal in mind will help identify any unforeseen barriers such as legislative hurdles. Policy and legislative support will drive projects beyond pilot-phase to scalable and sustained implementation; Pilot projects provide material for case studies and serve to raise awareness. Further consideration needs to be taken of access to finance, business case, availability of technology support, etc.;
- The extensive range of green- and circular economy related initiatives in South Africa offers potential alignment with future EU development cooperation programmes. Exploiting potential synergies between the various circular economy related projects may significantly support the development of a national circular economy structure.

Effective cooperation with the European Investment Bank (EIB) and other European Development Finance Institutions (DFIs)

- The Project Development and Support Facility (EIB and Development Bank of Southern Africa (DBSA) joint facility) should focus on high development impact projects, notably also investing in rehabilitation measures, while promoting climate change resilience of existing infrastructure. This facility for funding can be strengthened by alignment with EIB's Circular Economy Guide, Climate Roadmap and Energy Lending Policy. The EIB's existing work in Europe can serve as guidance to effective cooperation in South Africa;

- EU support for local funds being established in SA, such as the GreenCape Green Outcomes Fund, that supports MSMEs, can bolster information dissemination, garner support and drive aggregation. EU support and knowledge sharing should include the evaluation of green bonds and funds in SA to establish best way forward for targeted support for a circular economy transition;
- The EIB and other DFIs could use circular economy projects conducted in the EU as a guideline. In this context, two particularly relevant mechanisms have already been developed: (1) The guidebook for municipalities and local authorities who want to address CE and; (2) InnovFin successful Research & Innovation projects that has already been tested in the EU market that could be of interest in the South African Context. This can be focused based on the priority sectors identified.

Advancing trade and investments in environmental goods and services between the EU and South Africa

- Formulate harmonised regulations and/or criteria on what constitutes an environmental good or service, and a preferential regime for them (e.g. custom duty exemption, green tax). This issue could be enhanced through the framework of the Africa Continental Free Trade Area AfCFTA;
- Work with dtic to develop mechanisms to incentivise investment in technologies for resource efficiency. Platforms such as NCPC (National Cleaner Production Centre) can be leveraged.

Creating a supportive environment for EU / African companies with circular economy operations in South Africa

- Strategically providing access to education, training and skills for their own workers as well as students would help both EU and local businesses seize new opportunities of future circular economy related labour markets. Special attention should be paid to the further education of girls and women;
- A development opportunity lies with inclusion of the informal sector in waste management. The existing structures could significantly benefit from circular economy related approaches such as recycling and reuse of resource as well as the co-creation of solutions.

Advancing research and technical cooperation between the EU and South Africa

- South Africa requires a more systematic engagement on the education and training sector, with particular emphasis on developing ecological and technical skills of the trainers and trainees. EU engagement on educational best practice can support a strained educational system needed for a strong research base;
- Advancement of research activities with DSI is of high priority in bilateral discussion and needs to explicitly focus on circular economy research;
- Cooperating with existing facilities that engage in scientific exchange in South Africa (Digital Hub in Johannesburg, Future Africa Innovation Campus in Pretoria amongst the EU-affiliated facilities), EU actors may promote circular economy related working groups and exchanges. This exchange could be further developed by creating a circular economy research task force which focuses on specific CE activities in the identified priority sectors.

1 Introduction

1.1 Scope and methodology of the report

Circular Economy (CE) in this report is understood as an economic system which ultimately produces neither waste nor pollution by keeping products longer in use and by circulating materials at a high quality within the production system and, if possible, feeding them back into the biosphere to restore natural capital at the end of life. As such, the circular economy covers both economic aspects (e.g. value addition, job creation, GDP growth) as well as environmental aspects (focusing on materials and resources). In addition, it takes a full lifecycle perspective, including raw material extraction and processing, design & manufacturing, use & consumption, as well as end-of-use management to look at the potential for circularity throughout the value chain. Although we acknowledge that the transition to a zero-emission energy system is related to the circular economy concept, this study addresses only material resources and not renewable energy deployment.

This report is developed in the context of the implementation of the European Green Deal¹ agenda, and notably of its international dimension. Elements developed in the Circular Economy Action Plan², but also in other EU strategies such as the Farm to Fork Strategy³ or in EU Waste prevention and management policies⁴ are taken as guiding principles. For instance, priority sectors or policy instruments have been taken as inspiration while not neglecting the local contexts and dynamics of the chosen African countries. Connections between the African and European policy agendas are shown throughout the report and potential future links are included in the recommendations chapter.

1.1.1 Methodology

The report has been prepared by Trinomics B.V., Adelphi and Cambridge Econometrics in close cooperation with TOMA-Now, who are based in South Africa. TOMA-Now have contributed local knowledge to the analysis across all sections of the report. In addition, the European Union Delegation in South Africa as well as several relevant (local) stakeholders have been interviewed (see Annex 2).

Desk research has been the basis for Chapter 2 and Chapter 4, and has also fed into Chapter 3. In addition, several datasets have been analysed to be able to understand the status of the circular economy in South Africa (Chapter 2). Interviews with relevant circular economy stakeholders have served to complement Chapter 2 and Chapter 4. The modelling of impacts and benefits on Chapter 3 has been carried out using Framework for Modelling Economies and Sustainability (FRAMES)⁵.

¹ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

² https://ec.europa.eu/environment/circular-economy/index_en.htm

³ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/farm-fork_en

⁴ https://ec.europa.eu/environment/green-growth/waste-prevention-and-management/index_en.htm

⁵ FRAMES is a new Input-Output (IO) tool with E3 linkages, capturing both direct and indirect (supply chain) impacts from a shift towards a more circular economy. FRAMES is particularly suitable for those countries not represented in E3ME due to data limitations, while its key features are similar to E3ME.

1.1.2 Reading guide

This report has been structured as follows:

- Chapter 2 provides an overview of the status of the circular economy in South Africa analysing circular economy trends, the policy framework supporting circular economy activities, trade and investments in the circular economy, and existing awareness and capacity;
- Chapter 3 estimates the economic, social and environmental impacts and benefits of the circular economy in South Africa at present and for the future;
- Chapter 4 studies cooperation between the EU and South Africa, by mapping circular economy-related cooperation activities between the two, and by exploring opportunities for expanding such;
- Chapters 5 provides recommendations for a more effective and integrated EU approach to promoting the circular economy transition in South Africa, including recommendations to advance policy dialogues, development cooperation, trade and investments, innovation and research;
- Chapters 6 provides the final conclusions addressing each section of this report.

1.2 South Africa and the circular economy

Selected industry sectors such as agriculture, plastics, construction and mining are primed for a transition to a circular economy. Principles of circularity and resource re-utilisation are on the rise. There are examples of innovative use of ICT services for a circular economy that have significant influence on the market uptake of circular economy approaches. The Industrial Policy Action Plan 2017/18-2019/20 states that the national focus areas are recycling principles for plastics, paper and e-waste, renewable energy, and (waste) water management and sanitation, amongst others. Although the concept of Circular Economy is not referred to per se, key action areas clearly indicate that adaptation towards resource, energy and carbon reduction will be undertaken throughout all economic sectors via promotion of innovative entrepreneurial solutions.

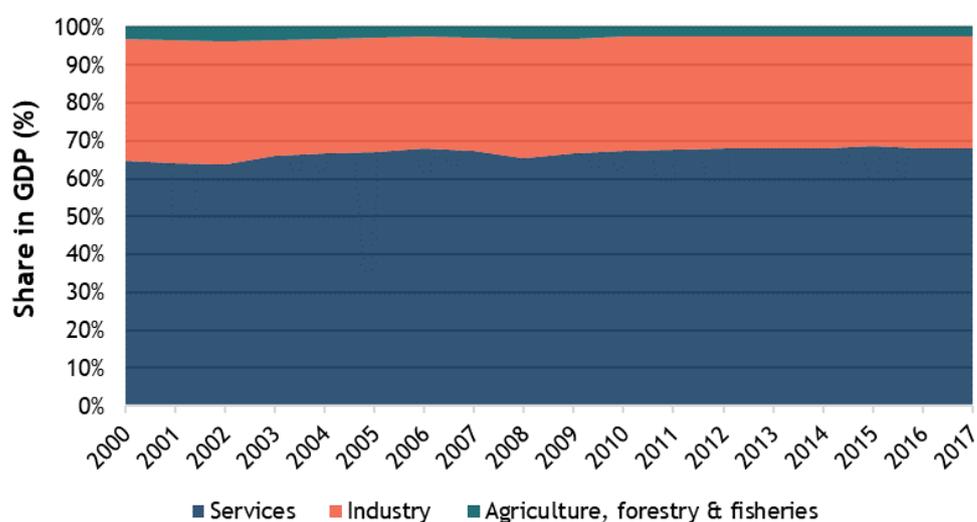
However, emergent CE-oriented enterprises still face unfavourable conditions and challenges related to access to technologies for cleaner production. To address this, the government proposes regulatory reforms for infrastructure investments, competition law and the quality of public services. These developments are also playing out against the backdrop of a need to create more opportunities for the youth, as stated in the 2017 African Economic Outlook. South Africa should focus on regional value chains to promote CE businesses. The Sustainable Development Goals, Africa's Agenda 2063 and the AfDB's Ten Year Strategy point towards more sustainable job solutions where entrepreneurship and economic diversification play an important role.

2 Status of the circular economy in South Africa

2.1 Economic Structure

The South African economy is heavily dependent on the highly developed service sector, with a strikingly low contribution from agriculture to GDP compared to the Sub-Saharan average. During the last two decades the relative contributions of services, industry and the primary sector to the value created in South Africa's economy has remained constant. The South African GDP stands at USD 368,3 Billion. The share of services increased slightly, from 65% in 2000 to 68% in 2017, whereas the share of industry declined with three percentage points to 29% in 2017. The structure of South Africa's economy is similar to the world average, but the relative contribution of the services sector is somewhat smaller than in the EU or the OECD average. The South African economy is the second largest economy in the African continent, representing 15% of the continent's GDP.

Figure 2-1 Contribution of the primary sector, industry and services to the South African economy.



Source: World Bank - World Development Indicators.

The drop in agricultural productivity in 2018 contributed to the contraction of the GDP⁶. Also, the agriculture, forestry and fishing industry decreased by 7,6% in Q4 2019. The decrease was mainly due to a fall in the production of field crops and horticultural products. Drought and climate variability and its extremes have played a role in reducing yield, in many African countries including South Africa. It has impacted both exports and imports as countries try to compensate for domestic production and need. In South Africa, three provinces were severely affected by the drought - Western Cape, some parts of the Northern Cape and Eastern Cape provinces.⁷

⁶ Towards measuring the extent of food security in South Africa: An examination of hunger and food adequacy/ Statistics South Africa. Pretoria: Statistics South Africa, 2019

⁷ Westerncape.gov.za. 2020. Statement By The Inter-Ministerial Task Team On Drought And Water Scarcity - News | 110% Green. [online] Available at: <https://www.westerncape.gov.za/110green/news/statement-inter-ministerial-task-team-drought-and-water-scarcity> [Accessed 29 June 2020].

2.2 Impact of Covid-19

Covid-19 will have potentially catastrophic implications for an economy that is already fragile⁸. As we are in the midst of the crisis no definitive outcomes are clear but projections are dire. It is unclear whether priorities related to circular economy will remain, rather the priorities of a survival-economy are being projected for South Africa. Rampant unemployment will contribute to social challenges, which may further hamper recovery. Initial research by Southern Africa -Towards Inclusive Economic Development (SA-TIED)⁹ presented bleak scenarios for the impact of Covid-19. The working document discussed the impacts of the first phase of South Africa's national lockdown¹⁰ and how interventions are expected to directly influence economic activity:

1. the forced reduction in production as a result of a national lockdown and other restrictions on non-essential business operation;
2. the impact of the lockdown on household demands for goods and services (e.g. tourism as a result of travel and movement restrictions);
3. the effect of disrupted global production and supply chains on South African exports;
4. the effect of uncertainty on business investment.

These impacts will have knock-on effects that will contribute to contraction of the GDP. The GDP contracted by just over 16% during the first two quarters of 2020.¹¹ Minister Barbara Creecy (DEFF) has indicated a focus on a green recovery during a recent CE Dialogue (September 2020) however no concrete frameworks have been established. At the time of writing this report, Covid-19 has brought complexity as well as opportunity. The ultimate outcomes for circular economy are not yet clear.

2.3 Circular economy-related trends

South Africa has identified the green economy¹² as a sustainable development path toward growing economic activity (which leads to investment, jobs and competitiveness) in the green industry sector and shift in the economy as a whole towards cleaner industries and sectors. The South African approach is to ensure that the transition to a green economy is built on existing best practices and processes, programmes, initiatives and indigenous knowledge in key sectors. In transitioning to a circular economy, including the full lifecycle perspective (considering raw material extraction, design & manufacturing, use & consumption, as well as end-of-use management) the existing green economy policies and initiatives should be leveraged to ease the process.

Sectoral analysis of promising circular economy-related fields, i.e. agriculture, plastics, construction and mining follows. The selection of these sectors is based on the following rationale:

- Relatively high contribution of these sectors to the national GDP and percentage of labour force;
- The existence of policies and strategies that support transition to circular economy in these sectors;
- Prioritisation of these sectors by DEFF and the dtic;
- Interlinking with the priorities of the EU's circular economy action plan;

⁸ TimesLIVE. 2020. Covid-19 Pandemic: 'Catastrophic' Economic Impact Looming In SA. [online] Available at: <https://www.timeslive.co.za/sunday-times/news/2020-05-03-covid-19-pandemic-catastrophic-economic-impact-looming-in-sa/> [Accessed 29 June 2020].

⁹ Supported by the EU delegation to South Africa, from which it receives funding.

¹⁰ 2020. Impact Of Covid-19 On The South African Economy. [ebook] Available at: <https://sa-tied.wider.unu.edu/sites/default/files/pdf/SA-TIED-WP-111.pdf> [Accessed 29 June 2020].

¹¹ StatsSA

¹² <https://www.environment.gov.za/projectsprogrammes/greeneconomy/about>

- Identification of opportunities in these sectors that contribute to the achievement of CE measures.

The State of ICT Sector in SA 2020 report notes South Africa's ICT sector has one of the country's biggest job markets and is one of the biggest contributors to the economy. ICT projects impact products across their life-cycle and can be a key enabler for the transition to a circular economy.

South Africa is facing complex challenges related to agricultural productivity and food security. Ongoing water scarcity, land reform policies, unsustainable farming practices and climate change related impacts have all contributed to a decline in this sector. A shift to innovative farming practices, supported by ICT platforms and irrigation solutions is happening, however the inclusion of small-scale and subsistence farmers needs to be prioritised to decentralise food supply.

The plastics industry makes a valuable contribution to the country's output growth and employment with a multiplier effect of 3.7% for every job created and 3.5% for every Rand invested to grow the industry.¹³ The industry employs an estimated 60 000 people, and the industry market share is estimated to be ZAR 70 Billion.¹⁴ The industry's circular economy shift can be bolstered by interventions across the value chain, starting with clear guidelines on designing for recycling and the inclusion of recycled content specifications, including materials specifications, engineering specifications, compliance systems, and supply chain requirements^{15,16}.

In previous years, South Africa's political, social and economic landscape has been shaped by the influential mining industry, which was a pillar of the economy. In 2018 the mining sector contributed R351 Billion to the South African GDP. A total of 456,438 people were employed in the mining sector in 2018. Continued declining production has opened up opportunities for urban mining, and project initiated are showing promising results.

South Africa is in a state of constant dynamic change, with a strong drive from national government to enact a green recovery. However, the full extent of the impact of Covid-19 is not yet clear, and the newly gazetted policies relating to waste management have not yet been in play long enough to give insight on their impact. We foresee that The National Waste Management Strategy 2020 (aimed at promoting the waste hierarchy and circular economy principles) will have far-reaching implications and impacts for a transition to a circular economy in South Africa, however the enforcement and cooperation from private sector will be deciding factors to its success.

2.3.1 Trends in agriculture, and food loss and waste

Agriculture can be a catalyst for employment, especially for youth-lead innovative solutions, typically focused on precision agriculture. Two exemplary initiatives are:

- Yellow Beast, which has developed a micro-irrigation device which applies Artificial Intelligence (AI) to automate the irrigation process;¹⁷

¹³ https://www.cbn.co.za/featured/plastics-industry-comments-on-sona/?utm_source=mailpoet&utm_medium=email&utm_campaign=cbn-daily-electronic-engineers-help-wine-growers-to-vintage-success_1021

¹⁴ 2020. Plastics SA Annual Review 2018-19. [pdf] Available at: <https://www.plasticsinfo.co.za/wp-content/uploads/2020/01/PlasticsSA-AR-201819-72pages.pdf> [Accessed 25 June 2020].

¹⁵ Cheri Scholtz, PETCO, Interview 8 April 2020

¹⁶ Chris Whyte, Use-It, Interview 20 February 2020

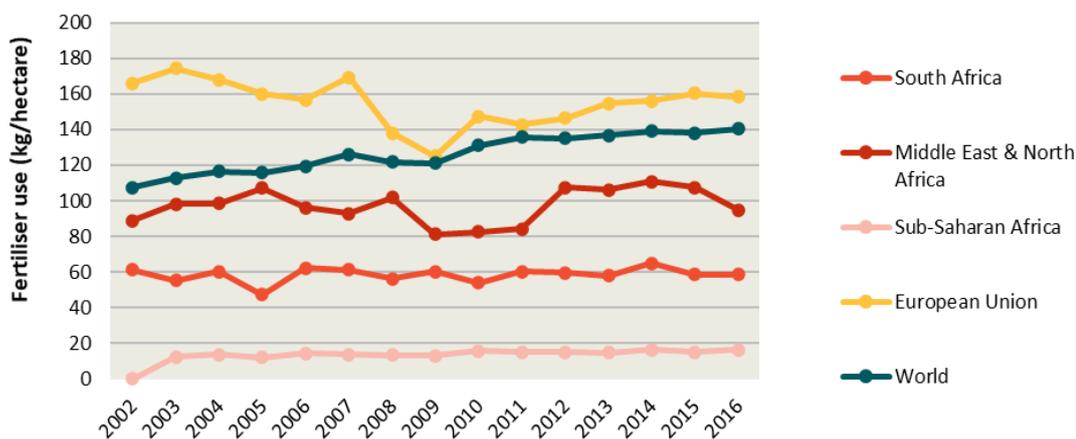
¹⁷ Innovationbridge.info. 2020. Nosetsa | Innovation Bridge Portal. [online] Available at: <https://www.innovationbridge.info/ibportal/?q=content/nosetsa> [Accessed 30 June 2020].

- Fruitlook, which provides semi-realtime information on crop growth, evapotranspiration deficits, and nitrogen status for irrigation blocks. It is currently limited to orchards and vineyards in the Western Cape's key growing areas.¹⁸

South Africa's fertiliser consumption is more than three times higher than the sub-Saharan average (Figure 2-2). An opportunity exists to increase use of organic fertilisers, so that nutrient loops are closed and the need for mineral fertilisers is reduced. There is also a need to rebuild the topsoil and soil holding capacity of agricultural lands. Several studies have been done on increasing carbon content to improve soil condition¹⁹. The outcomes indicate the potential to use biochar for carbon enriching in the top soil. Of particular note for SA is the growing global interest in biochar (pyrolyzed biomass) as a soil amendment due to its potential to:

- Permanently sequester carbon in soils (slow to degrade compared to compost or manure);
- Improve the fertility of degraded soils;
- Pyrolysis can potentially be used to generate electricity;
- Sources of biomass currently used included alien invasive vegetation and sawmill waste.

Figure 2-2 Fertiliser use intensity in South Africa compared to regional average



Source: World Bank - World Development Indicators.

In addition, South Africa is approaching food loss and waste mitigation as preventative and with a focus on the recovery of nutrients. Preventative interventions focus on production to distribution. Recovery options consider vehicles for donating surplus food and beneficiating organic products.

South Africa has made a commitment to Sustainable Development Goal 12.3.²⁰ A roadmap for the development of a Voluntary Agreement on Food Loss and Waste is in process. The roadmap is being developed by the dtic and CGCSA.²¹ This includes a Food Waste Voluntary Agreement for South African companies.²² The voluntary agreement targets food manufacturers, suppliers and retailers. This

¹⁸ n.d. CASE STUDY #1 FRUITLOOK. [ebook] Western Cape Government. Available at: <https://www.greenagri.org.za/assets/documents-/SmartAgri/Case-Studies/1.-Case-Study-FruitLook-FINAL.pdf> [Accessed 30 June 2020].

¹⁹ Stellenbosch University 2010. Biochar Amendment Of Infertile Western Cape Sandy Soil: Implications For Food Security. [ebook] Available at: [http://Biochar amendment of infertile Western Cape sandy soil: Implications for food security](http://Biochar%20amendment%20of%20infertile%20Western%20Cape%20sandy%20soil:%20Implications%20for%20food%20security) [Accessed 8 July 2020].

²⁰ By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.

²¹ Food and Agriculture Organization of the United Nations. 2020. News Details. [online] Available at: <http://www.fao.org/save-food/news-and-multimedia/news/news-details/en/c/293895/> [Accessed 29 June 2020].

²² CGCSA Food Loss and Waste Protocol Workshop 10 March 2020

commitment is critical given that an estimated 27% of food is currently lost or wasted in South Africa. Stakeholders are encouraged to disclose their food waste by implementing the Food Loss and Waste Protocol²³ as part of the Food Waste Voluntary Agreement. The agreement will prioritise food waste and apply the food waste hierarchy (which may be redefined in the South African context)²⁴. In a world first, South Africa will also be including the agricultural sector in this agreement. Food waste is addressed in the Waste Roadmap²⁵ and recommendations are made for mitigating waste along the value chain as listed in the table below. Secondary uses of unavoidable waste can be of high value, processing of citrus peels to fibre for clothing²⁶ for example. Beneficiation opportunities are ample, however barriers in terms of technology access persists.

Table 2-1 Food waste on Waste Roadmap, activities across the value chain

Production	Handling and storage	Processing and packaging	Distribution and market
<ul style="list-style-type: none"> Convert unmarketable crops into value-added products Improve agriculture extension services Improve access to infrastructure and markets Improve harvesting techniques 	<ul style="list-style-type: none"> Improve storage technologies Improve low-carbon cold chains Improve handling to reduce damage 	<ul style="list-style-type: none"> Re-engineer manufacturing processes Improve supply chain management Improve packaging and materials Review portioning in line with market needs Reprocess / repackage food not meeting specifications 	<ul style="list-style-type: none"> Encourage increased donation of unsold food (reduced liability, incentives) Change food date labelling practices Review cosmetic standards to food 'perfection'

Table 2-2 Local projects and initiatives aimed at addressing food surplus:

Western Cape Government's 110% Green programme²⁷	Food Forward initiative. Raise awareness on food wastage, catalyse action and reduce inefficiencies within the food value chain. Project aims to encourage reduction of food loss and waste in the Western Cape by mobilising key stakeholders to optimise the entire food value chain.
Woolworths, retailer²⁸	Preventative: Comprehensive approach to waste reduction through full supply chain. Highest levels of food loss, waste can occur on farm where up to 60% of crop could be lost (based on single product -spinach). Primary causes include damaged harvests or over-planting. In the processing stage, waste usually caused by quality issues and size variations: does not meet required Woolworths procurement specifications. Waste

²³ Food Loss and Waste Protocol. 2020. Home - Food Loss And Waste Protocol. [online] Available at: <https://flwprotocol.org> [Accessed 29 June 2020].

²⁴ CGCSA Food Loss and Waste Protocol Workshop 11 March 2020

²⁵ 2020. Foodwaste Present. [ebook] Available at:

https://www.wasteroadmap.co.za/download/ims2017_foodwaste_present03.pdf [Accessed 29 June 2020].

²⁶ Hmgrou.com. 2020. Orange Fiber. [online] Available at: <https://hmgrou.com/media/Our-stories/orange-fiber.html> [Accessed 30 June 2020].

²⁷ Westerncape.gov.za. 2020. Food Forward Project - Project | 110% Green. [online] Available at: <https://www.westerncape.gov.za/110green/projects/food-forward-project> [Accessed 7 July 2020].

²⁸ 2018. Food Loss And Waste: Facts And Futures Taking Steps Towards A More Sustainable Food Future. [ebook] WWF. Available at: http://awsassets.wwf.org.za/downloads/WWF_Food_Loss_and_Waste_WEB.pdf [Accessed 7 July 2020].

	<p>management efforts include fit-for-purpose packaging, on-pack information, donations of surplus food to more than 1000 charities annually and promoting supply chain efficiency and sustainable farming practices. By 2020, Woolworths aims to ensure 95% of store waste and 100% head offices, Distribution Centres, does not land up in landfill. If not fit for human consumption, diverted to other uses such as feed, compost or energy.</p> <p>Gap: Food waste management needs to address food loss on the farm by investing in infrastructure solutions, as well harvesting mechanisms.</p>
PicknPay ²⁹	<p>Vermicompost. Waste to Food initiative establishes an innovative business process that converts excess organic waste into very high-grade compost, through naturally occurring digestive processes in earthworms. Pick n Pay, with assistance from the Ackerman Pick n Pay Foundation, has invested R2m in the social enterprise project, diverting waste from landfill to the Waste to Food project. The Philippi-based project was founded in 2012 and aims to reduce the food waste footprint while creating jobs and empowering the local community. Partners in the project include Pick n Pay, City of Cape Town, Industrial Development Corporation (IDC), Philippi Economic Development Initiative (PEDI), waste management company Don't Waste, and operating company Waste to Food. Compost is currently sold through Pick n Pay stores.</p>
AgriProtein, part of the Insect Technology Group ³⁰	<p>Close the loop in food production. Agriprotein uses insects to convert food waste into proteins that can substitute as fishmeal, by offering an alternative protein for use in aquaculture, livestock and pet feeds. This is an environmentally beneficial alternative for food waste by creating sustainable, high-quality feed ingredients. Part of the value proposition is a reinvention of the unsustainable use of fishmeal.</p>

2.3.2 Trends in waste management, with a focus on plastics

New market data suggests South Africa's waste management industry is currently worth around ZAR 25 Billion (EUR 1.4 Billion)³¹. Plastics recycling in South Africa continues to grow, with more than 330,700 tonnes recycled annually. The average recycling rate for plastics exceeds 43%, which analysts note is higher than the 31% figure for Europe.³²

An urgent priority for waste management is diversion from landfill due to depleting available landfill airspace. Other challenges include lack of available land for waste depot sites and the prohibitive capital required for waste to energy plants. Household recyclable waste is not reaching recycling streams due to barriers to collection and inadequate drop-off sites. This is compounded by littering and illegal dumping³³.

Informal waste sector

The informal waste sector is an integral part of the waste system in South Africa. Waste pickers recover recyclables from landfill sites, dump sites, kerbside (household and communal bins), and businesses.

²⁹ <https://www.supermarket.co.za/news-article.asp?ID=6954&CatTags=8-Going%20green,%2015-Innovation%20and%20technology>

³⁰ <https://www.agriprotein.com>

³¹ Recycling International. 2020. Latest Recycling Stats For South Africa • Recycling International. [online] Available at: <https://recyclinginternational.com/business/latest-recycling-stats-for-south-africa/27327/> [Accessed 7 July 2020].

³² *ibid.*

³³ Abel Malaka, City of Tshwane, ACTtank facilitated by TOMA-Now. 26 June 2019

Cherry picking of most valuable wastes generally occurs. The waste pickers sell the collected recyclables to brokers (e.g. buy-back centres) or private recycling companies for a daily income³⁴.

Integrating the informal waste sector is complex. Integration initiatives need to be carefully tailored to suit the local context. As an example, Distell³⁵ advocates for a value-driven approach with their GreenUp Initiative (see table below). They are formalising the informal sector through empowerment and dignity processes such as training, provision of personal protective equipment (PPE), and working with buy-back centres and waste processors. Throughout the country, post-consumption waste is being benefited to empower communities. Often this happens in the informal sector.

Table 2-3 Recycling initiatives that embrace the informal sector

Recycling initiative	Detail on activities	Goals
Destination Green Recycling Pty (Ltd) ³⁶	<ul style="list-style-type: none"> Focused on collections and sorting processes, within the recycling value chain. Long- term goal is to expand into Mechanical Recycling Sector. 	<ul style="list-style-type: none"> Improve living conditions of the citizens in the township. Reduce land pollution and establish sustainable system to promote recycling. Minimise non-biodegradable waste sent to landfills.
Food for Waste and Separation at Source Projects ³⁷	<ul style="list-style-type: none"> Assistance to informal waste reclaimers. Establish cooperatives/ non-profit organisations, to collect recyclables from separation at source areas. Pikitup assist in construction of satellite sorting/buy-back facilities, managed by cooperatives/non-profit organisations, as well as provision of caged waste collection vehicles and PPE. 	<ul style="list-style-type: none"> Clear illegal dumpsites in informal settlements through job creation to reduce poverty. Beneficiaries collect recyclables and exchange them for a daily food parcel. Divert recyclable waste from landfills/dumpsites to save airspace, reduce transportation costs, reduce littering and illegal dumping.
Vukuzenzele and Nkoza Drop-Off and Sorting Cooperative Pilot Project ³⁸	<ul style="list-style-type: none"> Pathway to integrating informal sector. Integrate recycling as a service assigned to cooperatives at no cost to Ekurhuleni Municipality. Selection and training of community-based cooperatives. Build drop-off centre for waste recycling, managed by a cooperative; Awareness raising in target communities. Households provided with reusable recycling bags, collected weekly by 	Develop community-based recycling in Wadeville and Actonville to foster job opportunities for disadvantaged groups.

³⁴ Department of Environmental Affairs. 2018. South Africa State of Waste. A report on the state of the environment. First draft report. Department of Environmental Affairs, Pretoria. p. 52

³⁵ EU Delegation Green Deal Round Table, Blain van Wyk, Sustainability Specialist Distell, 28 February 2020, Cape Town

³⁶ Destinationgreen.co.za. 2020. Destination Green - Throw It Our Way!.. [online] Available at: <http://destinationgreen.co.za> [Accessed 7 July 2020].

³⁷ 2020. Food For Waste 2 WASTE MIN PAGE -. [online] Available at: <<http://www.pikitup.co.za/flagship-projects-2/food-for-waste-2-waste-min-page/>> [Accessed 7 July 2020].

³⁸ 2018. BUILDING A COLLECTIVE FOCUS REVIEW OF PETCO ACTIVITIES 2018. [ebook] PETCO. Available at: https://petco.co.za/wp-content/uploads/2019/06/PETCO-2018-Annual-Review_FINAL.pdf [Accessed 7 July 2020].

Recycling initiative	Detail on activities	Goals
	cooperative members and transported to drop off centre using specially adapted bicycles.	
GreenUp Distell, Separation at Source: Khayelitsha-based recycling programme³⁹	<ul style="list-style-type: none"> Formalise and create sustainable income streams for environmental assistants (waste pickers) in Khayelitsha. Support designated environmental assistants with necessary training, resources and access to buy-back centres (BBCs). Khayelitsha has a few scattered informal BBCs. Although the township is well-serviced for waste collection and street cleaning, most malls and shopping centres are under-serviced for recycling collection and pick-ups. 	<ul style="list-style-type: none"> Help combat socio-economic challenges and empower individuals within expansive and fast-growing community. Work with Separation at Source (S@S) to formalise waste management networks or value chains in Khayelitsha. Align operational activities with sustainability objectives: Sensitive and responsive to company's environmental impact.
Small scale initiative: Glass bottle collection and recycling⁴⁰	<ul style="list-style-type: none"> Project based in Ekurhuleni Started collecting returnable glass bottles over 10 years ago to do good in the community and for the environment. Employs elderly women to collect glass. Expanded business now collects glass from Ekurhuleni to as far as Delmas. 	<ul style="list-style-type: none"> To impact the environment and the lives of the people in the community. Has received support from The Glass Recycling Company (TGRC) with infrastructure.

Plastics

The plastics recycling industry in South Africa is well-developed⁴¹:

- The plastics recycling industry provides direct employment to more than 7,800 people and creates a further 58,500 income-generating jobs;
- ZAR 3 Billion was injected into the informal sector through the purchase of recyclable plastic waste in 2018.

The plastics recycling industry offers a vehicle for EU engagement. There is opportunity for knowledge and experience sharing regarding guidelines and regulation, as well as for the inclusion of technologies obtained from abroad, modified for an African context. South Africa is emulating European models (Extended Producer Responsibility, the Plastics Pact) but there is a need to actively engage and interpret models through an African lens. Key in the South African context is the important role the informal sector

³⁹ 2019. DISTELL Sustainability Report. [ebook] Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewirnMPsh7vqAhWWSBUiHTm2D5MQFjACegQIAxAB&url=https%3A%2F%2Fwww.distell.co.za%2Fknowledge%2Fpkdownloaddocument.aspx%3Fdocid%3D1235&usq=AOvVaw0viPHdaGPgq83cw4_TC2t4 [Accessed 7 July 2020].

⁴⁰ Theglassrecyclingcompany.co.za. 2020. The Glass Recycling Company - Home 2017 | The Glass Recycling Company. [online] Available at: <https://theglassrecyclingcompany.co.za> [Accessed 7 July 2020].

⁴¹ Cape Business News. 2020. Plastics Industry Comments On SONA - Cape Business News. [online] Available at: https://www.cbn.co.za/featured/plastics-industry-comments-on-sona/?utm_source=mailpoet&utm_medium=email&utm_campaign=cbn-daily-electronic-engineers-help-wine-growers-to-vintage-success_1021 [Accessed 29 June 2020].

plays in waste management. For a model to be successful, this needs to be taken into account.⁴² The same applies to the uptake of European technologies for recycling - this applies to both the technology and finance models.

The plastics industry contributes to the development of a circular economy in South Africa by mitigating climate change and creating an enabling environment that invests in infrastructure and structural transformation. However, the industry faces challenges to scaling-up circular approaches, including operational problems related to energy access (unstable national grid and loadshedding), and water scarcity. Currently, the significant decline in oil prices have made recycling of plastics less competitive than virgin material.

Table 2-4 Selected examples plastics recycling in South Africa

Sector	Details
Industry	Corruseal ⁴³ , a national manufacturer and supplier of packaging to a wide range of industries across South Africa, now uses only recycled PET strapping on their products, sourced locally from Cape Town-based supplier Propet. rPET strapping can be made from green plastic bottles, which have had a limited end-use market to date.
Retail	PALLETPLAST ⁴⁴ , by Sandplast, has introduced a lightweight rPET pallet made from as much as 97% recycled PET. The pallet has been approved by UK retailer TESCO, opening up the export market.
Food and beverage	Fair Cape Dairies ⁴⁵ changed their packaging from a white opaque PET bottle to a clear PET bottle. Once the dairy received feedback from their consumers that local recyclers were no longer accepting their opaque milk bottles, they immediately addressed it across their value chain. This proactive partnership approach enabled the dairy to shift to 100% recycled packaging with little to no impact on the quality of the product or on consumer expectation. Today, each clear bottle is made with 50% recycled PET.
Construction	In South Africa, polystyrene is recycled into a wide variety of products, ranging from picture frames and coat hangers, to seedling trays, lightweight cement blocks, cornices, skirtings, outdoor furniture and decking for construction. ⁴⁶ Aggregate post-consumer and post-industrial polystyrene granulated into beads, is blended with cement and additives to form insulated, soundproof, fireproof, water-resistant lightweight concrete blocks and screeds. Recycled, Expanded Polystyrene (EPS) is being used in building and construction projects as lightweight concrete bricks and screeds. Lightweight construction material saves on cost and CO2 emission. They feature SABS fire rating, Agreement Certification, Sound and temperature insulation and a faster construction process.
Community waste collection	The PACKA-CHNG project ⁴⁷ , a recycling truck with a trailer attached, drives through a community and parks at designated sites on particular days to collect recyclables. Individuals bring their materials to the truck where they are checked, weighed and exchanged for a monetary value that is paid into their eWallet account in real time. The material prices are set by the owner-operator of the unit and determined according to the current market value for each material type. Once

⁴² Cheri Scholtz, PETCO, Interview 8 April 2020

⁴³ Corruseal.co.za. 2020. Innovative Packaging Manufacturers | Packaging Manufacturers - Corruseal Group. [online] Available at: <http://www.corruseal.co.za> [Accessed 17 July 2020].

⁴⁴ SA Plastics, C., 2020. Palletplast's rPet Pallet Offers Optimum Lightweight Transport Solution - Issuu. [online] Available at: https://issuu.com/tohara/docs/sapt_feb-mar_2019/s/71672 [Accessed 17 July 2020].

⁴⁵ Fair Cape Dairies. 2020. Fair Cape Dairies | We Do The Right Thing. [online] Available at: <http://www.faircape.com> [Accessed 17 July 2020].

⁴⁶ Polystyrenesa.co.za. 2020. Recycling - Polystyrene SA. [online] Available at: <https://polystyrenesa.co.za/recycling/> [Accessed 17 July 2020].

⁴⁷ Pikitup.co.za. 2020. [online] Available at: http://www.pikitup.co.za/wp-content/uploads/2019/09/2019_20-Pikitup-SOC-Ltd-Business-Plan_Approved-by-BoD.pdf [Accessed 17 July 2020].

Sector	Details
	collection is finished, the materials are loaded into the truck and trailer and removed from the site. The initiative not only removes recyclables from areas without formal collection processes but helps associate value with these materials.

Extended Producer Responsibility

Industry-created, voluntary producer responsibility organisations (PRO)⁴⁸ serve regional and market segments. As an example, PETCO is the PRO for PET converters and recyclers that fully embraces circular economy thinking. PETCO financially contributes to volume driven projects that support recyclers who have an end-use market in their value chain. The project partners are the investors in new plants and equipment that is required to deliver the tonnes of PET recycled each year. They support collection through training, equipment and access. They invest in testing equipment, quality control, and the development of new end-use markets. The cost of the PETCO model to the consumer currently averages at approximately 1 cent per bottle.⁴⁹ PETCO's support for their partnered recyclers has led to increased collection volumes and investment in infrastructure in 2019. Highlights include⁵⁰:

- Record collection by Extrupet in October and November 2019 of close to 4,000 tonnes respectively;
- Extrupet announced its B2B expansion for 2019 that will on completion, double the current capacity from 20,000 to 40,000 tonnes of rPET per annum;
- Kaytech ramped up their additional continuous filament line to full capacity;
- Sen Li Da Chemical Fibre began expansion of their fibre production;
- Da Run Fa began expansion of their fibre processing capacity;
- Propet opened a new PET strapping line in the Western Cape;

Mandatory EPR, as proposed in the Extended Producer Responsibility Regulations, 2020, can level the playing field and support sufficient investment in the industry - the pooled fees can contribute to investment in infrastructure that benefits the entire industry. Discussions are taking place regarding the development of systems for biodegradable and bio-based materials⁵¹.

2.3.3 Mining, with a focus on urban mining and Waste Electronic and Electric Equipment (WEEE)

Resource extraction in South Africa is relatively equally divided across the different resource types with coal being the most important product in terms of volume, accounting for a third of the total resource extraction over the period 2000-2017. A large share of natural resource rent income is derived from coal production. During the period 2000-2017, natural resource rents from this sector accounted on average for 46% of the natural resource rents generated in the country. This is hardly surprising given the country's heavy dependence on fossil fuel-based energy production. Currently, circular economy principles are not being implemented in South Africa's coal production industry, and the continuing reliance on coal power generation does not indicate a transition being on the cards anytime soon.

⁴⁸ Packaging SA. 2018. Extended Producer Responsibility (EPR) Plan.

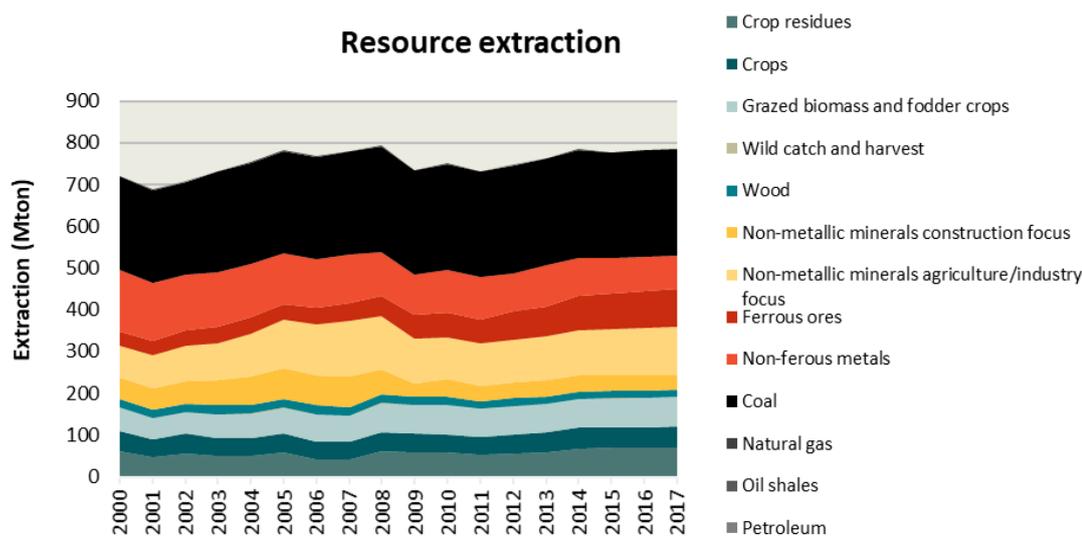
⁴⁹ PETCO. 2020. Petco Industry Projects. [online] Available at: <https://petco.co.za/petco-industry-projects/> [Accessed 29 June 2020].

⁵⁰ 2018. BUILDING A COLLECTIVE FOCUS REVIEW OF PETCO ACTIVITIES 2018. [ebook] PETCO. Available at: https://petco.co.za/wp-content/uploads/2019/06/PETCO-2018-Annual-Review_FINAL.pdf [Accessed 7 July 2020].

⁵¹ Anton Hanekom, PlasticsSA 23 April 2020

The level of production in the mining sector has continued to decline in 2018 and 2019, led by a slump in gold and diamond production⁵². Mineral rents represent the second most important source of income, accounting for 37% of the total resource rents during the same period. The declining gold extraction has led to exploration of urban mining and secondary resource extraction from waste electric and electronic equipment (WEEE). A global oversupply and lower demand for the platinum group metals, used largely (37%) in automotive catalysts, together with lower mining productivity, has also seen the exploration of recovery from spent autocatalysts.

Figure 2-3 Resource extraction in South Africa by type for the period 2000-2017



Source: UN SDG Indicator 12.2 Domestic Resource Extraction

With support from the Global Knowledge Partnerships in e-Waste Recycling programme, initiated by the Swiss State Secretariat for Economic Affairs (SECO) and implemented by the Federal Laboratories for Materials Testing and Research, e-waste recycling projects have been initiated successfully in three South African provinces (KwaZulu-Natal, Western Cape and Gauteng).

- Pilot projects (2017) in Johannesburg⁵³:
 - SA Precious Metals is engaging in the extraction of precious metals from e-waste through a combined hydro-metallurgical and electro-metallurgical process;
 - Rand Refinery is enhancing its intake of processed e-waste to boost economies of scale in gold extraction.
- Gauteng Refineries in collaboration with Mintek: Urban Mining - the recovery and recycling of precious metals from autocatalysts, e-waste and other consumer wastes. Gauteng Refineries is currently exploring various opportunities in further exploiting this value stream;
- Local platinum producers, Sibanye and Northam Platinum, entered the platinum-group metals (PGMs) recycling market in 2017. Platinum recovered from spent automotive catalytic converters is forecast to rise 2% year-on-year to above 1.25-million ounces.⁵⁴

⁵² Africa, S., 2020. Mining Loses Shine For The Second Year In A Row | Statistics South Africa. [online] Statssa.gov.za. Available at: <http://www.statssa.gov.za/?p=12970> [Accessed 29 June 2020].

⁵³ 2019. E-Waste Challenges In Cape Town: Opportunity For The Green Economy?. [online] Available at: https://www.researchgate.net/publication/333939220_E-waste_challenges_in_Cape_Town_Opportunity_for_the_green_economy [Accessed 29 June 2020].

⁵⁴ Oliveira, D., 2020. SA Platinum Miners Enter Recycling Market Despite Mixed Expectations. [online] Engineering News. Available at: <https://www.engineeringnews.co.za/article/sa-platinum-miners-enter-recycling-market-despite-mixed-expectations-2017-09-22> [Accessed 29 June 2020].

Over 100 companies are formally registered across the WEEE recycling chain in South Africa. The majority of companies are involved in the early stages of the value chain - collection, consolidation, dismantling and refurbishment.⁵⁵ South African WEEE recycling organisations are committed to process locally, as far as possible. However, the complex fractions are exported, mainly to Europe and Asia. This includes 90% of printed circuit boards, 60% of phosphor powders, and some ferrous and non-ferrous metals⁵⁶. An overview of the e-waste dismantling, pre-processing and processing technology landscape in South Africa shows that one of the biggest challenges affecting sourcing, operation and implementation of WEEE recycling technologies was the low volumes of e-waste in South Africa, resulting in the inability of companies to achieve economies of scale, remain profitable and invest in upgrading and expanding operations⁵⁷.

The e-Waste Association of South Africa (eWASA) emphasises that informal operators collect 25% of the total volume of e-waste recycled^{58,59}. It is estimated that more than 10 000 (2 000 with WEEE as core business) informal pickers are involved in collection.⁶⁰ E-waste Recycling Association (ERA) has set the target of creating an additional 4 265 employment opportunities in the WEEE collection and recycling sector by 2023.⁶¹ Integration of the informal sectors seems to be key to a successful multi-pronged approach to e-waste recycling. Efforts are being made by PROs to include the informal sector in Industry Waste Management Plans⁶² and this should be extended to the mandated EPR programme(s).

The Covid-19 pandemic has highlighted the ongoing need for access to ICT infrastructure, including data-enabled devices. The refurbishment of WEEE, particularly for the ICT sector, will enable economic participation while contributing to the minimisation of waste.

2.3.4 Construction

A sector with potential for promoting a circular economy in South Africa is the building sector, where waste materials can be reused in new buildings and constructions. There are already a few projects embracing this principle.

With total expenditure on construction works and related activities amounting to more than R430.2 billion in 2018, the South African construction sector is of strategic importance to the development of the country and its economy. However, the sector is facing barriers to sustainable growth as Statistics South Africa reports that 142,000 jobs were lost in the construction sector in the first quarter of 2019. The sector is under significant pressure as spending on infrastructure has declined. The local economy failed to grow and concerns have mounted regarding expropriation of land without compensation⁶³. The industry is experiencing shrinking profit margins, cost overruns, labour disruptions and poor productivity, a shortage of skilled workers and the rising cost of inputs.

⁵⁵ Department of Environmental Affairs. 2018. South Africa State of Waste. A report on the state of the environment. First draft report. Department of Environmental Affairs, Pretoria. p.27

⁵⁶ Department of Environmental Affairs. 2018. South Africa State of Waste. A report on the state of the environment. First draft report. Department of Environmental Affairs, Pretoria. p. 27

⁵⁷ UNEP (2018). Africa Waste Management Outlook. United Nations Environment Programme, Nairobi, Kenya. p.112

⁵⁸ *ibid.*

⁵⁹ In South Africa, WEEE recycling is low: only 11% of WEEE is recycled. Mouton and Wichers (2016: 464) estimate that “20% of WEEE is recycled by formal firms” and “70% of South Africa’s WEEE remains in storage.”

⁶⁰ ERA, 2018. South African E-waste Industry Waste Management Plan 2018-2023 (draft). Cape Town: eWaste Recycling Authority.

⁶¹ *ibid.*

⁶² *ibid.*

⁶³ WIRE, B., 2020. South Africa Construction Industry Report 2019 - Researchandmarkets.Com. [online] Businesswire.com. Available at: <https://www.businesswire.com/news/home/20190802005286/en/South-Africa-Construction-Industry-Report-2019--> [Accessed 17 July 2020].

The construction industry is responsible for producing large amounts of building-related waste which is often disposed of in landfills. The largest contribution to total quantity of general waste was ‘other’ (35%), which comprises 13% construction and demolition waste⁶⁴. This is of great concern as a growing number of municipalities face limited capacity and lifespan of their landfills. Current drivers of the construction and demolition waste economy include rising virgin material prices, cost of transporting materials, regulation of waste flows, and increasing disposal cost due to limited landfill airspace. South Africa has to-date focused on approaching construction waste in terms of prevention and minimisation, while managing the waste that cannot be prevented.

The rising cost of inputs can potentially be mitigated by a robust secondary resource economy for recycled and re-used construction materials that creates alternative opportunities for waste:

- There is a clear need for re-use and for recycled materials to be included in material specifications and to be more widely adopted in governmental housing and development projects. Support is needed to establish these material specifications. Although an interest has been expressed in re-use of second-hand materials there is some reluctance based on concerns that this may compromise the integrity of future buildings;
- Data and market place development: Focus on next use and not just diversion. An effective market place needs both volume and quality related data. Development of second-hand material specifications should support this;
- Improve ease of access to secondary materials:
 - Drop-off sites for construction waste - this represents a business opportunity for collection and beneficiation;
 - Establish a secondary resources market enabled by separation at source.;
 - Develop waste sorting universally adopted facilities to cater for informal waste collectors.

2.4 Key enablers for a circular economy transition in South Africa

2.4.1 Policy framework supporting circular economy activities

While the Green Economy is well-entrenched in various policy instruments and strategies, the wide-spread adoption of circular practices is still lagging behind. There is not yet a national Circular Economy strategy or policy, and the need for a quantified plan is becoming more pressing. There has been progress made and the transition is being enabled by supportive policies, such as:

- A transition to a circular economy remains a priority for the DSI, embedded as a key tenet of the Decadal Plan on Science Technology and Innovation, which will serve as an implementation plan over the period 2020-2030. Consultation is ongoing at the time of this report;
- South Africa benefits from the implementation of a 10-year national Waste Research, Development and Innovation (RDI) Roadmap. The vision of the Roadmap is to stimulate waste innovation (technological and non-technological), R&D, and human capital development (HCD), through investment in science and technology. In doing so, it aims to maximise diversion of waste from landfill towards value-adding opportunities, including prevention of waste and the

⁶⁴ Researchspace.csir.co.za. 2020. [online] Available at: https://researchspace.csir.co.za/dspace/bitstream/handle/10204/7576/Van%20Wyk_2014.pdf?sequence=1 [Accessed 17 July 2020].

optimised extraction of value from reuse, recycling and recovery, in order to create significant economic, social and environmental benefit;⁶⁵

- Policy developed by the dtic can support a just transition by enabling investment in circular economy⁶⁶, whereas the Department Environment Forestry and Fisheries' Waste Management policies enable a circular economy by means of the definition of waste as a resource material and management of compliance;
- The 2020 Revised and Updated National Waste Management Strategy (NWMS) is of particular importance for enabling a circular economy. The strategic goals of the NWMS include waste minimisation and building a secondary resource economy to achieve a circular economy. Implementation includes cleaner production, industrial symbiosis, and extended producer responsibility.
- The EPR framework in support of this objective was gazetted in June 2020, which requires EPR programmes be developed by the priority waste sectors: Paper and Packaging, Electrical and Electronic Equipment, and Lighting. Landfill bans have come into effect to support drives to divert waste from landfill. National norms and standards for the assessment of waste dictate disposal at landfill.

Operation Phakisa

Operation Phakisa is a government mechanism for the implementation of the National Development Plan, with the ultimate goal of boosting economic growth and creating jobs. This initiative was designed to fast-track the implementation of solutions on critical development issues, such as poverty, unemployment and inequality.⁶⁷ *The Chemical and Waste Economy* is one of Operation Phakisa's seven labs. The overall goal of this lab is to establish how the contribution of the chemicals and waste economy can be increased to reach the Medium Term Strategic Framework (MTSF) and National Development Plan (NDP) targets on GDP and job creation, while reducing the negative environmental and health impact of chemicals and waste.⁶⁸ This mechanism is a key enabler for the transition to a circular economy. More specifically, the Chemicals and Waste Economy Phakisa Lab has the following objectives;⁶⁹

- Grow the secondary resources economy by increasing local utilisation and beneficiation of waste resources by 50% - 75% through creation of an enabling regulatory environment;
- Generation of opportunities from chemical and waste resources for the creation of jobs/ opportunities in new / existing markets specifically through enabling MSMEs;
- Investment in research, development and innovation (R&DI), to enhance the utilisation of local waste resources for new products, substances and services that will create jobs, and enhance the production of environmentally friendly chemicals;
- Reduce waste to landfill by 75% industrial waste and 50% municipal waste through education and awareness, a more compliant society and application of cleaner technologies.

⁶⁵ Wasteroadmap.co.za. 2020. About The Roadmap "Waste Research, Development And Innovation Roadmap. [online] Available at: <https://www.wasteroadmap.co.za/about/index.php> [Accessed 29 June 2020].

⁶⁶ Lorren de Kock, WWF, Interview 12 March 2020

⁶⁷ Operationphakisa.gov.za. 2020. Pages - Home. [online] Available at: <https://www.operationphakisa.gov.za/Pages/Home.aspx> [Accessed 29 June 2020].

⁶⁸ *ibid.*

⁶⁹ 2017. Minister Molewa's Speech During Launch Of Africa Alliance On Circular Economy. [ebook] Available at: https://www.environment.gov.za/speech/molewa_cop23africaalliance_circular_economylaunch [Accessed 29 June 2020].

Nationally-driven financial programmes and initiatives supporting circular economy-related sectors

Waste management charges aim to incentivise / disincentivise waste management behaviour across the value chain. These instruments provide incentives for manufacturers, consumers, recyclers and other actors along the product-waste value chain to reduce waste generation and to seek alternatives to final disposal to landfill, such as reuse, recycling or recovery⁷⁰.

Table 2-5 Nationally-driven pricing strategies

Details	Aims
<p>The National Pricing Strategy for Waste Management (NPSWM)⁷¹ is a legal requirement of the National Environmental Management: Waste Amendment Act (NEM:WAA) and gives effect to the NWMS through economic instruments and extended producer responsibility. It was published on 11 August 2016 and due to be promulgated imminently.</p>	<ul style="list-style-type: none"> It is aimed at reducing waste generation and increasing the diversion of waste away from landfill towards reuse, recycling and recovery to support the growth of the South African secondary resource economy from waste. The NPSWM looks at both upstream and downstream economic instruments. The downstream economic instruments look at volumetric tariffs (“pay-as-you-throw” approach) and includes landfill taxes for waste disposal to landfill. The upstream economic instruments focus on the extended producer responsibility and international best practice in waste management.
	<ul style="list-style-type: none"> One of the main objectives of the NPSWM is to address the pervasive under-pricing of waste services in South Africa. Under-pricing creates the wrong set of incentives, undermines waste minimisation efforts, and ultimately undermines the polluter pays principle. This is one of the reasons that disposal to landfill is still perceived to be the least costly and therefore more attractive option for waste management in South Africa.

In addition to the above pricing strategy, there are other nationally-driven financial programmes and initiatives supporting circular economy-related sectors. Examples are listed in the table below.

Table 2-6 Nationally-driven financial programmes

Mandate/purpose	Details
<p>Development Bank South Africa and the Green Fund⁷²</p>	<ul style="list-style-type: none"> The DBSA seeks to play a pivotal role in delivering developmental infrastructure in South Africa and the rest of the African continent. To advance the development impact in the region by expanding access to development finance and effectively integrating and implementing sustainable development solutions to: The Green Fund is a unique, newly established national fund that seeks to support green initiatives to assist South Africa’s transition to a low carbon, resource efficient and climate resilient development path delivering high impact economic, environmental and social benefits. The Fund is managed by the Development of Bank of South Africa (DBSA) on behalf of DEFF.

⁷⁰ Department of Environmental Affairs. 2018. South Africa State of Waste. A report on the state of the environment. First draft report. Department of Environmental Affairs, Pretoria. p. 49

⁷¹ Pmg.org.za. 2020. National Pricing Strategy For Waste Management | PMG. [online] Available at: <https://pmg.org.za/call-for-comment/244/> [Accessed 17 July 2020].

⁷² 2020. Green fund. [online] Available at: <https://www.sagreenfund.org.za/wordpress/> [Accessed 17 July 2020].

	Mandate/purpose	Details
	<ul style="list-style-type: none"> • Improve the quality of life of people through the development of social infrastructure • Support economic growth through the investment in economic infrastructure • Support regional integration • Promote sustainable use of scarce resource 	<ul style="list-style-type: none"> • By 2016, the Fund had approved a total of 55 projects and disbursed R782 million to investment projects, research initiatives and capacity-building programmes for implementation. • 2355 direct (812 women) and 9285 indirect jobs created • 8857 people trained • R184 M invested in renewable energy projects • R159.5 M spent on waste reduction projects • 17 post-doctoral fellowships granted • 21 230 ha of land rehabilitated, protected and or conserved.
TIA Technology Innovation Agency	<ul style="list-style-type: none"> • The TIA mandate is to provide financial and non-financial support to innovators and inventors. Financial support includes: <ul style="list-style-type: none"> ○ Source investments and provide funding for technology innovative opportunities ○ Drive commercialisation and exploitation of technology innovative opportunities ○ Promote national and local technology innovation agenda through thought leadership initiatives ○ Participate, coordinate and contribute to building the Nation System of Innovation and seek alignment with key stakeholders 	<ul style="list-style-type: none"> • The main purpose of the Fund is to enable innovators to evaluate, demonstrate and advance the value proposition and commercial potential of their research outputs. The Fund therefore contributes towards de-risking research outputs in order to increase the pipeline for TIA and other funders. • The Technology Development Fund provides funding to advance technologies from proof of concept to technology demonstration. • The Pre-Commercialisation Support Fund assists existing or potential individual entrepreneurs and MSMEs to obtain funding to support pre-commercialisation activities including the development of production/service capacity to levels that will support operational sustainability. This includes market testing and validation of the technology in the potential customer environment, as well as bridging finance in preparation for commercialisation.

2.4.2 Existing awareness and capacities on circular economy in South Africa

National awareness on circular economy

Although the national awareness of circular economy in South Africa is still in a developmental stage, the underlying concepts have received growing attention in recent years. The concept of the ‘green economy’ is seen as an important means of responding to some of the country's critical and interlinked development challenges, ranging from unemployment, poverty and inequality to energy security and climate change.⁷³ As a result, transitioning to a greener economy has increasingly been put into action through an extensive policy and regulatory framework, and is being articulated at the highest political level. Besides being part of South Africa’s long-term development policy, the National Development Plan: Vision for 2030

⁷³ 2017. GREEN ECONOMY INVENTORY FOR SOUTH AFRICA: AN Overview. [ebook] Available at: https://www.un-page.org/files/public/green_economy_inventory_for_south_africa.pdf [Accessed 29 June 2020].

(NDP), the broad framework for key thematic areas of the green economy is set in the National Strategy for Sustainable Development and Action Plan.⁷⁴ In the framework of the Action Plan, the South African government has defined 9 priority areas, most of which are relevant for circular economy. The priority areas include among others, green buildings and the built environment, resource conservation and management, sustainable waste management practices and sustainable consumption and production.⁷⁵

To strengthen the cooperation, coordination and capabilities required to implement the country's transition to a low-carbon, resource-efficient and pro-employment development path, South Africa joined the global Partnership for Action on Green Economy (PAGE) in 2015⁷⁶. According to an assessment conducted by PAGE, South Africa has over 32 green economy-related policies and strategies. Although none has a particular focus on facilitating circular economy, streamlining and coordinating these policies and strategies in the direction of circular economy, could help to raise awareness, attract additional investment in green and circular economy sectors and initiatives, and effectively facilitate South Africa's transition towards a circular economy.⁷⁷

Businesses/industries awareness

In line with the general lack of national awareness on circular economy, the awareness of South African businesses and industries is not yet very pronounced as well. The private sector is however steadily starting to become involved in circular economy-related activities and green economy initiatives, with certain sectors and companies being more active than others.⁷⁸ In the South African waste management sector, for example, circular economy plays an increasingly important role and several businesses have already initiated projects that illustrate how waste can either be a valuable by-product of a process or be reused to create additional value.

With approximately 300 active plastic recycling companies, varying from small enterprises to large-scale facilities, the South African plastic industry plays a pioneering role in this context. However, there is also an increasing number of industry initiatives in the wastewater sector, particularly focusing on the recovery of nutrients. As an example, Johannesburg Water processes municipal wastewater, separating sludge from the water to prepare dry manure that is then collected mostly by local farmers.⁷⁹ There are also increasing efforts to waste recycling and reuse in the agri-food sector, including, for instance, the use of IFCO containers in supply chains or retailers switching from transparent, non-recyclable PET baskets to cloudy polypropylene baskets that are fully recyclable. There are also examples of circular approaches beyond the beneficiation of waste, implemented across the agroprocessing value chain, which include Faircape's shift to clear PET milk bottles and PALLETPLAST's rPET pallets (table 2-4). To date, however, these approaches are often not yet subsumed under the term "Circular Economy".

National programmes such as the National Cleaner Production Centre South Africa (NCCP-SA) promote awareness and implementation of resource efficient and cleaner production (RECP) methodologies in the South African industry. The NCCP-SA Industrial Symbioses Programme (ISP), for instance, aims to build a

⁷⁴ *ibid.*

⁷⁵ 2020. *About Green Economy*. [online] Available at: <https://www.environment.gov.za/projectsprogrammes/greeneconomy/about> [Accessed 29 June 2020].

⁷⁶ 2020. *Partnership For Action On Green Economy (PAGE)*. [online] Available at: <https://www.environment.gov.za/projectsprogrammes/page> [Accessed 29 June 2020].

⁷⁷ 2017. *GREEN ECONOMY INVENTORY FOR SOUTH AFRICA: AN Overview*. [ebook] Available at: https://www.un-page.org/files/public/green_economy_inventory_for_south_africa.pdf [Accessed 29 June 2020].

⁷⁸ *ibid.*

⁷⁹ Southern Courier. 2020. *Joburg Water Takes Waste Water Treatment Seriously* | *Southern Courier*. Available at: <https://southerncourier.co.za/92033/joburg-water-takes-waste-water-treatment-seriously/> [Accessed 29 June 2020].

network of businesses in which mutually profitable links or “synergies” between companies can be identified, so that the under-utilised and under-valued resources from one company may be recovered and reused by another company, thus leading to economic, environmental and social benefits. The identified synergies, promoted by the programme, often result in new innovative business practices and technology development, creating opportunities in the waste sector for SME’s and entrepreneurs.⁸⁰

Consumer awareness of CE

Although the majority of South African consumers are not yet familiar with the concept of circular economy as such, they are becoming increasingly aware of their impact on the environment. As a result, more and more people are starting to separate their waste and buy environmentally-friendly alternatives. However, for many consumers inadequate education about energy efficiency and waste minimisation and recycling still result in poor waste management practices as well as high rates of consumption.⁸¹ A lack of incentives for sustainable practices and penalties for the unsustainable practices further encourage these consumption patterns. While there is scope for raising consumer awareness on environmentally preferable products and services, and many companies are capable to meet production standards that comply with the requirements of the European Union eco-label at reasonable cost, the demand to do so is currently still insufficient.⁸²

Overview of awareness creation initiatives

In recent years a number of awareness creation initiatives for circular economy-related measures were launched in South Africa. In addition to state-organised donor- and state-funded initiatives, social entrepreneurs in South Africa are also increasingly involved in awareness-raising efforts for circular economy, as shown in Table 2-7.

Table 2-7 Examples of circular economy awareness creation initiatives in South Africa

<p>Good Green Deeds Campaign</p> <p>Good Green Deeds⁸³ is nationwide environmental campaign that proposes a simple blueprint for what individuals, organisations, communities and the nation can do to bring about the realisation of a cleaner and more environmentally attractive country. The campaign aims to change people’s attitudes and behaviour towards waste and its management, as well as to encourage the public to begin taking charge and responsibility of keeping their neighbourhoods clean.</p>
<p>Pick n Pay plastic waste awareness campaign</p> <p>The second largest supermarket chain store in South Africa, Pick n Pay, launched a plastic waste awareness campaign to encourage positive consumer behaviour at an event in Cape Town in 2018. The campaign aims to raise consumer awareness on plastic waste, facilitating a real shift in behaviour and making a sustainable long-term impact to the environment, by following a “reduce, reuse and recycle” approach.⁸⁴</p>
<p>Clean-up and Recycle Week South Africa</p> <p>Clean-up and Recycle SA Week⁸⁵ is an annual initiative by the local plastics industry, supported and endorsed by the various packaging and retail streams and retailers. Each year, close to 120 000 volunteers participate in these clean-up activities that take place along roadsides, rivers, schools, residential and illegal dumping areas. The initiative is supported by provincial governments, local municipalities, environmental organisations, businesses, schools and communities.</p>

⁸⁰ Npc.co.za. 2020. *What Is ISP?* [Accessed 29 June 2020].

⁸¹ 2020. *Sustainable Consumption And Production Patterns*. [Accessed 29 June 2020].

⁸² *ibid*.

⁸³ <https://www.gov.za/goodgreendeeds>

⁸⁴ <https://www.iol.co.za/news/south-africa/pick-n-pay-launches-plastic-waste-awareness-campaign-17738751>

⁸⁵ https://www.environment.gov.za/event/deptactivity/cleanupandrecycle_week2018

National capacities on Circular Economy

Education and skills gaps

In order to reach the goals set out in the National Sustainable Development and Action Plan, the South African government is actively trying to foster innovative green economy skills and promote environmental education. In an effort to identify existing gaps in education and skills and define how environmental education has to be addressed within the different spheres of the educational system, DEFF has developed an Environmental Sector Skills Plan (ESSP) for South Africa.

Although South Africa's National Curriculum Statement for General and Further Education and Training takes account of environmental, sustainable development and social change issues, it has been criticized for being difficult to implement. It is also missing an adequate focus on teachers' competence and pedagogical content knowledge to introduce new areas of learning (e.g. knowledge of environmental change/global change; biodiversity; sustainable development, etc.).⁸⁶ In addition, South Africa's higher education institutions (HEI) show increased efforts to implement environmental, sustainable development and global change related knowledge areas in existing HEI teaching programmes. Almost every SA university is involved in one way or another, in producing at least some environmentally aware graduates.^{87,88} However, the various approaches are usually poorly coordinated and harmonised, highly depending on lecturers' interest, thus being mostly inadequate to meet the skill demand for an emerging green and circular economy.⁸⁹

Vocational training capacities

In an attempt to curtail the problems mentioned above, the South African government initiated various vocational training programmes (outlined below). Vocational Training in South Africa is mostly managed by the Department of Higher Education, Science and Innovation via Technical Vocational Education and Training (TVET) and the Sector Education and Training Authority (SETA). TVET is provided by a network of over 50 TVET colleges and Community Education and Training Colleges.⁹⁰ However, according to the assessment of the Environmental Sector Skills Plan (ESSP) in 2015, these are currently failing to provide sufficient environmental skills, since the curricula taught in the colleges usually have little relevance to environmental skill needs. The National Curriculum Vocational (NCV) makes some provision for training in sustainable agriculture and eco-tourism, but lecturers often lack the necessary environmental knowledge and the resources to teach these subjects adequately.

⁸⁶ 2020. *Environmental Sector Skills Plan For South Africa*. [ebook] Available at: https://www.environment.gov.za/sites/default/files/docs/environmentalsector_skillsplanfor_southafrica.pdf [Accessed 29 June 2020].

⁸⁷ 2016. *GREEN ECONOMY LEARNING ASSESSMENT SOUTH AFRICA*. [ebook] Available at: https://www.un-page.org/files/public/green_economy_learning_assessment_south_africa.pdf [Accessed 29 June 2020].

⁸⁸ 2020. *Environmental Sector Skills Plan For South Africa*. [ebook] Available at: https://www.environment.gov.za/sites/default/files/docs/environmentalsector_skillsplanfor_southafrica.pdf [Accessed 29 June 2020].

⁸⁹ 2020. *Environmental Sector Skills Plan For South Africa*. [ebook] Available at: https://www.environment.gov.za/sites/default/files/docs/environmentalsector_skillsplanfor_southafrica.pdf [Accessed 29 June 2020].

⁹⁰ Dhet.gov.za. 2020. *Department Of Higher Education And Training - Setalinks*. [online] Available at: <http://www.dhet.gov.za/SitePages/SETALinks.aspx> [Accessed 7 July 2020].

3 Impacts and benefits of the circular economy in South Africa

3.1 Existing impacts and benefits

This section summarises key impacts of some of the most impactful existing CE initiatives in South Africa.

3.1.1 *Economic impacts and benefits*

The implementation of national policies and initiatives that are related to the circular economy have several positive economic impacts that include:

- increase in local production;
- waste beneficiation projects.

3.1.2 *Social impacts and benefits*

The implementation of national policies and initiatives that are related to circular economy have several positive social impacts that include:

- creation of new business and employment opportunities including substitution, elimination, transformation and redefinition;
- capacity building, knowledge sharing and up-skilling;
- raising awareness among the public (e.g. on better waste management practices, more responsible consumption patterns);
- improved health conditions of the public (e.g. as a result of safer waste management practices).

3.1.3 *Environmental impacts and benefits*

The implementation of national policies and initiatives that are related to circular economy have several positive environmental impacts that include:

- reduced GHG emissions;
- improved air quality;
- resource efficiency;
- recycling of wastes;
- diversion from landfill.

The following table summarises some of the positive outcomes resulting from the adoption/implementation of initiatives, projects or organisations listed in previous sections of this report.

Table 3-1 Economic, social and environmental outcomes and benefits

Economic	Social	Environmental
<p>Green Fund⁹¹ The Green Fund is a national fund that seeks to support green initiatives to assist South Africa's transition to a low carbon, resource efficient and climate resilient development path delivering high impact economic, environmental and social benefits. The Fund is managed by the Development of Bank of South Africa (DBSA) on behalf of Department of the Environment Forestry and Fisheries.</p>		
<ul style="list-style-type: none"> 49 projects and ZAR 661 Million in funding has been approved. 2 355 direct jobs created, 9 285 indirect jobs created, 812 women employed in direct jobs, 8 857 people trained 	<ul style="list-style-type: none"> 17 Post-doctoral fellowship granted, 10 learnerships funded, more than 50 businesses and 130 entrepreneurs mentored. 	<ul style="list-style-type: none"> Projects include reforestation of unused landfill sites, the scale up of traditional medicinal plant harvesting, research into a policy framework to promote sustainable innovation and capacity building projects. R184M invested in renewable energy project, 5159.5M Spent on waste reduction projects, 21 230 Hectares of land rehabilitated
<p>PIKITUP: Johannesburg⁹² (SOC) Ltd is the official integrated waste management service provider to the City of Joburg. They are mandated to provide integrated waste management services to the residents of Johannesburg.</p>		
<ul style="list-style-type: none"> 4,053 work opportunities created for youth, women and previously disadvantaged individuals through extended public works programme 	<ul style="list-style-type: none"> Increased collection from households: 2017/2018 reported collection from 864,185 formal households on a weekly basis. Waste refuse management to 164 informal settlements, counteracting illegal dumping in peri-urban areas. 	<ul style="list-style-type: none"> Builders rubble diversion 2017/18 is 29 482 tons, 73.7% of the annual diversion target Green waste diverted 2017/18 is 35 615 tons, 73.1% of the annual target. Dry waste recycling 29 258 tons, 71.2% of the annual Total waste diverted away from landfills 94 355 tons 2017/18, 73% of a target of 130 000 tons set.
<p>PETCO is the PRO for PET converters and recyclers that fully embraces circular economy thinking. PETCO financially contributes to volume driven projects that support recyclers who have an end-use market in their value chain.</p>		
<ul style="list-style-type: none"> PETCO helped to establish the Ekurhuleni Waste Management Association (EWMA), which includes 40 cooperatives and MSMEs in the business of waste management. PETCO's #Do1Thing marketing campaign reached over 2.2 million people 	<ul style="list-style-type: none"> 2018/19 PETCO Capacity building: 5 accredited Entrepreneur Training courses for 320 MSME and cooperative members 3 PRASA (Paper Recycling Association of SA) Entrepreneurship courses involving 165 MSMEs and cooperative members. 	<ul style="list-style-type: none"> In 2015, 1.7 billion PET bottles were harvested, or 4.7 million per day, 15% more than in 2014. In addition, for the first time in the country, more bottles were recycled than landfilled: 52% of the bottles produced were reprocessed. PETCO efforts have led to a 6% increase in bottles recovered for recycling year-on-year. 98 649 tonnes

⁹¹ <https://www.sagreenfund.org.za/wordpress/wp-content/uploads/2017/09/Green-Fund-Impact-Study.pdf>

⁹² http://www.pikitup.co.za/wp-content/uploads/2019/09/2019_20-Pikitup-SOC-Ltd-Business-Plan_Approved-by-BoD.pdf

Economic	Social	Environmental
<p>through social media and 2.5 million people through traditional media. Their PR efforts unlocked almost R7 million worth of value (a return on investment of over 3 000%).</p>	<ul style="list-style-type: none"> Nearly 50,000 people earn income from these bottle recycling activities and others benefit from the related entrepreneurial opportunities. 	<p>were collected for recycling in 2018, which equates to a total of 2.3 billion bottles and some 6.2 million bottles collected each and every day. This resulted in a 63% recycling rate.</p> <ul style="list-style-type: none"> Record collection by Extrupet in October and November 2019 of close to 4,000 tonnes respectively. Extrupet announced its B2B expansion for 2019 that will on completion, double the current capacity from 20,000 to 40,000 tonnes of rPET per annum.
<p>GreenUp: Distell, Separation at Source: Khayelitsha-based recycling programme</p>		
<p>No data available</p>	<ul style="list-style-type: none"> Formalises and creates sustainable income streams for environmental assistants (waste pickers) in Khayelitsha. Support designated environmental assistants with necessary training, resources and access to recyclable waste buy-back centres (BBCs) in close proximity to their working environments. 141 Environmental Assistants registered at 6 buy-back centres 	<p>Offers access to recycling collection for retail and industry in townships where operational.</p>

3.2 Future impacts and benefits

As the South African economy moves away from a traditional linear economy towards a more circular economy, this will be expected to have economic, social and environmental impacts. The following subsections present our modelling results, highlighting the direction and magnitude of potential impacts of the circular economy in South Africa.

3.2.1 Modelling approach and framework

The modelling of the macro-economic impacts of the circular economy transition in South Africa was carried out using Cambridge Econometrics' E3ME model. This is a global macro-econometric model that builds on a historical database of econometric data and projects forward annually until 2030, covering 43 sectors (for details see Annex B).

A conventional difference-to-baseline approach is followed. The circular economy (CE) scenario is compared against a baseline⁹³ in which no explicit assumptions are made about circular economy activity (a 'business-as-usual' scenario, in other words), in order to compare outcomes between the two.

We have adopted an 'activities' approach (rather than a 'policies' approach) to modelling the CE scenario. This choice means that the analysis does not assess potential impacts of specific policies but instead looks directly at the links between specific changes in an economy and the direct, indirect and induced effects, without making any explicit assumptions about whether these changes are driven by policies, behavioural change or new technology.

3.2.2 Modelling inputs for the CE scenario

Circular economy narrative

Based on our research on the trends in and opportunities for circular economy activities in the eight case study countries, five priority sectors have been chosen to be covered in the modelling exercise. Those are the waste sector, electronics manufacturing, the plastics sector, the agri-food sector and the construction sector. It should be noted that some specific circular activities that are currently commonly mentioned within the European policy and industry context were left out as we did not consider them realistic to be implemented within the coming decade, due to a lack of industrial development or circular economy awareness or the fact that the impacts will only materialise on a longer timescale (e.g. building design for de-construction or modular building design).

The sectors that we have focused on are the waste sector, the plastics (packaging) sector, electronics, agriculture and construction. The waste sector is an important enabler of a (more) circular economy and to be effective in this waste collection rates and recycling rates need to increase. Plastic (packaging) waste is a daunting problem in most African countries, a combination of more effective plastic waste collection and the recycling of plastic waste into new plastic packaging can make an important contribution to solving this urgent problem. E-waste is another challenge in several African countries, but with proper and safe treatment practices in place it also represents an opportunity for reusing and remanufacturing, resulting in an increased supply of affordable EEE products as well as an opportunity for recycling of valuable materials present in the E-waste, when high-value CE strategies are not feasible. Agriculture is still a critical part of the economy in many African countries. In this sector, substantial potential resides in the improvement of handling, storage and distribution of food products to prevent losses and to increase the use of organic fertilizers. Lastly, construction is a booming activity in Africa, but up to now circular practices are virtually absent. Therefore, for the short term there seems to be potential for increasing the use of secondary materials in this sector, either directly or via construction products that incorporate by-products or waste materials.

Modelling assumptions

Where possible the aforementioned sectoral narratives have been translated into modelling assumptions. It should be noted that the aim of the exercise has not been to forecast the future in 2030, but to explore the impacts that more increased circularity could have by that year, were this to become a reality. To this end, we made evidence-based assumptions about the form and scale circular economy activities could take in South Africa by 2030 and used these as exogenous inputs into the model. These model inputs are summarised in **Error! Reference source not found.**

⁹³ The baseline is E3ME's standard projection to 2030 for the South African economy, based on official published economic and energy forecasts. See Annex B for more details.

Table 3-2 Circular economy activities and corresponding modelling inputs

Category	Circular economy activity	Modelling input
Waste management	Improved waste collection rate	Increase in waste sector output
Electronics, electric equipment & E-waste	Improved recycling of valuable materials in e-waste	Investment in recycling sector to improve health & safety standards (50% funded by industry, 50% funded through public/ODA financing)
		Exports of materials recovered from e-waste recycling
	Increased use of recycled materials in electronics production, replacing virgin metals and plastics	Shift in plastics' intermediate demand: reduced purchases from metals and plastics sectors, replaced by purchases from recycling sector
Agriculture	Prevention of food loss in agricultural supply chain through improved storage and logistics	Substitution of agricultural imports by domestic agricultural production
		Investment in storage and logistical capabilities (50% funded by industry, 50% funded through public/ODA financing)
	Increased use of organic fertilisers materials in agriculture , replacing use of mineral fertilisers	Shift in intermediate demand in agriculture: fewer purchases from chemicals, more purchases from agriculture
Plastics packaging	Increased use of recycled feedstock in plastics production, replacing virgin feedstock	Shift in plastics' intermediate demand: reduced purchases from chemicals sector, replaced by purchases from recycling sector
Construction	Increased use of recycled minerals in construction, replacing virgin minerals (glass, cement, sands, ceramics)	Shift in plastics' intermediate demand: reduced purchases from non-metallic minerals sector, replaced by purchases from recycling sector

Modelling limitations

As shown in the table, the circular economy activities and the related modelling assumptions focus on recycling and trade activities as well as on raw material inputs. There are two main reasons for this. First of all, due to the lack of well documented data, other activities ranking higher in the waste hierarchy, such as high-quality refurbishing (e.g. in the EEE sector), had to be neglected. Secondly, the technical construction and set up of the E3ME model restricted the type of assumptions and inputs that could be used. For instance, as the model is a demand-driven one, it is difficult to model a policy-driven increase in recycling when this is not fully coupled to an increase in demand for recycled materials across sectors. As such, growing activity in the waste sector was limited to increasing waste collection rates. Furthermore, some activities are hard to represent in the modelling as the sectoral aggregation is too coarse to allow for modelling for changes in production processes within sectors. These limitations are important to take into account, when interpreting the results presented in the following sections. The impacts that circular economy could potentially bring to the chosen sectors and countries are thus not fully covered in the modelling, and could thus differ from the modelling outcomes in reality.

3.2.3 Modelling results

The modelling results presented in this section reflect differences between the CE scenario and the baseline by 2030, rather than the net effect of economic developments occurring between 2020 and 2030. For instance, if the price level in the CE scenario is reported as -1% by 2030, this does not imply

that deflation occurred in the CE scenario, but that inflation was slightly lower in this scenario than in the baseline scenario.

Economic impacts and benefits

Our modelling suggests that circular economy activities in South Africa would have a positive impact on the South African economy. By 2030, South Africa's GDP is projected to be around 0.8% higher in 2030 in the circular economy scenario compared to the baseline scenario. In other words, this suggests that the South African economy would be slightly larger as a result of increased circular economy activity than it would be in a 'business-as-usual' situation. **Error! Not a valid bookmark self-reference.** shows the CE scenario results for each of the components of GDP, as well as for the price levels. Results for the CE scenario are presented as differences from the baseline scenario by 2030, in absolute (monetary) and relative (percentage) terms.

Table 3-3 Macro-economic impacts of the CE scenario

Variable	Absolute difference from baseline scenario by 2030 (€2019)	Relative difference from baseline scenario by 2030 (%)
GDP	+ €3.7bn	+ 0.8%
Consumer	+ €4.0bn	+ 1.4%
Investment	+ €174m	+ 0.2%
Exports	+ €69m	+ 0.1%
Imports	+ €589m	+ 0.4%
Inflation	-	+ 0.2%

These results suggest that consumer spending would be the biggest driver of the positive economic impact of the circular economy activities, alongside a slightly smaller contribution from investment. Some of this additional consumption would be met by imports, however, leading to a slight deterioration in the trade balance relative to the baseline.

The projected rise in consumption would be a direct consequence of rising employment in certain key sectors (namely waste management and recycling) as a result of circular economy activity (see next section). Rising employment leads to rising disposable income in the economy, which in turn drives higher levels of consumer expenditure. The results suggest that higher consumption would be the most important channel for economic impacts as a result of circular economy activities in South Africa.

These higher levels of household consumption would drive a large part of the projected impacts in other components of final demand. Most directly, some part of consumer demand for goods and services would be met by imports. Despite the fact that the CE scenario featured an input assumption of a €500m reduction in imports of agricultural products, the results suggest that rising consumer expenditure on imports would contribute to an *increase* in gross imports to South Africa of around €600m relative to the baseline. The increase in investment expenditure is more directly linked to circular economy activities, as it is assumed that greater investment would be required to achieve the prevention of food losses and increased recycling rates in the CE scenario.

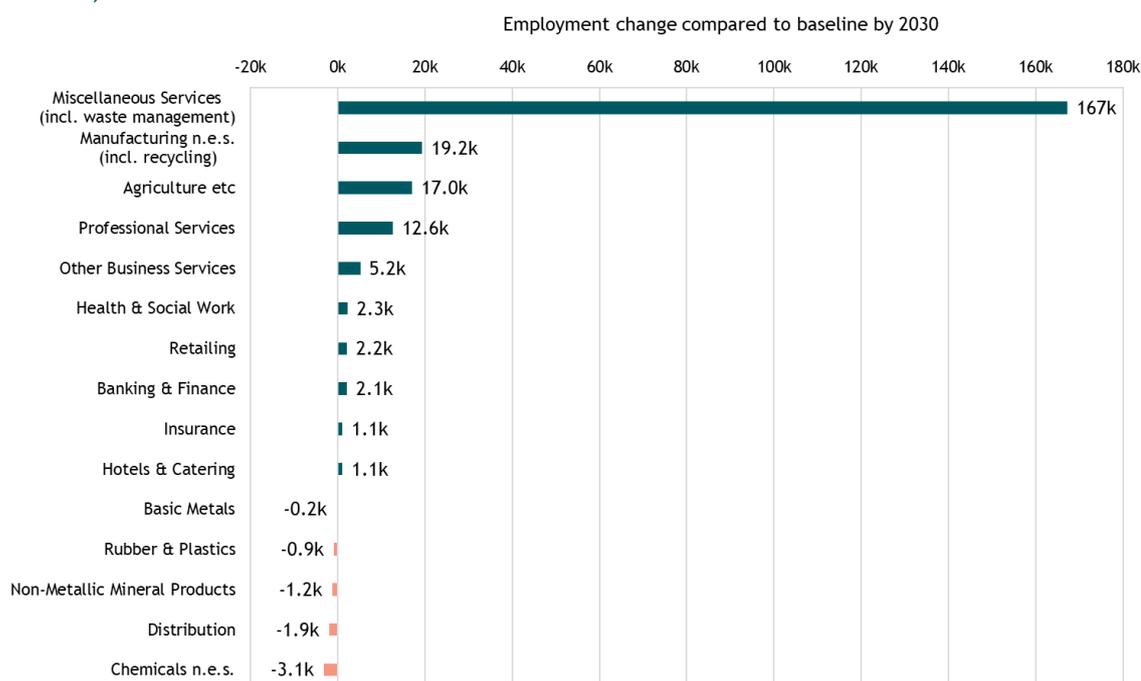
When interpreting these economic results, it is important to note that not all of the projected impacts in the CE scenario would necessarily be sustained beyond 2030. On the one hand, we may expect a permanent impact from circular economy activities such as preventing food losses in the agricultural supply chain, or increasing waste collection rates, assuming efforts are made to maintain these practices

in the future. On the other hand, some of the projected GDP impacts are a direct result of time-limited injections of funds into the economy, such as the assumed increase in investment in agriculture. We have assumed that half of this investment stimulus would be funded either through public deficits or official development assistance: if this type of funding were to be discontinued from 2030, then we would expect the GDP impact to be somewhat smaller from 2031 onwards.

Social impacts and benefits

In line with the positive economic effects, the circular economy in South Africa would also have positive employment effects. Overall, a net increase in employment relative to the baseline scenario of around 1.3% is projected, or approximately 226,000 additional jobs compared to the baseline (Figure 1).

Figure 3-1 Absolute employment changes in CE scenario in most strongly impacted sectors (relative to the baseline scenario)



The job creation associated with circular economy activity would be concentrated in specific sectors of the economy.⁹⁴ Most of additional jobs in the CE scenario relative to the baseline would be seen in the waste management. This is a key sector in the circular economy, as achieving higher waste collection rates would require higher output and employment in this sector. As one of the most labour-intensive sectors in the South African economy, this increase in output has a magnified impact on overall job creation. An increase in waste management activity goes hand in hand with the need for training of waste workers and the informal sector to develop the right skills. These skills are therefore important for the South African government to consider under their Environmental Sector Skills Plan.

A smaller employment impact would be seen in the agricultural sector, as efforts to prevent food losses would lead to increased domestic production of agricultural goods. Employment in the recycling sector would also see a positive impact, as recycled products would replace virgin materials as construction materials and as inputs into electronic and plastics production. A range of services sectors such as

⁹⁴ For a detailed overview of employment impacts for all sectors see Annex F- Part 2.

professional and business services, retail, hotels and catering, finance and health would see an increase in employment relative to the baseline, as a result of higher consumer expenditure (see previous section).

The employment gains seen in the recycling sector relative to the baseline outweigh the relative losses seen in virgin materials producing sectors, including plastics, chemicals, basic metals and non-metallic minerals. This is despite the fact that we initially assumed no net change in demand across these sectors: the increase in demand for recycled materials was assumed to be equal to the decrease in demand for virgin materials. However, increases in consumption expenditure in the wider economy (discussed in the previous section) would have the effect of a rising tide lifting all boats, cushioning the blow in demand for virgin materials producing sectors, and amplifying the boost to demand for recycled products. The rebound effect to demand is sufficiently small, however, that output and employment in these virgin materials sectors is still smaller than in the baseline: this suggests that it is possible to generate positive economic impacts while at the same time reducing consumption of these virgin materials.

As explained throughout this report, the impact of CE strategies on informal workers is very important in South Africa. The model is only capable of quantifying changes in overall employment volumes (including both formal and informal workers - see Annex F for more details), but not to assess the impacts of specific groups within the workforce in qualitative terms. This means that the shifts in economic activities in this assessment can affect the job types and skill sets required. Involving informal workers in the economic transformation process is thus crucial for achieving societally beneficial outcomes.

Environmental impacts and benefits

Our model suggests that the economic growth seen as a result of circular economy activity in South Africa would result in a slight increase in carbon emissions than in the baseline, with CO₂ emissions forecast to be 0.1% higher than baseline levels by 2030.⁹⁵

The relatively small net impact of circular economy activities reflects the contrasting fortunes of different sectors in the economy. The increase in aggregate demand relative to the baseline increases demand for key energy sectors including power generation, which are relatively carbon intensive. The recycling and waste management sectors, both direct beneficiaries of circular economy activities, would also see a corresponding increase in carbon emissions relative to the baseline.

However, the increased emissions from these sectors would be counterbalanced by reductions in emissions from sectors producing virgin materials, which would see a relative fall in output as demand for their products is replaced by demand for recycled materials. The reduction in carbon emissions is particularly strong in the chemicals and non-metallic minerals sectors, which not only produce less emissions from the burning of fossil fuels, but also produce fewer process emissions as a by-product of chemical reactions in their production process.

It is important to take account of some methodological limitations when interpreting these environmental impacts. Firstly, our modelling likely overestimates emissions impacts from certain circular economy

⁹⁵ The emissions results presented here include only CO₂ emissions, and only those produced as a result of energy use (such as burning of fossil fuels for energy) and industrial processes (for example CO₂ as a byproduct of the decomposition of limestone in lime production). The results therefore do not include emissions of other greenhouse gases (such as methane), or CO₂ emission from other sources, notably land-use and landfill emissions. This is due to a lack of reliable data for these emissions at the sectoral level required in this study. As a result, the CE scenario emissions results do not fully capture the climate impacts of CE activities, in particular in the agricultural and waste sectors.

activities, such as in agriculture, as we faced limitations in how accurately we could model these activities. For instance, we modelled the prevention of food losses in the agricultural supply chain as an increase in demand for domestically produced agricultural goods, to substitute for imports of those goods. This implies that preventing a given amount of food losses requires the same amount of energy as growing an equivalent amount of food. It is surely the case, however, that the former is more energy-efficient than the latter as this food was already produced in the baseline case, but no measures were taken to prevent it from being lost. Similarly, the model does not necessarily capture the effect that greater recycling rates would have on reducing landfill emissions, or the effect of reduced food losses on organic waste emissions, as our results only include emissions from energy use and process emissions.

Secondly, it should be noted that the results presented here only project the emissions impacts in South Africa and do not attempt to project the net impact on global emissions. For instance, a substitution of imports for domestic production would, all else being equal, result in no net change in emissions, as production has simply relocated from one place to another. However, this development is represented in our results as an increase in emissions in South Africa, without taking account of any corresponding decrease in emissions outside of its borders.

Thirdly, these emissions impacts should be seen in the context of environmental goals, more broadly defined. For instance, the increase in emissions as a result of circular economy activities must be weighed against the abatement of other forms of pollution, such as that generated by uncollected waste. Economic statistics such as national accounts generally don't capture the broader co-benefits of increasing waste collection output in terms of human health, ecosystem services, reduced pollution, resource savings and conservation of natural capital. However, due to the lack of data on sectoral resource consumption and waste generation, such impacts could not be quantified.

4 Mapping of the CE-related cooperation between the EU and SA

4.1 Policy dialogues

The Agreement on Trade, Development and Co-operation Agreement (TDCA) in 1999 provided the legal framework for collaborative actions in the areas of trade, political dialogue, and development co-operation.⁹⁶ South Africa and the EU agreed on a Strategic Partnership to complement the TDCA in 2007. The Strategic Partnership expanded the scope of interaction by establishing a new overarching framework for co-operation activities. This new framework, which came to be known as the Mogôbagôba Dialogue, provided additional arrangements of partnership dialogue going beyond trade policies and foresaw a topical inclusion and expansion of policy dialogues, sectoral cooperation, development cooperation and political dialogue between both partners. The Mogôbagôba Dialogue further served as the institutional oversight for all forms of cooperation between the EU and South Africa and hence structured the joint dialogue between both parties. Consequently, it provided the framework for meetings of the Joint Cooperation Council, the Ministerial Political Dialogue and Summits at Heads of State / Heads of Government level.⁹⁷

During the SA-EU Forum on Environment and Sustainable Development the first specific bilateral negotiations on joint activities in the fields of environment and sustainable development took place in 2007, 2011 and 2012, addressing various circular economy related topics such as waste management, sustainable consumption and production, technical assistance and green economy.⁹⁸ ⁹⁹ Recognising the value of these meetings, the EU and South Africa agreed to relaunch the Forum in 2016. Under the revised EU-SA Forum on Environment, Climate Change, Sustainable Development and Water, annual meetings have been held from 2016 to 2019, all of which specifically addressed CE as a priority area for cooperation.¹⁰⁰

Although the circular economy is not yet formally mentioned within these bilateral agreements, the exchange on circular economy related issues between the EU and South Africa has been very productive in recent years. Most notably this was achieved by the EU Circular Economy Mission to South Africa, which took place in 2017 as part of a series of high-level political and industrial meetings to communicate and promote sustainable and resource-efficient policies.¹⁰¹ The meetings of the circular economy mission were held in Pretoria, Johannesburg and Durban and featured a wide variety of circular economy discussions and workshops. Participants engaged in technical discussions on plastic recycling, the

96 2016. *Reviewing A Decade Of The EU-South Africa Strategic Partnership*. [ebook] Available at: https://www.fes-southafrica.org/fileadmin/user_upload/documents/Event_EU-SA_Report_final.pdf [Accessed 30 June 2020].

97 Southafrica.be. 2020. SA-EU STRATEGIC PARTNERSHIP | EMBASSY OF THE REPUBLIC OF SOUTH AFRICA. [online] Available at: <http://www.southafrica.be/sa-eu-strategic-partnership/> [Accessed 30 June 2020]

98 Ec.europa.eu. 2020. *South Africa - International - Environment - European Commission*. [online] Available at: https://ec.europa.eu/environment/international_issues/relations_south_africa_en.htm [Accessed 30 June 2020].

99 2020. SOUTH AFRICA- EUROPEAN COMMISSION FORUM ON ENVIRONMENT AND SUSTAINABLE DEVELOPMENT. [ebook] Available at: <http://www.dirco.gov.za/foreign/saeubilateral/docs/dialogue%20forum/environment-tor-29may07-final.pdf> [Accessed 30 June 2020].

100 2018. *European Union South Africa Joint Statement*. [ebook] Available at: <https://www.consilium.europa.eu/media/36982/eu-sa-final-statement.pdf> [Accessed 30 June 2020].

101 Ec.europa.eu. 2020. *Circular Economy Missions - International Issues - Environment - European Commission*. [online] Available at: https://ec.europa.eu/environment/international_issues/missions_en.htm [Accessed 30 June 2020].

industrial interdependence of circular economy in the region of Kwa-Zulu Natal or in informal B2B meetings.¹⁰² The mission was followed up by a formal CE dialogue funded by the EU-SA Dialogue Facility. The dialogue included two workshops, a symposium and two study tours. The results fed into the STI framework for CE in South Africa that in turn will be integrated into the DSI's 2020-2030 decadal plan. An additional informal setting for CE-relevant policy exchange between South Africa and EU member states was provided by the South African Department of Science and Technology's (now DSI) active participation in the third World Circular Economy Forum (WCEF) in Helsinki.¹⁰³ The conference also featured a contribution of the African Circular Economy Alliance, which was co-founded by South Africa.¹⁰⁴ International conferences hosted in South Africa, such as the 2019 World Economic Forum on Africa, serve a similar function, as they develop the exchange of collaborative activities on selected conference topics, which also includes the circular economy.¹⁰⁵

Further, South Africa is part of the global programme Partnership for Action on Green Economy (PAGE)¹⁰⁶, a United Nations (UN) programme which brings together the expertise of five UN agencies: United Nations Environment Programme (UN Environment), International Labour Organization (ILO), United Nations Development Programme (UNDP), United Nations Industrial Development Organization (UNIDO) and United Nations Institute for Training and Research (UNITAR), aiming to support nations and regions in transforming their economies into drivers of sustainability and social equity. PAGE in South Africa is partnering with the South African government, through DEFF, the Economic Development Department (EDD), the dtic and DSI to implement sustainability in economic policies and practices to advance the 2030 Agenda. To achieve this target the programme focuses, among other things, on contributing to better policy coordination, strengthened dialogue and improved collaboration in green economy policy, planning and implementation processes.¹⁰⁷ These activities have culminated in several achievements, including: (1) social dialogue on Just Transition and accelerating reforms related to green industry, green economy progress measurement, trade, water and renewable energy, (2) the compilation of a Green Economy Inventory for South Africa (GEISA¹⁰⁸) or (3) an industry and trade analysis for South Africa (GEITA¹⁰⁹). In turn, they have contributed to SDG 8 and cut across several others, including SDGs 4, 9, 10, 12, 15 and 17.¹¹⁰

As a beneficiary country of the EU-funded SWITCH Africa Green programme, South Africa has also hosted a National Networking Event. The forum, which was hosted by the DEFF, was intended to facilitate collaborative meetings between participants from the private and public sector, civil society, development partners, as well as project grantees and beneficiaries. Within the forum, grantees shared their success stories and the participants were informed on implementation and wider replication of the

¹⁰² 2017. *CIRCULAR ECONOMY MISSION TO SOUTH AFRICA*. [ebook] Available at:

https://ec.europa.eu/environment/international_issues/pdf/programme_South_Africa.pdf [Accessed 30 June 2020].

¹⁰³ 2020. *South Africa Opportunities In The Circular Economy Sector*. [online] Available at:

<https://www.marketopportunities.fi/home/2019/south-africa-opportunities-in-the-circular-economy-sector/> [Accessed 30 June 2020].

¹⁰⁴ Group, A., 2020. *World Circular Economy Forum 2019: Africa Wants To Go Green*. [online] African Development Bank - Building today, a better Africa tomorrow. Available at: <https://www.afdb.org/en/news-and-events/world-circular-economy-forum-2019-africa-wants-to-go-green-19386> [Accessed 30 June 2020].

¹⁰⁵ World Economic Forum. 2020. *Event Sessions*. [online] Available at: <https://www.weforum.org/events/world-economic-forum-on-africa-2019/player?p=1&pi=1&id=a0W0X00000Ege0hUAB> [Accessed 30 June 2020].

¹⁰⁶ Between 2013-2019 the EU contributed 19.116.200€ to PAGE

¹⁰⁷ Un-page.org. 2020. *South Africa | PAGE*. [online] Available at: <https://www.un-page.org/countries/page-countries/south-africa> [Accessed 17 July 2020].

¹⁰⁸ PAGE (2017) GREEN ECONOMY INVENTORY FOR SOUTH AFRICA. [online] Available at: https://www.un-page.org/files/public/green_economy_inventory_for_south_africa.pdf

¹⁰⁹ PAGE (2018) A GREEN ECONOMY INDUSTRY AND TRADE ANALYSIS. [online] available at: https://www.un-page.org/files/public/green_economy_industry_and_trade_analysis_-_south_africa.pdf

¹¹⁰ PAGE (2019) Annual Report 2019. [online] available at: <https://2019.page-annual-report.org/south-africa/>

supported projects.¹¹¹ Other events in South Africa hosted as part of the SWITCH Africa Green project have had a similar purpose and helped to promote the development of green (notably circular) economy approaches. This for instance, includes a series of National Workshops on *Sustainable Consumption and Production in the South African Industry* which were implemented in 2018.¹¹²

Another instrument of bilateral political exchange between the EU and South Africa is represented by the multilateral EU-SADC Economic Partnership Agreement (also see section 4.4), with South Africa hosting the first meeting of the Joint Council of the EPA in Cape Town¹¹³. Although the EPA does not feature direct references to Circular Economy, it has a few articles that refer to sustainable development and thus could provide a basis for circular economy relevant actions.

The following table lists opportunities and potential barriers for improving and expanding future CE-related policy dialogues between both parties.

Table 4-1 Opportunities and Barriers for future CE-related policy dialogues between South Africa and the EU

Opportunities and Barriers for future CE-related policy dialogues between South Africa and the EU
<p>Existing circular economy related SA-EU policy dialogues offer great potential to continue and specify the multilateral dialogue on circular economy. This also applies for the events hosted under Switch Africa Green as well as PAGE. Pooling existing expertise by interlinking the various circular economy related dialogue efforts in a dedicated framework might help to improve the coordination and alignment of the various activities.</p>
<p>The large number of high-level policy dialogue activities between SA and the EU offer great potential to address CE in more detail. As circular economy is an overarching concept, this is not only true for dialogues on topics such as sustainability or green economy, but also for dialogues with a different focus. A more frequent political exchange on the potential impact on circular economy on the labour market and economic development in particular offers good opportunities to promote the development of circular economy efforts in SA.</p>
<p>Increased EU lobbying for circular economy relevant legislative changes in SA could help to address necessary regulatory changes and needs. This concerns both circular economy dialogues and trade policy dialogues.</p>
<p>Existing bilateral (or multilateral) partnership agreements - such as the SA-EU strategic partnership - offer great potential for including the circular economy and its components in the development and improvement of legislation, thus strengthening the common will to cooperate in the field of circular economy.</p>

¹¹¹ 2017. *Switch Africa Green Quarterly Report*. [online] Available at: https://www.switchafricagreen.org/index.php?option=com_docman&view=download&alias=49-switch-africa-green-quarterly-report-april-june-2017&category_slug=sag-quarterly-reports&Itemid=1366&lang=en [Accessed 30 June 2020].

¹¹² 2020. *SA Survey*. [online] Available at: <http://www.switchafricagreen.org/SA/index.php/k2/item/280-sa-survey> [Accessed 30 June 2020].

¹¹³ 2019. *1ST MEETING OF THE JOINT COUNCIL OF THE EU-SADC ECONOMIC PARTNERSHIP AGREEMENT (EPA)*. [online] Available at: https://trade.ec.europa.eu/doclib/docs/2019/february/tradoc_157698.pdf [Accessed 30 June 2020].

4.2 Development cooperation projects and programmes, including by the EU Member States

The core strategic objectives of development cooperation between the EU and South Africa are listed in the South Africa EU-Strategic Partnership Joint Action Plan of May 2007. They are further complemented by objectives from the TDCA as well as the Development Cooperation Instrument (DCI). The strategic objectives of the TDCA, DCI and the Joint Action Plan are bundled within the EU multi-annual indicative programme (MIP) 2014-2020 for South Africa, which further aligns these objectives with the objectives of South Africa's National Development Plan (NDP). As highlighted by the EU, all MIP interventions will comply with both global environmental objectives and South Africa's own environmental policy. They will also emphasise environmental issues within the planned activities. Although the joint MIP does not specify how environmental issues will be addressed within development cooperation projects and hence also does not refer to any specific CE actions, the ongoing policy dialogues (see section 4.1) show that CE is already recognised as key topic for future development cooperation. In this context the European Green Deal, which sets out the roadmap for making the EU's economy sustainable, will likely have implications on future focus areas of development cooperation as well.

Although circular economy related activities in the sphere of development cooperation are still scarce in South Africa, activities such as SWITCH Africa Green, indicates a progression towards CE-related cooperation. Besides the dialogue platforms mentioned in chapter 4.1, SWITCH Africa Green also funds several circular economy related projects. Most of the projects in Phase 1 addressed sustainable strategies in agriculture, with one of the implemented projects focusing on the management of integrated waste management in the context of power generation¹¹⁴. Phase 2, which was launched in 2018, features projects that specifically embody the idea of the circular economy, such as the *Waste to Wing* project or *Promoting Inclusive Sustainable Practices in the South African Claybrick manufacturers industry*.¹¹⁵

As one of the most influential countries of the Southern African Development Community, South Africa is further involved in various CE-related development cooperation projects with individual EU member states.

¹¹⁴ Switchtogreen.eu. 2020. *Map Of Switch2green Projects*. [online] Available at: <https://www.switchtogreen.eu/map-of-projects/#projects/771> [Accessed 30 June 2020].

¹¹⁵ 2020. *Switch Africa Green*. [online] Available at: https://www.switchafricagreen.org/index.php?option=com_k2&view=item&layout=item&id=444&Itemid=1386&lang=en [Accessed 30 June 2020].

Table 4-2 Member State funded development cooperation programmes in South Africa, with identified priorities

Organisation/ Country	Projects	Priorities
AFD: French Development Agency	<p>PRODUCING CLEAN ENERGY FROM WASTE Starting in 2004 the AFD has provided EUR 6 Million in financial support to the eThekweni municipality to develop innovative solutions to waste management. The aim of the project is to collect methane emitted by waste fermentation and use it to produce clean energy, while reducing the impact of these urban landfills on climate change. 103 extraction wells were built and distributed over the three landfills; the wells are connected to a plant which generates electricity from burning methane. The plant is connected to the municipality's electricity supply network.¹¹⁶</p> <p>SUPPORTING SOUTH AFRICAN SMES TO DEVELOP ENERGY EFFICIENCY PROJECTS Under its green finance label "Sunref" the AFD provided financing to Bio2Watt, an industrial scale biogas waste-to-energy company in Bronkhorstspuit, near Johannesburg. Bio2Watt has received a EUR 6 million loan from Sunref, which is intended to aid in the realization of further investments that would lead to a reduction of waste generated within the production process (also see Table 2-7)¹¹⁷ Bio2Watt is leading the way for future biogas waste-to-energy developments in South Africa and the rest of the African continent. The company is looking at expanding the capacity of the Bronkhorstspuit plant from 4.4 MW to 6.9 MW in the near future, and setting up similar renewable energy projects in other countries in Africa.</p> <p>UPGRADING THE DRINKING WATER SUPPLY IN SOWETO The South African government entrusted municipalities with the responsibilities associated with the water and sanitation services investment and operation. The Johannesburg Municipality, via Johannesburg Water, the company in charge of water service, is responsible for addressing the water needs of over 3 million inhabitants, including over one million living in Soweto. Within this framework, AFD provides support to the city of Johannesburg with the implementation of the Gcin'amanzi ("water conservation" in Zulu) project. The project aims at upgrading the water networks to prevent losses and wastage.¹¹⁸</p>	<p>The objectives for AFD are:</p> <ul style="list-style-type: none"> • Promote balanced and sustainable territorial and urban development • Accelerating the energy transition • Improving opportunities for access to employment

¹¹⁶ Afd.fr. 2020. Producing Clean Energy From Waste. [online] Available at: <https://www.afd.fr/en/carte-des-projets/producing-clean-energy-waste?origin=/en/carte-des-projets> [Accessed 30 June 2020].

¹¹⁷ Afd.fr. 2020. Supporting South African SMEs To Develop Energy Efficiency Projects. [online] Available at: <https://www.afd.fr/en/carte-des-projets/supporting-south-african-smes-develop-energy-efficiency-projects?origin=/en/carte-des-projets> [Accessed 30 June 2020].

¹¹⁸ <https://www.afd.fr/en/carte-des-projets/upgrading-drinking-water-supply-soweto?origin=https://www.afd.fr/en/page-region-pays/south-africa>

Organisation/ Country	Projects	Priorities
GIZ: German Society for International Cooperation	<p>Supporting marine spatial planning in the Benguela Current ecosystem The GIZ supports the sustainable marine use of the Benguela Current, which extends along the coast of Angola, Namibia and South Africa in the south eastern Atlantic, by implementing marine spatial planning (MSP), a decision-making process that guides when and where human activities occur in the ocean. The aim is to permit the right activity to be performed in the right place in a way that sustainably supports the development of the maritime economy in the region to the benefit of people and the environment.^{119 120}</p> <p>TVET and the promotion of innovation for green employment On behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), GIZ is working closely with the South African Department of Higher Education and Training (DHET) and the Department of Science and Technology (DST). The project aims to improve the countries individual, institutional and societal frameworks needed to provide qualified experts and adequate technologies for establishing a ‘green’ economy.¹²¹</p>	<p>Thematic priorities in German development cooperation with South Africa are:</p> <ul style="list-style-type: none"> • Governance and administration • Energy and climate • HIV and AIDS
Denmark	<p>Working at the municipal level with City of Tshwane and City of Aarhus. The programme is the first between Denmark and South Africa unfolding at municipal level. The approach and flexibility of cooperating on the municipal level is expected to have a huge untapped potential in forging new partnerships. The cooperation is connecting the City of Tshwane in the Gauteng Province with the City of Aarhus, the second biggest city in Denmark. Both cities are keen to strengthen their international outlook through mutually beneficial partnerships. Strategic Water Sector Program.</p> <p>Under the umbrella of its Strategic Sector Cooperation, Denmark supports the South African government agencies and other relevant stakeholders in developing and implementing strategy, management and regulatory frameworks to contribute to the National Water Resource Strategy (2013), namely that “water is efficiently and effectively managed for equitable and sustainable growth and development.”. The cooperation focuses on five specific areas, these being groundwater, water wastage, water efficiency in industry, water sector financing as well as research and innovation.¹²²</p> <p>Strategic Smart and Sustainable Cities Sector Cooperation Program The programme focuses on solutions to create smart and sustainable cities by exchanging know-how on regulatory frameworks between the cities of Tshwane (SA) and City of Aarhus (DEN), extending networks of competences within the private sector. More specifically, the programme focuses on activities around: City</p>	<p>Energy Partnership Program:</p> <ul style="list-style-type: none"> • The first phase of cooperation has addressed the transfer of Danish expertise in the field of renewable energy, wind energy, energy efficiency and climate change. • The second phase is designed to focus more narrowly on capacity development for energy sector planning with the Department of Energy and renewable energy integration into the national power system with ESKOM. <p>Water Sector Program: Top 3 thematic Areas:</p> <ul style="list-style-type: none"> • Urban Water Management, groundwater, water Efficiency in Industries • Smart and Sustainable Cities Program

¹¹⁹ <http://www.benguelacc.org/index.php/en/marisma>

¹²⁰ <https://www.giz.de/en/worldwide/61194.html>

¹²¹ Giz.de. 2020. TVET And The Promotion Of Innovation For Green Employment. [online] Available at: <https://www.giz.de/en/worldwide/17848.html> [Accessed 30 June 2020].

¹²² <https://um.dk/en/danida-en/sustainable%20growth/strategic-sector-cooperation-new/>

Organisation/ Country	Projects	Priorities
	planning and development, Growth (business, workplaces and livelihood), and Water and energy. ¹²³	
Finland	<p>Fund for Local Cooperation (FLC)</p> <p>The Fund for Local Cooperation is a fund administered by the Embassy of Finland in Pretoria. The fund supports initiatives of local Non-Governmental Organisations (NGOs), science and technology communities, universities and other educational and research institutions, independent media, public corporations and cultural institutions (e.g. museums, libraries and theatres), chambers of commerce and commercial associations, organisations in the area of export and investment promotion, businesses, cooperatives, interest groups of companies and employees, foundations and religious organisations. Among the funds strategic thematic areas are the support of science, technology and innovations in South Africa.¹²⁴</p>	<p>For more than 20 years, the development cooperation between Finland and South Africa has notably focused on initiatives that promote environmental governance, implementation of renewable energy services, entrepreneurship, and advancement of innovations and information society. The objectives and priorities of the cooperation are defined by both countries but South African institutions are responsible for the implementation of the programmes. Finland's role is to support the initiatives by building capacity and providing expertise.</p>

Based on the mapping exercise above following barriers and opportunities for future CE-related development cooperation between the EU and South Africa were identified:

Table 4-3 Opportunities and Barriers for future circular economy related development cooperation and programmes between South Africa and the EU

Opportunities and Barriers for future circular economy related development cooperation and programmes between South Africa and the EU
<p>The extensive range of green- and circular economy related development projects in South Africa offers great potential for an alignment with future EU development cooperation programs. Exploiting potential synergies between the various circular economy related projects may significantly support the development of a national circular economy structure.</p> <p>A shift to circular and blue economies approaches in priority sectors identified in this report (i.e. plastics, agriculture, construction, ICT and urban mining) , has significant potential to contribute to Africa's economic growth and future development. Cooperation activities that focus on these sectors are therefore particularly promising. In this context, the facilitation of knowledge exchange and identification of co-working opportunities on selected issues is key. Additional sectors that are promising with regards to increased CE-related cooperation are sustainable energy and transportation.</p> <p>Managing a socially just transition away from fossil fuels and the extraction of selected resources such as coal could be another promising goal of future development cooperation. In this context CE-approaches may play an important role in substituting fossil energy force for instance by reusing waste as energy.</p>

¹²³ <https://sydafrika.um.dk/en/sector-cooperation/smart-and-sustainable-cities-program/>

¹²⁴ <https://finlandabroad.fi/web/zaf/fund-for-local-cooperation>

4.3 Activities by the European Investment Bank (EIB) and other European Development Finance Institutions (DFIs)

An overview of the major CE-related activities by the European Investment Bank (EIB) and other European Development Finance Institutions (DFIs) in South Africa is shown in Table 4-4 below.

Table 4-4 Activities by the EIB and other European DFIs in South Africa

European Investment Bank (EIB)
<p>For over 25 years the EIB has been financing a variety of projects in South Africa. Besides providing credit lines for the private sector, the EIB's activities are focused on energy, water and sewage, and urban development projects. Despite the EIB's ambitions to facilitate the transition to a circular economy, the projects supported by the Bank in South Africa currently lack a clear focus on this matter. Projects that are currently financed by EIB within the country include the Nedbank private sector facility 2 and 3, both consisting of a credit facility to the Nedbank Group, one of south Africa's four largest banks. With a proposed financing amount of EUR 100 Million and EUR 92 Million respectively, the facility focuses on financing private entities, including small businesses, for undertaking projects in South Africa.¹²⁵ Although the credit lines are not particularly aimed at supporting CE-operations, final beneficiaries are requested to comply with applicable national and EU legislation. Similar credit lines could in the future potentially be applied to support local SMEs in creating sustainable and circular business models.</p>
Netherlands Development Finance Company (FMO)
<p>The FMO engaged in the Lereko Metier Sustainable Capital fund, which is described as a pioneering sustainable capital fund making investments in the renewable energy, energy efficiency, water and waste management sectors in South Africa. With FMO as an anchor investor, the fund obtained support from benchmark local and international institutions. The Fund specifically targets investees that want to invest in renewable energy and cleaner technology projects that contribute to a reduction in carbon emissions as well as businesses that focus on climate change mitigation and clean technologies.^{126,127}</p>
German Kreditanstalt für Wiederaufbau (KfW)
<p>In alignment with the focus areas for development cooperation set by the German Government, the KfW's activities in South Africa focus on projects related to energy & climate. CE related activities financed by the bank include the support of the Clean Ocean Initiative under which the KfW provided financing of EUR 80 Million for a wastewater management project in Cape Town.¹²⁸ As part of the project 26 water treatment and sewage plants were refurbished, repaired and expanded in order to address issues such as the spread of waterborne disease, harmful leaks to the environment and other impacts that resulted from an outdated water system. As the city is expanding with an alarming speed, the project further aimed to adapt the water system to the needs of the ever-growing number of inhabitants, taking into account the required capacity of the next thirty to forty years.¹²⁹</p>
Agence Française de Développement (AFD)
<p>Under the AFD's green finance label, Sunref, various South African companies have received financial support to achieve their specific sustainability goals. This includes Connacher, a recycling company based in Hammersdale, Kwa-Zulu Natal, which has benefitted from Sunref funding and strongly increased their production capacities and output (2.5-fold). The company recycles waste textiles making them usable again for different industries. The bio-briquetting business has become a particular success as it shortened the project payback period and increased the viability of the overall business.¹³⁰</p>

¹²⁵ <https://www.eib.org/en/projects/pipelines/all/20190746>

¹²⁶ <https://www.fmo.nl/project-detail/31595>

¹²⁷ <https://www.fmo.nl/project-detail/55790>

¹²⁸ https://suedafrika.ahk.de/fileadmin/AHK_Suedafrika/Short_Market_Analysis_Waste_South_Africa.pdf

¹²⁹ <https://www.kfw.de/stories/economy/infrastructure/treatment-plants-cape-town/>

¹³⁰ <https://www.sunref.org/en/projet/increasing-productivity-via-energy-efficient-textile-recycling-equipment/>

Based on the mapping exercise above, the following opportunities for DFIs to facilitate CE in South Africa were identified:

Table 4-5 Opportunities and barriers for future CE-related DFI-activities in South Africa

Opportunities and barriers for future CE-related DFI-activities in South Africa
<p>In the past circular economy related projects often ended at report level (reflecting potential only) without focusing on the implementation of actual measures. DFIs should therefore especially consider the embedding of their projects into the local legal framework (instead of ending at the reporting level, without including an implementation phase), as outcomes and recommendations are otherwise only difficult to support.</p>
<p>As financing solutions need to be viewed holistically, it is necessary to ensure a continuum between the pilot phase, the subsequent development phases as well as the relevant policy frameworks. To achieve this, DFIs could cooperate with the EU Chambers in order to lobby for a more conducive legal framework.</p>
<p>The EIB and other DFIs could use circular economy projects conducted in the EU as a guideline. In this context 2 particularly relevant mechanisms have already been developed: (1) The Circular City Funding Guide¹³¹ and; (2) InnovFin a successful Research & Innovation project that has already been tested in the EU market and could be of interest in the South African Context¹³².</p>

4.4 Trade and investments in environmental goods and services

South Africa's trade relations and development co-operation with the European Union are currently governed by the Trade, Development and Co-operation Agreement (TDCA). The TDCA has established a Free Trade Area (FTA) that covers 90% of bilateral trade between the EU and South Africa. In order to protect the vulnerable sectors of both parties, certain products are excluded from the FTA. For the EU, these are mainly agricultural products, while for South Africa, they are industrial products, in particular certain motor vehicle products and certain textile and clothing products.¹³³ In June 2006 the Southern African Development Community Group (SADC) comprising South Africa, Botswana, Lesotho, Mozambique, Namibia, and Eswatini (formerly Swaziland) signed the Economic Partnership Agreement (EPA) between the EU and the SADC. The EPA guarantees South Africa improved trading terms with the EU mainly in agriculture and fisheries, including for wine, sugar, fisheries products, flowers and canned fruits, while fully or partially removing customs duties on 98.7% of imports coming from South Africa¹³⁴. The EU on the other hand obtains meaningful new market access into the Southern African Customs Union (products include wheat, barley, cheese, meat products and butter).¹³⁵ Although the EPA aims to promote sustainable development within South Africa and the entire SADC, it still lacks specific reference to the improved trade of environmental goods and services.

Until date, exports of green/ environmental goods and services remain a small part of South Africa's broader export basket. Of the 12 green trade products identified under the Green Economy Industry and Trade Analysis conducted by PAGE, only catalytic converters are a significant export commodity, a result

¹³¹ <https://www.circularcityfundingguide.eu/>

¹³² EIB (n.d.) InnovFin - EU Finance for innovators. [online] Available at: <https://www.eib.org/en/products/blending/innovfin/index.htm>

¹³³ 2019. 1ST MEETING OF THE JOINT COUNCIL OF THE EU-SADC ECONOMIC PARTNERSHIP AGREEMENT (EPA). [online] Available at: https://trade.ec.europa.eu/doclib/docs/2019/february/tradoc_157698.pdf [Accessed 30 June 2020].

¹³⁴ Trade.ec.europa.eu. 2020. [online] Available at:

https://trade.ec.europa.eu/doclib/docs/2014/october/tradoc_152818.pdf [Accessed 17 July 2020].

¹³⁵ Ec.europa.eu. 2020. Southern African Development Community (SADC) - Trade - European Commission. [online] Available at: <https://ec.europa.eu/trade/policy/countries-and-regions/regions/sadc/> [Accessed 17 July 2020].

of the strength of South Africa's platinum industry and large-scale support from government. The same is true for the export of fuel cells which is heavily supported by the South African government, notably through the programmes of the Department of Science and Technology (DST) ¹³⁶. On the import side, rapid growth from a low base has resulted in several green products growing at extremely high rates. As a result of Renewable Energy Independent Power Producers Procurement Programme (REIPPPP), which was initiated in 2011, especially the imports for solar and wind power equipment from China, the USA and the European Union has increased drastically. Other green product imports are mostly made up of control equipment for electrical power, which includes smart meters and other monitoring systems, as well as a variety of waste management technologies¹³⁷. South Africa currently imports twice as many "green" goods and services than it exports. However, the Government is showing a strong commitment to create the conditions for new "green" export industries to thrive, and to take advantage of the potential to produce green products and services domestically, rather than to import them.¹³⁸

To support South Africa in reaching this target, the UN Environment's Environment and Trade Hub delivered training to provincial-level policymakers, non-state actors and other stakeholders on the role of green industrial policy and trade in the green economy transition. The training included a toolbox on green and industrial policy and trade, which also forms part of the Green Industrial Policy trilogy of PAGE (see section 4.1) ¹³⁹.

Based on the mapping exercise above following opportunities and barriers for improving the trade and investments in environmental goods and services between the EU and South Africa:

Table 4-6 Opportunities and barriers for trade and investments in environmental goods and services between the EU and South Africa

Opportunities and barriers for trade and investments in environmental goods and services between the EU and South Africa
<ul style="list-style-type: none"> As the current version of the EU-SADC EPA does not explicitly refer to trade in environmental goods and services, the forthcoming review, which is scheduled for 2021 under the provisions of the agreement, can serve as an opportunity to fill this gap within the agreement. This could include specific recommendations and measures to increase trade in environmental goods and services (e.g. green procurement, special provisions for remanufacturing goods) between the parties Although imports of hazardous waste from the EU to South Africa have caused major incidents in the past, the country still shows a weak regulatory framework banning waste imports and continues to offer ideal conditions for international waste dealers. In particular, the import of white goods and used electronics from Germany, China, United States, United Kingdom, Japan and the Republic of Korea has been identified as a major issue in South Africa. Seeking to restrict the movement of hazardous waste between countries, specifically from developed countries, South Africa has ratified the Basel Convention (1989). However, similar to many other African countries, South Africa has not applied this domestically in the form of appropriate legislations for various waste streams. Due to its potential impact on trade in waste and the interest in importing waste for recycling in the future, the Bamako Convention (1991), which bans the import of hazardous wastes into Africa

¹³⁶ PAGE (2018) A GREEN ECONOMY INDUSTRY AND TRADE ANALYSIS. [online] available at: https://www.un-page.org/files/public/green_economy_industry_and_trade_analysis_-_south_africa.pdf

¹³⁷ PAGE (2018) A GREEN ECONOMY INDUSTRY AND TRADE ANALYSIS. [online] available at: https://www.un-page.org/files/public/green_economy_industry_and_trade_analysis_-_south_africa.pdf

¹³⁸ UN Environment Programme (2018) Environment and Trade Hub: Laying the groundwork for green trade in South Africa. [online] Available at: <https://www.unenvironment.org/news-and-stories/story/environment-and-trade-hub-laying-groundwork-green-trade-south-africa>

¹³⁹ UN Environment Programme (2018) Environment and Trade Hub: Laying the groundwork for green trade in South Africa. [online] Available at: <https://www.unenvironment.org/news-and-stories/story/environment-and-trade-hub-laying-groundwork-green-trade-south-africa>

and minimises and controls the trans-boundary movement of hazardous waste, was also not ratified by South Africa.

4.5 EU companies with circular economy operations in the country

In the recent decades, South Africa has been able to attract many EU companies and to date over 2000 EU companies operate within South Africa creating over 350 000 jobs and producing value added goods which are exported and contribute substantially to skills development and job creation¹⁴⁰. Although a growing number of these companies is becoming active in in circular economy-related activities, most of these activities are however conducted independently, meaning that their integration in the local business context may still be improve. The following table lists EU companies that carry out CE-related operations in South Africa.

Table 4-7 Selected EU companies with CE operations in South Africa

<p>Erema (Austria)</p> <p>The Austrian company, Erema has successfully established partnerships with various recycling plants in Western Cape. Erema has equipped Wingspan Plastics, a recycling company that has been in the market for over ten years and is the Western Cape’s second largest recycler of plastics. It processes up to 7,200 tonnes of post-consumer and post-industrial scrap each year, providing recycled pellets for the film and injection moulding industry. The post-consumer input material mainly consists of PE films and HDPE regrind material from cosmetic bottles, screw tops, as well as poison cans used in farming activities. The company also processes clean, sorted scrap plastic such as LDPE films with paper labels from pallet packaging in the post-industrial sector. The plant is fully committed to EREMA technologies in most of their processes¹⁴¹.</p>
<p>Herbold Meckesheim (Germany)</p> <p>The German company Herbold Meckesheim recently installed a new large-scale plant in Germiston South close to Johannesburg. The plant processes strongly polluted mixed PE waste with a capacity of up to 8,000 tons of foils, used big bags and comparable waste materials per year. To remove impurities the pressed bundles of waste are pre-sorted, shredded and washed. This is followed by various washing processes, which also remove non-processable plastic materials. Finally, the purified materials are dried and transformed into pellets. According to the company, the recycled pellets can then be used for the next manufacturing cycle of high-quality foil¹⁴².</p>
<p>Unilever (Netherlands)</p> <p>The Dutch-British food and beverage company Unilever has initiated various projects around their own production facilities in South Africa. Unilever has dealt with the water scarcity which South Africa is increasingly facing. Unilever committed to halving the amount of water consumers need when using their products by 2020. Their mission was to adapt their products for the South African market in a way to ensure that they require less water and, in some cases, even no water at all. Another project was targeted at the prevention of plastic pollution by encouraging plastic collection services. A pilot project launched in September 2019 worked closely with reclaimers/collectors and residents in the Brixton and Auckland Park communities in order to demonstrate that reclaimers can provide an efficient, cost effective separation service. The project aims to increase collection rates of recyclable material from households and offices, improve the livelihoods for reclaimers through recognition and compensation for their collection work, as well as overall community behaviour change on waste management. Besides funding reclaimer service fees, Unilever focuses on supporting the reclaimers in the ongoing need to educate and encourage communities to play their part in sustainability practices. The pilot project forms part of Unilever’s Sustainable Living Plan (USLP) that aims to reduce the company’s environmental impact by half until 2030. Unilever South Africa</p>

¹⁴⁰ Friedrich Ebert Stiftung (2016) [Reviewing a Decade of the EU-South Africa Strategic Partnership](#). [Accessed 3 December 2020].

¹⁴¹ https://www.ereama.com/en/success_stories/#filterLand=country_ZA

¹⁴² <https://eu-recycling.com/Archive/19112>

has further committed to 100% reduction in single-use plastic packaging by 2025, with one of the flagship brands, Sunlight Dishwashing Liquid, leading the way for this ambition with its 100% recycled & recyclable bottle¹⁴³.

Remondis (Germany)

The German recycling and water management company, Remondis has joined a group of scientific and business partners to initiate a research project in South Africa, looking into the possibilities of applying integrated water resource management. The study found that increasing value-added processes should be a medium to long-term goal of future activities in the water sector. It also revealed a need for developing or importing both know-how and technology. The involvement of locals and South African businesses was identified as another important factor for improving the South African water system. The findings of the study are used as a base to optimise the water value flow, while achieving more socio-economic benefits. As one of the first milestones, the company wants to create suitable structures to ensure that high quality water facilities can be operated both economically viable and environmentally friendly. The Middle Olifants region presents a starting point for the company with possible expansion of the approach in the future.¹⁴⁴

Alpla (Austria)

Alpla Group is an international specialist for plastic packaging and recycling based in the city of Hard. Recently Alpla has started to build a new facility in Lanseria, South Africa, which is expected to open its doors in summer 2021. With the construction of a new production site in South Africa, Alpla plans to consolidate five existing plants from around South Africa into the new Lanseria plant. Standard bottle solutions and tailor-made packaging for the food, personal care, home care, chemical, detergent and pharmaceutical industries will be predominantly manufactured in the new facility. Customers include international groups as well as smaller, local players, according to Alpla. The Lanseria plant allows the company to produce according to globally applicable corporate standards. This should not only improve the product quality, but also meet the increasing demands of global consumers¹⁴⁵.

Based on the mapping exercise above following opportunities and barriers for future CE-related activities of EU companies were identified:

Table 4-8 Opportunities and Barriers for future CE-related operations of EU companies in South Africa

Opportunities and Barriers for future CE-related operations of EU companies in South Africa
<ul style="list-style-type: none"> • Strategically providing access to education, training and skills for their own workers as well as students would help both EU and local businesses seize new opportunities of future circular economy related labour markets. Special attention should be paid to the further education of girls and women • EU companies active in the water and sanitation sector may profit from a collaborative engagement, promoting better water management in South Africa. • By investing in strengthening collaborative circular economy structures and capacities across Africa, SA included, EU companies could help to foster knowledge exchange and identify co-working opportunities on selected issues. • A particular opportunity for EU companies active in the waste management sector lies in the development of mechanisms for inclusion of the informal sector in waste management as the existing structures could significantly benefit circular economy related approaches such as recycling and reuse of resource as well as the co-creation of solutions. • The creation of dedicated stream of work with EU businesses through chambers of commerce (EU and SA companies) to offer more detailed profitable examples of CE concepts • Supporting structures for green and circular economy business models are yet to be integrated in existing policy frameworks. • Low consumer awareness of circular economy might hinder a successful rollout of CE business models

¹⁴³ Unilever (2019) [Building an inclusive circular economy: recycling with reclaimers](#). [Accessed 3 December 2020].

¹⁴⁴ <https://www.remondis-sustainability.com/en/inspiring/research/#c164254>

¹⁴⁵ <https://www.recyclingtoday.com/article/alpla-plastic-packaging-recycling-builds-site-south-africa/>

Research and technical cooperation

Preceding the ratification of the Trade, Development and Cooperation Agreement (TDCA), South Africa and the EU already signed the Science and Technology Cooperation Agreement. The agreement, signed in 1996, outlines the first joint activities in research and technical cooperation. It also consolidated the first thematic dialogue forum between the EU and South Africa. Ever since, research cooperation activities between the EU and South Africa have been productive, with both partners having participated in a total of 16 meetings of the Joint Science and Technology Cooperation Committee.¹⁴⁶

South Africa has also concluded several bilateral cooperation agreements with EU and Associated Member States, and is aiming to create a robust national system of innovation to enable its transition to a knowledge economy, achieving sustained growth and development. To this regard, the Strengthening, Technology, Research and Innovation Cooperation between Europe and South Africa (ESASTAP) initiative provides an opportunity to support the deepening of scientific and technological cooperation between South Africa and Europe with a special focus on innovation.¹⁴⁷ Based on the successes of the preceding projects (ESASTAP, ESASTAP-2, ESASTAP Plus and ESASTAP 2020 projects), which were funded by the European Commission with contribution of the Department of Science and Innovation (DSI) of South Africa, the platform continues to support and strengthen the SA-EU STI relations. ESASTAP is thus forming a central instrument within the sphere of STI and providing an important connecting piece in transferring the recommendations and needs from the policy dialogue level to the implementation level.¹⁴⁸

Although CE does not yet form an explicit part of joint scientific undertakings within the research landscape shared between the EU and South Africa, it has evidently become more prevalent. This is especially underlined in the most recent White Paper on Science, Technology and Innovation published by the DSI. The white paper, which sets the long-term policy direction for the South African government to ensure a growing role for STI, clearly addresses the need to support the transition to a circular economy.¹⁴⁹ Furthermore, the study tour on Circular Economy in 2019, which took place in the framework of EU-SA policy dialogues (see section 4.1), and was, apart from policy makers, also joined by a group of leading South African research scientists, which visited circular economy related European facilities.¹⁵⁰ Given that EU's new framework programme for science and innovation "Horizon Europe" shows a strong focus on CE, CE-related research and technical cooperation between South Africa and the EU are likely to gain importance in the near future

Table 4-9 CE-related research and technical cooperation between South Africa and the EU

SWITCH Africa Green	The SWITCH Africa Green programme is developed and funded by the European Union to support African countries in their transition to an inclusive green economy and in promoting Sustainable Consumption and Production (SCP) patterns and practices. The programme is managed by the European Commission (DG DEVCO) and has already been implemented in 7 African countries: Burkina Faso, Ghana, Kenya, Mauritius, South Africa, Ethiopia and
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¹⁴⁶ 2020. *JOINT COMMUNIQUE OF THE 16TH SOUTH AFRICA - EUROPEAN UNION JOINT SCIENCE AND TECHNOLOGY COOPERATION COMMITTEE*. [ebook] Available at: https://ec.europa.eu/research/iscp/pdf/policy/ec_rtd_joint_communique_eu-sa_jstcc_2019.pdf [Accessed 30 June 2020].

¹⁴⁷ ESASTAP. 2020. *Home | ESASTAP*. [online] Available at: <https://esastap.org.za/> [Accessed 30 June 2020].

¹⁴⁸ *ibid*.

¹⁴⁹ Department for Technology and Innovation (2019). *White Paper on Science, Technology and Innovation*. [online] Available at: https://www.dst.gov.za/images/2019/WHITE_PAPER_ON_SCIENCE_AND_TECHNOLOGY_web.pdf

¹⁵⁰ Twitter.com. 2020. *Twitter*. [online] Available at: <<https://twitter.com/ESASTAP/status/1198911489136058374>> [Accessed 30 June 2020].

	Uganda. The programme has three components: Policy Support, Green Business Development and Networking Facility. Since 2018, the Green Business Development component is implemented by the EU Delegations with support from DG DEVCO.
Global Alliance to end Plastic Waste	The Global Alliance is a not-for-profit organisation that includes companies that make, use, sell, process, collect and recycle plastics. This includes chemical and plastic manufacturers, consumer goods companies, retailers, converters, and waste management companies, also known as the plastics value chain. The Alliance has been working with the World Business Council for Sustainable Development as a founding strategic partner.
EWIT	Funded under the European Commission's Horizon 2020 Research and Innovation Programme, the e-waste implementation toolkit (EWIT) was developed to support the recycling and secondary raw material recovery strategies in metropolitan areas in Africa. EWIT contributes by defining the conditions and actions necessary to implement effective electronic waste management systems in African urban areas, improving environment and health protection of local communities, generating new jobs and increasing recycling opportunities for entrepreneurs. ¹⁵¹
AquaVitae	AquaVitae is a research and innovation project funded by the EU's Horizon 2020 programme. The project consortium consists of 36 partners, from 16 different countries, spread across four continents. In addition to Europe, partners are situated in countries bordering the Atlantic Ocean, including Brazil, South Africa, Namibia, as well as in North America. The project aims to facilitate sustainable and innovative aquaculture across the Atlantic Ocean with a focus on a circular economy and the zero-waste approach. ¹⁵²
ReTraCE	Bringing together a team of world-leading experts from a wide set of beneficiaries and partners, ReTraCE aims to achieve breakthroughs in understanding how the transition towards a circular economy can be realised in a successful way in the European context, both within existing organisations and industries as well as through innovative and sustainable business models. The project is, among others, supported by the South Africa based African Circular Economy Network. ¹⁵³
BIORECOVER	The EU-funded BIORECOVER project, aims to develop a sustainable and safe process based on biotechnology for the selective extraction of a range of critical raw materials from primary and unexplored secondary sources. The project is among others supported by the University of Cape Town and the University of the Witwatersrand in Johannesburg. ¹⁵⁴
SisAl Pilot	SisAl Pilot aims to demonstrate a patented novel industrial process to produce silicon, (Si), a critical raw material, enabling a shift from today's carbothermic Submerged Arc Furnace (SAF) process to a far more environmentally and economically alternative: an aluminothermic reduction of quartz in slag that utilizes secondary raw materials such as aluminium (Al) scrap and dross, as replacements for carbon reductants used today. The project is among others supported by the South African research institution, MINTEK. ¹⁵⁵
ERA-MIN 2	To strengthen industry competitiveness and the shift to a circular economy, ERA-Min 2 aims to implement a Europe-wide coordination of research and innovation programs on raw materials. The project is among others, supported by the South African Department for Science and Innovation. ¹⁵⁶

Furthermore, several EU member states are involved in circular economy related joint research activities. The French Development Agency is currently supporting the digital content hub in Johannesburg - a facility that fulfils a number of different requirements for South Africa's digital scene to thrive. It serves as an incubator for entrepreneurs, provides training of skills needed to succeed in the digital economy

¹⁵¹ <https://ewit.site/about-ewit/>

¹⁵² https://aquavitaeproject.eu/press_releases/low-trophic-aquaculture-on-the-spotlight-in-new-eu-funded-project/

¹⁵³ <https://cordis.europa.eu/project/id/814247>

¹⁵⁴ <https://cordis.europa.eu/project/id/821096>

¹⁵⁵ <https://cordis.europa.eu/project/id/869268>

¹⁵⁶ <https://cordis.europa.eu/project/id/730238>

and collaborates with academia, corporates, government and entrepreneurs to disseminate these skills into all societal spheres. The project started in 2018 and also involves training modules provided by French institutes. Although no direct link to circular economy exists, some of the thematic alignments of the digital hub also captures circular economy related aspects.¹⁵⁷ Finland is similarly involved with the digital sector. The country collaborated with South Africa in the opening of the Future Africa Innovation Campus in Pretoria. Similar to the Digital Hub, there is currently no specific circular economy alignment of this facility, however, it could exhibit some circular economy elements.¹⁵⁸ The German development agency collaborated with the Department of Science and Technology in an effort to provide technical training for aspects of the green economy within the TVET education system. The project aimed at establishing topics such as renewable energy and sustainable production in the curriculum, while also providing lecturers with course-relevant training and teaching materials.¹⁵⁹

Table 4-10 South African research institutions active in CE-related research

The Council for Scientific and Industrial Research (CSIR)
<p>The Council for Scientific and Industrial Research (CSIR) is a leading scientific and technology research organisation that researches, develops, localises and diffuses technologies to accelerate socioeconomic prosperity in South Africa. The organisation's work contributes to industrial development. The organisation plays a key role in supporting public and private sectors through directed research that is aligned with the country's priorities, the organisation's mandate and its science, engineering and technology competences.</p> <p>CSIR, among other things, runs a Bio-refinery Industry Development Facility that supports the development of high-value products from biomass waste¹⁶⁰. The council is further involved in the development of Green chemistry technologies including the development and implementation of cutting-edge green chemistry technologies through combined bio- and chemical conversions of biological and petrochemical feed stocks.¹⁶¹</p>
The Water Research Commission (WRC)
<p>The Water Research Commission (WRC) was established in terms of the Water Research Act (Act No 34 of 1971), following a period of serious water shortage. It was deemed to be of national importance to generate new knowledge and to promote the country's water research purposefully, owing to the view held that water would be one of South Africa's most limiting factors in the 21st century. The WRC contributes to the development of the capacity of the water sector, the broadening of the country's water-centred R&D base, and the WRC's continued commitment to direct and fund research on critical issues</p>
Trade & Industrial Policies Strategies (TIPS)
<p>Trade & Industrial Policies Strategies (TIPS) is an independent, non-profit, economic research institution established in 1996 to support economic policy development. TIPS undertake quantitative and qualitative research, project management, dialogue facilitation, capacity building and knowledge sharing. Its areas of focus are trade and industrial policy, sustainable growth, and inequality and economic inclusion.</p>

¹⁵⁷ Afd.fr. 2020. *A Digital Content Hub For The African Continent*. [online] Available at: <https://www.afd.fr/en/carte-des-projets/digital-content-hub-african-continent?origin=/en/carte-des-projets> [Accessed 30 June 2020].

¹⁵⁸ 2020. *South Africa Opportunities In The Circular Economy Sector*. [online] Available at: <https://www.marketopportunities.fi/home/2019/south-africa-opportunities-in-the-circular-economy-sector/> [Accessed 30 June 2020].

¹⁵⁹ Giz.de. 2020. *TVET And The Promotion Of Innovation For Green Employment*. [online] Available at: <https://www.giz.de/en/worldwide/17848.html> [Accessed 30 June 2020].

¹⁶⁰ CSIR (n.d.) *ADVANCED AGRICULTURE AND FOOD*. [online] Available at: <https://www.csir.co.za/advanced-agriculture-and-food>

¹⁶¹ CSIR (n.d.) *FUTURE PRODUCTION: CHEMICALS*. [online] Available at: <https://www.csir.co.za/future-production-chemicals>

TIPS's research focus areas include, among other things, sustainable growth and green economy, where the organisation has published a multitude of research papers on topics such as the development of bio-materials, green economy strategies, or green jobs. ¹⁶²

Based on the mapping exercise above following opportunities for future CE-related research cooperation between the EU and South Africa were identified:

Table 4-11 Opportunities and Barriers for future CE-related research cooperation between South Africa and the EU

Opportunities and Barriers for future CE-related research cooperation between South Africa and the EU
<ul style="list-style-type: none"> • Cooperating with existing facilities that engage in scientific exchange in South Africa (Digital Hub in Johannesburg, Future Africa Innovation Campus in Pretoria amongst the EU-affiliated facilities) EU actors may promote circular economy related working groups and exchanges. This exchange could be further developed by creating a circular economy research task force, which focuses on specific CE activities (e.g. waste management, green entrepreneurship, wastewater treatment, e-waste recycling) • Further possibilities for supporting circular economy in South Africa lie in the cooperative development of a local database for life cycle assessments that can evaluate local green and circular products and production methods. • Research cooperation between the EU and SA could also focus on the development of shared standards for circular economy products - This could set the framework for more coordinated and aligned research and technical cooperation in the future.

¹⁶² TIPS (n.d.) Green Economy. [online] available at: <https://www.tips.org.za/research-archive/sustainable-growth/green-economy>

5 Recommendations

Throughout the report, we have provided an overview on the status of the circular economy in South Africa with a focus on priority sectors in the South African policy context and that also coincide with the circular economy priorities in the EU Circular Economy Action Plan.

5.1 General findings and recommendations

- In South Africa there is policy and funding that drives and supports a green economy transition, but does not explicitly refer to a circular economy;
- We recommend that there be clarity and development of terminology and awareness for the circular economy to help support the transition. There should be explicit reference to and prioritisation of circular economy considerations in the existing green economy policy framework. Promoting the term circular economy would define a guiding line in the various initiatives set up by both European and international actors and ensure a common understanding;
- Clarity and development of terminology and awareness for the circular economy can help support the transition. Promoting the term circular economy would define a guiding line in the various initiatives set up by both European and international actors;
- The term circular economy must be generalised in all the sectors it encompasses, whether it be for the creation of green jobs, the improvement of waste management, the implementation of more responsible agricultural techniques, etc.
- Existing dedicated circular economy strategic documents, like a national CE action plan should be elaborated.

5.1.1 Governance for implementation of national roadmaps

Although various discussions are underway, presently there is no national circular economy roadmap. We recommend that the EU support the establishment of an Advisory Board that has a mandate to drive implementation of policy. Departments have advocated that a circular economy Advisory Board will ensure a systemic approach to the adoption of circular economy principles. This would ensure that the Roadmap (when it is established) does not act as a static document, but can be agile based on the needs of its stakeholders.

- A coordinated approach championed by DEFF with close alignment with DSI, dtic and National Treasury, can support the establishment of an Advisory Board for circular economy. The Board can also include multi-sectoral stakeholders from the private sector, where relevant.

5.2 EU - South Africa Cooperation

Table 5-1 Cooperation areas and recommendations between the EU and South Africa cooperation

Cooperation area	Recommendations
Strengthening policy dialogues	<p>Framework for engagement that is inclusive of public and private sector</p> <ul style="list-style-type: none"> • Existing circular economy related SA-EU policy dialogues offer the potential to extend multilateral dialogue on circular economy. This also applies to events hosted under Switch Africa Green. Pooling existing expertise by linking the circular economy related dialogue

Cooperation area	Recommendations
	<p>efforts in a dedicated work stream or think tank might improve coordination of the joint efforts.</p> <ul style="list-style-type: none"> • Policy dialogue needs to be elevated to the level of Ministers, to have the desired impact. In order to ensure continued relevance to SA, the EU must engage with key issues such as employment and economic benefits of circular economy. Increased EU lobbying for circular economy could facilitate relevant legislative changes in SA. This concerns both circular economy dialogues and trade policy dialogues. • The EU must be ready to debate on tangible value that the circular economy brings and how it can benefit South Africa's economy, as well as offer examples of where it is demonstrated that it can work. This is why activities like the 2019 DSI EU-SA dialogue are so effective. Against this backdrop, the circular economy needs to be intrinsic to all economic and development needs, such as sustainable employment creation, based on robust policies that incentivise circular approaches. • The mainstreaming of circular economy into other key policy dialogues (e.g. Chambers of Commerce, B2B platforms, dialogues feeding into SADC EU EPA processes) is needed. • Support MSMEs through the creation of dedicated hubs/clusters with EU businesses through chambers of commerce (EU and SA companies) to offer more detailed profitable examples of circular economy concepts as case studies; • 'Voluntary business initiatives' (from EU and from South African business organisations) can further support engagement on policy to strengthen green employment within the circular economy. <p>Fact-finding missions can offer platforms for policy dialogues informed by on-the-ground experience from local stakeholders.</p> <ul style="list-style-type: none"> • These should ideally be driven by exchange of knowledge. More exchanges and fact-finding missions such as the 2019 EU-SA exchange should take place. This type of mission helps to create a dedicated workstream with EU businesses through chambers of commerce (EU and South African companies) to offer more detailed profitable examples of circular economy concepts; • There is need for first-hand experience of SA, to learn from the EU (missions) the CE processes that have been included and how (if any) these would be relevant to South Africa's transition. These tours hosted by the EU or member states such as planned by Flanders in Belgium (now postponed), are noted to have a positive impact on dialogue and implementation as seen in the EU study tour from 2019. The outcomes and level of commitment from these tours need to be carefully monitored to ensure strategic interventions are developed and prioritized.
<p>Successful development cooperation projects and programmes</p>	<p>Unlocking potential beyond pilot phase</p> <p>To have real impact, development cooperation projects and programmes need to extend beyond reporting and feasibility studies (pilot phase) to include implementation. A holistic approach with this end goal in mind will help identify any unforeseen barriers such as legislative hurdles.</p> <ul style="list-style-type: none"> • Policy and legislative support will drive projects beyond pilot-phase to scalable and sustained implementation. Pilot projects provide material for case studies and serve to raise awareness. However scaling up CE practices and business models can create a tangible impact in terms of growth, jobs and environmental objectives; Further consideration needs to be taken of access to finance, business case, availability of technology support, etc. • Focus on most promising sectors and seek to exploit synergies • The extensive range of green- and circular economy related initiatives in South Africa offers potential alignment with future EU development cooperation programmes. Exploiting potential synergies between the various circular economy related projects may significantly support the development of a national circular economy structure.

Cooperation area	Recommendations
<p>Effective cooperation with the European Investment Bank (EIB) and other European Development Finance Institutions (DFIs)</p>	<ul style="list-style-type: none"> • The Project Development and Support Facility (EIB and Development Bank of Southern Africa (DBSA) joint facility) should focus on high development impact projects, notably also investing in rehabilitation measures, while promoting climate change resilience of existing infrastructure. This facility for funding can be strengthened by alignment with EIB's Circular Economy Guide, Climate Roadmap and Energy Lending Policy. The EIB's existing work in Europe can serve as guidance to effective cooperation in South Africa. • InnovFin brings successful Research & Innovation projects closer to market. This approach can be applied to South Africa for the implementation of innovative technologies that are traditionally difficult to finance. This needs to be explored as a potential model for financing in South Africa; • EU cooperation with existing funds being established in SA, such as the GreenCape Green Outcomes Fund that supports SMMEs, to bolster information dissemination, garner support and drive aggregation. EU involvement will increase visibility. EU support and knowledge sharing should include the evaluation of green bonds and funds in SA to establish best way forward for targeted support for a circular economy transition. • Financing solutions should be made available for both pilot and implementation of initiatives. A continuum between the pilot phase and the subsequent development phases as well as the policy framework has to be ensured. To achieve this, DFIs could cooperate with the EU Chambers in order to be able to better lobby the legislature. <p>Knowledge sharing and localising best practices</p> <p>The EIB and other DFIs could use circular economy projects conducted in the EU as a guideline. In this context, two particularly relevant mechanisms have already been developed: (1) The guidebook for municipalities and local authorities who want to address CE and; (2) InnovFin successful Research & Innovation projects that has already been tested in the EU market that could be of interest in the South African Context. This can be focused based on the priority sectors identified.</p>
<p>Advancing trade and investments in environmental goods and services between the EU and South Africa</p>	<ul style="list-style-type: none"> • Formulate harmonised regulations and/or criteria on what constitutes an environmental good or service, and a preferential regime for them (e.g. custom duty exemption, green tax). This issue could be enhanced through the framework of the Africa Continental Free Trade Area AfCFTA. • Technology can be used as an accelerator to speed up, leap frog and explore new areas of growth. • Work with dtic to develop mechanisms to incentivise investment in technologies for resource efficiency. Platforms such as NCPC (National Cleaner Production Centre) can be leveraged.
<p>Creating a supportive environment for EU / African companies with circular economy operations in South Africa</p>	<ul style="list-style-type: none"> • Strategically providing access to education, training and skills for their own workers as well as students would help both EU and local businesses seize new opportunities of future circular economy related labour markets. Special attention should be paid to the further education of girls and women. • By investing in strengthening collaborative circular economy structures and capacities across Africa, SA included, EU companies could help to foster knowledge exchange and identify co-working opportunities on selected issues. • A development opportunity lies with inclusion of the informal sector in waste management. The existing structures could significantly benefit from circular economy related approaches such as recycling and reuse of resource as well as the co-creation of solutions.
<p>Advancing research and technical cooperation</p>	<ul style="list-style-type: none"> • South Africa requires a more systematic engagement on the education and training sector, with particular emphasis on developing ecological and technical skills of the trainers and trainees. EU engagement on educational best practice can support a strained educational system needed for a strong research base.

Cooperation area	Recommendations
between the EU and South Africa	<ul style="list-style-type: none"> • Advancement of research activities with DSI is of high priority in bilateral discussion and needs to explicitly focus on circular economy research. • Incubators need to be established to build on joint research and develop technologies that can be adopted in the South African context. The emphasis needs to be on cooperation, with strong contribution of local expertise. • Cooperating with existing facilities that engage in scientific exchange in South Africa (Digital Hub in Johannesburg, Future Africa Innovation Campus in Pretoria amongst the EU-affiliated facilities), EU actors may promote circular economy related working groups and exchanges. This exchange could be further developed by creating a circular economy research task force which focuses on specific CE activities in the identified priority sectors. <p>Research cooperation between the EU and SA could include the development of standards for circular economy products.</p>

5.3 Sector-specific recommendations

Table 5-2 Sector-specific recommendations

Agriculture
<p>Knowledge exchange</p> <ul style="list-style-type: none"> • Programmes that create new employment opportunities for vulnerable communities in the agricultural sector with support to capacitate unskilled workers are essential. Key areas of focus can be achieved by working with members of the value chain to identify, in priority, areas of greatest impact. • Best practice exchanges, lessons learned and case studies showcasing successful, cost effective adoption are needed. This can be identified by reviewing existing programmes such as Switch Africa Green for relevant case studies to showcase in detail. • Engagement with experienced EU practitioners can support scaling of existing initiatives for food security, irrigation solutions, and biomass beneficiation. A number of these pilots already exist but may need guidance for further development. <ul style="list-style-type: none"> ○ CoCreate, the existing partnership between South Africa and the Netherlands which includes a focus on Climate Smart Agriculture, can be leveraged for knowledge and technology sharing.
<p>Food loss and waste</p> <ul style="list-style-type: none"> • As most food loss occurs on the farm, initiatives that focus on harvesting practices and storage will be most impactful for waste prevention. A start with knowledge exchange can be developed into introduction of technology related best practice. • The size and scope of private sector engagement is based on adoption of voluntary agreements as well as ability to use food and organic waste for further beneficiation. • EU member states and businesses with best practice examples and appropriate technology solutions / models can help accelerate this transition. • The importance of including end-consumers in food waste and loss mitigation is imperative. Consumer education campaigns are needed (to ensure clear grasp of food standards and labelling, correct storage at home, and preparation and preservation methods that can minimise waste at home). This should be included in any planned initiatives.
Plastics Industry
<p>Inclusive employment and green growth</p> <ul style="list-style-type: none"> • South Africa can leverage the existing Industrial Symbiosis Programme, a resource efficiency approach where unused or residual resources of one company are used by another. This results in mutual economic, social and

environmental benefits. The programme is driven by the NCPC which forms part of an international community. This creates an opportunity to introduce international best practice.

- Localised beneficiation and proper supply chain management is needed. A mechanism needs to be developed that effectively includes the informal sector.

Innovation and product development

- The industry's circular economy shift can be bolstered by interventions across the value chain, starting with clear guidelines on designing for recycling and the inclusion of recycled content specifications, including materials specifications, engineering specifications, compliance systems, and supply chain requirements. The plastics industry needs to engage with designers and developers across the product value chain, to ensure full product lifecycle is considered during design, in order to shift from "waste to worth" at end of lifecycle. A number of these designers work in multinationals outside South Africa. A pathway for engagement needs to be developed.
- Establish the economic viability of chemical recycling as it poses several advantages such as being able to process several unsorted materials at the same time and being able to address traditionally "unrecyclable" plastics. This currently occurs to a very limited extent, mainly due to cost and a relatively small market for recovered chemicals.

Knowledge sharing and technology adoption

- There is opportunity for knowledge and experience sharing between the EU and SA regarding guidelines and regulation, as well as for the inclusion of technologies obtained from abroad, modified for an African context. We recommend the following:
 - The Circular Plastics Alliance can play a key role in sharing lessons learned in boosting the market for recycled plastics.
 - South Africa is emulating European models (Extended Producer Responsibility, the Plastics Pact) but there is a need to actively engage and interpret models through an African lens. An opportunity exists to share lessons learned from both sides. Participation fees such as those for the Plastics Pact need to be allocated to infrastructure development. South Africa's plastics recycling industry is robust, however, opportunities for innovation in materials processing and chemical recycling can be explored. Focus needs to be on the most problematic waste streams and how to create value from there.
 - Adoption of EU technologies need to take local circumstances into account. This includes cognisance of the informal sector and complex socio-economic disparities.
- EU knowledge sharing is needed regarding implementation of Plastics Pacts and other related initiatives. Governance structures and policy levers around the local implementation could be strengthened. EU lessons learned could support a stronger implementation of the Pact and a deeper connection with the global vision.

Urban mining and WEEE

- Integration of the informal sectors is key to a successful multi-pronged approach to WEEE recycling, including skills development and safe work practices. Efforts are being made by PROs to include the informal sector in Industry Waste Management Plans and this should be extended to the mandated EPR programme(s). Potential priority focus areas for industry development have been identified:
 - New technologies and automated processes will need to be developed and implemented by recycling facilities if they are to process the growing volume of e-waste; existing labour force (formal and informal) need to be upskilled to retain livelihoods.
 - How the technologies will be funded needs to be clarified: external support needs to be accessed to develop local processing capabilities and infrastructure/technologies for these complex fractions.
 - Recycling facilities and electronic goods manufacturers should form strategic local partnerships for mutual benefit; existing symbiosis programmes can be built on.
- Collaboration opportunities exist with the EU:
 - Policy development and exchange. Opportunities for best practice sharing and development of strategic plans to bolster the industry;

- Research opportunities exist for both urban mining material recovery as well as exploration and development of secondary resource value chains;
- Private sector collaboration on materials beneficiation.
- Hisense factory in Atlantis SEZ, as an example, is strategically well-positioned to drive a local recycling hub in the SEZ, due to its location in the SEZ and potential to include recycled materials in its products. A local hub can be supported by The Western Cape Industrial Symbiosis Programme (WISP), funded by the City of Cape Town, which facilitates mutually beneficial relationships, connecting companies with unused or residual resources such as materials, energy, water, assets, logistics and expertise.
 - Companies must partner effectively with the entire circular supply chain to optimise collections, efficiently process material and find sustainable use for the recovered commodities. These partnerships will reduce the amount of e-waste in landfills and unlock potential value through a circular economy. Business chambers can play an effective role in creating awareness as well as providing mechanisms for material flow.

Construction

Support for creating alternative opportunities for waste.

- There is a clear need for re-use and for recycled materials to be included in material specifications and to be more widely adopted in governmental projects; Support to encourage adoption of green procurement strategies.
- Establish reuse / second-hand material specifications: Although an interest has been expressed in re-use of second-hand materials there is some reluctance based on concerns that this may compromise the integrity of future buildings;
- Leverage existing platforms such as Master Builders and Green Building Council¹⁶³ South Africa for further development of certification and rating systems.
- Material access for both disposal and reuse (building centres/ banks): An opportunity exists to engage with buy-back centres to include construction waste for re-use. These value chains need to be mapped and key support areas identified to encourage both collection and use of the materials.

Leverage previously developed platforms such as The Better Living Challenge¹⁶⁴ to support innovations with construction waste.

¹⁶³ <https://gbc.org.za>

¹⁶⁴ <https://betterlivingchallenge.co.za>

6 Conclusions

6.1 Circular economy trends in South Africa

Although South Africa may not be ready to wholesale transition towards a circular economy, selected industry sectors are more inclined towards this transition such as agriculture, plastics, and the waste sector (see 6.7). The Department of Environment Forestry and Fisheries has indicated the opportunity for a green recovery¹⁶⁵ that places the green economy at the centre. Green industries can open up new possibilities for development and assist in creating much-needed jobs as South Africa recovers economically from the pandemic. The government's shift to a green economy can be leveraged as a basis to build a circular economy on.

6.2 Policy framework supporting circular economy activities

It is clear that government on all levels (national, provincial and local) has a key role to play in championing a just transition to the circular economy. However, they are not always aligned in their purpose. Although there is a fair amount of discussion around transitioning to a circular economy, the term and its implications are not widely understood. Currently, discussions are policy driven but there is a need for pragmatic interventions. It is essential to address value chains, including the supply and demand of materials, as well as products containing secondary resources, to ensure wide-scale adoption. One of the areas of opportunity is with government-led preferential green procurement. This is something that although called for, has not yet been adopted.

There is a need for alignment and role definition amongst government departments. As an example, policy developed by the Department of Trade and Industry and Competition (dtic) can support a transition by enabling investment in circular economy, while the Department of Environment Forestry and Fisheries' Waste Management policies enable a circular economy through redefining waste as a resource material and manage compliance. There is not yet a national circular economy strategy or policy, and the need for a quantified plan is becoming pressing. Legislation as a regulatory mechanism can drive industry-wide transparent and accountable reporting. Clear reporting can support the establishment of goals, targets and a holistic quantified plan for a transition to the circular economy.

6.3 Trade and investments in the circular economy in South Africa

South Africa is an important trade partner, and not dependent on development cooperation. There is substantial trade ongoing between South Africa and its international trading partners, with a share of trade in the total economic output comparable to the world average. In 2018, about 23% of total exports were going to the EU, while 29% of imports originated from the EU. In total, over 15% of EU's African exports go to South Africa. From all EU imports from outside the EU, 16% of African origin comes from South Africa, making the country EU's most important export partner in Africa, while ranking as the primary import partner in Africa.

Foreign investments in South Africa are also at the world average level currently, although in the past years they have been rather low and volatile. The National IDZ Programme's main focus is to attract Foreign Direct Investment and export of value-added commodities. The policy was reviewed and the new

¹⁶⁵ (Green Economy Journal, n.d.)

SEZ (special economic zone) Programme implemented, also brought about by the developments in national economic policies and strategies. The SEZ Policy provides a clear framework for the development, operations and management of SEZs.

South Africa's transition to a circular economy will benefit from trade dialogues related to circular economy and which aims to facilitate stronger implementation pathways and scalable efforts.

6.4 Existing awareness and capacities on circular economy in South Africa

Although the majority of South African consumers are not yet familiar with the concept of circular economy, they are becoming increasingly aware of their impact on the environment. As a result, consumers are increasingly recycling their waste and buying green, environmentally-friendly alternatives to protect the environment. While there is scope for raising consumer awareness on environmentally preferable products and services, and many companies are capable to meet production standards that for instance match those of the European Union eco-label at reasonable cost, the demand to do so is currently still insufficient.

There is overall, a lack of knowledge on the exact value proposition a circular economy development pathway presents for South Africa, as well as risks and opportunities that global shifts to circular economies would present - this is based on the early stage of implementation and adoption of circular economy principles thus far. The knowledge base related to similar concepts such as "green economy", "climate change" and the "waste economy" amongst others, is more developed and could provide the foundation for circular economy research going forward. Green economy as an example, is more firmly entrenched, such that it has been named by the Presidency and reiterated by DEFF, as one of the pillars for a post-COVID economic recovery.

Although national awareness is still at a developmental stage, the underlying concepts have received growing attention in recent years. In particular, the concept of the green economy is seen as an important means of responding to some of the country's critical and interlinked development challenges. This ranges from unemployment, poverty and inequality, to energy security and climate change. As a result, transitioning to a greener economy has increasingly been put into action through an extensive policy and regulatory framework, and is being articulated at the highest political level.

Similarly, circular economy awareness amongst South African businesses and industries, is not yet pronounced. However, the private sector is becoming increasingly involved in circular economy-related activities and green economy initiatives, with certain sectors and companies being more active than others.

6.5 Existing and future economic, environmental and social impacts and benefits.

The implementation of national policies and initiatives related to the circular economy have several positive impacts and benefits. These include:

- Creation of **new business and employment opportunities**, which go beyond "creation" to "substitution, elimination, transformation and redefinition";

- **Capacity building, knowledge sharing and up-skilling initiatives.** Operative plans to integrate recycling as service assigned to cooperatives, at no cost to municipalities. Selection and training of community-based cooperatives. Building waste recycling drop-off centres managed by cooperatives;
- **Waste beneficiation** projects, such as The National Pricing Strategy for Waste Management (NPSWM) is a legal requirement of the NEM:WAA and gives effect to the NWMS through economic instruments and extended producer responsibility. Address pervasive under-pricing of waste services in South Africa. Under-pricing creates the wrong set of incentives, undermines waste minimisation efforts, and ultimately undermines the polluter pays principle;
- **Public awareness raising** on better waste management practices. Youth-led company, Destination Green Recycling founded by university graduates during their final year-Integrated Resource Management course, identified need for recycling to improve the conditions of their local environment, addressing land pollution. They have established a sustainable system that promotes recycling and minimises the non-biodegradable waste that is being sent to landfills.

The forward-looking modelling assessment done as part of this study suggests that circular economy activities in South Africa would have a positive impact on the South African economy and employment.

- In a circular economy scenario by 2030, South Africa's GDP is projected to be around 0.8% higher (equivalent to an increase of €3.7 bn) than in the baseline scenario or business as usual.
- Consumer spending would be the biggest driver of the positive economic impact of the circular economy activities, alongside a slightly smaller contribution from investment.
- Society would further benefit from 226,000 additional jobs (equivalent to an increase of 1.3%).
- Most of additional jobs in the CE scenario relative to the baseline would be seen in the waste management.

6.6 Mapping of circular economy-related cooperation activities between the EU and South Africa

The mapping exercise has demonstrated that circular economy already is and increasingly will have a prevalence in future bilateral policy dialogues between South Africa and the EU. However, a joint strategic approach is yet to be developed. Although circular economy related activities in the sphere of development cooperation are still not mainstreamed in South Africa, there has been progress, most notably with SWITCH Africa Green that acts in policy dialogues and development cooperation projects. South Africa is a trade partner and development cooperation is not a priority area for EU engagement.

The active DFIs in South Africa (EIB, FMO, KfW and AFD) currently have a strong focus on promoting energy efficiency and renewable energies, as well as improvement of waste and the water systems. However, none of the DFI financed projects is specifically targeted to foster a transition towards a circular economy.

SA-EU trade is governed by the SADC-EPA, which does not currently include specific reference to improved trade of environmental goods and services to support a transition to a circular economy. The revision of the EPA and inclusion of such provisions can bolster trade in EGS, potentially with the inclusion of South Africa's SEZ/IDZs as a growing opportunity for investment. Further, South Africa has been able to attract many EU companies that engage in circular economy-related activities. The areas in which EU companies are operating in the country are relatively diverse.

In terms of research and technical cooperation, circular economy does not yet play an explicit role in joint scientific undertakings within the research landscape shared between the EU and South Africa. However, it has evidently become more prevalent. Additional research and technical cooperation activities between South Africa and the EU which overlap with CE might in the future play an increasingly important role.

6.7 Sector-specific conclusions

6.7.1 *Agriculture and food loss and waste*

South Africa is struggling with the volume of food waste generated as well as food loss in a number of places within the value chain. Although 30% of South African households are at risk of hunger (amounting to 7.4 Million people), the voluntary agreement in development put this issue front and centre with business, in particular. Value-generation activities in the sector can be explored in addition to solutions for minimising waste generation. Of strategic importance is agroprocessing, potentially adding value to unavoidable waste by production of oils, extractions and non-food application such as natural body-care. EU member states and businesses with best practice examples and appropriate technology solutions / models can help accelerate this transition. A key driver for food loss and waste interventions is the support from EU for the development of the Voluntary Agreement on Food Waste and Loss.

In addition, the modelling exercise carried out shows that a shift to a circular economy would lead to 17,000 additional jobs by 2030 as efforts to prevent food losses would lead to increased domestic production of agricultural goods.

6.7.2 *Plastic and the informal sector*

The industry's circular economy shift can be bolstered by interventions across the value chain, starting with clear guidelines on designing for recycling and the inclusion of recycled content specifications, including materials specifications, engineering specifications, compliance systems, and supply chain requirements^{166 167}. Design is critical for circularity - packaging designers need to be engaged to design packaging compatible with the current recycling industry, taking into consideration both material and economic requirements¹⁶⁸. The waste management sector has a strong potential to innovate and improve socio-economic conditions and contribute to sustainable development and resource use. In fact as the modelling exercise showed, a high number of jobs would be created in waste management would South Africa shift towards a circular economy. For the plastics sector specifically, a shift into a circular economy would imply a small number of jobs are lost due to increased use of recycled feedstock in plastics production, replacing virgin feedstock.

6.7.3 *Urban mining and WEEE*

Integration of the informal sectors seems to be key to a successful multi-pronged approach to e-waste recycling. (e.g. skills transfer, infrastructure support, incubation support, partnerships in value chain development, employment of best practices, and assurance that informal suppliers adhere to decent work criteria).

¹⁶⁶ Cheri Scholtz, PETCO, Interview 8 April 2020

¹⁶⁷ Chris Whyte, Use-It, Interview 20 February 2020

¹⁶⁸ Cheri Scholtz, PETCO, Interview 8 April 2020

South Africa's mining sector needs to be engaged to pivot to circular approaches to resource extraction. Of note in South Africa is a shift in the PGMs, exploring secondary resources and recycling.

6.7.4 Construction

A sector with potential for promoting a circular economy in South Africa is the building sector, where waste materials can be reused in new buildings and constructions.

South Africa has to-date focused on approaching construction waste in terms of prevention and minimisation, while managing the waste that cannot be prevented. DEFF is in discussion with sister departments on utilising alternative building materials consisting of repurposed ash, construction and demolition waste and well as organic waste. New building standards in this regard can improve circularity.

Annex A - Looking beyond

Trends in Information Communication Technology (ICT)

South Africa's ICT sector continues to demonstrate dynamic growth, increasing 12% from ZAR 204 Billion in 2017, to ZAR 238 Billion in 2019. The State of ICT Sector in SA 2020 report notes South Africa's ICT sector has one of the country's biggest job markets and is one of the biggest contributors to the economy, driven by mobile services. ICT projects impact products across their lifecycle and can be a key enabler for the transition to a circular economy.

Table A-0-1 Selected mobile and online platforms that support circular economy approaches

Agriculture	Fisheries	Mobility	Waste
Market Price Information portal Live updates to prices for more than 100 agricultural products. Transparency and access to trade for SMMEs	ABALOBI An app suite that sells sustainably sourced seafood while empowering the small-scale fishing community.	GOMETRO Transportation app for commuters and a pro version that informs city planning.	WRAPP Links independent truck owners with clients who need waste removed
Fruitlook Satellite-derived information on crop growth, crop water use, and nitrogen.	South African Sustainable Seafood Initiative (SASSI) Platform for identifying sustainable seafood choices according to the SASSI list	KHWELA Transportation app for the minibus taxi industry, linking customers and up to date information about taxi ranks and routes.	JustNow Links retailers and consumers to sell food close to expiry at a discounted rate. Not yet nationwide.

Textiles

The clothing, textiles, footwear and leather (CTFL) sector is characterised by a relatively high number of Small, Medium & Micro Enterprise Businesses (MSMEs) as well as informal operations. There were only 20 large firms in operation at the end of 2017¹⁶⁹. The sector accounts for around 14% of manufacturing employment in South Africa, employment stood at 269 000¹⁷⁰ (Q1 2019 QLSF)¹⁷¹, which includes a high proportion of women. The current employment number is unconfirmed with the severe impact of Covid-19 on the manufacturing sector.

Reducing the environmental and climate pressures and impacts from textiles production and consumption – while maintaining economic and social benefits – will need a systemic change towards circularity. In South Africa the industry hopes to attract new investment through scaled-up competitiveness packages such as the Clothing and Textiles Competitiveness Programme (CTCP) that assists industry in upgrading

¹⁶⁹ Markets, R., 2020. The Textile Industry In South Africa 2018: Demand Drivers & Emerging Trends. [online] Prnewswire.com. Available at: <https://www.prnewswire.com/news-releases/the-textile-industry-in-south-africa-2018-demand-drivers--emerging-trends-300674194.html> [Accessed 17 July 2020].

¹⁷⁰ estimates range from 87 000 (QES) to 106 000 (Quantec) to 269 000 (QLSF)

¹⁷¹ 2019. Re-Imagining Our Industrial Strategy To Boost Inclusion & Private Investment. [ebook] Available at: <http://www.thedtic.gov.za/wp-content/uploads/Re-imagining-Industrial-Strategy-FINAL-13-June-2019.pdf> [Accessed 8 July 2020].

equipment, process, products and people for more efficient production. The aim is to enable the industry to compete with other low-cost producing countries.

The retail clothing, textiles, leather and footwear (CTLF) Masterplan has been published, as a guiding document for a resilient retail CTLF sector. The retail CTLF Masterplan does not include guidelines on end-of-life management of surplus textiles/garments in the retail environment. This gap is an opportunity to recommend actions for retailers to mitigate textile waste on consumer end. Best practices from European retailers such as H&M and Zara can serve as guidance for developing an action plan for collection and redistribution/recycling. The multinational retailers implement collection programmes via their physical retail stores, with next steps including collection options. The collected garments are reused, upcycled, or recycled.

Waste tyres

The waste tyre sector is of note notwithstanding ongoing setbacks. In November 2019 DEFF commissioned the Council for Scientific and Industrial Research (CSIR) in terms of section 29 of the Waste Act to develop an industry waste management plan for the waste tyre sector. The Department has the intention to issue a version which is fully compliant with the regulatory environment later this year. Currently the tyre levy remains the same at a rate of R 2.30/kg per tyre. It is payable by manufacturers and the rate is set irrespective of the tyre's previous use and irrespective of whether the tyre was imported or manufactured locally. The levy is earmarked for recycling and is payable in addition to any existing customs and excise duty payable on the import/export of such tyres.

Draft Industry Waste Management Plan for tyres has been open to stakeholder consultation. Waste tyres can contribute to a circular economy in South Africa, if the following is realised:

- Sustainable off-take markets for recycled tyre products to create demand for processed waste tyres;
- Develop waste tyre processing capacity and infrastructure to support local waste tyre arisings (i.e. generation of waste tyres) in an environmentally sustainable way, with the potential to grow processing capacity to support the Southern African region in the future;
- Establish smart logistics and transport systems to optimise the collections and distribution of waste tyres from point of generation to processor;
- Create sustainable jobs and MSME opportunities in line with national government imperatives; and
- Foster transparent, equitable, and fair distribution of cost and benefits across the waste tyre value chain.

EU can engage in this sector to guide development of an Industry Waste Management Plan that achieves buy-in from a complex industry. Technical support for technology to process the resource.

Annex B - Stakeholders interviewed

Table B-0-1 Interviewed stakeholders

Organisation	Name	Role
AFDB - African Development Bank	Arona SOUMARE	Principal climate change and green growth officer, African Development Bank
AFDB - African Development Bank	MURARA, MELISSA	
AFDB - African Development Bank	MILENGE-UWELLA Davinah	Coordinator, Africa NDC Hub, African Development Bank
BASF West Africa	Michael Gotsche	Vice President and Head of Market Area Africa
CGCSA	Matlou Setati	FSI Executive
City of Tshwane	Abel Malaka	Acting Divisional Head : Waste Management
Department of Science and Innovation	Georgina Ryan	Deputy Director: Green Economy
Department of Science and Innovation	Henry Roman	Director: Environmental Services and Technologies
Department Trade and Industry	Gavin Adams	Director
DEPT ENVIRONMENTAL AFFAIRS	Mark Gordon	DDG: Chemicals and Waste Management
DISTELL	Blain van Wyk	Sustainability Specialist
DISTELL	Eric Leong Son	Group Head: Sustainability
dtic Industrial Parks	Bernd Oellermann	Director: Regional Industrial Development Division: SEZ&ET
Embassy of Finland	Marko Saarinen	South Africa - Counsellor, Development Cooperation - Embassy of Finland
EXTRUPET	Chandru Wadhvani	Joint Managing Director
GreenCape	Saliem Haider	Programme Manager: Circular Economy
Hustlenomics	Nhanhla Ndlovu	Founder and CEO
National Cleaner Production Centre South Africa	Victor Manavela	Regional Manager: Gauteng
Nedbank	Marco Lotz	Sustainability Carbon Specialist
PETCO	Cherie Scholtz	Chief Executive Officer
PETCO	Janine Osbourne	Stakeholder Relations Manager
Plastics Pact	Lisa Parkes	
Plastics Pact: GreenCape	Kirsten Barnes	Researcher: Waste Economy
Plastics Pact WWF SA	Lorren de Kock	Circular Plastics Economy :: Policy & Futures Unit, WWF-SA
Plastics SA	Anton Hanekom	Executive Director
Plastics SA	Douw Steyn	Sustainability Director
Shoprite Checkers	Sanjeev Raghubir	Group Sustainability Manager
South African Plastics Recycling Organisation	Annabé Pretorius	Technical Trainer
The Greenhouse	Philippa Notten	Director
Use-it	Chris Whyte	Managing Director
Water Research Commission	Bonani Madikizela	Research Manager
Water Research Commission	John Zvimba	Research Manager: Waste water treatment

Annex C - Waste generation

Table C-0-1 General waste (tons) by management option (2017)

	Generated	Recovered/Recycled	Landfilled	% recovered/recycled
Municipal waste	1 770 009		1 770 009	0%
Commercial & Industrial waste	3 179 157		3 179 157	0%
Organic Waste	6 656 234	812 206	5 844 028	12%
Construction & demolition waste	5 360 556	305 761	5 054 795	6%
Paper	3 635 825	1 414 378	2 221 447	39%
Plastic	2 247 323	332 713	1 914 610	15%
Glass	1 395 103	320 000	1 075 103	23%
Metals	3 345 565	1 622 059	1 723 506	48%
Tyres	221 751	64 061	157 690	29%
Other	14 868 997		14 868 997	0%
Total waste	42 680 520	4 871 178	37 809 342	11%

Waste Electronic and Electric Equipment (WEEE) appears to be the only 'unclassified' waste stream that is being recycled (approximately 8%).¹⁷²

Table C-0-2 Hazardous waste (tonnes) by management option in 2017

	Generated	Recovered/Recycled	Landfilled	% recovered/recycled
Gaseous waste	62		62	0%
Mercury containing waste	978		978	0%
Batteries	35 932	32 339	3 593	90%
POP waste	547		547	0%
Inorganic waste	316 781		316 781	0%
Asbestos containing waste	36 322		36 322	0%
Waste Oils	133 000	93 100	39 900	70%
Fly ash and dust	31 117 409	2 178 219	28 939 190	7%
Bottom ash	5 491 308	384 392	5 106 916	7%
HCRW	48 749		48 749	0%
Miscellaneous	368 537		368 537	0%
Total hazardous waste	42 680 520	4 871 178	37 809 342	11%

¹⁷² Department of Environmental Affairs. 2018. South Africa State of Waste. A report on the state of the environment. First draft report. Department of Environmental Affairs, Pretoria. p. 20

Annex D - Policy Framework

The policy framework includes green economy strategies, environmental legislation and policies that support green technologies.

Table D-0-1 Policy frameworks

<p>Strategic policy with the potential to drive the Circular Economy</p>	<ul style="list-style-type: none"> • New Growth Path (2010) and the Green Accord; • National Framework for Sustainable Development (2008) and National Strategy for Sustainable Development & Action Plan (2011); • National Planning Commission - National Development Plan (2030).
<p>Policies enabling and supporting the Circular Economy in terms of resource efficiency and green job creation</p>	<ul style="list-style-type: none"> • National Skills development Strategy III; • Medium-term Strategic Framework 2014 - 2019; • Integrated Resources Plan 2019; • Ten Year Innovation Plan 2008; expired. A new Decadal Plan is in the making. The DSI will integrate a CE Framework within the Plan which is due later in 2020; • White Paper on Science Technology and Innovation adopted in March 2019 • National Building Regulations and Building Standards 2010; • Climate Response White Paper 2011; • Environmental Fiscal Policy Paper 2006; • National Waste Management Strategy 2019; • Industrial Policy Action Plan 2015; • National Transport Master Plan 2050.
<p>Long term plans and strategies in waste management</p>	<p>Integrated Waste Management Plans (IWMP):</p> <ul style="list-style-type: none"> • Local and district municipalities are required to submit their IWMPs to the relevant provincial department for approval, and to ensure that the IWMPs are included in their Integrated Development Plans (IDPs). IWMPs are five-year plans, which are generally reviewed annually.
	<p>Extended Producer Responsibility Regulations, 2020. These regulations lay out the extended producer responsibility measures to be implemented by producers. Key points are:</p> <ul style="list-style-type: none"> • Definition of “producer” to include any person or category of persons or a brand owner who is engaged in the commercial manufacture, conversion, refurbishment or import of new and/or used products as identified by the Minister by notice in the Government Gazette in terms of section 18(1) of the Act; • Minimum requirements and criteria for extended producer responsibility schemes to operate, including cleaner production measures, minimum recycled content standards, environmentally preferable products procurement procedures.

Current Acts regulating Environmental and Waste Management	<p>National Waste Management Strategy: 2020</p> <p>The purpose of the NWMS is to achieve the objects of the (National Environmental Management: Waste Act (NEM:WA) The NWMS has eight goals, which organs of state and affected persons are obliged to give effect to and achieve:</p> <ul style="list-style-type: none"> • promote waste minimisation, re-use, recycling and recovery of waste; • ensure the effective and efficient delivery of waste services; • grow the contribution of the waste sector to the green economy; • ensure that people are aware of the impact of waste on their health, well-being and the environment; • achieve integrated waste management planning; • ensure sound budgeting and financial management for waste services; • provide measures to remediate contaminated land; • establish effective compliance with and enforcement of the Waste Act.
	<p>Waste Amendment Act 2014 to amend the NEM:WA 2008. This amendment is of note regarding the definition of waste as well as when it ceases to be waste.</p> <ul style="list-style-type: none"> • NEM:WAA included a comprehensive definition of “waste.” • It also included a definite “end of waste status” by opening up more opportunities for the recycling market, and amends the terms “reuse” and “recovery”.
	<p>National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)</p> <ul style="list-style-type: none"> • The fundamental guiding principles of NEMA include, amongst others, the concepts of “polluter pays”, “cradle to grave”, “precautionary principle” and “waste avoidance and minimisation.” <p>National Environmental Management: Waste Act 2008 (Act No. 59 of 2008) (NEM:WA), a waste specific environmental management act. The previous procedures for the permitting of waste sites in terms of Section 20 of the ECA were replaced by various provisions in the NEM:WA.</p> <ul style="list-style-type: none"> • In terms of the NEM:WA, all listed waste management activities must be licensed through an integrated environmental impact assessment (EIA) process. • The NEM:WA promotes the principles of the waste hierarchy, which is an international and best practice waste management approach that has been adopted in South Africa. <p>The National Environmental Management: Waste Amendment Act (No. 26 of 2014) (NEM:WAA) came into effect on 2 June 2014 in order to rectify the shortcomings of the NEM:WA.</p> <p>The National Waste Information Regulations, 2012 (GN R. 635) (NWIR) was implemented on 1 January 2013.</p> <ul style="list-style-type: none"> • Regulates the collection of data and information on waste management. • Waste Classification and Management Regulations (GNR. 634 of 2013) (WCMR) were promulgated on 23 August 2013.

Environmental standards

- National Domestic Waste Collection Standards (RSA, 2011);
- National Norms and Standards for the assessment of waste for landfill disposal (GNR.635 of 2013); and

- National Norms and Standards for disposal of waste to landfill (GNR. 636 of 2013) including detail on the barrier design based on the classification of the material;¹⁷³ Section 5 (1) (a - u), as well as Section 5 (2) (a - c), provides for a non-exhaustive list of waste types that are prohibited from disposal to landfill in South Africa.¹⁷⁴
- National Norms and Standards for GN R. 921: waste activities requiring a WML are divided into Category A, Category B, and Category C; where Category C activities need to be registered with the Department and comply with specific requirements, such as the Norms and Standards for Storage of Waste (GN 926 of 29 November 2013);
- National Norms and Standards for Storage of Waste (GN 926 of 29 November 2013) applies to general waste storage facilities and hazardous waste storage facilities that have the capacity to store, continuously, more than 100 m³ of general waste or 80 m³ of hazardous waste, respectively. It is only applicable to new facilities that have not yet been constructed;
- National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening and Bailing of General Waste (GN R 1093) was promulgated with the concurrent removal of this activity from the list of waste management activities requiring a WML i.e. Category A3(2) of GN R 921;
- GN 528 was issued on 2 June 2017 for comment in terms of the NEM:WA; The purpose of GN R 528 is to make regulations to exclude waste streams from the definition of waste namely, waste slag from ferrochrome metallurgy; waste ash from combustion plants; and waste gypsum from pulp, paper and cardboard production and processing. The regulations state that where a waste stream has been excluded from the definition of waste, that waste may be recovered or treated prior to use without a WML; and the negative impacts must be mitigated according to certain duty of care principles, and norms and standards;¹⁷⁵

¹⁷³ Department of Environmental Affairs. 2018. South Africa State of Waste. A report on the state of the environment. First draft report. Department of Environmental Affairs, Pretoria. p. 46

¹⁷⁴

<https://content.interwaste.co.za/hubfs/Landfill%20Prohibitions%20August%202019%20%7C%20%20Downloadable.pdf?hsCtaTracking=4f85e652-050d-4a09-8aa2-d79825858f52%7C43504dc0-7f71-486c-8f8b-17e7d18e9624>

¹⁷⁵ Department of Environmental Affairs. 2018. South Africa State of Waste. A report on the state of the environment. First draft report. Department of Environmental Affairs, Pretoria. p. 46

Annex E - Trade and investments in the circular economy in South Africa

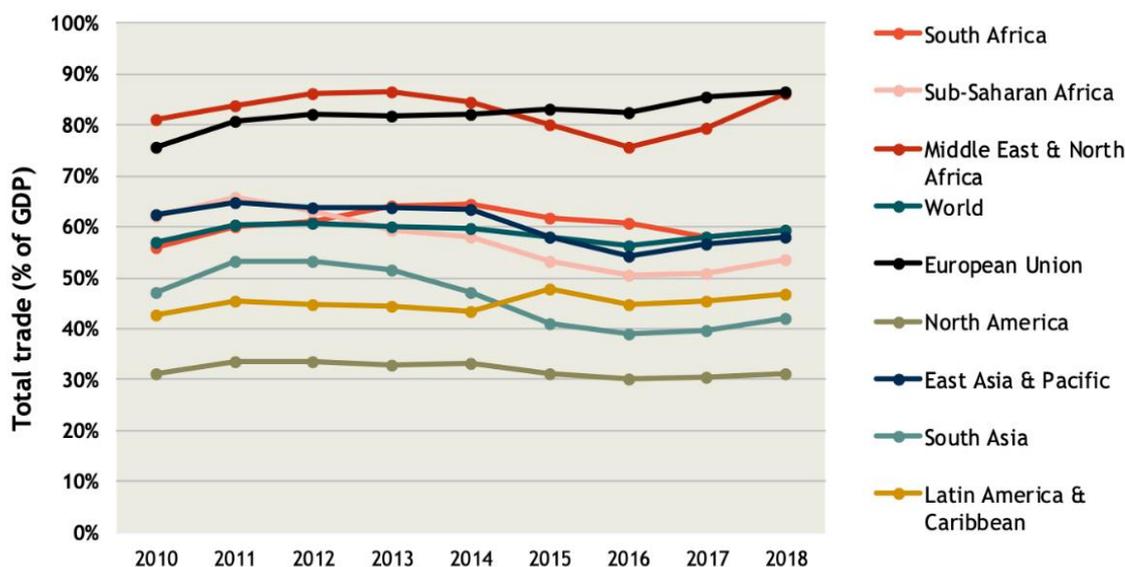
This section looks at the level of trade and foreign investments in South Africa as well as at the factors that influence trade and investment. First, an overview is given on the trends in trade and investment. Subsequently, economic, financial and political factors that affect the level of trade and foreign investments are analysed.

Overview of ongoing trends in trade and foreign direct investment

Trends in trade

In 2018, South Africa's relative level of trade with other countries was 54% of the country's GDP, equal to the average world trade share. For the period 2010-2018 South Africa's share of trade was far below that of the MENA region. However, since 2013, South Africa's trade share has steadily risen slightly above that of the Sub-Saharan African average. The share of trade was highest in 2013 and 2014 when trade accounted for 64% of the South African GDP. As of 2017 South Africa had a positive trade balance of USD 26,4 Billion in net exports.¹⁷⁶

Figure E-0-1 Share of total trade (Imports+exports) in GDP (%) in South Africa compared to regional averages for the period 2010-2018.



Source: World Bank - World Development Indicators - Trade (% of GDP)

In 2018, about 23% of total exports were going to the European Union, while 29% of imports originated from the European Union.¹⁷⁷ The trade shares have remained relatively stable over the last decade. This accounted for 1.2% of the imports coming outside the EU (extra EU trade figures). In total, over 15% of EU's African export goes to South Africa. From all EU imports from outside the EU, 16% of African origin

¹⁷⁶ <https://oec.world/en/profile/country/zaf/>

¹⁷⁷ UN Comtrade

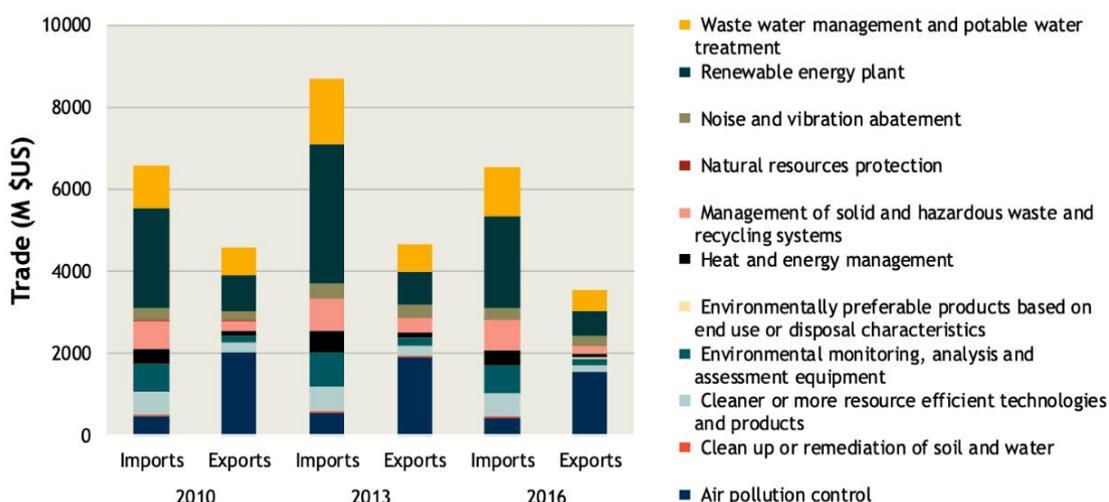
comes from South Africa. As such, South Africa is the EU's most important export partner in Africa and ranks also as the primary import partner in Africa.¹⁷⁸

Trade in environmental goods and services

In several economic databases the level of activity in these 'environmental goods and services sectors' is monitored, to provide a proxy of the volume of trade in environment-related goods and services. It is important to note though, that in reality, only part of the goods and services that are generated in these sectors are related to the environment.

In South Africa in 2010, the environmental goods and services sectors accounted for 5% of the total trade volume and over the years this share increased steadily to 6% in 2016. When looking at the trade balance, we see that imports dominate trade in environmental goods and services. Renewable energy technologies account for the largest part of the imports followed by water treatment technologies. When it comes to exports, air pollution control is the predominant area.

Figure E-0-2 imports and exports of environmental goods and services in South Africa for the years 2010, 2013 and 2016.



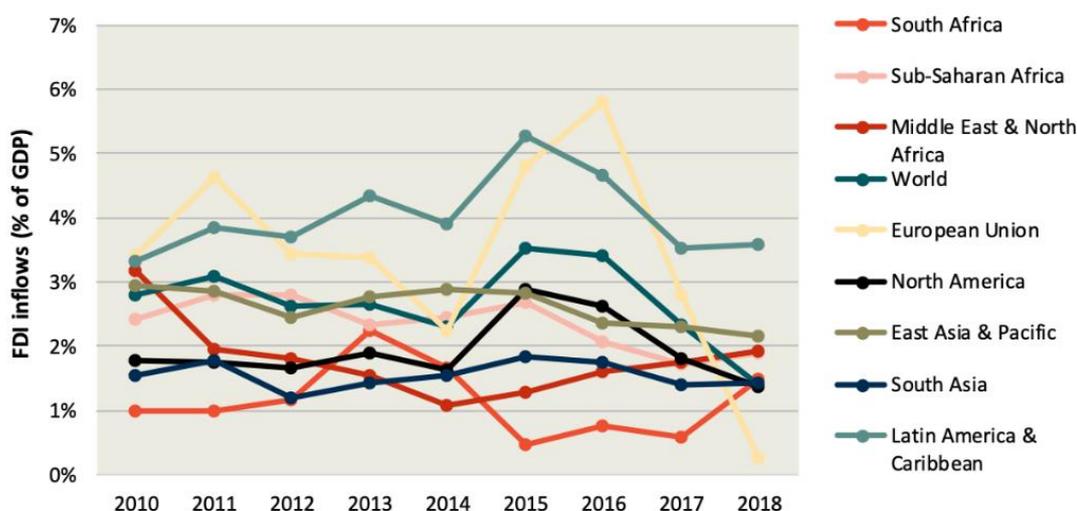
Source: OECD - Trade in Environmental goods and services.

Foreign direct investment

Foreign direct investment (FDI) in South Africa has been low in the period 2010-2017 compared to the Sub-Saharan average and world average among others. In 2018, FDI was 1.5% of GDP, just above the world average (1.4%) and still below the Sub-Saharan Africa average (1.9%) and MENA region average (1.9%). FDI was highest in 2013, when it reached 2.2% of GDP. Conversely, FDI was lowest (around 0.5% of GDP) between 2015 and 2017.

¹⁷⁸ Eurostat - International trade in goods by partner

Figure E-0-3 Share of Foreign Direct Investment (inflows) as share of GDP (%)



Source: World Bank - World Development Indicators - FDI inflows as share of GDP (%)

Industrial Development Zones (IDZ) programme and Special Economic Zone (SEZ) policy

In South Africa there is a national IDZ Programme whose main focus is to attract Foreign Direct Investment and export of value-added commodities. Although there were major achievements with the IDZs, there were weaknesses that led to the policy review and the new SEZ policy.

The policy review and the new SEZ Programme, which began in 2007, was also brought about by the developments in national economic policies and strategies such as the National Industrial Policy Framework, and the New Growth Path, as well as developments in the global economic environment such as the formation of BRICS. The SEZ Policy provides a clear framework for the development, operations and management of SEZs, with the purpose to¹⁷⁹:

- Expand the strategic industrialisation focus to cover diverse regional development needs and context;
- Provide a clear, predictable and systemic planning framework for the development of a wider array of SEZs to support industrial policy objectives, the Industrial Policy Action Plan (IPAP) and the New Growth Plan (NGP);
- Clarify and strengthen governance arrangements, expand the range and quality of support measure beyond provision of infrastructure;
- Provide a framework for a predictable financing framework to enable long term planning.

Currently there are 11 operating IDZs in South Africa, as listed by the dtic¹⁸⁰ (2020), below are the most pertinent for the circular economy:

¹⁷⁹ https://www.thedti.gov.za/industrial_development/sez.jsp

¹⁸⁰ https://www.thedti.gov.za/industrial_development/sez.jsp

Table E-0-1 IDZ/SEZs in South Africa

<p>Atlantis SEZ: GreenTech Hub</p>	<p>Atlantis SEZ is part of the City of Cape Town's initiative taken in 2011 to establish a greentech manufacturing hub in Atlantis. This was in response to the Department of Energy's Renewable Energy Independent Power Producer Programme (REIPPP). Localisation of manufacturing and the resultant job creation is one of the key priorities of Government through the REIPP programme. Situated on the West Coast of South Africa, 40km from Cape Town, the Atlantis SEZ (ASEZ) capitalises on the province's already booming renewable energy and green technology sector. The SEZ was designated in 2018. Greentech refers to green technologies that reduce or reverse the impact of people on the planet. This includes renewable energy technologies. Wind turbines, solar panels, insulation, biofuels, electric vehicles, materials recycling and green building materials are all examples of green technology. The hub has already attracted its first large greentech investor, Gestamp Renewable Industries (GRI). A wind tower manufacturer, GRI has already invested ZAR300 Million and is in full-scale production.</p>
<p>Nkomazi SEZ: Agro-processing and regional linkage</p>	<p>Nkomazi SEZ is located approximately 65km from the central business district of Nelspruit in Mpumalanga Province. The geographic location of the Nkomazi area is its main competitive advantage. The Nkomazi area is strategically placed between northern Swaziland and the southwest of Mozambique. It is linked to Swaziland by two national roads, the R570 and R571 and with Mozambique by a railway line and the national road the N4 which together form the Maputo Corridor. The SEZ is well-located to support agro-processing - Mbombela is the second-largest citrus-producing area in South Africa and provides one third of the country's export in oranges. Groblersdal is an important irrigation area, yielding crops such as citrus, cotton, tobacco, wheat and vegetables. Carolina-Bethal-Ermelo is mainly a sheep-farming area but potatoes, sunflower, maize and peanuts are also produced in this region.</p>
<p>Coega IDZ: Manufacturing</p>	<p>Coega IDZ is the largest IDZ in Southern Africa. It was designated in 2001 and became South Africa's first Industrial Development Zone. It is located in the Nelson Mandela Bay Metropolitan Municipality, Eastern Cape Province and is strategically located on the east-west trade route to service both the world and African markets. The Coega IDZ leverages public sector investment to attract foreign and domestic direct investment in the manufacturing sector with an export orientation. The IDZ has attracted investment in the agro-processing, automotive, aquaculture, energy, metals logistics and business process services sectors. This has advanced socio-economic development in the Eastern Cape through skills development, technology transfer and job creation.</p>
<p>Dube TradePort</p>	<p>Dube TradePort is a catalyst for global trade and a portal between KwaZulu-Natal and the world. It is the only facility in Africa that brings together an international airport, a cargo terminal, warehousing, offices, a retail sector, hotels and an agricultural area. Areas that have been designated as the Industrial Development Zone are the Dube TradeZone and the Dube AgriZone.</p> <p><i>Dube TradeZone</i> aims to focus on manufacturing and value-addition primarily for automotive, electronics and fashion garments. The facility involves warehousing, manufacturing, assembling, real estate resource, complete with a single facility in which all freight forwarders and shippers are located (Dube TradeHouse), which enjoys a direct link to the adjacent Dube Cargo Terminal via an elevated cargo conveyor system.</p> <p><i>Dube AgriZone</i> is a high-tech, future farming facility and host to the continent's largest climate-controlled growing area under glass. It will focus on high-value, niche agricultural and horticultural products. The AgriLab will look into specialised tissue culture, greenhouses, flowers and plants, all of which require swift air transportation.</p>

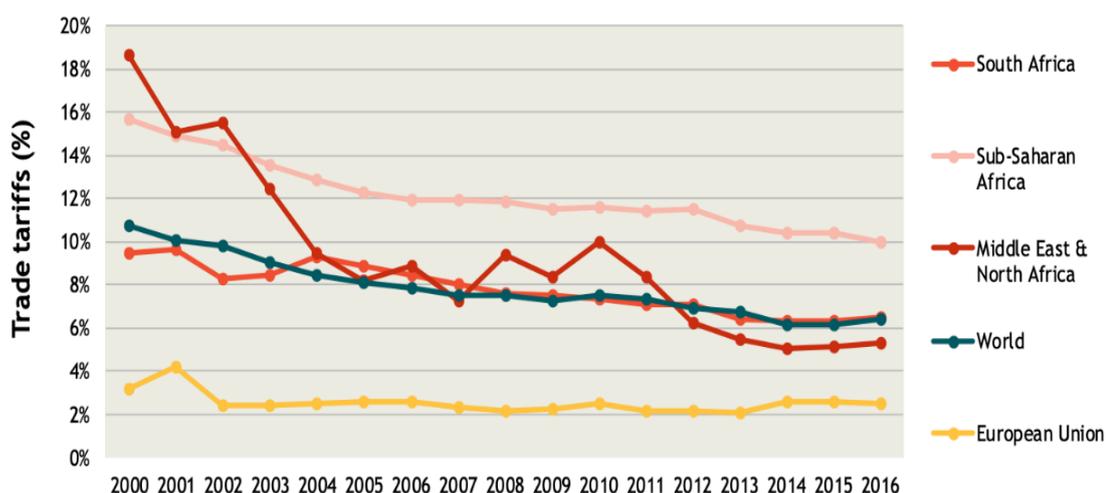
The IDZ/SEZs offer incentives to encourage investment. This includes amongst others preferential (15%) corporate tax, building allowance, employment incentive (tax relief), Customs Controlled Area (tax relief), and 12L Tax Incentive to support Greenfield investments.¹⁸¹

Opportunities and barriers for trade

Trade tariffs

In the 2000s, trade tariffs in South Africa were 9%, below the world average tariffs (11%), Sub-Saharan Africa's tariffs (16%) and the MENA region tariffs (19%). Since then, trade tariffs in South Africa have followed a steady, long term, downward trend until 2016, when trade tariffs were at 6%. This is comparable to world average tariffs (6%), above the MENA region tariffs (5%) and way below the Sub-Saharan tariffs (10%). Tariffs being average, these should not pose a barrier for growth in international trade. In fact, when asked for the biggest obstacle in doing business in South Africa (last records are from 2007), just 1% of the firms mentioned customs and trade regulations as the biggest obstacle.¹⁸² According to the Doing Business in South Africa (2018)¹⁸³ database, to promote South African exports, port handling fees are lower for exports than for imports. These costs include cargo dues levied by Transnet Ports Authority, terminal handling charges imposed by Transnet Port Terminals (standard across ports) and other port service fees charged by the shipping lines. While the same terminal handling charges apply to exporting and importing a 20-foot container, cargo dues are three times higher for imports than for exports.¹⁹ Cargo dues are charged to the users (exporters, importers and shipping lines) to cover port infrastructure costs. Port handling costs for imports among South African ports are 34% steeper than for OECD high-income economies that import by sea.

Figure E-0-4 Mean of the tariff rates applied to all products in South Africa (%)



Source: World Bank - World Development Indicators - Tariff rate, applied, simple mean, all products (%)

Trade costs

Apart from trade tariffs, there is a wide variety of costs associated with trade of products and services, including costs related to border compliance and documentary compliance. The 'ease of doing business index' of the World Bank scores the position of a country based on empirical research on the trade costs

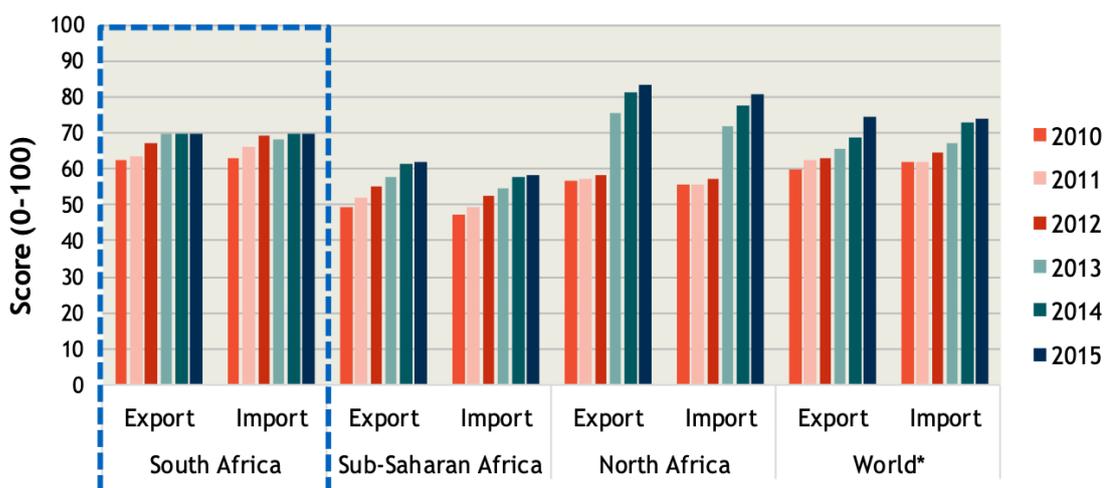
¹⁸¹ https://www.thedti.gov.za/industrial_development/sez.jsp

¹⁸² World Bank - Enterprise survey (2016).

¹⁸³ Doing Business Database 2018

of countries (the higher the score, the easier doing business is for the country). Based on the index results, South Africa’s score has improved over time both for exports as well as for imports and sits in 2015, at 70 (out of 100). As such, South Africa in the period 2010-2015, has scored better than the Sub-Saharan Africa average. It has also scored better than North Africa and the world average until the years 2014 and 2015 respectively, when the scores of these started to improve faster than the score of South Africa. South Africa’s score trend has also been way better than that of Kenya and Rwanda, almost as good as that of Nigeria, and considerably lower than the score of Morocco.¹⁸⁴ This implies customs and administration related costs have been overall relatively low, thus driving trade in the country.

Figure E-0-5 Score on cross-border trade costs for exports and imports in South Africa in comparison to global and regional averages.



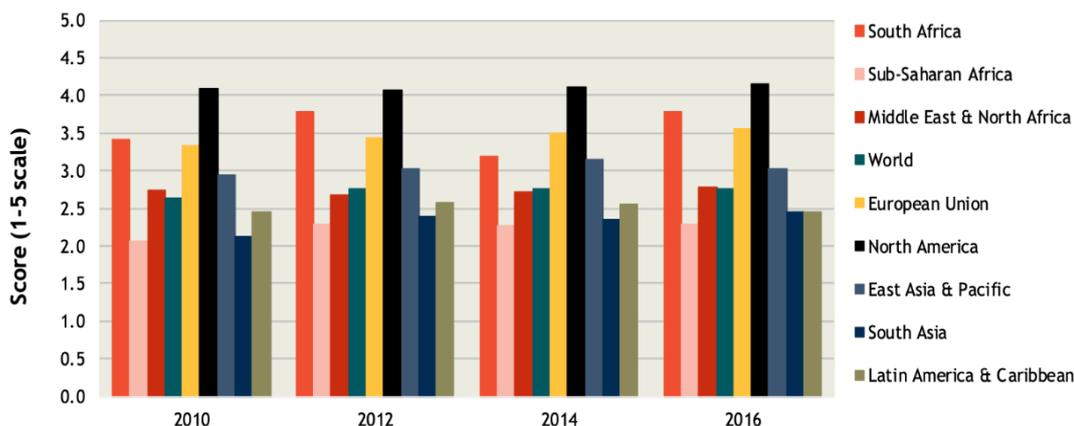
Source: World Bank - Ease of doing business - Trading across borders: Cost to export/import (US\$ per container) (DB06-15 methodology) - Score.

Suitability of infrastructure for trade

In order to facilitate trade, reduce transport time and costs, the presence of good transport infrastructure is essential. The World Bank monitors quality transport infrastructure as part of the logistics performance index. The results of this index for South Africa show that the quality of trade and transport-related infrastructure in South Africa is relatively very good, comparable (and actually slightly better overall) than that of the European Union, and considerably better than the logistics infrastructure of Sub-Saharan Africa average, MENA region average, the world average among others. Only North America shows a better performance for this index. This is considered beneficial for trade.

¹⁸⁴ See information in the individual other country reports for these countries.

Figure E-0-6 Score of South Africa in the Quality of trade and transport-related infrastructure compared with global and regional averages



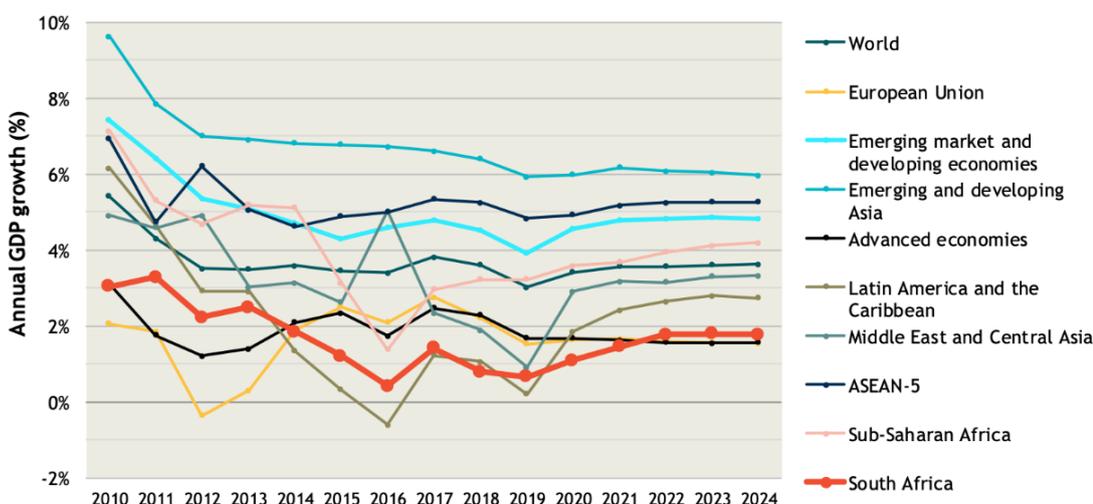
Source: World Bank - Logistics Performance Index - Quality of trade and transport-related infrastructure.

Opportunities and barriers for investments

Economic opportunity

Over the past ten years, the economic growth trend in South Africa has been overall negative and lower than the growth trend of the Sub-Saharan Africa average. In 2010 annual GDP growth was 3%, comparable to that of advanced economies and considerably lower than GDP growth levels in Sub-Saharan Africa and the world’s average. Until 2019, economic growth has been overall decreasing in South Africa, with small recoveries in 2013 and 2017. Pre-COVID-19, the current situation and future outlook for the economic situation in South Africa according to the IMF look positive, with a steady growth trend predicted until 2022 (from 0.7% in 2019), when GDP growth would reach 2% and would stabilise at that level at least until 2024. This growth curve is slightly above the average growth rates expected in the world, Sub-Saharan Africa, the EU and in other advanced economies. This should act as a driver for investments in the South Africa.

Figure E-0-7 Historical GDP growth and growth outlook until 2024 for South Africa, compared to global and regional averages.



Source: International Monetary Fund - World Economic Outlook.

Ease of starting a business

Starting up business activities in another country can be cumbersome. As an organisation, you need to get acquainted with all the rules and procedures in the country. The World Bank, in its ‘doing business’ survey, monitors the ease of starting a business in a country. South Africa scores relatively well in this survey, with a score that has been rather stable i.e. the score was 81 out of 100 in 2009 and is just below 80 out of 100 in 2018. The score in 2018 is comparable to that of Egypt and Nigeria, slightly below Kenya’s score and far below the scores of Ghana, Morocco and Rwanda. Some of these countries have historically had worse scores than South Africa but have improved their scores (notably) in the past decade (Kenya, Rwanda, Egypt). In the same period (2009-2018), the average score for the EU-28 went from approximately 84 to approximately 89. Based on this, it is hard to conclude whether ‘the ease of starting business’ is a driver or a hindrance for South African economy at the moment.

Governance, political stability and regulatory quality

Political instability & security

Currently, South Africa is benefiting from political stability and strong leadership. According to the World Bank’s enterprise survey (2007 edition)¹⁸⁵, political instability is not a major problem that entrepreneurs identify, with just 1% of the respondents bringing it as an issue when doing business in South Africa. Economic empowerment is a priority action. However, trust in the government by its citizens, does not reflect the hope and expectation that this will realise. According to Edelman¹⁸⁶ Trust barometer, South Africa still ranks the lowest globally, with only 20% of the general public trusting the government.

Corruption

Corruption is still a problem in South Africa, which hampers the economy and acts as a barrier for foreign companies to invest in the country. In the global Corruption Perception Index of 2018 assessing ‘the lowest level of corruption’, South Africa ranks 73rd (shared place with Morocco), with a score of 43 on a scale from 0-100 (most corrupt-least corrupt). As such, South Africa scores better than Ghana, Egypt, Kenya and Nigeria. In the enterprise survey conducted in 2007 by the World Bank, corruption was mentioned by around 7% of the respondents as the most important obstacle to doing business in South Africa making it the #4 most important obstacle for doing business in South Africa. Furthermore, nearly 17% of the respondents identified corruption as a major constraint when trying to do / doing business.

Financial stability

Inflation

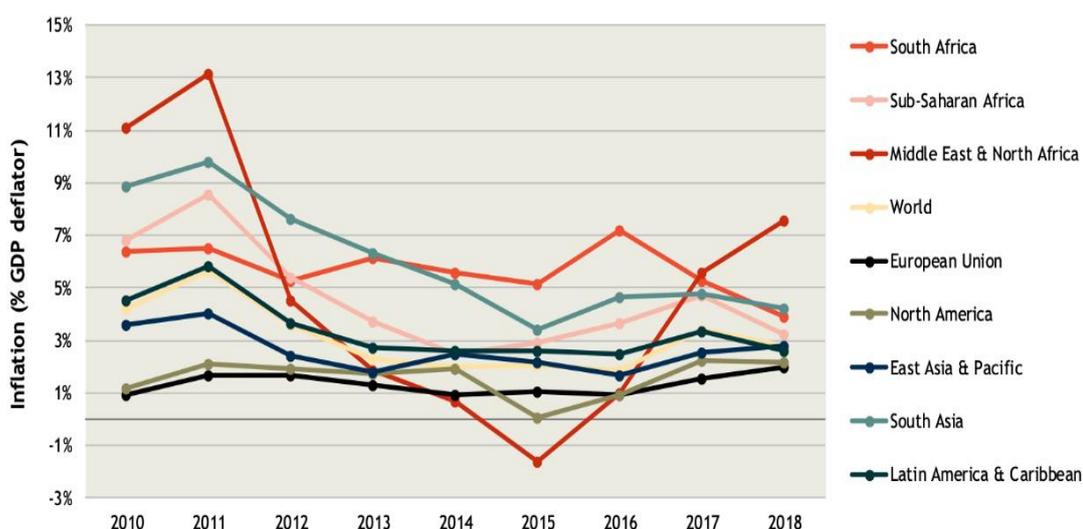
South Africa has had relatively high inflation rates as share of GDP (average 6%) in the period 2010-2018. From 2012 to 2016 inflation rates were considerably above the Sub-Saharan Africa inflation average, the MENA region average and the world average. In 2018 South Africa’s inflation rate was 4%, which is closer to the average rates in Sub-Saharan Africa (3%) and the world average (3%), and almost half of the average inflation rate in the MENA region (nearly 8%).

¹⁸⁵ Data is not available for other editions

¹⁸⁶

https://cdn2.hubspot.net/hubfs/440941/Trust%20Barometer%202020/2020%20Edelman%20Trust%20Barometer%20Global%20Report.pdf?utm_campaign=Global:%20Trust%20Barometer%202020&utm_source=Website

Figure E-0-8 Historical trends in inflation (GDP deflator %) in South Africa compared to global, regional and continental averages.



Source: World Bank - World Development Indicators - Inflation, GDP deflator (annual %)

National creditworthiness

Whereas the inflation rate reflects the monetary stability in a country, the creditworthiness reflects the stability and sustainability of public finance. Of the twenty-one African countries that have recently received a credit rating from the rating agency Standard & Poor's, the majority of the countries received a B rating, whereas the lowest rating of CCC+ was given to two countries. On the high side of the spectrum, one country received an A- rating and three countries received a B+ rating. South Africa was rated BB, meaning that the country performs below the African average in terms of creditworthiness. The rating agency also thinks that the rating may worsen in the future and gave it a 'negative' outlook for the future. The rating agency Fitch gives to South Africa is slightly more positive i.e. BB+. However, the prospects for the future are also 'negative'. Moody's rating agency has also cut South Africa's credit rating. Moody's cited the deterioration in South Africa's fiscal strength and "structurally very weak growth" for its decision to lower the country's rating to Ba1 from Baa3. The outlook remains negative.¹⁸⁷

Table E-0-2 Most recent credit ratings (2019) by Standard & Poor's for African countries and their outlook (N=20) (In orange: South Africa's rating)

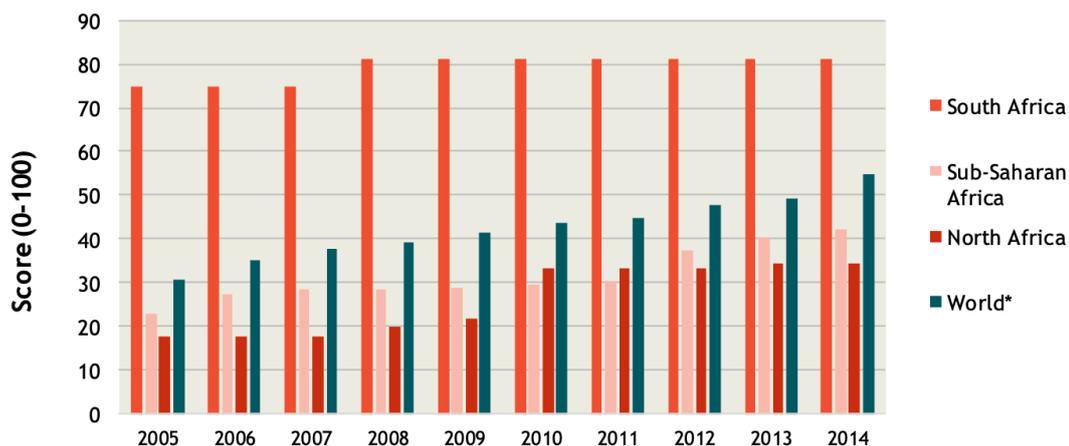
S&P	\# countries	Outlook	# countries
A-	1	Stable	12
B+	3	Developing	4
B	10	Negative	4
B-	2		
BB	2		
BBB-	1		
CCC+	2		

¹⁸⁷ <https://tradingeconomics.com/south-africa/rating>

Ease of getting credit

For many African countries, access to finance is an important obstacle for people and organisations that want to start up a business. The World Bank’s indicator on the ‘ease of getting credit’ indicates that access to finance is not really a problem for people and organisations that want to start up a business in South Africa. Since 2008, South Africa scores above 80 (in a scale up to 100), which is higher than the world average and more or less twice what Sub-Saharan Africa and North Africa score on average. It should be mentioned that in the ‘enterprise survey’ conducted by the World Bank in 2007, the lack of access to finance was considered the third largest obstacle to doing business in the country.

Figure E-0-9 South Africa’s score (0-100 scale) for the ease of getting credit compared to global and regional averages



Source: World Bank - Ease of doing business - Getting credit (DB05-14 methodology) - Score.

Annex F - Method for modelling of impacts

Part 1 Methodological details of the modelling approach

The E3ME model

The process of estimating impacts of circular economy activities in South Africa was carried out using Cambridge Econometrics' E3ME model. E3ME is a global, macro-econometric model of the world's economic and energy systems and the environment. It was originally developed through the European Commission's research framework programmes and is now widely used for policy assessment, forecasting and research purposes across different geographical areas.

E3ME's historical database covers the period 1970-2016 and the model projects forward annually to 2050. The main data sources for South Africa is the World Bank, UN National Accounts, IMF and ILO, supplemented by data from national sources. Energy and emissions data are sourced from the IEA and EDGAR. Gaps in the data are estimated using customised software algorithms.

The current version of the model has the following dimensions:

61 regions - all major world economies (i.e. G20), the EU28 and candidate countries plus other countries' economies including South Africa

- 43 industry sectors, based on standard international classifications
- 28 categories of household expenditure
- 22 different users of 12 different fuel types
- 14 types of airborne emissions (where data are available) including the six greenhouse gases monitored under the Kyoto protocol

The impact of policies and economic reforms can be simulated thanks to a detailed representation of sectors and spending categories built into the model: 43 industry sectors, based on standard international classifications; and 28 categories of household expenditure, 23 fuel users of 12 fuels and 15 users of 7 raw materials. As a general model of the economy, based on the full structure of the national accounts, E3ME is capable of producing projections for GDP and the aggregate components of GDP (household expenditure, investment, government expenditure and international trade), and other output indicators including employment by sector and GHG emissions. The 43 industry sectors available for South Africa in E3ME are:

1. Agriculture etc
2. Coal
3. Oil & Gas etc
4. Other Mining
5. Food, Drink & Tobacco
6. Textiles, Clothing & Leather
7. Wood & Paper
8. Printing & Publishing
9. Manufacture of Fuels
10. Pharmaceuticals
11. Chemicals n.e.s.
12. Rubber & Plastics
13. Non-Metallic Mineral Products
14. Basic Metals
15. Metal Goods
16. Mechanical Engineering
17. Electronics
18. Electrical Engineering & Instruments
19. Motor Vehicles
20. Other Transport Equipment
21. Manufacturing n.e.s.
22. Electricity
23. Gas Supply
24. Water Supply
25. Construction
26. Distribution
27. Retailing
28. Hotels & Catering
29. Land Transport etc
30. Water Transport
31. Air Transport
32. Communications
33. Banking & Finance
34. Insurance
35. Computing Services
36. Professional Services
37. Other Business Services
38. Public Administration & Defence
39. Education
40. Health & Social Work
41. Miscellaneous Services
42. Unallocated
43. Forestry

In addition to capturing direct and indirect impacts from the transition to a more circular economy, the model can capture the full induced effects, most notably rebound effects. A shift to a more circular economy involves reducing inputs to production (the direct effect), and this in turn affects demand along supply chains (i.e. the indirect effects¹⁸⁸). In addition, these shifts create changes in demand and employment, for example through creating jobs in recycling, leading to higher aggregate wages in the economy, or from reducing prices faced by consumers and therefore allowing higher real consumption. This creates additional demand, and further boosts value added and employment (induced effects¹⁸⁹). The rebound effect for the circular economy means that some of the initial reductions in resource consumption are eroded due to additional spending elsewhere in the economy.

For more information on the E3ME model, including the model manual, please visit www.e3me.com.

Treatment of the informal sector

The informal sector is an important consideration when modelling circular economy activities in Africa, as much economic activity may not be fully recorded in official national statistics. This issue is most relevant to agriculture, given the importance of smallholder agriculture in many African countries. E3ME is capable of capturing this part of the economy, as it is built using economic data from the World Bank and employment data from the ILO, both of which incorporate estimates of the informal sector in their data.

Scenario design

E3ME is most used for scenario analysis, evaluating the impacts of an input shock to a reference scenario. An input shock may be either a change in policy, a change in economic assumptions or another change to a model variable. By comparing different scenarios - each representing an alternative future with different policies and/or economic assumptions - it is possible to assess the impact of a change in policies and/or economic assumptions. For this report, the following scenarios were modelled: a baseline scenario and a circular economy (CE) scenario with a scale of circularity on top of the level embedded in the baseline (see Table F1).

Table F-0-1 Scenario design

Scenario	Scenario Description
Baseline	A baseline constructed based on official published economic and energy-sector projections. The modelling baseline does not explicitly assume a certain level of circular economy activities.
Circular Economy	This scenario assumes an ambitious uptake of the circular economy, in addition to the baseline scenario. The base year for the modelling is 2020 and the target year is 2030.

We have adopted an ‘activities’ approach (rather than a ‘policies’ approach) to modelling the CE scenario. This choice means that the analysis does not assess potential impacts of specific policies but

¹⁸⁸ Indirect effects are associated with input-output relationships between industries, and refer to the knock-on impacts on other industries in the supply chain. For instance, if circular economy activities reduce construction demand for raw materials, then the extractives sector will see a fall in demand. This will in turn cause falls in demand for their suppliers (e.g. business services), and so on.

¹⁸⁹ Induced effects refer to wider macroeconomic impacts. For example, if the construction sector operates more efficiently due to circular economy activities, it may be able to employ more workers or pay higher wages. This may ultimately increase demand for raw materials, so the net impact of all these effects on the extractives sector may be positive, even if the direct and indirect effects had been negative.

instead looks directly at the links between specific changes in an economy and the direct, indirect and induced effects, without making any explicit assumptions about whether these changes are driven by policies, behavioural change or new technology.

The activities approach implies generating modelling inputs from a sectoral perspective. Inputs are formed by studying the plausible circular economy activities that will take place in selected key sectors and their supply chains. This is to reflect that the impact of a transition to a more circular economy will vary between sectors, as sectors differ in the way in which resource flows and relationships with the consumer are organised.

Increased waste collection and recycling are modelled as central circular economy activities. In addition, activities for four additional sectors are modelled, selected based on existing policy priorities, but also on the basis of the anticipated scale of the potential benefits (in consultation with country experts): electronics (e-waste), plastics, agriculture and construction.

The selected activities are translated into modelling inputs and methods, so that the economic, social and environmental impact can be simulated in E3ME. Together, the selected activities should be broad enough to represent the most important circular economy changes and their potential impacts.

Scenario assumptions

provides a summary of the selected circular economy activities and how the identified circular economy activities were translated to modelling inputs that have been implemented in E3ME.

Table F-0-2 Scenario assumptions

Category	Circular economy activity	Modelling input	Input size
Waste management	Improved waste collection rate	Increase in waste sector output	Increase from 61% to 95%
E-waste	Improved enforcement of e-waste trade restrictions	Reduction in e-waste (i.e. electronics) imports	n/a
		Investment in recycling sector to improve health & safety standards	€15m
	Improved recycling of valuable materials in e-waste	Share of recycling investment paid for by private and public sectors	50:50
		Exports of materials recovered from e-waste recycling	€75m
Agriculture	Prevention of food loss in agricultural supply chain through improved storage and logistics	Substitution of agricultural imports by domestic agricultural production	€513m
		Investment in storage and logistical capabilities	€154m
		Share of investment paid for by private and public sectors	50:50
Circular production	Increased use of recycled materials in industrial production	Electronics production: shift from virgin metals and plastics inputs to recycled inputs	20% of virgin inputs replaced by recycled inputs
		Plastics production: shift from virgin feedstock to recycled feedstock	25% of virgin inputs replaced by recycled inputs

	Construction: shift from virgin non-metallic minerals (glass, cement, sands, ceramics) to recycled minerals	10% of virgin inputs replaced by recycled inputs
	Agricultural production: shift from mineral fertilisers to organic fertilisers	20% of mineral fertiliser replaced by organic fertiliser

As indicated in the last two columns, the various economic changes associated with the circular economy are modelled through specific input assumptions. They mainly relate to gross output, input-output coefficients, investment and the trade balance.

Gross output

The increase in the waste collection rate is modelled as a change in output in the waste management sector. This increase in gross output can be thought of as resulting from a government mandate, rather than being caused by an increase in a component of demand.

Input-output linkages (intermediate demand between sectors)

We have modelled an increase in the circularity of production for a number of sectors through adjustments to the existing input-output structure of the model. This reflects changes to the supply chain of a sector as a result of higher circular economic activities. For example, if the electronics sector uses less metal and plastic material, and substitutes these for recycled parts from e-waste manufacturing, this change is entered to E3ME as an adjustment to the input-output linkages (i.e. coefficients) of the electronic sector: it purchases less from the plastic and metal sectors and more from the recycling sector.

Investment

Some of the modelled circular economy activities are associated with an increase in investment, such as the investment required to prevent food losses in the agricultural sector, or to increase health and safety in the recycling sector. In these cases, assumptions are also needed regarding the share of the investment costs that will be paid by the private and public (or aid) sectors: we have assumed a 50:50 split in all cases. In practice, this means that 50% of the investment input is represented as a cost to the investing industry; the other 50% is assumed to be funded by deficit spending or official development assistance, and is thus represented as an injection of funds into the economy.

Trade balance changes

In some cases, the modelled changes to the trade balances represent circular economy activities which directly relate to the trade balance, such as the reduction in imports of e-waste. In other cases, changes to the trade balance are a way to represent a change in productivity in a demand-led model. For instance, we have modelled a reduction in food losses in the agricultural supply chain (effectively an increase in agricultural productivity) as a reduction in imports of agricultural products, as domestic supply is better able to meet domestic demand. Similarly, some portion of the materials recovered from e-waste recycling are modelled as an increase in exports, as we do not assume that domestic demand for these materials has necessarily increased.

Mapping inputs to E3ME sectors

In some cases, the sectors available in E3ME were too broad to allow for the targeting of inputs at the level described in

Table F2 above. For example, modelling the increase in waste collection rates required a given percentage increase in the output of the waste management sector. However, in E3ME, waste management is contained within a broader ‘Miscellaneous Services’ sector, and so the size of the waste management sector itself is not given. **Error! Reference source not found.** provides an overview of how each of the modelled activities corresponded to the sectors available in E3ME. We produced estimates of waste management output and other missing datapoints using national accounts data, where possible, as well as other sources.

Table F-0-3 Mapping to E3ME sectors

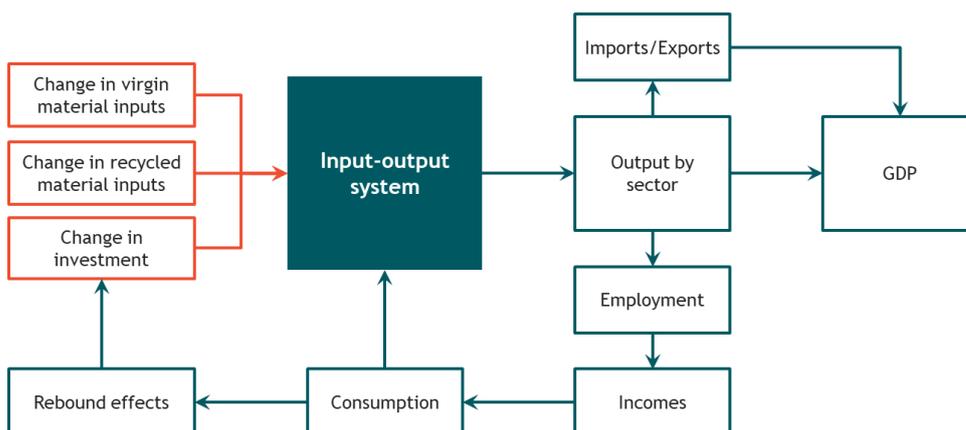
Activity sector	E3ME Sector	Variables affected by modelling inputs
Waste management	41. Miscellaneous Services	Gross output
Recycling	21. Manufacturing n.e.s.	IO coefficients, Investment, Exports
Electronics	17. Electronics	IO coefficients, Imports
Plastics	12. Rubber & Plastics	IO coefficients
Construction	25. Construction	IO coefficients
Agriculture	1. Agriculture etc	IO coefficients, Investment
Metals	14. Basic Metals	IO coefficients (electronics input)
Chemicals	11. Chemicals n.e.s.	IO coefficients (plastic feedstock, mineral fertilisers)
Mining of non-metallic minerals	4. Other Mining	IO coefficients (construction materials)
Production of non-metallic minerals	13. Non-Metallic Mineral Products	IO coefficients (construction materials)

Model linkages and feedbacks

The impact of circular economy activities will not be linear. A change in investment or material consumption may have feedback effects that may in turn alter investment and consumption levels. A full-economy model like E3ME is able to capture these complex interactions, enabling a deeper analysis of the trade-offs inherent in a circular economy transition, as limits are placed on certain economic activities while demand for others increases.

For instance, the shift towards recycled materials will tend to increase the labour intensity of production. On the one hand, we can expect that this will increase unit production costs, which may be passed on to consumers via higher prices. Such a negative supply shock would be expected to reduce consumption in the economy. Furthermore, increasing the capacity of recycling centres may require more advanced machinery of a kind that is not produced domestically, causing imports to increase and GDP to fall.

Figure F-0-1 E3ME linkages - flow diagram



On the other hand, the shift towards recycled materials may also be associated with increased employment, increasing disposable incomes and consumption. The additional investment required by the transition would also filter through the economy, increasing demand in the financial and construction industries, among others.

The overall consumption of raw materials is determined by these trade-offs within the economy. If the rebound effects from the additional demand are strong, the impact of circular economy activities may be to increase the extraction of raw materials more than ever, with improved resource efficiency offset by higher consumption overall. As the relative importance of sectors with different labour and carbon intensities changes as a result of the circular economy, we may expect to see similar dynamics in terms of employment and carbon emissions in aggregate, with employment and carbon emissions being added in certain areas of the economy while employment and emissions potentially being reduced in other areas of the economy. Through its model linkages and feedbacks, E3ME captures these various effects and estimates the net impacts.

Part 2 - Detailed modelling results

Table F-0-4 South Africa's score (0-100 scale) for the ease of getting credit compared to global and regional averages

Detailed employment results by sector

Sector	Baseline scenario employment, 2030 (000s)	CE scenario employment, 2030 (000s)	Absolute difference from baseline scenario in 2030 (000s)	Relative difference from baseline scenario in 2030 (%)
1 Agriculture etc	891.6	908.7	17.0	1.9%
2 Coal	207.4	207.7	0.3	0.1%
3 Oil & Gas etc	29.7	29.7	0.0	0.1%
4 Other Mining	59.1	59.1	0.0	0.0%
5 Food, Drink & Tobacco	211.2	211.0	-0.2	-0.1%
6 Textiles, Clothing & Leather	69.5	69.5	0.0	0.0%
7 Wood & Paper	40.1	40.1	0.0	0.0%
8 Printing & Publishing	138.3	138.6	0.2	0.2%
9 Manufacture of Fuels	21.8	21.8	0.0	0.0%
10 Pharmaceuticals	89.3	89.3	0.0	0.0%
11 Chemicals n.e.s.	159.6	156.5	-3.1	-2.0%
12 Rubber & Plastics	92.1	91.2	-0.9	-0.9%
13 Non-Metallic Mineral Products	61.2	60.0	-1.2	-2.0%
14 Basic Metals	405.2	405.0	-0.2	0.0%
15 Metal Goods	48.7	48.8	0.1	0.2%
16 Mechanical Engineering	37.4	37.8	0.4	1.2%
17 Electronics	15.7	15.9	0.2	1.4%
18 Electrical Engineering & Instruments	70.9	71.2	0.4	0.5%
19 Motor Vehicles	347.9	347.8	-0.1	0.0%
20 Other Transport Equipment	30.0	30.0	0.0	0.0%
21 Manufacturing n.e.s. (incl. waste recycling)	50.1	69.3	19.2	38.4%
22 Electricity	95.2	95.2	0.0	0.0%
23 Gas Supply	19.5	19.5	0.0	0.1%
24 Water Supply	18.3	18.3	0.0	0.0%
25 Construction	1549.8	1550.6	0.8	0.0%
26 Distribution	1594.4	1592.5	-1.9	-0.1%
27 Retailing	1115.5	1117.7	2.2	0.2%
28 Hotels & Catering	710.1	711.2	1.1	0.2%

29 Land Transport etc	525.1	525.2	0.1	0.0%
30 Water Transport	53.6	54.3	0.6	1.2%
31 Air Transport	162.2	162.2	0.0	0.0%
32 Communications	449.7	449.5	-0.2	-0.1%
33 Banking & Finance	284.8	286.9	2.1	0.7%
34 Insurance	184.1	185.2	1.1	0.6%
35 Computing Services	0.0	0.0	0.0	0.0%
36 Professional Services	1089.4	1102.0	12.6	1.2%
37 Other Business Services	1228.5	1233.7	5.2	0.4%
38 Public Administration & Defence	828.2	828.4	0.2	0.0%
39 Education	1287.7	1287.7	0.0	0.0%
40 Health & Social Work	1300.4	1302.7	2.3	0.2%
41 Miscellaneous Services (incl. waste management)	2440.4	2607.6	167.2	6.9%
42 Unallocated	0.0	0.0	0.0	0.0%
43 Forestry	16.4	16.3	0.0	-0.2%
TOTAL	18030.2	18255.9	225.7	1.3%

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