



Sustainable Agriculture

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2020

Market Intelligence Report

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GreenCape

GreenCape is a non-profit organisation that drives the widespread adoption of economically viable green economy solutions from the Western Cape. We work with businesses, investors, academia and government to help unlock the investment and employment potential of green technologies and services, and to support a transition to a resilient green economy.

Acknowledgements

We thank Inge Kushke, for the time and effort that she has put into compiling this market intelligence report.

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List of acronyms and abbreviations

AfCFTA	African Continental Free Trade Area
agtech	Agricultural technology
APAP	Agricultural Policy and Action Plan
CA	Conservation Agriculture
CCT	City of Cape Town
CO ₂ e	Carbon Dioxide Equivalent
COJ	City of Johannesburg
CSA	Climate Smart Agriculture
DAFF	Department of Agriculture Forestry and Fisheries
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
FAO	Food and Agriculture Organisation
FIVS	International Federation of Wine and Spirits
GHG	Greenhouse gas
Ha	Hectare
IGDP	Integrated Growth and Development Plan
IPW	Integrated Production of Wine
IRP	Integrated Resource Plan
JHB	Johannesburg
kWh	Kilowatt-hour
LRAD	Land Redistribution for Agricultural Development
MWp	Megawatt peak
NDC	Nationally Determined Contribution
NDP	National Development Plan
NEMA	National Environmental Management Act
NGP	New Growth Path
OIV	International Organisation of Vine and Wine
PA	Precision agriculture
PLAS	Proactive Land Acquisition Strategy
SA	South Africa
SPLAG	Settlement Production Land Acquisition Grant
UA	Urban Agriculture
UAV	Unmanned Aerial Vehicle
UN	United Nations
WC	Western Cape
WCDoA	Western Cape Department of Agriculture
WCWSS	Western Cape Water Supply System
WMA	Water Management Area
WUA	Water Use Association
WWF	World Wide Fund for Nature

Executive summary

The South African and Western Cape agriculture sectors offer numerous opportunities for investors, agricultural and green technology manufacturers, service providers, distributors, and others in the value chain.

Primary agriculture contributed a relatively small share of the total GDP (2.6% in 2018) in South Africa (SA), but is significant in terms of providing employment and earning foreign exchange. However, when taking into account the whole agricultural value chain, the sector is estimated to contribute about 12% of the national GDP.

Water availability is a key driver for the uptake of agricultural technology (agtech) in SA. SA is a semi-arid country, with limited land suitable for rain-fed agriculture production. This makes water a key constraint to agricultural development.

South Africa, in particular the Western Cape (WC), experienced one of the worst droughts on record from 2014/15 – 2017/18, which resulted in water restrictions and large economic losses. The drought, together with other factors such as loss of and diminishing returns on arable land due to conventional farming practices, climate change, and population growth, has put the long-term resilience of the agricultural sector into focus. The uptake of sustainable technologies and practices are crucial for the continuity of the sector.

Other important trends in sustainable agriculture production include international market pressure for low carbon, environmentally friendly products, and international regulations on the use of synthetic chemicals.

These trends, as well as rising input costs of conventional inputs, contribute to emerging investment opportunities in:

- **remote sensing technologies** for precision agriculture applications (driven specifically to improve water efficiency and climate adaptation);
- **urban agriculture**, with hydroponic production specifically still emerging;
- **undercover farming**, which includes low-tech infrastructure such as shade netting and higher-tech controlled environment agriculture systems; and
- well-established investment opportunities in **renewable energy and conservation agriculture**.
- **Remote sensing applications for precision agriculture**: There are emerging opportunities for companies offering bespoke services in aerial-data analytics for farmers. The current market estimate for irrigated agriculture in the WC is R37.5 million/year.
- **Urban agriculture (UA)**: Specifically hydroponic production is still emerging. A conservative estimate for the market of rooftop hydroponic production is R2.59 million to R3.94 million, based on current installations by largest market player.

- **Undercover farming (UF)**: The potential market for low-tech UF in SA is estimated at R38 billion, and R1.9 billion in the WC. There has been a significant increase in UF in the WC over the past five years. Shade netting has increased by 171% from 2013 to 2018 in terms of area under production. The number of tunnel structures has increased by 55% for the same time period. The market for medium- to high-tech systems in South Africa is worth more than ~R1 billion. UF provides numerous opportunities for suppliers and manufacturers of UF components as well as consultants, especially in high-tech UF.
- **Renewable energy**: The market for renewable energy in agriculture is estimated to be 90 MW in terms of installed capacity, a market of between R945 million and 1.5 billion in 2019.
- **Conservation agriculture (CA)**: The estimated market size for no-till machinery in SA ranges from R136 million to R747 million, based on the current uptake of farmers who are practising CA. There are further emerging opportunities for organisations in regenerative agriculture (RA), such as certification bodies, technical consultancies, environmental NPOs, research institutions, carbon offset companies, and bioproduct manufacturers.

The main drivers of these opportunities are:

- **rising input costs** for energy (particularly electricity and diesel), fertiliser and pesticides;
- **increasing awareness** of sustainable practices and technologies available, as well as their benefits;
- **climate change**, forcing the sector to adopt more sustainable practices to increase its resilience; climate change also exacerbates water scarcity through increasing evaporation and recurrence of droughts;
- **detrimental environmental effects** associated with conventional (i.e. traditional) inputs and practices, specifically pollution and soil degradation, leading to lower production yields, loss of arable land, and reduced resilience;
- **decreasing costs** of greentech, such as solar panels; and
- **scarce natural resources** (particularly arable land and water) that are primarily affected by climate and farming practices.

Table 1: Summary: Investment opportunities in sustainable agriculture for 2019/20

Opportunity	Key drivers	Requirement & barrier	Term	Macro environment
Renewable energy (solar photovoltaic)	<ul style="list-style-type: none"> ■ Rising electricity tariffs ■ Security of energy supply ■ Increasing ability to feed back into the grid ■ Decreasing cost of technology ■ Innovative finance options ■ Corporate social responsibility (CSR) 	<ul style="list-style-type: none"> ■ Strong business case for large (e.g. cold storage) and year-round energy users ■ Seasonal nature of agriculture production affects the business case 	Short to medium term	SA was the fastest grower of solar photovoltaic (Solar PV) installations in 2017 globally. An estimated 10% of all solar PV installations are in the agricultural sector, and the business case is well known to the industry.
Conservation agriculture (no-till planting equipment)	<ul style="list-style-type: none"> ■ The main driver is soil degradation resulting from conventional tillage and subsequently diminishing returns on land, due to factors such as decreased moisture-holding capacity and biological functions 	<ul style="list-style-type: none"> ■ High cost of equipment ■ Long-term return on investment when converting from conventional to conservation practices ■ Sustainable farm management practices such as crop rotation and permanent soil cover play an important role to improve the business case 	Medium to long term	Globally, the uptake of CA is high, particularly in South America. Only 15% to 20% of commercial grain farmers and 5% of smallholder farmers in SA have adopted CA.
Undercover farming (various technologies)	<ul style="list-style-type: none"> ■ Resource scarcity ■ Increased yields and quality ■ Providing products out of season ■ Climate change ■ Technological advances in LED lighting 	<ul style="list-style-type: none"> ■ High capital cost with limited financing options ■ High cost of electricity affects viability of controlled environment systems ■ Business case not well established for high-tech systems ■ Lack of technical knowledge 	<p>Low-tech systems: Short to medium term</p> <p>High-tech systems: Long term</p>	<p>Greenhouses are well established globally. SA, as with most developing countries, has been very slow to adopt greenhouse technology, and is estimated to be 50 years behind developed European countries such as the Netherlands.</p> <p>Low-tech systems such as netting and tunnels are growing rapidly, particularly for high value export fruits.</p>

Precision agriculture (remote sensing applications)	<ul style="list-style-type: none"> ■ Resource scarcity, particularly water availability ■ Global competitiveness and economies of scale ■ Technological advances in drone, satellite and information communication technology and the Internet of Things (IoT). 	Barriers highlighted by current players in the field includes: <ul style="list-style-type: none"> ■ The mind-set change required by farmers to adopt new farm management technologies. ■ A lack of integration between various disciplines. ■ The inclusion of the end user in developing software solutions, which results in limited understanding of the end user's actual needs. 	Medium to long term	<p>Globally, agriculture is the least digitised sector (throughout its value chain) and thus technology-based decision-making is still emerging.</p> <p>Remote sensing applications is an emerging market in SA's agriculture sector, with the exception of GPS guidance for tractors.</p>
Urban agriculture (hydroponic production)	<ul style="list-style-type: none"> ■ Resource scarcity ■ Urbanisation ■ Advances in technology, specifically hydroponic systems and LED lighting ■ Consumer preferences for locally produced food ■ Waste minimisation 	<ul style="list-style-type: none"> ■ Enabling municipal support environment, such access to water and space. ■ Access to finance for technology infrastructure ■ Lack of technical knowledge ■ Business case not well established 	Long term	<p>Urban agriculture (UA) growth is the largest in Asian countries characterised by high-density urban populations. In particular, vertical farming production, as it uses space more efficiently than flat structures. Commercially viable production of agricultural produce in SA's urban environments is still in its infancy. Various factors, such as spacing, scale, product demand and market access needs to be better understood to create successful enterprises.</p>

Introduction and purpose

This market intelligence report (MIR) has been compiled by GreenCape's Agriculture Sector Desk. It highlights opportunities for greening agriculture production and is written for investors, with a focus on new investors exploring the South African agtech¹ market.

What's new?

The 2019 Sustainable Agriculture MIR discussed the economic impacts of external factors on the sector, particularly the Western Cape drought (2015 – 2018). The industry's response to the drought was an important indicator of the level of resilience of the agricultural sector.

The 2020 Sustainable Agriculture MIR looks toward longer-term trends and investments for sector resilience, particularly in the light of climate change scenarios (such as more frequent and severe weather events), resource scarcity (particularly water), and the global factors (such as synthetic chemical bans). These long-term trends include:

- The movement towards regenerative agriculture production for long-term sustainability of soil health through increasing water-holding capacity, soil carbon, soil organic matter, and microbial activity.
- The emergence of urban agriculture production, particularly hydroponic rooftop production, resulting from a need for alternative food supply systems due to resource scarcity and urbanisation.
- The role of corporate social responsibility (CSR) in sustainable investments in the sector.

Another addition to this year's report is a section on general sustainability initiatives / investments undertaken by various agricultural industry players to give the reader an understanding of the sustainability environment in SA.

The MIR further investigates key developments for remote sensing applications for precision agriculture by presenting a case study of technology uptake and trends based on FruitLook data.

The MIR also discusses, for the first time, emerging opportunities in urban agriculture in South Africa, specifically hydroponic production.

For new readers, we advise that you first read the 2019 Agriculture MIR for an in-depth understanding of established opportunity areas.

GreenCape's Agriculture Sector Desk was established in 2014 in partnership with the Western Cape Department of Agriculture (WCDoA). The desk aims to support the development of sustainable and competitive agricultural value chains through the uptake of agricultural technology (agtech) and sustainable production practices. This is achieved by raising awareness of the benefits of agtech uptake (i.e. driving demand within agriculture), and highlighting opportunities for agtech investors, manufacturers, and service providers (i.e. supporting supply).

This MIR provides updates on key issues and opportunities identified in previous MIRs, and highlights new opportunities related to technologies and practices that:

- increase input resource efficiency in primary production;
- benefit the environment, primarily by conserving resources, reducing negative impacts such as soil degradation and pollution;
- increase resilience to climate change; and
- have the potential to attract international investment.

The main focus in this MIR is on remote sensing applications for precision agriculture (PA) and urban agriculture (UA). Updates are provided on the areas explored in detail in the 2019 MIR: undercover farming, renewable energy and conservation agriculture.

In what follows, there is a **sector overview** (Section 2) that provides a national and provincial economic overview of agriculture with the focus on macro-economic trends and key players. This is followed by an overview of **policies and regulations** (Section 3) that guide and affect investors in the agriculture sector. Key **opportunities, trends and barriers** are highlighted (Section 4). The final sections provide information on available **finance and incentives** (Section 5), present the case for the **Western Cape as Africa's emerging greentech hub** (Section 6), and explain **GreenCape's work** in the green economy (Section 7).

For assistance, or if you have any questions after reading this MIR, please contact the agriculture team on telephone +27 (0)21 811 0250 or email agri@greencape.co.za.

¹ AgTech represents the application of technology – especially software and hardware technology – to the field of farming.



2 Sector overview

This section provides an overview of the South African and Western Cape agricultural sectors. It includes an overview of the sector's structure, macro-economic trends, key players, and drivers of green technology and practices in agriculture.

2.1. Physical geography and climate

SA is a resource scarce country and classified as semi-arid. The country's land cover (in total 122 million hectares) and select land use classifications are illustrated in [Figure 1](#) below (DAFF 2013a).

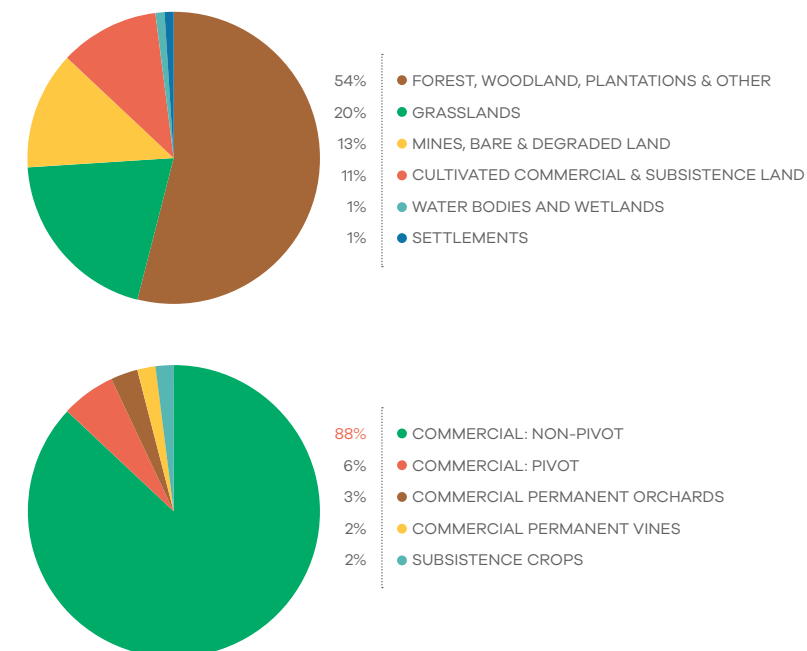


Figure 1: South Africa's land cover and select land use classifications

Only ~11% of land in SA is considered arable, of which 3% is truly fertile soil. A mere 1% has the right climate and soil combinations for rain-fed crops. Water availability for irrigation is thus vital for the sector and the largest limiting factor in production. SA is ranked as the 30th driest country globally. Water availability is under further pressure from climate change and increased competition due to population growth.

SA has a wide range of agro-climatic regions, as shown in [Figure 2](#) (FAO 2010). Climatic regions include Mediterranean, subtropical and semi-desert, enabling the production of a wide range of agricultural commodities.

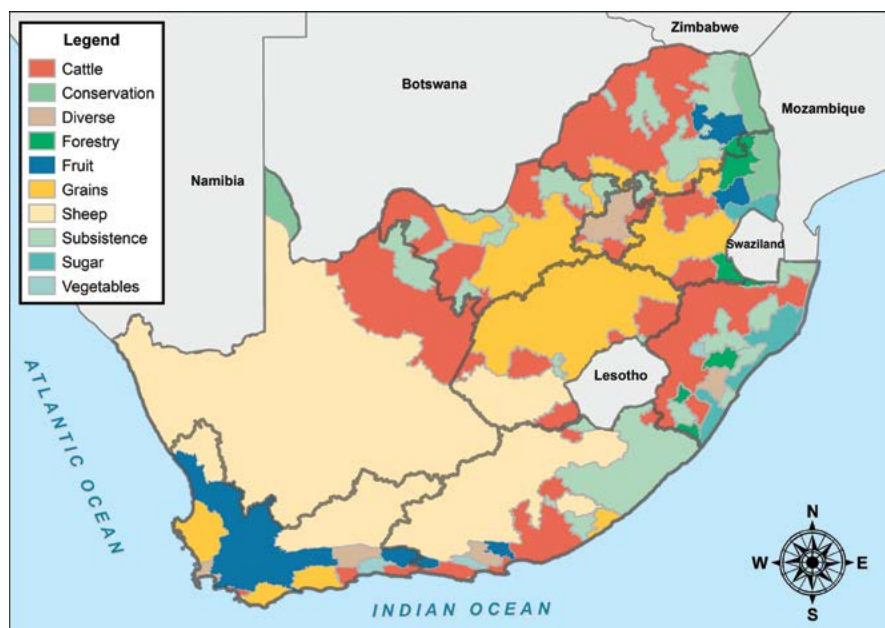


Figure 2: South African agricultural regions

2.1.1. Western Cape agriculture

Fruit production dominates agricultural production in the WC (see Figure 3), with a large percentage of these considered high value and destined for export markets. Grains in the WC is mostly under dryland production. All fruit production is under irrigation.

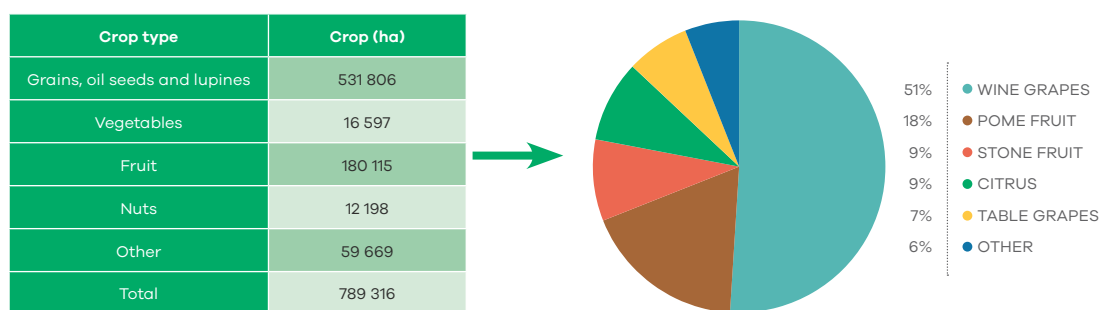


Figure 3: Proportion of agricultural commodities produced in the WC

Recent years have seen significant increases in the area under production of high-value export crops. Growth in production area was seen from the WCDoA's census data for citrus (35%), berries (33%), sub-tropical fruits (21%), and nuts (79%) from 2013/14 to 2017/18. This growth is largely due to an increase in consumer demand for healthy foods, especially by Millennials and Generation Z, who are willing to pay a premium for such products (Forbes 2019).

There has been an exponential rise in the WC in the production of high-value crops between 2013 and 2018, in citrus, berries, tropical fruits, and nuts.

Growth in export crops is an important trend in terms of sustainable agriculture, as international market pressure for low-carbon, environment-friendly products is an increasingly important driver for the uptake of practices and technologies that reduce the use of chemicals, and a product's carbon and water footprint. Sustainability drivers are further discussed in Section 2.4 of this report.

The long-term resilience of the sector has drawn a lot of attention in recent years, especially in the light of:

- climate change predictions that the province will experience a 50% decrease in rainfall by 2050, as well as more frequent and severe weather events such as floods and droughts;
- large output and job losses due to the drought (2015 – 2018); and
- decreasing return on soil due to conventional production practices.

It should be noted that although the Western Cape has the largest area under irrigation (269 476 ha) in South Africa, it also has the lowest water use per area unit (5 874 m³/ha). This shows that efficiency measures have already been put in place (WWF, 2018). This indicates that there is awareness of the importance of using water efficiently, making it a good investment destination for efficient irrigation technology.

Technologies and practices that make the sector more resilient and sustainable are discussed in Section 4 of this report.

2.2. Overview of the agricultural economy

This section provides an overview of the agricultural economy in SA and the WC, with a focus on the sector's economic contribution, value of commodities, and production trends.

2.2.1. South African agriculture

The South African agricultural economy has seen decent growth over the past decade, albeit with some difficult periods that have stifled growth. Figure 4 below reveals the performance of the agricultural economy, showing trends for both the agricultural gross domestic product (GDP) and net farm income (NFI) in South Africa. The declines registered between 2015 and 2016 are mainly attributed to the drought in the summer rainfall region. The most recent decline in 2018 is also due to drought conditions experienced in the Western Cape, with the resultant income losses. Several other factors affecting below-average growth in the sector have been caused by animal disease outbreaks. For instance, in June 2017, Highly Pathogenic Avian Influenza started spreading in the South African chicken industry, which ultimately led to the compulsory culling of 70% of all layer birds in the Western Cape.

Although the Western Cape has the largest area under irrigation in South Africa, it also has the lowest water use per area unit showing that efficiency measures have already been put in place (WWF, 2018).

The recent outbreak of foot-and-mouth disease in 2019 has led to restrictions on exports and movement of animals to be sold to abattoirs. Finally, the current policy uncertainty with regard to land ownership and the potential impact of expropriation without compensation is hampering investment in the sector.

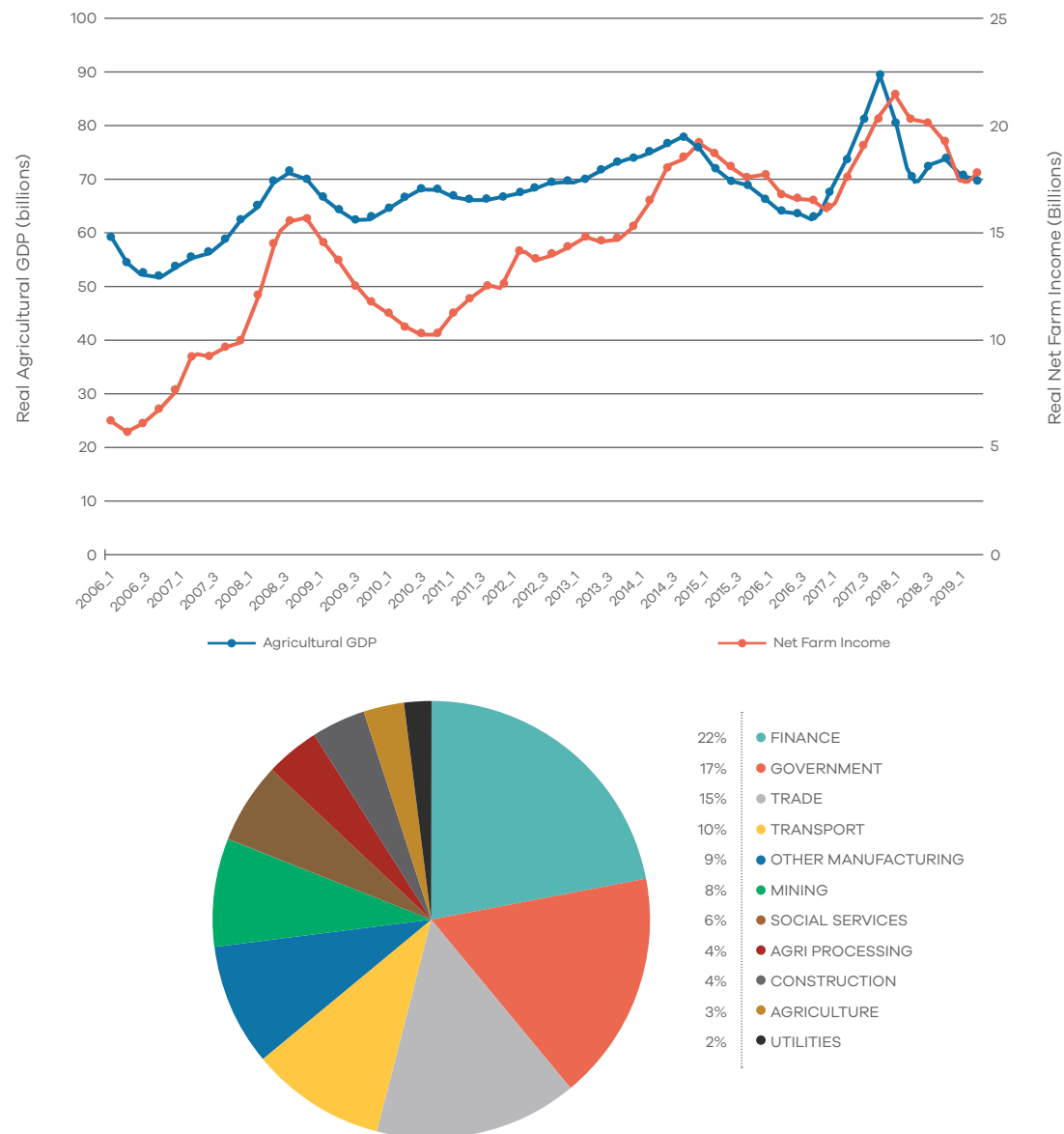


Figure 4: Agricultural economy and South African sectoral GDP (ZAR billion per quarter)

Although primary agriculture, including downstream agricultural value-added activities known as the agri-processing sector, contributed a relatively small share of the total South African economy (2.6%) in 2018, its contribution has since increased to 7%. However, when considering the impact these two sectors have on employment and in generating foreign earnings in export markets, it is clear that the economy is dependent on well-functioning and sustainable agricultural value chains. Figure 5 elaborates on the trade performance of agricultural and related products since 2001. South African agricultural exports have performed well, growing from R48 billion to more than R144 billion in the past decade, which is equivalent to an average annual growth of 11.5%.

This growth means that the trade balance has also increased, although imports also expanded during the same period.

An exciting new development for agricultural trade is the African Continental Free Trade Area (AfCFTA), which is outlined in the African Continental Free Trade Agreement. The agreement was brokered by the African Union (AU) and signed in March 2018 by 44 of the 55 AU member states. In terms of the AfCFTA agreement, 90% of all traded goods between African countries will be traded at zero tariffs. It is expected that this free trade area will unlock new opportunities for the South African agricultural sector to expand existing trade and open up new market opportunities on the continent.

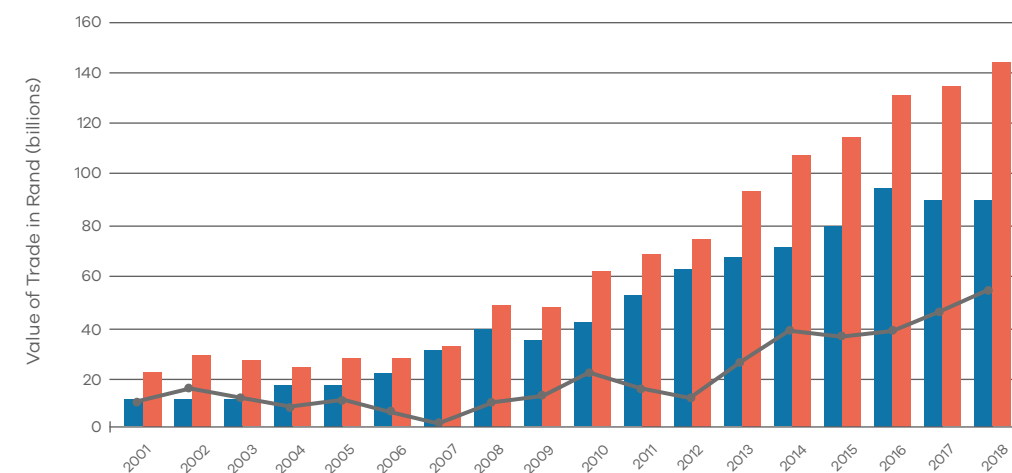


Figure 5: South African agricultural GDP and trade balance (ZAR billion per year)

2.2.2. Western Cape agriculture

The agricultural sector in the Western Cape is unique compared to other growing regions in the country, mainly due to the winter rainfall and Mediterranean climate. Horticulture and grape production is particularly concentrated in this region, of which around 45% gets exported into world markets (Hortgro, 2019). The province's agricultural value of production contributes to 21% of the country's total agricultural output, whilst around 44% of all exported agricultural goods comes from the Western Cape. The characteristics of the Western Cape agricultural sector are illustrated in Figure 6. It aggregates the exports by value for 2018 on the left, and then breaks down the area planted in hectares for crops included under fruit and nuts. Around half of all exports comes from the fruit industry,

The province's agricultural value of production contributes to 21% of the country's total agricultural output, whilst around 44% of all exported agricultural goods comes from the Western Cape.

followed by beverages (19%), and fish and crustaceans (9%) (Quantec, 2019). In terms of area planted, wine grapes still dominate, even though there has been a decline in orchards in the past several years. Pome and stone fruits make up around 27%, followed by citrus (9%) and table grapes (7%) (WCDa, 2018).

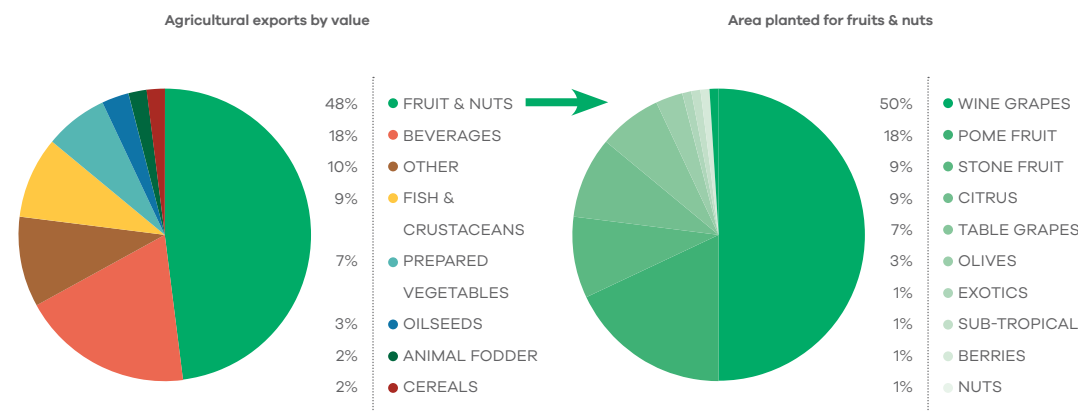


Figure 6: Breakdown of Western Cape exports by value and area planted for fruit & nuts



© WCDaA

Important to note is that these exported products are highly labour intensive. The income generated from these activities plays a significant role in contributing to the WC economy. In 2018, the agricultural sector contributed 4.1% to the WC economy, and another 5.7% for value-add under the agri processing sector (Quantec, 2019). These two sectors employ around 297 000 workers directly on farms and in manufacturing plants, which translates to 12% of the Western Cape labour force (QLFS, 2018).

2.3. Key players

As shown in Figure 7, key players in the agriculture sector can be divided into six broad categories: producers/farmers, input/technology suppliers, industry associations, research/academia, and labour organisations. SA's national agriculture department, the Department of Agriculture, Land Reform and Rural Development (DALRRD), governs the whole industry.

- **Producers/farmers** produce commodities and in most cases do their own harvesting, storage, and transport.

- **Input suppliers** produce inputs such as fertiliser, seeds, pesticides, packaging, and machinery. Suppliers of green technology, such as conservation agriculture equipment and solar PV manufacturers, also belong to this category.
- **Technology suppliers** are found across the value chain, from inputs, production, harvesting processing, logistics and waste processing (e.g. bio-digesters and composters).
- **Industry associations** are involved in all aspects of the value chain. They support farmers and provide them with relevant and reliable information regarding regulations, logistics, cultivar development, etc. They also do or support research in various fields, including soil, water, production practices, and cultivars.
- **Research institutions** like universities investigate all aspects of the value chain.
- **Labour organisations** provide support for employees in the agricultural sector by assisting them in attaining the best possible financial and social position in all employment positions along the entire value chain.

R&D	Inputs	Production	Harvesting	Storage	Transport	Processing	Wholesale, retail & exports	Waste
Government								
Producer								
Research institutions								
Input suppliers								
Technology suppliers								
Industry associations								
Labour organisations								

Figure 7: Key role players in agriculture

Key role-players for various agtech opportunities are discussed in detail in [Section 4](#).

2.3.1. Sustainability initiatives and investments by value chain players

This section explores general sustainability initiatives undertaken by industry stakeholders. It aims to illustrate that broader sector role-players, such as retailers, financiers and government, are aware of the importance of sustainable and resilient production through actively supporting and/or investing in the primary sector. These include:

- **Woolworth's Farming for the Future** initiative. The initiative is about saving water, improving soil quality, and working with nature. The goal is to grow quality produce while minimising any negative effect on the environment, and reducing farmers' dependence on chemical products. Certification includes assessing the management of soil minerals and microbes, pests, plants, biodiversity, irrigation, and wastewater. Woolworth's food business achieves a 20 per cent share in national fresh produce sales in South Africa (PMA 2017).
- **Nedbank** has made various investments into the sector. Most notably it contributed to:
 - Aerobotics, an aerial imaging and analysis company that provides early warning systems to farmers;
 - the first commercial floating solar PV system in Africa on a fruit farm in South Africa;
 - the bank's recently launched innovative funding plan to assist farmers with the installation of shade netting in orchards for protection against wind, hail, frost, sunburn, and birds; and
 - safeguarding critical water source areas, biodiversity hotspots and rural livelihoods. Money (R25 million) will be spent in partnership with the World Wide Fund for Nature (WWF), with which they have collaborated for the past eight years to support sustainable farming across SA. This forms part of the next 5-year plan.

- **The Wide Fund for Nature (WWF)** engages with farmers in the Western Cape, KwaZulu-Natal, Mpumalanga, Limpopo, and southern Cape, helping them improve land use planning, production efficiency, and responsible farming practices. This is achieved by developing best practice guidelines and standards, and helping impact sectors understand what sustainable farming entails.
- **Blue North's Confronting Climate Change (CCC)** initiative was developed to support South African fruit and wine farmers. It is a carbon footprinting project that identifies the risks and opportunities associated with carbon emissions. The CCC initiative includes an online carbon-footprinting platform, a series of regular industry engagement workshops, a range of commodity-specific industry benchmark reports, and up-to-date and relevant energy and emissions-related news and information.
- **LandCare** is a specialised service of the **Western Cape Department of Agriculture's** Farmer Support and Development program. LandCare is involved in multiple projects, including clearing of alien invasive species, which is crucial for water availability. Alien clearing not only improves sustainable water use in agriculture, but also creates jobs in rural areas. To date, an estimated 216 farmers have benefited from these projects. Another initiative, FruitLook, is discussed in detail in [Section 4](#) of this report.
- **Stellenbosch Wine Routes²** has signed the **Porto Protocol** – a global sustainable initiative signed by companies across numerous industries – in an effort to commit itself to making an accelerated contribution towards climate change mitigation. The Porto Protocol was launched by former US President Barack Obama in 2018. Stellenbosch Wine Routes became the first southern hemisphere wine region to join the ranks of global signatories.

² Stellenbosch Wine Routes represent more than 200 wine and grape producers within the boundaries of the Stellenbosch Wine of Origin classification.

2.4. Drivers of sustainable technologies and approaches in agriculture

The key drivers of sustainable technology and innovation in the sector are:

2.4.1. Environment

- **Climate change**, forcing the sector to adopt more sustainable practices to increase its resilience. Climate change also exacerbates water scarcity through increasing evaporation and recurring drought.
- **Scarce natural resources** (particularly arable land and water) that are primarily affected by climate, farming practices, and population growth.
- **Detrimental environmental effects** associated with conventional (i.e. traditional) inputs and practices, specifically pollution and soil degradation, leading to lower production yields, loss of arable land, and reduced resilience.

2.4.2. Industry cost structure

- **Rising input costs** for energy (particularly electricity and diesel), fertiliser, and pesticides.
- **Decreasing costs** of cleantech such as solar panels.

2.4.3. Market pressure and readiness

- **Market pressure** driving stricter regulations, particularly for chemical usage, through increasing consumer demand for sustainable products.

- **Increasing awareness** of sustainable practices and technologies available, as well as their benefits.
- The **international regulatory environment**, especially synthetic chemical bans and stricter environmental regulation (discussed further in [Section 3](#)). This has been the main driver for the increased uptake of biocontrol³, which is predicted to grow at a significantly higher compounded annual growth rate (CAGR) compared to conventional pesticides. It has increased from 2% to approximately 8% of the market over the past few years.
- **Corporate social responsibility** is playing an increasingly important role in investment decisions. A recent example of this is Diageo, one of the world's largest producers of spirits and beers. It has committed to investing \$219 million (R3.2 billion) in upgrades at 11 of its breweries in Africa. This investment will deliver new solar energy, biomass power, and water recovery initiatives at 11 sites in seven countries, including Kenya, Uganda, Tanzania, South Africa, Seychelles, Nigeria and Ghana. This is believed to be one of the biggest single investments in addressing climate change issues across multiple sub-Saharan markets. The business stated that it has a responsibility as a local manufacturer and employer in Africa to grow its business sustainably.

³ Biocontrol is the control of pests by interference with their ecological status, e.g. by introducing a natural enemy or a pathogen into the environment.



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3

Policies and regulations

South Africa has an extensive and robust range of policies and regulations governing the country's agricultural sector.

3.1. South Africa's agricultural policies and regulations

This section outlines the main policies governing the agriculture sector in SA, as well as key developments. The Department of Agriculture, Land Reform and Rural Development (DALRRD) and the Department of Environmental, Forestry and Fisheries (DEFF) are national entities responsible for overseeing and supporting the

development of the agricultural sector in South Africa. Support by the DALRRD and DEFF is guided by the vision of a sustainable agricultural sector that addresses agricultural policy distortions of the past, with reformative policies that create an enabling agricultural sector for the future. South Africa's agricultural sector is governed by a suite of key policies and legislation outlined in [Table 2](#) below:



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Table 2: Key policies and legislation

Name of policy	Key objectives
The National Development Plan 2030 (NDP 2012)	<ul style="list-style-type: none"> ■ Elimination of poverty ■ Reduction of inequality ■ Highlighting the importance of agriculture to the green economy
The Strategic Plan for the Department of Agriculture, Forestry, and Fisheries (DAFF 2013)	<ul style="list-style-type: none"> ■ Providing an effective framework to address various challenges facing the sector ■ Setting targets for the departmental programmes from 2012 to 2017 ■ Focusing on building a leading, dynamic, united, prosperous and people-centred sector
The Agriculture Integrated Growth and Development Plan (IGDP 2012)	<ul style="list-style-type: none"> ■ Devising plans to develop equitable, productive, competitive, profitable and sustainable agriculture, forestry, and fisheries sectors ■ Emphasising that the sector needs to benefit all South Africans
The Agricultural Policy Action Plan (APAP 2014)	<ul style="list-style-type: none"> ■ A programmatic response to key policy documents, including the National Development Plan (NDP) and the New Growth Path (NGP)
The National Environmental Management Act 107 of 1998 (NEMA 1998)	<ul style="list-style-type: none"> ■ NEMA is the overarching legislative framework for environmental governance. Core values are reflected through the following principles: <ul style="list-style-type: none"> ■ Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural, and social interests equitably ■ Development must be environmentally, socially, and economically sustainable
Integrated Resources Plan (IRP) 2019	<ul style="list-style-type: none"> ■ The IRP is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment (minimise negative emissions and water usage) ■ A detailed analyses of the policy can be found in the 2020 Energy Services MIR⁴

Table 3: Draft policies in SA agriculture

Name of draft policy	Key objectives
Draft Conservation Agriculture Policy (2017)	<ul style="list-style-type: none"> ■ To promote and establish ecologically and economically sustainable agricultural systems to increase food security ■ Recommending government to offer producers with incentives to adopt conservation agriculture measures, thereby developing incentive schemes, and that tax rebates are provided to manufacturers of conservation agriculture equipment
Draft Climate Smart Agriculture Framework Policy (2018)	<ul style="list-style-type: none"> ■ To outline the role of climate smart agriculture (CSA) practices in addressing climate change related vulnerabilities facing the agricultural sector ■ Highlighting the importance of integrating mitigation and adaptation strategies into production systems, and the need for resource investment into indigenous knowledge systems ■ To guide government, investors and developmental partners in integrating CSA within projects and programmes

⁴ <https://greencape.co.za/market-intelligence/>

A comprehensive list of key policies and regulations influencing the agricultural sector can be found on the GreenAgri portal under the Action Plans and Policies section⁵.

3.2. Water

The regulatory landscape of the water sector in 2018 was predominantly influenced by the prolonged drought experienced across the country. The policy updates were characterised by the need for agricultural water users to reduce their water consumption, monitor their water usage, and comply with metering installation enforcements and reporting requirements specified by the National Department of Water and Sanitation (DWS). Water restrictions resulted in major economic and employment losses in the agricultural sector, which are detailed in the 2019 Agri MIR.

3.2.1. Water policy updates for agriculture

There are still large parts of the province that are experiencing drought conditions. Many local municipalities have water restrictions in place. Four other provinces in SA are expected to implement water restrictions: parts of Gauteng, the North West, Free State and Mpumalanga. Low dam levels are attributed to high temperatures, very low rainfall, and high consumption rates.

More detail on water policy and legislation can be found in the 2020 Water MIR⁶.

⁵ <http://www.greenagri.org.za/>

⁶ <https://greencape.co.za/market-intelligence/>

3.3. Carbon Tax

The South African Carbon Tax Act No.15 of 2019 came into effect on 1 June 2019. The first phase of the tax will run until December 2022, with the second phase running from 2023 to 2030. Agriculture is not included in the first phase, and it is uncertain as to how (and whether) it will be included in the second phase. The basic tax rate is set to be R120/tonne CO₂e, with a basic allowance of R48/tonne CO₂e.

From 2022 onwards, farmers could be paying both direct and indirect carbon taxes. Direct emission sources listed in the Act relevant to agriculture include N₂O emissions; urea application; liming; biomass burning; land use change; and diesel generators with a combined capacity of 10 MW or greater.

From 2022 onwards, farmers could be paying both direct and indirect carbon taxes. Direct emission sources listed in the Act relevant to agriculture include N₂O emissions; urea application; liming; biomass burning; land use change; and diesel generators with a combined capacity of 10 MW or greater.

Indirect emission sources listed in the Act relevant to agriculture include, electricity, diesel, petrol and N₂O emissions. Figure 8 illustrates typical CO₂e contribution of different inputs for commercial fruit and wine farms in SA.

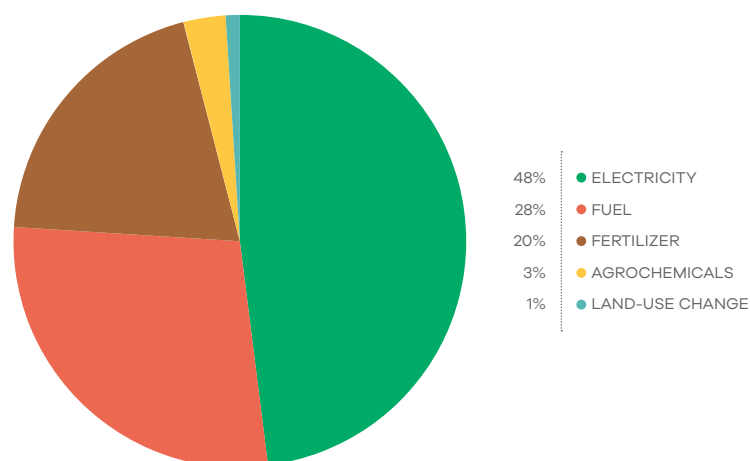


Figure 8: Fruit and wine farm CO₂e “hotspots” (Blue North, 2019)

Table 4: Projected cost of carbon tax for fruit and wine farmers (Blue North, 2019)

	Electricity	Diesel	Nitrogen fertiliser
Consumption per bearing ha ⁷	3 353 kWh	320 L	101 kg
Approximate tax rate	Indirect: 7.5c/kWh ⁸	Indirect: 10c/L	Direct: R48/tonne CO ₂ ⁹
Projected cost per bearing ha	R252/ha	R32/ha	R59/ha

3.3.1. Policy implications

The carbon tax is expected to be a key driver in the uptake of technologies and practices that increase resource efficiency and decrease dependence on synthetic fertilizer on farms. This includes precision agriculture technologies and regenerative agriculture practices, discussed in more detail in Section 4 of this report. The latter also holds potential for sequestering atmospheric carbon, and can be used to offset carbon emissions.

⁷ Average consumption is based on graded datasets contained in the CCC database and reflects a combined average of South African fruit and wine data.

⁸ Estimated indirect carbon tax levy. No official information on the electricity tariff was available at the time of writing.

⁹ Expected maximum effective carbon tax rate. Nitrogen carbon costs were determined using an emission factor of 12.044 kg CO₂/kg N fertilizer.

3.4. Land Reform

South Africa adopted the White Paper on South African Land Policy in 1997 to address the historical discriminatory injustices in land dispossession during colonialism and apartheid, which transpired into inequalities in land ownership and land use. The White Paper was one of the earliest pieces of democratic legislation to emphasise the need for sustainable use of land. It also introduced the three fundamental components of land reform as restitution, redistribution, and tenure reform. Various policies have since been introduced by the State to support successful land reform transitions. These include the Land Redistribution for Agricultural Development (LRAD) programme, the Proactive Land Acquisition Strategy (PLAS), and the Settlement Production Land Acquisition Grant (SPLAG).

3.4.1. Land reform policy updates

There have been some key updates within the land reform policy arena during 2019.

Land expropriation and redistribution

The Joint Constitutional Review Committee (JCRC) released its final recommendation in which it advised that Section 25 of the Constitution of South African should be amended to allow expropriation of land without compensation as a legitimate option for land reform. The next steps in this process are for the Section 25 Ad Hoc Committee to initiate and introduce legislation which is expected to be gazetted in December 2019. Also, in May 2019, the final report of the Presidential Advisory Panel on Land Reform and Agriculture were released with several detailed recommendations. It is expected that many of these recommendations will be used to inform the finalisation of a comprehensive, far-reaching and transformative land reform programme.

In his State of the Nation address, President Ramaphosa committed government to accelerating efforts to release public land for farming and urban settlements, whilst around R4 billion has been allocated to the Land Bank to support black commercial farmers.

Empirical data for land reform strategies

The DAFF together with Statistics South Africa launched a Farmer Producer/Register Campaign in September 2018 to gather more information on the country's smallholder farmers. It would assist government in measuring the progress of land reform by using the data to inform its strategies. The Western Cape phase of data collection started in November 2019. It is expected that the entire process will be completed in 2021. The census would be conducted in two parts – focusing on commercial farmers in 2019 and smallholder farmers in 2020. A total of R10 million has been invested into the census database.

3.5. International regulations

Many of SA's agricultural products are exported and as such have to adhere to international environmental regulations and standards. The wine industry in particular has a well-established certification scheme, namely the Integrated Production of Wine (IPW), which complies with international wine industry environmental sustainability criteria, including the *Global Wine Sector Environmental Sustainability Principles* as published by the International Federation of Wine and Spirits (FIVS), as well as *Guidelines for sustainable Viti-viniculture: Production, processing and packaging of products* as published by the International Organisation of Vine and Wine (OIV).

More recent international regulatory developments are discussed below.

3.5.1. Synthetic chemical bans

China and the European Union (EU) are SA's largest fruit, nut, and wine importers. China's increasingly strict environmental compliance requirements and the routine banning of mainstay chemical pesticides by the EU will affect SA's production input:

- The EU has implemented a near total ban on neonicotinoids, currently the world's biggest insecticide group.
- Switzerland is to vote on a complete synthetic pesticide ban within the next three years.
- France has indicated an intention to phase out synthetic pesticides in five years.
- China leads the world in generic pesticide production and currently produces 90% of the world's active ingredients. Thus, any disturbance in supply from China affects the supply and demand equation globally.



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4 Opportunities and barriers

Renewable energy and conservation agriculture solutions continue to offer opportunities for investors and businesses in the agriculture sector. Emerging opportunities with significant growth potential include technologies for undercover, precision, and urban agriculture. The main market drivers for these opportunities are climate adaptation and water risk mitigation.

This section starts by providing brief updates on the 2019 MIR for agriculture-related market opportunities in renewable energy (RE), conservation agriculture (CA), and undercover farming (UF).

For a more in-depth analysis of these opportunities, including energy efficiency in agriculture, refer to the 2017 and 2018 Agriculture MIRs. Opportunities are then addressed in more detail for:

- **precision agriculture (PA)**, in particular the growing demand for bespoke advisory services. These services have capitalised on the **emerging opportunities in software development** and add value to relatively mature technology, specifically remote sensing technology such as sensors, drones and satellite imaging; and
- **urban agriculture (UA)**, which is in its infancy in South Africa and encompasses different production technologies. The section will focus on emerging trends for hydroponic UA in South Africa.



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Table 1: Summary of market opportunities (repeated here from page 3)

Opportunity	Key drivers	Requirement & barrier	Term	Macro environment
Renewable energy (solar photovoltaic)	<ul style="list-style-type: none"> ■ Rising electricity tariffs ■ Security of energy supply ■ Increasing ability to feed back into the grid ■ Decreasing cost of technology ■ Innovative finance options ■ Corporate social responsibility (CSR) 	<ul style="list-style-type: none"> ■ Strong business case for large (e.g. cold storage) and year-round energy users ■ Seasonal nature of agriculture production affects the business case 	Short to medium term	SA was the fastest grower of solar photovoltaic (Solar PV) installations in 2017 globally. An estimated 10% of all solar PV installations are in the agricultural sector, and the business case is well known to the industry.
Conservation agriculture (no-till planting equipment)	<ul style="list-style-type: none"> ■ The main driver is soil degradation resulting from conventional tillage and subsequently diminishing returns on land, due to factors such as decreased moisture-holding capacity and biological functions 	<ul style="list-style-type: none"> ■ High cost of equipment ■ Long-term return on investment when converting from conventional to conservation practices ■ Sustainable farm management practices such as crop rotation and permanent soil cover play an important role to improve the business case 	Medium to long term	Globally, the uptake of CA is high, particularly in South America. Only 15% to 20% of commercial grain farmers and 5% of smallholder farmers in SA have adopted CA.
Undercover farming (various technologies)	<ul style="list-style-type: none"> ■ Resource scarcity ■ Increased yields and quality ■ Providing products out of season ■ Climate change ■ Technological advances in LED lighting 	<ul style="list-style-type: none"> ■ High capital cost with limited financing options ■ High cost of electricity affects viability of controlled environment systems ■ Business case not well established for high-tech systems ■ Lack of technical knowledge 	<p>Low-tech systems: Short to medium term</p> <p>High-tech systems: Long term</p>	<p>Greenhouses are well established globally. SA, as with most developing countries, has been very slow to adopt greenhouse technology, and is estimated to be 50 years behind developed European countries such as the Netherlands.</p> <p>Low-tech systems such as netting and tunnels are growing rapidly, particularly for high value export fruits.</p>

Opportunity	Key drivers	Requirement & barrier	Term	Macro environment
Precision agriculture (remote sensing applications)	<ul style="list-style-type: none"> ■ Resource scarcity, particularly water availability ■ Global competitiveness and economies of scale ■ Technological advances in drone, satellite and information communication technology and the Internet of Things (IoT). 	<p>Barriers highlighted by current players in the field includes:</p> <ul style="list-style-type: none"> ■ The mind-set change required by farmers to adopt new farm management technologies. ■ A lack of integration between various disciplines. ■ The inclusion of the end user in developing software solutions, which results in limited understanding of the end user's actual needs. 	Medium to long term	<p>Globally, agriculture is the least digitised sector (throughout its value chain) and thus technology-based decision-making is still emerging.</p> <p>Remote sensing applications is an emerging market in SA's agriculture sector, with the exception of GPS guidance for tractors.</p>
Urban agriculture (hydroponic production)	<ul style="list-style-type: none"> ■ Resource scarcity ■ Urbanisation ■ Advances in technology, specifically hydroponic systems and LED lighting ■ Consumer preferences for locally produced food ■ Waste minimisation 	<ul style="list-style-type: none"> ■ Enabling municipal support environment, such access to water and space. ■ Access to finance for technology infrastructure ■ Lack of technical knowledge ■ Business case not well established 	Long term	<p>Urban agriculture (UA) growth is the largest in Asian countries characterised by high-density urban populations. In particular, vertical farming production, as it uses space more efficiently than flat structures. Commercially viable production of agricultural produce in SA's urban environments is still in its infancy. Various factors, such as spacing, scale, product demand and market access needs to be better understood to create successful enterprises.</p>

4.1. Market updates for renewable energy and undercover farming

Table 5: Market update for renewable energy

Opportunity	Updated market size for agriculture ¹⁰	Developments and insights	Barriers to uptake
<p>The current opportunity driving the uptake of renewable energy (RE) is:</p> <ul style="list-style-type: none"> the replacement of expensive grid electricity (Eskom) with relatively 'cheap' alternative energy, and the growing ability to connect and feed into the grid. <p>There are specifically solar PV opportunities for manufacturers and service providers, which include:</p> <ul style="list-style-type: none"> manufacture of components/products, installation of systems energy services (specifically performance-based electricity supply contracts) 	<ul style="list-style-type: none"> The total installed small-scale embedded generation (SSEG¹¹) capacity for solar PV in South Africa in 2019 was 900 MWp, of which 10% is estimated to be in the agriculture sector. The estimated market size for solar PV in SA is R945 million – R1.5 billion. 	<ul style="list-style-type: none"> 22/25 municipalities allow SSEG tariffs when feeding into the grid. Businesses that buy electricity directly from Eskom can feed back into the grid, although the industry has expressed that the process is time consuming and applications are not always approved. The majority of agricultural electricity users buy directly from Eskom. Increasing tariffs are causing input costs to rise more than income for many industries, including agriculture. Furthermore, load shedding results in significant economic losses, especially for perishable goods. The 2019 IRP was released and serves as an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment (minimise negative emissions and water usage). A detailed analysis of the policy can be found in the 2020 Energy Services MIR¹². 	<ul style="list-style-type: none"> High capital cost (although technology prices are decreasing). Scepticism and lack of understanding about what energy services companies (ESCOs) can offer through their funding models.

¹⁰ Based on capital costs of R10 500 – R16 000 per kWh for solar PV (larger units become cheaper per unit of energy) and an industry-projected uptake of 10% per year.

¹¹ Systems that are under 1MW are classified under net consumption

¹² <https://greencape.co.za/market-intelligence/>

Table 6: Market update for undercover farming (UF)

Opportunity	Updated market size	Developments and insights	Barriers to uptake
<p>UF ranges in technology use and, as such, the amount of control the grower has over environmental factors (see Figure 9 overleaf).</p> <p>There are opportunities for manufacturers and suppliers of:</p> <ul style="list-style-type: none"> steel, plastic (especially polyethylene, which is mostly used in SA tunnel production), netting, hydroponic equipment, including pumps and pipes, growth medium (such as gravel, sawdust and peat), air conditioning and lighting; and automation systems and ICT solutions <p>Furthermore, in especially high-tech systems, there is opportunity for training and consulting as the systems are relatively new in South African agriculture.</p>	<ul style="list-style-type: none"> The 2019 MIR showed that the potential market for low-tech UF in SA is estimated at R38 billion, and R1.4 billion in the WC. There was a significant increase in hectares under shade netting (171%) and the number of tunnel structures (55%) between 2013 and 2018. Since the 2017/18 census an additional 2 822 hectares expansion of shade netting has been observed in the WC. This is a 131% increase and a further estimated R500 million investment¹³. The updated market size for low-tech UF in the WC is estimated at R1.9 billion. The market for medium to high-tech systems in South Africa is worth over ~R1 billion. 	<ul style="list-style-type: none"> Sophisticated systems, specifically automation technology, is mostly imported into SA. Notably, a driver of automated systems in many developed countries is a shortage of agricultural labourers, which is not the case in SA. Countries that have established markets in greenhouse technologies are increasingly interested in entering the SA market. Examples of these include the following: <ul style="list-style-type: none"> Delphy is in the process of establishing a centre of excellence with Stellenbosch University and Elsenburg to train students in greenhouse production. A UK based company, Seawater Greenhouse, is looking to do a proof of concept on greenhouse production in coastal areas in SA, using its desalination technology. 	<ul style="list-style-type: none"> The main cause of failed projects in SA has been linked to poor feasibility studies, and components and systems that are not suitable for local conditions. High-tech UF projects are energy intensive. Electricity plays a significant role in keeping the system functioning (e.g. cold storage, regulating water temperature in aquaculture) Lack of access to finance, particularly for high-tech systems due to the perceived risk of emerging technologies.

¹³ The data presented in this report is the preliminary results from field observations, aerial photography and satellite image analysis of the shade net expansion in the Western Cape. Accuracy and completeness cannot be guaranteed. Any person using this information will be doing so at own risk and the Department of Agriculture will under no circumstances be responsible for any loss suffered by any person/organisation using the information contained in this report.

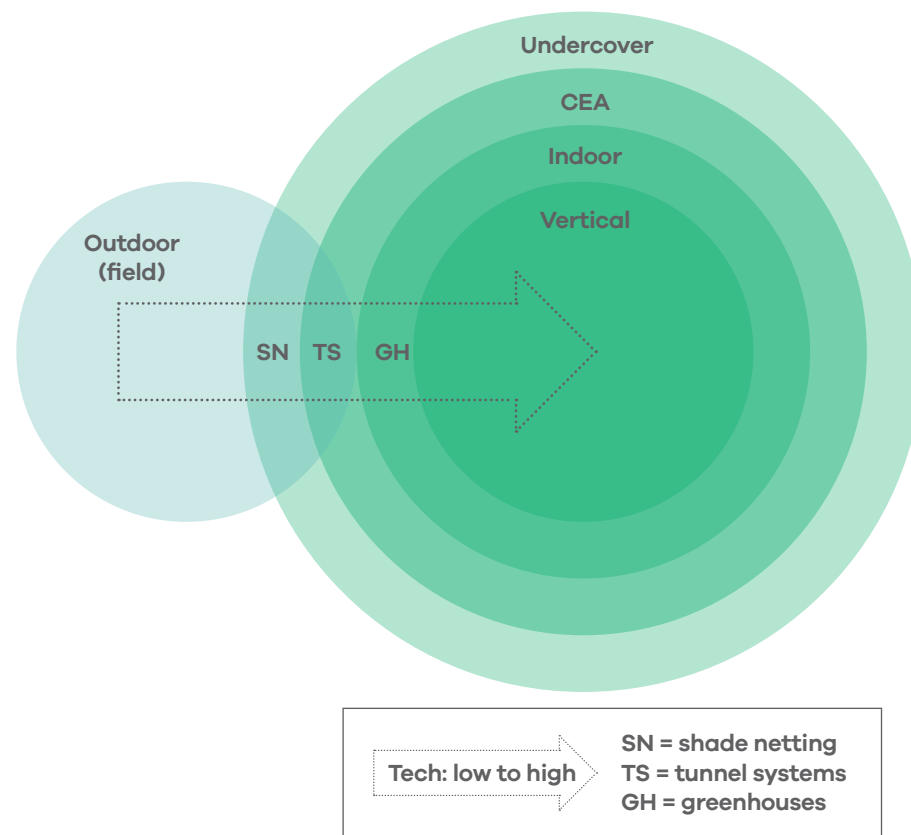


Figure 9: Undercover farming and its various forms

4.2. Market update for conservation agriculture

The 2019 Sustainable Agriculture MIR discussed the market size of conservation agriculture through the estimated size of the main agtech opportunity, namely no-till machinery (R136 million – R747 million). An estimated 15%-20% of commercial grain farmers practise CA in SA (WWF 2018). As the conversion from conventional production systems (chemical farming and mono-cropping) to more sustainable systems happens in the long-term, market developments are not very dynamic and new statistics on uptake are released every 5 to 10 years¹⁴.

As such, this report will look at the emerging opportunity of regenerative agriculture (RA). RA is essentially conservation agriculture evolving with new management principles as many farmers move away from conventional farming practices, which are considered unsustainable. The principles of RA are based on the same concept, but takes a more holistic approach due to the addition of cover crops and, in some systems, grazing. These principles broadly aim to add biodiversity (above and below ground) and improved soil health to the system so as to increase production resilience.

4.2.1. Regenerative agriculture

The **uptake** of RA practices (cover crops, no-till and crop diversity) is **increasing in SA**, especially among **fruit farmers**. Traditionally it used to be practised almost exclusively in grain production. Water scarcity, diminishing return on land (due to conventional farming), rising input costs, stricter chemical use regulations and changing consumer demands are the major drivers of this movement. The business case and research for RA is also becoming better known, allowing farmers to make more informed decisions. Cover crops are an important component of regenerative agriculture and improve soil health and productivity through:

- **Physical stability:** It limits loss of soils and nutrients and it retains the soil floor.
- **Nutrient recycling and retention:** It improves nutrient recycling (which reduces the need for input nutrients like nitrogen) and limits water loss.
- **Improved hydrology:** It improves water infiltration and water holding capacity, cools soil temperature, and decreases evaporation.

- **Increased biodiversity** (above and below the soil): This improves biological control and balances soil biology.

An example of regenerative agriculture in SA is fruit and vegetable giant ZZ2. It reported an increase in soil carbon, decreasing nitrogen (85%) and water application, and increasing yields after moving towards more regenerative practices.

Another observed trend is that farmers form **study groups**, particularly in drier areas of the country. In the Olifants River Valley a group of farmers committed to each converting a hectare of their land to RA to test soil health improvements.

Following international trends, **various opportunities** for organisations such as certification bodies, technical consultancies, environmental NPOs, research institutions, carbon offset companies, and bioproduct manufacturers are **emerging**, stemming from the rise in RA. In SA, planters are being modified so that cover crops can be planted on banks in orchards.



¹⁴ See 2017 Agriculture MIR for more detail, including definitions and evidence of uptake.

4.3. Precision agriculture: using remote sensing technologies for resource-efficient farming

This section focuses on the opportunities created for investors through the demand for remote sensing technologies that are used with software solutions, which communicate near real-time information as actionable insights to a farmer.

4.3.1. Overview

The 2019 Sustainable Agriculture MIR aimed to demonstrate the local market for remote sensing technologies in agriculture through case studies. This is due to the concept of Precision Agriculture¹⁵ (or its evolving term “Smart Farming”) being complex and encompassing various technological aspects, as shown in Figure 10. Furthermore, remote sensing applications are an emerging market in the agriculture sector, with the exception of GPS guidance for tractors¹⁶. Globally, agriculture is the least digitised sector (throughout its value chain) and thus technology-based decision-making is still emerging.

The key opportunity discussed in this section (as shown in Figure 10) is remote sensing technologies (satellites and drones) coupled with software solutions to provide farmers with actionable insights into increasing input (especially water) efficiencies. The main drivers for the uptake of remote sensing in agriculture are:

- **rising input costs**, particularly of energy, pesticides, and fertilisers;
- **water availability**;
- **the falling cost of new technologies**; and
- **export market requirements** for minimum chemical residue.

This report shares key industry developments, as well as an updated case study on the FruitLook tool. More information on precision agriculture can be found in the 2019 Agri MIR.

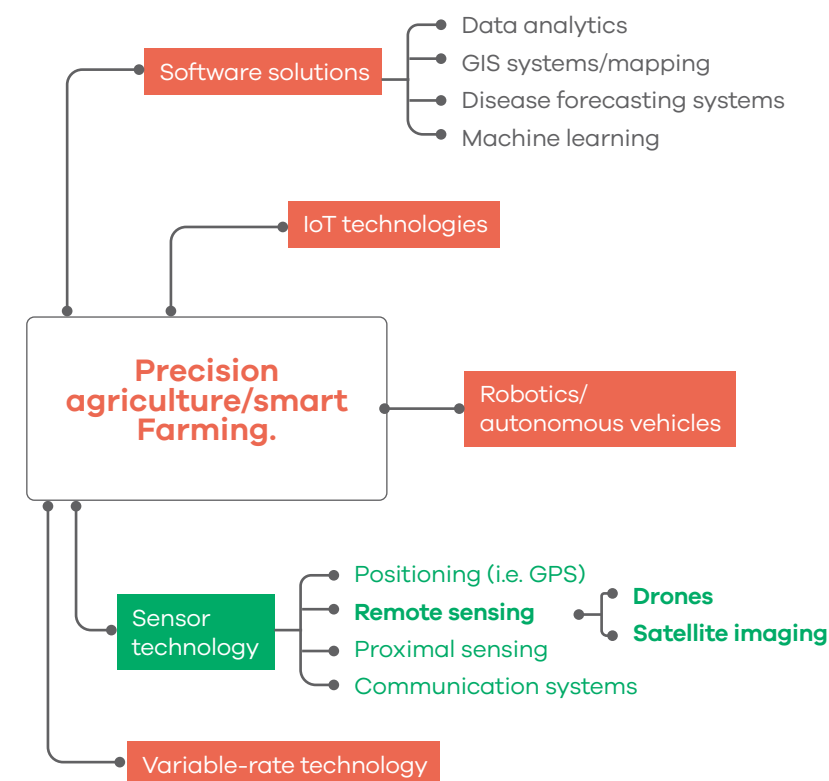


Figure 10: Aspects of precision agriculture / smart farming

4.3.2. Market size

Global market

Details on the global market can be found in the 2019 Agri MIR.

South African market

Remote sensing applications for precision farming is an emerging market in SA. The FruitLook tool enables a better understanding of the potential of remote sensing technologies in the SA agriculture market.

¹⁵ Precision Agriculture (PA), also called ‘smart farming’, ‘satellite farming’ or ‘site-specific crop management’, enables producers to accurately apply inputs such as water, fertiliser and pesticides through certain technologies.

¹⁶ A GPS-connected controller in a farmer’s tractor automatically steers the equipment based on the coordinates of a field. This reduces steering errors by drivers and therefore any overlap passes on the field. In turn, this results in less wasted seed, fertiliser, fuel, and time.

4.3.3. Case study: FruitLook

FruitLook¹⁷ is an operational service in which satellite information is provided to Western Cape fruit farmers in support of (water) efficient farming. The project is funded by the Western Cape Department of Agriculture.

eLEAF is responsible for near real-time provision of satellite based data products via the FruitLook web portal. FruitLook is available for all major agricultural areas in the Western Cape: this includes close to 250 000 ha of irrigated agriculture.

Table 7: Uptake of FruitLook over time

Year	Actual Coverage (ha)	Potential coverage	% Used
2014/15	15 608	161 807	9.60%
2015/16	25 270	171 000	14.80%
2016/17	31 944	182 606	17.50%
2017/18	39 306	194 445	30.20%
2018/19	76 211	1 591 958	4.80%

A clear trend of increased use of the tool over time is observed. These increases are the result of a combination of factors, such as training initiatives on data analysis, pressure from the drought, increased observational area, website functionality, and awareness of the tool. Coverage was increased in 2018/19 as FruitLook included all areas in the Western Cape and not just the fruit growing areas.

This decision was mainly to assist more farmers due to ongoing drought conditions. The 2018/19 year saw the uptake of new crops ordering data through FruitLook, notably grains (17 600 ha). This indicates that remote sensing can be used in dryland production. Figure 11 below illustrates the uptake of different fruit sectors in terms of hectares ordered.

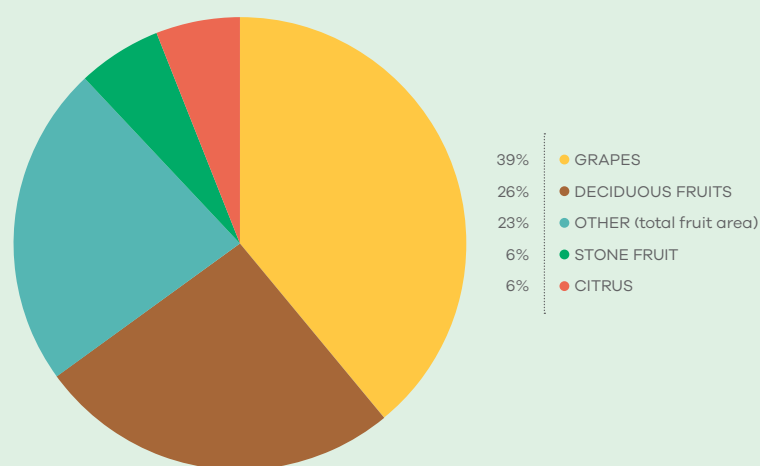


Figure 11: Crops surveyed using FruitLook (average 2014 – 2019)

¹⁷ <https://www.fruitlook.co.za/>

The business case for irrigation management technology

A survey on water savings by FruitLook users indicated that the majority of respondents saved at least 10% of irrigation water/ha. Assuming this translates to a 10% saving in electricity used per hectare, the business case for using remote sensing technologies as an irrigation saving aid is very strong. This is illustrated in the 2019 Agri MIR, which showed monetary savings of up to R1 000/ha.

FruitLook is currently available for free to users, however it is envisioned to become a commercial service in the future. The current price as indicated on the website, which was

estimated in 2015, is R150/ha/year. This can be further broken down to roughly R13/ha per month. A new estimate has not been made, but it is under consideration. Processing price and other data needs to be considered to see what price would make the service worthwhile. An important aspect of remote sensing applications in precision agriculture is information and communication technology (ICT) software and the interface being used to make communication of data collected by remote sensing hardware possible. It is clear however, that the benefits from using the service are more than the cost. The estimated current and potential market sizes are shown in Table 8 below.

Table 8: Estimated and potential market size for select commodities based on FruitLook

Commodity	Captured (ha WC) ¹⁸	Estimated market size / year (WC) ¹⁹	Potential (ha SA) ²⁰	Potential value / year (SA)
Citrus	4 383 (28%)	R658 350	58 185	R8.7 million
Wine grapes	15 941 (18%)	R2 391 150	94 545	R14.2 million
Table grapes	2 325 (19%)	R348 750	26 739	R4 million
Stone fruit ²¹	2 865 (17%)	R429 750	17 926	R2.7 million
Pome fruit ²²	9 387 (29%)	R1 408 050	36 491	R5.5 million
Total	34 901 (21%)	R5 236 050	245 586	R35 million

Prices and service offerings in this space vary. These and other trends are discussed in more detail in the 2019 Sustainable Agriculture MIR. When considering the total irrigated area in the Western Cape under FruitLook, the potential market size for one province is R37.8 million.

When considering the total irrigated area in the Western Cape under FruitLook, the potential market size for one province is R37.8 million.

¹⁸ As per 2019 FruitLook data.

¹⁹ Based on estimated cost of service/ha/year for FruitLook tool (R150) for current hectares ordered through the tool.

²⁰ Based on the latest data for hectares under production in SA.

²¹ Apricots, nectarines, peaches and plums

²² Apples and pears

Another important trend is that satellite data in general is a lot more accessible free of charge to different consumers through different platforms, such as Aerobotics's free data, Villa Crop's Crobotical tool and FruitLook that have been available for a number of years. Making this data more accessible helps to prepare the industry for technological advances in the near future. Although the drought has eased in certain areas, producers have not gone back to "business as usual". Many have started to calculate the actual water use compared to supply so as to not plant to their full capacity. This serves as a buffer for building long-term resilience, should another drought or decrease in water availability come into effect.

FruitLook has done various member surveys; some key insights from these are described below.

Other irrigation management technologies

A survey of the FruitLook 2018-19 season requested users to indicate which tool(s) they use to optimise their irrigation management, in addition to FruitLook. The results provide an indication of the uptake, awareness, and adoption of technology in the Western Cape to make better decisions on water management. Figure 12 below shows other irrigation management tools used by FruitLook members.

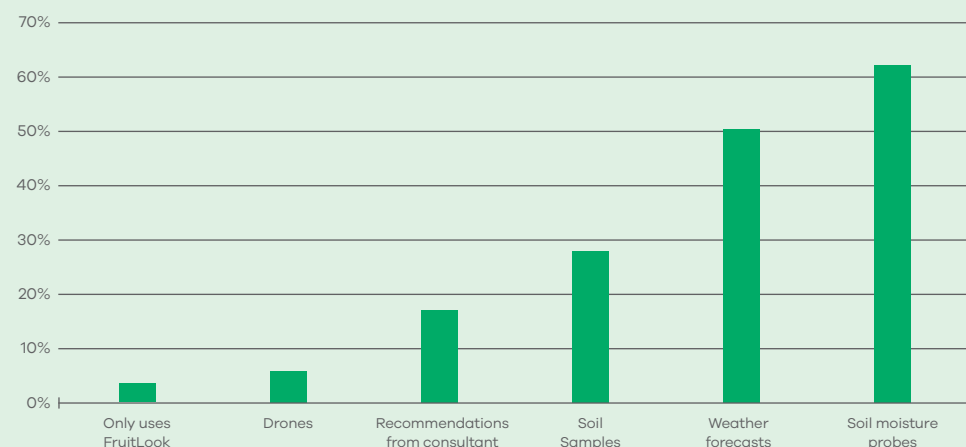


Figure 12: Other irrigation management tools used by FruitLook users (adapted from FruitLook, 2019)

Sector communication on new agtech

Altogether 388 unique responses were received. The results are displayed in Figure 13 on page 36. It is clear that many routes are needed to reach potential users. Almost a third of the respondents, namely 120, indicated that they first heard about

FruitLook via word of mouth. It underlines how vitally important a trustworthy reputation is to benefit from the social cohesion in the commercial agricultural sector in the Western Cape. Other important mediums are Google, industry magazines, and especially agricultural conferences.

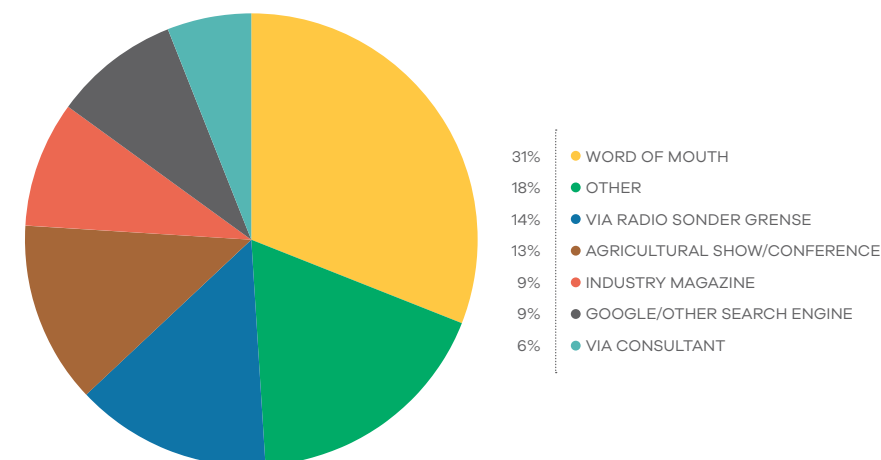


Figure 13: Sector communication on new agriculture technology (adapted from FruitLook, 2019)



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4.3.4. Local market players providing agricultural remote sensing services

Current market players offering remote sensing applications to improve agriculture production efficiencies include:

- Aerobotics
- AeroVision
- Agri-Sense
- DRONESIX
- FarmPin
- FruitLook
- Terracam

Both Aerobotics and FarmPin have incorporated satellite imagery into their service offering after an initial focus on drones. However, FarmPin focuses exclusively on satellite imagery and targets a wider market within agriculture, i.e. commodities other than high-value export crops. This is predominantly the result of increased capabilities (such as higher resolution and thermal bands), together with the decreasing cost of using satellite technology.

4.3.5. Barriers and risks

Barriers to the uptake of remote sensing in PA include:

- **Licensing and regulation of drones²³:** The response of the industry to the initial regulations was unenthusiastic. Other countries that have integrated unmanned aerial vehicles (UAVs) in their spaces have less onerous and complex legislation than SA has.
- **Cost of technology:** Although technology prices are decreasing, it is still seen as expensive, especially when incorporating additional technology such as multispectral cameras for the agriculture sector.
- **Insufficient support environment:** Rapid evolution of the ICT²⁴ ecosystem requires sufficient capacity in organisations that are driving and supporting investment and growth. There is currently limited capacity dedicated to agtech.
- **Limited funding opportunities:** Early seed funding for start-ups in SA, including agtech start-ups, is extremely limited.

- **Lack of integration²⁵** between various disciplines and the inclusion of the end-user in developing ICT solutions. This results in **limited understanding** of the end-user's actual needs. This is particularly problematic for agtech as the technology skills are generally concentrated in urban areas, and developers have little or no interaction with farmers.
- **Lack of awareness** by farmers on available technology and its benefits.
- **Mind-set:** Changing from conventional practices takes time as production has been done in a certain way for generations. There is also a high risk associated with new technology.
- **Lack of agri-industry collaboration²⁶,** particularly between the science community and commercial agriculture. This collaboration is essential in order to form a new research agenda.
- **Lack of local technical knowledge** resulting in hardware and software components being imported. Also, there is a relatively low level of digital literacy and limited technical sophistication compared to other countries, particularly in the agricultural sector.
- **High cost of data in SA** is a big limitation to the uptake of remote sensing services.

As with any new technology penetrating an existing and mature market, there are lots of challenges to come. A large amount of capital is required to start a regulated and licensed operation, particularly for drones. Thus, it is critical to demonstrate that a business can remain profitable within an ever-changing landscape; spending money where it counts while maintaining high levels of safety and compliance.

4.4. Urban Agriculture

This section focuses on hydroponic agriculture production in SA's urban environments.

4.4.1. Overview

Urban agriculture (UA) is an emerging trend globally and is largely driven by resource scarcity, urbanisation, consumer preferences for locally and sustainably produced food, and waste minimisation.

Advances in technology, specifically hydroponic systems (both indoor and outdoor), allow for production in urban environments through:

- reducing inputs (water and fertiliser) requirements by using only what is needed; systems also reuse water, depending on sophistication, by up to 95% compared to conventional open farming systems; and
- yielding higher output per m² than conventional open farming systems without requiring soil.

The uptake of these technologies plays an important role in developing UA in South Africa.

4.4.2. Market size

Global market

Urban agriculture (UA) growth is the largest in Asian countries characterised by high-density urban populations. It involves vertical farming production in particular, as it uses space more efficiently than flat structures. Table 9 below shows estimated market sizes for key technologies (Mordor Intelligence 2018).

Table 9: Global market uptake of selected UA components

Industry	Current global market (latest available figure)	Predicted growth: Controlled Annual Growth Rate (CAGR) for 2018 – 2023	Other insights
Indoor farming ²⁷	USD 106.6 billion / R1.5 trillion ²⁸ (2017)	CAGR 3.4%	<ul style="list-style-type: none"> ■ North-America accounted for nearly 44.2% of the global market in 2017.
Hydroponic farming	USD 21.2 billion / R 306.6 billion (2016)	CAGR 6.5%	<ul style="list-style-type: none"> ■ Common crop types include tomato, cucurbits, lettuce and peppers. ■ The Netherlands is the largest producer of hydroponic crops and is expected to maintain the lead for the next 10 years.
Vertical farming ²⁹	USD 1.5 billion / R 21.7 billion (2016)	CAGR 23.02%	<ul style="list-style-type: none"> ■ Asia-Pacific is presently the largest and leading region in using vertical farming. ■ Key drivers: farmland shortage, population growth, and demand for pesticide-residue-free food.

²³ Find relevant legislation under "Knowledge base" at www.cuaasa.org, website of the Commercial Unmanned Aircraft Association of Southern Africa (CUAASA).

²⁴ ICT in the agriculture context involves software and the interface used that makes communication of data collected by remote sensing hardware possible.

²⁵ From engagement with Silicon Cape.

²⁶ According to the WCDOA's 4th Industrial Revolution report.

²⁷ Indoor farming ranges in technology use and can include hydroponics, aeroponics, aquaponics, soil-based systems or a combination of these, flat or vertically structured.

²⁸ Average annual exchange rate for 2019 (R14.46 to USD 1).

²⁹ Indoor and outdoor vertical farming.

The global indoor farming market in 2017 was worth USD 106.6 billion (R1.5 trillion). The global uptake is increasing, with rapid growth predicted for vertical farming at a CAGR of more than 20%. However, hydroponic systems are limited in the types of commodities that can be grown.

South African market

Commercially viable production of agricultural produce in SA's urban environments is still in its infancy. Due to economies of scale, competing with established commercial supply chains is not feasible for small-scale urban farmers.

Aside from environmental benefits, the development of urban agriculture also creates job opportunities in cities and can contribute to

The global indoor farming market in 2017 was worth USD 106.6 billion (R1.5 trillion).

food security. There is an opportunity for technology providers, training organisations, building owners, and entrepreneurs in this space.

This section aims to explore the market size of hydroponic urban agriculture production in SA's most populated city, Johannesburg (JHB). Due to the emerging nature of the opportunity, a case study is used to gain more insight into the current market environment.

Case study: Future Farms

Future Farms³⁰ is the largest builder of urban hydroponic production systems in SA. To date, the company has done 16 rooftop farm installations in JHB, which is a conservative estimated market share of 60% of the systems currently in place. These farms typically range from 21m x 7m to 28m x 8m in size, and are covered by plastic or shade netting. The hydroponic infrastructure mostly used thus far has been Nutrient Film Technique (NFT) hydroponic A-frame systems for leafy greens (cash crops with a short shelf life in close proximity to the marketplace.) This translates into a minimum conservative market size for rooftop farm installations of R2.59 million to R3.94 million³¹.

Future Farms will be promoting the use of medium-based hydroponic systems in 2020, as it expects a current oversupply of leafy greens to the existing market. These systems enable the growth of most market crops compared to only water-based systems, which allow the urban farmer to have a more diverse offering to the potential off-taker. The company predicts that medium-based rooftop systems will be the biggest opportunity for the development of urban agriculture (UA) as it enables the growth of most crops all year round close to market.

According to Future Farms, the largest driver for the uptake of UA in the current SA environment is job creation. Most of the farms are funded by grants aimed at agriculture and UA development, which in turn is driven by urbanisation and the threat of lack of food security. Another important driver highlighted by the company is increased consumer demand for sustainably produced produce, particularly in the more affluent markets where consumers will buy climate-friendly produce at a premium.

The company describes market access as the largest barrier to the uptake of UA. Producers need a reliable buyer of your crop at a relatively predictable price. This is the largest challenge facing small-scale urban farmers in the leafy green space. Another highlighted barrier is access to capital. Emerging farmers in this space often have no agricultural experience or credit history. Furthermore, hydroponics is not a well-established technology in SA, and as such no commercial finance is available. This has led to the emergence of innovative finance and training solutions (see "other UA initiatives" below).

Other UA initiatives in SA

The Johannesburg Inner City Partnership has launched a project called the Urban Agriculture Initiative. The partnership is working with the City of Johannesburg (CoJ), the Department of Small Business Development, the Small Enterprise Development Agency, and SAB KickStart to raise funds for the Urban Agriculture Initiative. Between 50 and 60 farms are planned for the next three years, with a spill-over effect of about 100 related enterprises, such as agri-processors and technology suppliers. The initiative provides information that enables an understanding of key trends in intensive urban production in SA.

- The largest opportunity for urban agriculture in the CBD of JHB is crop production on rooftops. This is likely to be the case in other metros in South Africa as well, depending on local conditions.
- Production technology typically consists of a vertical hydroponic A-frame under shade netting or plastic tunnels. The A-frame allows natural light to penetrate all the plants,

instead of using expensive artificial lights, particularly considering the cost of electricity in SA cities.

- Produce typically grown is spinach, basil, lettuce and chives.
- Most produce is supplied to restaurants. Entering the commercial supply chain (supermarkets and fresh produce markets) is extremely difficult for small emerging producers, predominantly due to economies of scale. The business case thus lies in more niche products and alternative supply chains. Further research needs to be done in the production business case, such as size of operation, line spacing and market demand to create successful enterprises. An example of the latter is producing lettuce in season and selling it to traditional markets such as the Fresh Produce Market. This will end in a loss per unit for a small-scale urban farmer, compared to high profits that can be realised in producing high-quality basil in winter months.



³⁰ For more on the company visit <https://futurefarmssa.co.za/>

³¹ Based on known rooftop installations in the City of Johannesburg

City of Cape Town (CCT) market

There are key differences between JHB and CCT, resulting in a barrier to uptake for the latter. CCT has significantly fewer buildings than JHB, and rooftop farming is difficult because of strong winds in the city. Government programmes around urban agriculture in Cape Town have been focused on community food gardens rather than commercially viable enterprises, which mostly utilise arable land and conventional production methods.

The long-term sustainability of these systems is being questioned due to climate change, water and land scarcity, and increasing urban populations (see Figure 14 below). This puts further pressure on resource availability, and thus the need for efficient, high-yield (urban) production systems.

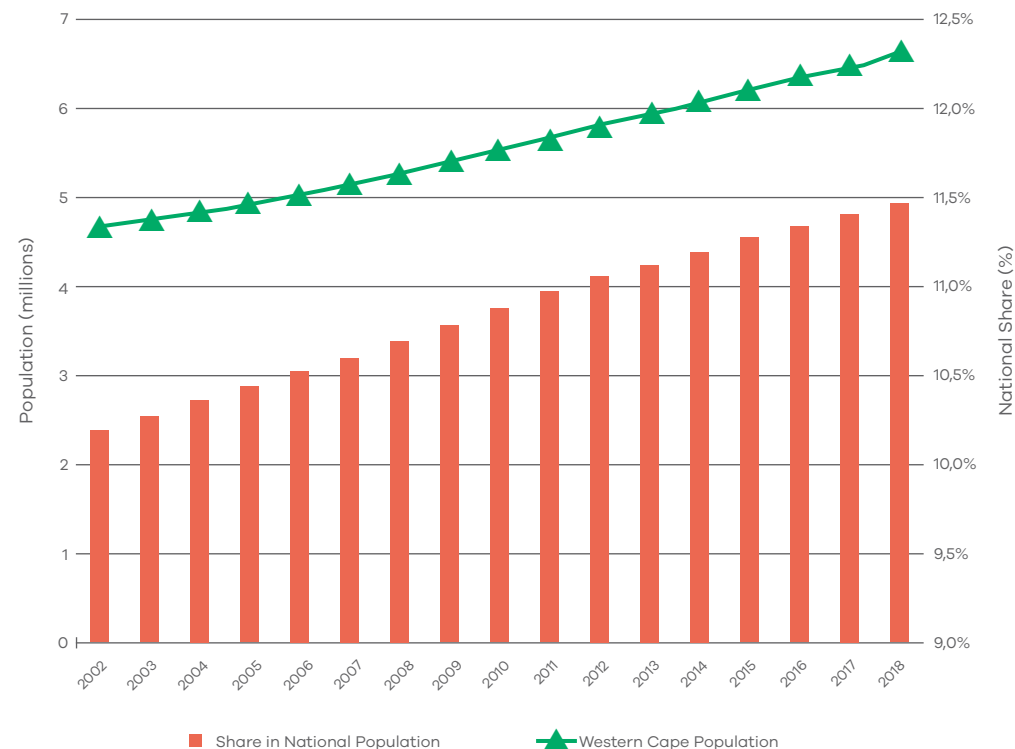


Figure 14: Western Cape population and South African population share: 2002 – 2018

It is clear from Figure 14 (Stats SA 2018) that the WC population has been exhibiting a strong upward trend, and that growth in the province's population has taken place at a faster rate than the national norm.

4.4.3. South African market players

There are not many local players (in addition to Future Farms featured here) that provide commercially viable rooftop farm solutions focusing on crop production. In peri-urban areas where larger undercover farming systems can be built, such as greenhouse and large-scale tunnel production, the players include:

- Dynatrade
- Greener Solutions
- HytechAgriculture
- Vegtech

4.4.4. Barriers to the uptake of urban agriculture

Below are some of the barriers highlighted by stakeholders in this space:

- **Enabling administrative environment.** This was listed as the largest barrier by key role-players in the sector. Aspects such as zoning, water allocation and tariffs, as well as electricity tariffs play a role in developing the urban agriculture sector.

- **Understanding the business case.** This is a challenge in any emerging market. As urban agriculture holds a lot of potential for job creation and economic development, there is often government intervention. Failing to see agriculture as a business, however, can and has led to unsuccessful initiatives.
- **Offtake:** Retailers are often unwilling to enter into supply contracts until quantity and quality can be demonstrated. Interviews with the local industry suggest that the current market for premium produce is relatively small in South Africa's retail sector. However, restaurants are willing to pay a premium price for high-quality produce.
- **Lack of access to finance** is the main barrier to the uptake of hydroponic systems. This is due to the perceived risk of emerging technologies, and commercial funding institutions not taking into account the decreased production risk that comes with more controlled systems.
- Emerging farmers **lack specialised skills and knowledge** to operate systems for primary production. Emerging farmers often lack a proper working knowledge of markets (what to produce, where, and when).



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5 Funding and Incentives

A range of general and sector-funding solutions and incentives is available to investors, manufacturers and service companies in the green economy.

It covers international sources, such as Development Finance Institutions (DFI), local funding pools including the public and private sector, and a considerable range of tax incentives.

5.1. General database web page

The GreenCape Finance Desk hosts a web page³² with a number of Green Finance resources that cover funding and incentives available to companies in the green economy. A few of the available database are highlighted below.

5.1.1. Green Finance Database

In conjunction with the South African National Energy Development Institute (SANEDI), GreenCape maintains a database of funding sources and primarily dti-driven incentives that may be relevant to green economy investors. The database contains information on more than 100 funding opportunities, including an overview of the opportunity and its contact details and links. It is ideal for any entity seeking a broad range of funding solutions and financial incentives, with South African institutions being the main source of opportunities. The database is available to view and download online³³.

5.1.2. Government funding and incentives database

An updated document focused on South African government funding and incentives is available to view and download online³⁴.

5.1.3. Finfind database

Finfind³⁵ is an innovative online finance solution that brings together SME finance providers and finance seekers. With a focus on finance readiness, Finfind has more than 200 lenders and over 350 loan products available to SMEs. The database is ideal for South African SMMEs who are seeking funding and/or business advisory services, and those who want to improve their understanding of finance.

5.1.4. AlliedCrowds database

AlliedCrowds³⁶ is the first complete aggregator and directory of alternative finance providers in the developing world. Sign-up is free and allows users to access a global database where one can filter for sector (including greentech, agriculture and social impact), type of capital (equity, lending, grant), and type of funding (crowdfunding, angel investing, venture capital, impact investing). In addition:

- Themed databases around the Sustainable Development Goals (SDGs) and the World Green Economy Organisation (WGE) are available.
- Reports, including a number specifically about African funding sources, can also be downloaded for free.
- You can also contact Allied Crowds to create a customised funding database for you.

This resource is ideal for any entity seeking a broad range of financial solutions on a global scale.

³² <https://www.greencape.co.za/content/focusarea/green-finance-databases>

³³ <https://www.greencape.co.za/assets/Uploads/GreenCape-Finance-Database-v6.xlsx>

³⁴ <https://www.greencape.co.za/assets/Uploads/Government-Funding-and-Incentive-Booklet.pdf>

³⁵ www.finfindeasy.co.za

³⁶ <https://alliedcrowds.com/>



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6

The Western Cape: Africa's green economy hub

The Western Cape is a world-class investment destination.

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

A great place for green business

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

- Africa's renewable energy (RE) and cleantech hub, with a critical mass of leading companies present.
- Local presence of major professional services and financiers.
- Significant market opportunities for businesses and investors in agriculture, energy services, utility scale solar and wind, waste, water, bioeconomy and resource efficiency.
- A supportive government that has made ease of doing business and the green economy key priorities.
- Five universities with comprehensive R&D capabilities and dedicated green economy skills programmes.
- A range of investment incentives in the Atlantis Special Economic Zone (SEZ) for Green Technologies.

Supporting businesses and investors

The province also offers dedicated support for businesses and investors focusing on greentech and services, including:

InvestSA One Stop Shop: Offers convenient investor support on permits, licensing and registrations - all under one roof.

GreenCape: Provides dedicated support and market intelligence to green economy sectors.

Wesgro: The official investment and trade promotion agency for the Western Cape.

SAREBI: A business incubator providing non-financial support to green entrepreneurs.

SARETEC: Offers specialised industry-related and accredited training for the wind and solar industries.

Market opportunities in the province and South Africa

Some of the major market opportunity areas in the province and South Africa in the next five years are outlined in the graphic on the next page (see individual MIRs and the GreenCape website for more information).

R&D capabilities and skills

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



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Atlantis Special Economic Zone for Green Technologies

The Atlantis SEZ is a zone dedicated to the manufacturing and provision of services in the green technology space – technologies that reduce or reverse the impact of people on the planet. Wind turbines, solar panels, insulation, biofuels, electric vehicles, materials recycling and green building materials are all examples of green technologies that will be welcomed to the zone.

The zone welcomes manufacturers, service providers, suppliers and other players in the value chains of different green technologies.

The SEZ is situated in the Atlantis industrial area north of Cape Town, south of Wesfleur, east of Dassenberg Road, and west of the Witsand community.

Why invest in the Atlantis SEZ?

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

Atlantis is a great location and development ready. 93 hectares of zoned City of Cape Town land is available for leasing to investors. Bulk infrastructure is in place and Atlantis has new public transport and shipping links and fibre connectivity. Atlantis is also close to major ports, roads, universities and greentech markets.

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

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

There is an attractive, wide-ranging skills base to recruit from with 5 universities and many more colleges in the province, and a large range of unskilled, semi-skilled, technical and professional candidates.

For more information, contact the SEZ's:
interim Chief Executive Officer, Pierre Voges
pierre@wesgro.co.za



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7

GreenCape's support to businesses and investors

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

Working in developing countries, GreenCape catalyses the replication and large-scale uptake of green economy solutions to enable each country and its citizens to prosper.

We work with businesses, investors, academia and government to help unlock the investment and employment potential of greentech and services, and to support a transition to a resilient green economy.

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

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

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

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

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

We have facilitated and supported R17bn of investments in renewable energy projects and manufacturing. From these investments, more than 10 000 jobs have been created. Through our WISP (industrial symbiosis) programme, by connecting businesses with waste / under- used resources, we have to date diverted nearly 63,000 tonnes of waste from landfill.

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

Figure 15 below shows the different focus areas within each of our programmes.

Benefits of becoming a GreenCape member

We currently have over 1100 members, and offer free membership. Becoming a member of GreenCape will give you access to the latest information regarding developments in the various sectors; access to tools, reports, and project information; and offer you the opportunity – through our networking events – to meet and interact with various stakeholders in the green economy.



① Renewable Energy

Utility-scale projects, localisation of component manufacturing, incentives & financing options, wheeling & energy trading.

② Energy Services

Energy efficiency & embedded generation, alternative basic electrification, incentives & financing options.

③ Electric Mobility

Electric vehicles & financing options.

④ Alternative Waste Treatment

Municipal decision-making & policy & legislative tools on alternative waste treatment options; small-scale biogas, recycling & reuse (dry recyclables, construction & demolition waste).

⑤ Western Cape Industrial Symbiosis Programme (WISP)

The team matches businesses to share unused resources, cut costs & create value. They also support entrepreneurs to identify & realise new business opportunities in the waste industry.

⑥ Water

Water provision & economic development; greentech opportunities for water use efficiency, treatment & reuse, business water resilience.

⑦ Sustainable Agriculture

Precision-, conservation- and controlled environment- agriculture; valorisation of wastes to high value bio- products, including bio-energy.

Figure 15: GreenCape's focus areas

Support through the International Cleantech Network

GreenCape's membership of the International Cleantech Network (ICN) gives our members access to international business opportunities in countries where other cleantech clusters are based (mainly Europe and North America).

To become a member or to get your ICN passport, please contact GreenCape or visit our website: www.greencape.co.za





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