GreenCape
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<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>AIS</td>
<td>Automotive Investment Scheme</td>
</tr>
<tr>
<td>APDP</td>
<td>Automotive Production &amp; Development Programme</td>
</tr>
<tr>
<td>AV</td>
<td>Autonomous Vehicles</td>
</tr>
<tr>
<td>BFP</td>
<td>Basic Fuel Price</td>
</tr>
<tr>
<td>BRT</td>
<td>Bus Rapid Transit</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>CSIR</td>
<td>Council for Science &amp; Industrial Research</td>
</tr>
<tr>
<td>DC</td>
<td>Direct Current</td>
</tr>
<tr>
<td>DoE</td>
<td>Department of Energy</td>
</tr>
<tr>
<td>DoT</td>
<td>Department of Transport</td>
</tr>
<tr>
<td>DST</td>
<td>Department of Science and Technology</td>
</tr>
<tr>
<td>E-buses</td>
<td>Electric Buses</td>
</tr>
<tr>
<td>EC</td>
<td>Eastern Cape</td>
</tr>
<tr>
<td>ES</td>
<td>Energy Storage</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>EV</td>
<td>Electric Vehicle</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>GHG</td>
<td>Greenhouse Gases</td>
</tr>
<tr>
<td>GP</td>
<td>Gauteng</td>
</tr>
<tr>
<td>GTS</td>
<td>Green Transport Strategy</td>
</tr>
<tr>
<td>ICE</td>
<td>Internal Combustion Engine</td>
</tr>
<tr>
<td>IDC</td>
<td>Industrial Development Corporation</td>
</tr>
<tr>
<td>IDZ</td>
<td>Industrial Development Zone</td>
</tr>
<tr>
<td>ITAC</td>
<td>International Trade Administration Commission</td>
</tr>
<tr>
<td>Km/a</td>
<td>Kilometres per annum</td>
</tr>
<tr>
<td>KZN</td>
<td>KwaZulu-Natal</td>
</tr>
<tr>
<td>LCV</td>
<td>Light Commercial Vehicles</td>
</tr>
<tr>
<td>LFP</td>
<td>Lithium Iron Phosphate</td>
</tr>
<tr>
<td>LIB</td>
<td>Lithium Ion Battery</td>
</tr>
<tr>
<td>MIR</td>
<td>Market Intelligence Report</td>
</tr>
<tr>
<td>NCA</td>
<td>Lithium Nickel Cobalt Aluminium Oxide</td>
</tr>
<tr>
<td>NHTS</td>
<td>National Household Transport Survey</td>
</tr>
<tr>
<td>NMC</td>
<td>Nickel Manganese Cobalt Oxide</td>
</tr>
<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
</tr>
<tr>
<td>PAYS</td>
<td>Pay As You Save</td>
</tr>
<tr>
<td>PI</td>
<td>Production Incentives</td>
</tr>
<tr>
<td>PJ/a</td>
<td>Petajoules per annum</td>
</tr>
<tr>
<td>PPPFA</td>
<td>Preferential Procurement Policy Framework Act</td>
</tr>
<tr>
<td>PRCC</td>
<td>Production Rebate Credit Certificates</td>
</tr>
<tr>
<td>PV</td>
<td>Photovoltaic</td>
</tr>
<tr>
<td>RAF</td>
<td>Road Accident Fund</td>
</tr>
<tr>
<td>RE</td>
<td>Renewable Energy</td>
</tr>
<tr>
<td>SA</td>
<td>South Africa</td>
</tr>
</tbody>
</table>
List of acronyms and abbreviations

SAAM    South African Automotive Masterplan
SADC    Southern African Development Community
SEZ     Special Economic Zone
dti     Department of Trade and Investment
TIA     Technology Innovation Agency
US      United States
UWC     University of the Western Cape
VAA     Vehicle Assembly Allowance
VALA    Volume Assembly Localisation Allowance
WC      Western Cape

Exchange rate used

An exchange rate of 1 USD = R14.10 was used.
Electric Vehicles: Market Intelligence Report 2019

Executive summary

Globally, the momentum for electric mobility has increased exponentially over the last seven years. Global sales of electric vehicles (EVs) are projected to reach five million in 2019, up from one million in 2015. This global shift is primarily driven by emission reduction commitments, growing urban air pollution concerns and continued crude oil price volatility.

While South Africa (SA) has not yet joined the ranks of those countries experiencing a steep rise in EV uptake, the country, much like others, has the same obligations where emissions and energy security are concerned.

South Africa already has a strong market for the manufacturing of internal combustion engine (ICE) vehicles. The automotive sector is a key player in the country’s economic landscape. Total revenue from this sector was more than R500 billion ($35.6 billion) in 2017, with the industry employing ~900 000 workers. SA is considered as a second-tier market producing over 600 000 ICE vehicles in 2018, predominantly for the export market.

For South Africa, a thriving EV market supported by local manufacturing holds the promise of economic growth and job creation. It will also counteract the inevitable decline in demand for ICE vehicles globally.

There are a number of emerging opportunities in SA’s nascent EV market:

- **Passenger vehicle manufacturing**: There is a medium- to long-term opportunity for SA to be used as a manufacturing hub for electric passenger vehicles for the export market, with manufacturing for the domestic market being a longer term opportunity as demand increases. This opportunity is particularly attractive to Greenfield investors.

- **Electric bus manufacturing**: Public transport presents the best business case for electrification. This is especially true for the bus market as it already produces buses largely for the domestic market. Buses are designated in SA and are subject to between 70% and 80% local content requirements by the dti for public procurement. The assembly of buses further enjoys the benefit of duty-free importation of all driveline components. SA assembled 1 131 units in 2017 with 54 (4.7%) of those destined for the export market. While this is a fairly flat market in SA, there is scope to revitalise this space. Incorporating e-bus manufacturing is a more economically viable way of achieving this revitalisation.

- **Lithium ion battery (LiB) production**: South Africa is an attractive manufacturing destination for lithium ion batteries because of its existing battery manufacturing (and recycling) industry. This is coupled with South Africa’s mining sector’s ability to provide some of the raw materials required for the nickel-manganese-cobalt (NMC) cathode battery chemistry, especially manganese. SA possesses 78% of the world’s manganese. In addition, other raw materials required in the cathode are mined in Sub-Saharan Africa.

Table 1 provides an overview of the major drivers and barriers that are also discussed in this report.
Introduction

Globally, the momentum for electric mobility has increased exponentially over the last seven years. It took five years for electric vehicle sales globally to reach one million units (in 2015). This figure doubled in just over a year, and it is projected that five million electric vehicles will be sold in 2019.

This global shift is primarily driven by governments on the back of emission reduction commitments, increasing air pollution concerns in cities and the continued volatility of the crude oil price. In order to drive the uptake of electric vehicles, governments have implemented financial and non-financial incentives to make electric vehicles an attractive purchase.

- **Emission reduction commitments:** The transport sector has been identified as a key contributor to global emissions because of its reliance on fossil fuels. The Paris Agreement obliging signatories to reduce their emissions, was signed by 195 countries. Electric vehicles provide an alternative to traditional internal combustion engines as they can be powered by renewables.

- **Air quality concerns in cities:** Of global carbon dioxide emissions, 15% are attributed to the transport sector. Increasing motorisation in cities has resulted in increasing air pollution concerns. Because electric vehicles produce zero direct emissions they are able to assist in improving air quality in cities.

- **Continued volatility of the crude oil price:** Reliance on fossil fuels in the transport sector poses a risk to countries because of the volatility of the crude oil price. As a result, many countries are seeking alternatives that will reduce their crude oil import bill. Because electric vehicles can be powered by local energy sources, they are becoming increasingly attractive.

While South Africa has not yet joined the ranks of those countries experiencing a steep rise in uptake of electric vehicles, the country, much like others, has the same obligations where emissions are concerned. Energy security for the transport sector is equally attractive. For South Africa, a thriving electric vehicle market supported by local manufacturing holds the promise of economic and investment growth and job creation.

This report provides potential investors and businesses with an overview of the state of the electric vehicle market in South Africa. It highlights emerging opportunities in the electric vehicle market, and also notes barriers and risks in the market. Although the market can be segmented in several ways, based on the context of the South African market, the key market segments discussed in this report are: private, public and industrial. A definition for each segment is provided in **Table 2**, as well as the types of vehicles included in each category.

### Table 1: An overview: drivers and barriers

<table>
<thead>
<tr>
<th>Market drivers</th>
<th>Market barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macroeconomic drivers</strong></td>
<td>■ Products not fit for the South African market</td>
</tr>
<tr>
<td>■ South Africa’s commitment to reducing emissions</td>
<td>■ High import duties</td>
</tr>
<tr>
<td>■ The potential loss of automotive trade markets</td>
<td>■ Lack of policy certainty</td>
</tr>
<tr>
<td><strong>Local demand drivers</strong></td>
<td>■ Lack of local skills to facilitate market growth</td>
</tr>
<tr>
<td>■ Climate conscious consumers</td>
<td>■ Lack of enabling finance terms</td>
</tr>
<tr>
<td>■ Rising fuel costs</td>
<td></td>
</tr>
<tr>
<td>■ Energy storage innovations</td>
<td></td>
</tr>
<tr>
<td>■ Falling cost of electric vehicles</td>
<td></td>
</tr>
<tr>
<td>■ Reduced range anxiety</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Key market segment definitions and vehicle types

<table>
<thead>
<tr>
<th>Market segment</th>
<th>Definition</th>
<th>Vehicle types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private transport</td>
<td>It refers to privately owned and operated vehicles. These vehicles are predominately used for personal travel and daily commuting.</td>
<td>■ Single occupancy vehicles</td>
</tr>
</tbody>
</table>
| Public transport   | It refers to transport of passengers by group travel systems available for use by the general public. These are typically scheduled, have dedicated routes and charge a fee for each trip. | ■ City buses  
■ Commuter buses  
■ Minibus taxis  
■ Metered taxis |
| Industrial transport | This refers to vehicles used in the commercial industry to move heavy goods and materials. | ■ Forklifts  
■ Trucks |

While there are a number of vehicle segments where the application of electric mobility is plausible, this report will focus on three key investment opportunities:

- The uptake and manufacturing of electric buses (e-buses);
- Lithium ion battery manufacturing; and
- Local manufacturing of private vehicles and components for the export, and later domestic, markets.

Additional markets that are affected (directly or indirectly) by the emerging market of EVs, but are not discussed in this report, include:

- the impact of electric vehicles on liquid fuel dynamics;
- grid impacts of electric vehicles;
- the role of electric vehicles in energy storage;
- electric mobility as a service;
- autonomous electric vehicles; and
- new models of vehicle ownership and the role that commercial banks can play in the market.

In what follows, this report provides potential investors and businesses with an overview of the state of the South African EV market (Section 3). It then highlights market drivers (Section 3.7), market barriers (Section 3.8), relevant policies and regulations (Section 4), and emerging opportunities in the South African EV market (Section 5). The sections that follow highlight finance and incentives (Section 6), and the case for the Western Cape as a greentech hub for Africa (Section 7). Section 8 outlines GreenCape’s work and the opportunities for investors across the South African and Western Cape green economy.

For enquiries or to access any of our support services, contact GreenCape’s Energy Sector Desk at +27 21 811 0250, or email energy@greencape.co.za.
Global industry overview

This section provides an overview of the global electric vehicle industry to provide context for the South African industry.

Figure 1 (BNEF, 2018) shows the exponential growth in global EV sales from 2011, which can be attributed largely to governments’ commitments to emission reduction targets and the need to achieve energy security. As a result, many governments have put in place enabling policy frameworks and mechanisms, and created generous incentives to encourage the uptake of EV.

According to one market research company, the global EV market was valued at ~R1.6 trillion (USD 118.9 billion) in 2018 with 783 000 units sold. Although only accounting for 2.1% of the automotive industry, the compound annual growth rate is estimated at 22.3%. The private transport segment accounts for the largest share of this global market, with public transport accounting for far less.

China (42%), Europe (26%) and North America (25%) are the markets leading the global uptake in EVs. BYD, Nissan and Tesla are the leading brands in the respective territories.

China is the largest global market for passenger vehicles, driven by:
- the government’s commitment to reducing greenhouse gas emissions; tight fuel regulations have resulted in the provision of generous incentives and subsidies (financial and non-financial), making EV cost comparable to ICE vehicles;
local manufacturing and economies of scale, thereby reducing the cost of vehicles; and
extensive charging infrastructure networks.

Europe and the US are also leading global markets, driven by financial and non-financial incentives for manufacturers and consumers, as well as each government’s commitment to developing enabling policy environments.

Although the market is seeing rapid growth, there are key factors that could slow down the growth of the EV market. These include:

- battery prices not decreasing as expected;
- oil prices falling further instead of increasing; and
- limited range and charging infrastructure networks.

Without incentives and subsidies, the aforementioned barriers would result in delayed EVs and ICE vehicles cost parity, thereby limiting rapid adoption.
3 South African industry overview

The emerging EV market represents substantial opportunities for businesses and investors active and/or interested in the sector.

This section will discuss how the EV market has unfolded within the SA context.

3.1. South African automotive market supply

The automotive sector is a key player in the country’s economic landscape. According to the 2018 Automotive Export Manual (AEM), the revenue from the automotive sector was more than R500 billion ($35.6 billion) in 2017, with the industry employing ~900 000 skilled, semi-skilled and unskilled employees. The automotive sector remains the largest manufacturing sector in the country as a second-tier market, producing over 600 000 ICE vehicles in 2018, predominantly for the export market.

Since the stabilisation of the sector in 1995 in the post-Apartheid era, the market has expanded to include all major global brands, with several brands also manufacturing locally. Table 3 provides an overview of known original equipment manufacturers (OEMs), importers, and distributors in each market segment, and a map that shows where manufacturing facilities are located in South Africa.
### Table 3: Private transport representation in SA

<table>
<thead>
<tr>
<th>Original equipment manufacturers</th>
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</thead>
<tbody>
<tr>
<td>BMW (South Africa (Pty) Ltd)</td>
</tr>
<tr>
<td>Ford Motor Company of Southern Africa (Pty) Ltd</td>
</tr>
<tr>
<td>Mercedes-Benz SA Ltd</td>
</tr>
<tr>
<td>Volkswagen Group South Africa (Pty) Ltd</td>
</tr>
<tr>
<td>Nissan South Africa (Pty) Ltd</td>
</tr>
<tr>
<td>Toyota South Africa Motors (Pty) Ltd</td>
</tr>
<tr>
<td>Isuzu South Africa</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Importers and Distributors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audi (VW Group)</td>
</tr>
<tr>
<td>European Automotive Imports South Africa (EAISA) (Pty) Ltd (Maserati)</td>
</tr>
<tr>
<td>FCA South Africa (Pty) Ltd (Fiat Chrysler Automobiles Group)</td>
</tr>
<tr>
<td>Jaguar Land Rover</td>
</tr>
<tr>
<td>Mini South Africa</td>
</tr>
<tr>
<td>Porsche</td>
</tr>
<tr>
<td>Volvo Car South Africa</td>
</tr>
<tr>
<td>Honda</td>
</tr>
<tr>
<td>Mahindra &amp; Mahindra South Africa (Pty) Ltd</td>
</tr>
<tr>
<td>Mazda Southern Africa (Pty) Ltd</td>
</tr>
<tr>
<td>Mitsubishi Motors South Africa (MMSA)</td>
</tr>
<tr>
<td>Peugeot SA (Pty) Ltd</td>
</tr>
<tr>
<td>Renault South Africa (Pty) Ltd</td>
</tr>
<tr>
<td>Subaru</td>
</tr>
<tr>
<td>Suzuki Auto South Africa</td>
</tr>
<tr>
<td>Hyundai Auto South Africa Pty Ltd (MOTUS Group)</td>
</tr>
<tr>
<td>KIA Motors South Africa (Pty) Ltd</td>
</tr>
<tr>
<td>HAVAL Motors South Africa (Pty) Ltd (HMSA)</td>
</tr>
<tr>
<td>TATA Motors South Africa</td>
</tr>
</tbody>
</table>
Figure 2 highlights that SA has three key automotive manufacturing hubs located in the Eastern Cape province (EC), KwaZulu-Natal (KZN) and Gauteng province (GP). Although the EC does not experience high commuter patterns like the WC, KZN and GP, the EC has been an attractive manufacturing destination because of the incentives provided by the East London and Coega Industrial Development Zones (IDZs). All three transport hubs have commonalities in that they all harbour private, public and industrial transport manufacturing industries, as well as component companies that support them.

3.2. South African automotive market demand

Commuter behaviour and travel patterns as well as consumer preference all play an important role in shaping the automotive market demand in SA.

3.2.1. Commuter behaviour and travel patterns

There are more than 12 million vehicles on South Africa’s road networks. Gauteng, KwaZulu-Natal and the Western Cape are the provinces with the highest vehicle sales and ownership. Uptake for EV is expected to grow in a similar geographic pattern as the incumbent vehicle market, based on a higher purchasing power in these provinces. Figure 3 (NHTS 2013) shows commuter travel patterns in South Africa, based on data obtained from the National Household Transport Survey (NHTS) that was conducted in 2013. The survey revealed that education was the dominant reason for increased commute time in SA, with work trips being the secondary driver. Private transport holds a dominant modal share with 62.1%. This pattern of modal share is expected to continue into the future. The consistently high private transport modal share provides an indication that the EV sales growth will likely be led by private transport as well. This bears similarities to how EV uptake has grown in the three leading global markets (see Section 2).
The public transport share of the total market has increased marginally since 1995. Minibus taxis have been the dominant mode of choice for public transport users, marginally increasing their market share at the expense of trains and buses. It is also worth noting that South Africa’s population continues to increase and city residents are also travelling more than previously, causing the total number of trips to increase.
Figure 4 (NHTS 2013) is a comparison of how commuters have used public transport for work trips in 2003 and 2013. The figure shows that:

- **minibus taxis** are the dominating mode and this has increased in all provinces except for Gauteng and the Western Cape;
- **bus** usage has also marginally increased in almost all provinces; this number would also have increased substantially with the introduction of Bus Rapid Transit (BRT) systems that have dedicated lanes and have improved reliability and travel efficiency for many commuters; and
- **trains**, despite being the most cost-effective mode of travel, is the least used option and one that has seen the smallest increase between 2003 and 2013. Reliability, safety and travel time are some of the factors cited as reasons for this limited increase in use.

#### 3.2.2. Consumer behaviour

This section discusses how South African consumers make decisions regarding vehicle purchases. It is expected that these factors will affect how customers engage with the EV market.

**Brand loyalty**

South Africans are brand conscious and loyal. They stick to tried and tested brands. They have high spending limits, but only when the price is considered fair. Any price premiums need to be linked with well-defined benefits. This is especially true for the middle class and the new black middle class.¹

Though anecdotal, this highlights two notable insights for the EV market:

- People identify and associate with premium brands, hence the higher uptake in EV sales for BMW in the country and an increased willingness to pay a premium price.
- A large portion of consumers have not been able to link the benefits of electric vehicles to their lifestyle, hence the limited uptake of EVs.

**Affordability**

The majority of South African households rely on debt to meet their consumer needs and the vehicle market is no different. While employment has increased by only 18% since 2007-08, the number of credit consumers has grown by almost 44%. As such, credit usage and extension outnumber job creation, and the over-indebt gap is growing.

These affordability indicators have two important implications for the EV market. Firstly, for EVs that have a price range between R450 000 and R565 000, one needs a monthly gross salary of between R50 000 and R61 000 to afford finance costs. Most South Africans do not earn this much. Secondly, if one could afford an EV, the operational cost savings achieved by EVs do not make up for the relatively high capital price difference between EV and ICE vehicles.

#### 3.3. An overview of the development of SA’s EV industry

The early foundations of the EV market in SA can be seen as far back as the early 1970s in response to the first oil crisis hitting SA. Table 4 details the developments from these early foundations until 2013.

Table 4: The foundations of the EV market: 1970s to 2013

**1970s**

In response to the first oil crisis, DMEA and the CSIR conducted research that highlighted EVs as an alternative to oil. This led to the development of the ZEBRA & LiB technologies.

**1988 – 2002**

Triggered yet again by high oil prices, the NEC was formed to look at alternatives. In 1992, Eskom took over the research and various vehicles were piloted. These include:

- two VW shuttle buses
- a utility vehicle
- an electric game viewer in the Kruger National Park.

It was also during the Eskom programme when Denel developed a hybrid electric combat vehicle. A decrease in oil prices saw the plug pulled on the Eskom programme in June 2002.

**2004 – 2012**

Kobus Meiring of Optimal Energy and his team started developing the Joule – a local, all-electric family car. This was funded from the national DST’s Innovation Fund (now the TIA) and the IDC with a combined investment of approximately R300 million.

The car needed R9 billion for commercialisation. The venture failed to demonstrate any economic merit or sustainability.

**2013**

The uYilo eMobility Technology Innovation Programme, which was initiated by the TIA in 2013, is the custodian of the Optimal Energy assets. uYilo is set up to fast-track the development and commercialisation of key technologies that will primarily support the electric vehicle industry.

**EV industry Roadmap.** Led by the dti, the roadmap proposed incentives for vehicle manufacturers to locally produce electric vehicles. The incentive was a 35% cash-back in investment over a three-year period on condition that manufacturers produce a minimum of 5 000 volumes annually to qualify for the incentive. The status of this subsidy is pending.

As shown in Figure 5, this nascent market has seen a slow growth path since Nissan entered the market in 2013, with BMW and Jaguar following in 2015 and 2018 respectively. Although the market is small and not showing significant growth, Audi, BYD, and Volvo are some of the automakers that are expected to enter the SA EV market in 2019.
3.4. The South African EV value chain

A variety of key players are competing to shape the South African EV market. While the exact dynamics of the industry are still emerging and the timing of key tipping points are unknown, car manufacturers and charging infrastructure companies are the most active investors in the market, with very limited activity currently from the battery companies (see Figure 6).

* Denotes potential entrants to SA’s EV market in 2019

Figure 5: Timeline of market entry by automakers
Figure 6: EV value chain in SA

As the EV market grows and local manufacturing is established, there will be an impact on the traditional internal combustion engine (ICE) value chain. Unlike ICE vehicles that have over a 1000 moving parts, EVs are much simpler in that regard, with fewer parts. While there are valid reasons for South Africa’s transition towards electric mobility, this is not without potential losses.

3.5. Potential impacts of EV market growth on the ICE value chain and economy

Figure 7 shows where we are likely to see gains and losses in the ICE value chain. SA’s involvement in the local EV market will result in minimal job losses, should there be a concerted effort towards upskilling across the value chain. Expected job gains and losses are, however, unquantifiable at this stage due to the nascent nature of the market.

Where there will be a notable impact is on fuel levies. Fuel levies are government’s fourth biggest and most efficiently collected revenue stream. At present, a fuel tax is levied on petrol, diesel and biodiesel with the policy silent on electricity as a fuel for mobility. Under the current fuel levy structure, EV uptake would have a significant impact on the fiscus over time.
The effect of EVs on oil imports, the balance of trade and government revenue

The South African transport sector consumes ~27 billion litres of liquid fuels per year, with additional oil used in the chemicals sector (for non-energy uses). Sixty per cent of South Africa’s liquid fuels consumption is met through crude oil imports, with an additional eight billion litres per year produced from coal and natural gas. Figure 8 below is an illustration of South Africa’s petrol and diesel consumption from 2007 to 2016 (DOE 2017).

Figure 8: Petrol and diesel consumption from 2007 to 2016

If South Africa were to introduce one million electric vehicles that all drive 20 000 km/a, they would collectively reduce the importation of oil by 58 PJ/a (Petajoules per annum). That is an oil import reduction of more than 6%, representing a potential ZAR 8.1 billion ($580 million per year) balance of trade saving for the South African economy.

South African consumers also pay a pre-determined fuel levy on all liquid fuels consumed. With the fuel levy going up by R0.29 and R0.30 per litre for petrol and diesel respectively, effective from 3 April 2019, the case for switching to electric vehicles improves further.

However, for the national government, the fuel levy represents an important and efficient revenue stream. It is expected that R77.5 billion will be collected from this levy in the 2018/19 financial year. Falling liquid fuel sales on the back of increased EV uptake could put this revenue stream at risk.

The macroeconomic benefits and drawbacks of a growing EV market are outlined in Table 5.

Table 5: Benefits and drawbacks of EV market growth and fewer oil imports

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>The country has an increased ability to meet emission reduction targets</td>
<td>Balance of trade saving on the back of decreased oil importation is not proportional to the revenue generated through the fuel levy.</td>
</tr>
<tr>
<td>Decreasing the expense on oil import</td>
<td>There is a high likelihood of reduced contributions to the Road Accident Fund (RAF)</td>
</tr>
<tr>
<td>Increased energy security</td>
<td></td>
</tr>
<tr>
<td>Better price control on electricity than oil</td>
<td></td>
</tr>
</tbody>
</table>
3.6. Market sizing and dynamics

Table 6 provides a snapshot of SA’s ICE vehicle market for 2017/18, showing EV penetration in different vehicle segments. The private car segment has seen the most market activity in both the ICE and EV markets.

Table 6: Overview of South Africa’s conventional ICE vehicle market: 2017/2018

<table>
<thead>
<tr>
<th>Vehicle segments</th>
<th>Number of ICE units sold</th>
<th>Availability of EV equivalent</th>
<th>Penetration rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private transport</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger</td>
<td>557 701</td>
<td>Yes</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Light commercial vehicles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public transport</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minibus taxi</td>
<td>14 100</td>
<td>Yes</td>
<td>0%</td>
</tr>
<tr>
<td>Buses</td>
<td>1 131</td>
<td>Yes</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Industrial transport</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forklifts</td>
<td>Unknown</td>
<td>Yes</td>
<td>Unknown</td>
</tr>
<tr>
<td>Heavy duty vehicles</td>
<td>26 153</td>
<td>Yes</td>
<td>0%</td>
</tr>
</tbody>
</table>

3.6.1. The EV passenger vehicle market

Figure 9 provides a breakdown of electric passenger vehicle sales from 2013 to 2018. There is a notable decrease in sales from 2015 onwards. This speaks to the need for a market step change for any significant growth to be recognised.

Figure 9: Passenger electric vehicle sales in South Africa: 2013 – 2018
3.6.2. The public and industrial EV market

It is expected that public transport will soon follow a similar trend to the one seen in passenger vehicles. The bus industry, BRT and local municipal buses in particular, and the minibus taxi industry present a good business case for electrification.

This potential business case is driven by:
- peak travel patterns (when and where people travel)
- long standing/idle times that coincide with current AC charging times.

The challenge in this market, as is with all EVs in SA at present, is financing for the significant capital price difference between ICE vehicles and EVs, and charging infrastructure investment.

Electrification of the forklift market is also expected to improve based on “fit for purpose” technology improvements. Where heavy-duty vehicles are concerned, the push for freight to rail is a more immediate need and this is expected to take precedence over electrification.

Despite the barriers, automakers see value in SA’s nascent EV market and expect a diversified electric vehicle mix as passenger vehicles continue to be purchased year-on-year. Forklifts and 2- and 3-wheeled EVs gain traction within the industrial segment and interest in the electrification of public transport increases.

3.6.3. Charging infrastructure and network

It is widely accepted that having charging stations in locations that commuters can easily access is key to the adoption and growth of the electric vehicle market. In South Africa the network currently consists of ~120 publicly accessible charging stations. Many of these are found in the Gauteng province and are largely AC charging stations that take up to six hours to arrive at a full charge. Figure 10 (PlugShare, 2019) shows active and incoming charging infrastructure stations in the country.

---

![Figure 10: Active & incoming charging infrastructure stations in SA](image)

- Public charging stations
- Stations that have restricted access or are under maintenance
The market is segmented based on the connector type: CHAdeMO and CCS, with Nissan using the former and BMW the latter. A broader breakdown of the charging standards employed by automotive companies in SA is shown in Table 7.

Table 7: OEMs and Industry & distributors’ DC charging technology

<table>
<thead>
<tr>
<th>Original Equipment Manufacturers</th>
<th>CHAdeMO charging technology</th>
<th>CHAdeMO/CCS charging technologies</th>
<th>CCS charging technology</th>
<th>TBA charging technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMW (South Africa (Pty) Ltd</td>
<td>Nissan South Africa (Pty) Ltd</td>
<td>N/A</td>
<td>Isuzu South Africa</td>
<td></td>
</tr>
<tr>
<td>Ford Motor Company of Southern Africa (Pty) Ltd</td>
<td>Toyota South Africa Motors (Pty) Ltd</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Volkswagen Group South Africa (Pty) Ltd</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mercedes-Benz SA Ltd</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importers &amp; distributors</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Audi (VW Group)</td>
<td></td>
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<tr>
<td>European Automotive Imports South Africa (EAISA) (Pty) Ltd (Maserati)</td>
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<tr>
<td>FCA South Africa (Pty) Ltd (Fiat Chrysler Automobiles Group)</td>
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<tr>
<td>Jaguar Land Rover</td>
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<tr>
<td>Mini South Africa</td>
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<tr>
<td>Porsche</td>
<td></td>
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<tr>
<td>Volvo Car South Africa</td>
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<td></td>
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<td></td>
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<tr>
<td>Honda</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mahindra &amp; Mahindra South Africa (Pty) Ltd</td>
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<td></td>
<td></td>
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<tr>
<td>Mazda Southern Africa (Pty) Ltd</td>
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<td></td>
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<tr>
<td>Mitsubishi Motors South Africa (MMSA)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Peugeot SA (Pty) Ltd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renault South Africa (Pty) Ltd</td>
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<tr>
<td>Subaru</td>
<td></td>
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<tr>
<td>Suzuki Auto South Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyundai Auto South Africa Pty Ltd (MOTUS Group)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KIA Motors South Africa (Pty) Ltd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAVAL Motors South Africa (Pty) Ltd (HMSA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>TATA Motors South Africa</td>
<td></td>
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</tbody>
</table>

The private sector has up until now been driving the roll-out of charging infrastructure in South Africa with limited support from government. AC chargers are expected to hold a significant share of the market. This is qualified by the potential increase in demand from the residential (multi-dwelling units), and to a larger extent, the retail (shopping malls, dealerships) and fuel (filling stations) sectors.

Growth for DC chargers is also expected to increase over time, driven by the growth of commercial vehicles for use in the public transport segment and a limited group of consumers looking to travel further than 400 km. Metropolitan cities, where there is a noticeable uptake in electric vehicles, are expected to drive the majority of the initial infrastructure growth, followed by major highways.

GreenCape’s engagements highlight that potential investors in this space are adopting a ‘wait and see’ approach because they believe the market is still too small and does not yet merit investment. That being said, the market for charging infrastructure is expected to grow as the market for electric vehicles grows, but the timing of this is speculative. What remains unclear is who is responsible for incurring the high costs of rolling out infrastructure – the government, electric vehicle manufacturers or others?
3.7. Market drivers: EV and charging infrastructure

3.7.1. Macroeconomic drivers

South Africa's commitment to reducing its contribution to global emissions
South Africa has made commitments under the Paris Agreement to reduce emissions to between 398 and 618 MT CO2e by 2030. The transport sector remains a significant contributor to South African emission statistics. The recently announced carbon tax, effective as of 5 June 2019, of 9 c/l and 10 c/l on petrol and diesel, respectively, is government’s step towards reaching these emission targets. Switching to EVs is another significant contributor to accelerating SA’s ability to reach these emission reduction targets. However, that impact is much greater if the electrical grid that powers EVs is also decarbonised (see GreenCape’s 2019 MIRs on Renewable Energy and Energy Services).

The potential loss of automotive trade markets if manufacturing does not adapt
South Africa has trade agreements in place with the EU, US and SADC that sustain the country’s automotive industry. The EU agreement allows for vehicles and components to be exported custom-free to 28 countries. This is a significant enabler of South Africa’s export market that makes a marked contribution to the national Gross Domestic Product. Many of these countries have announced the ban of new-sale ICE vehicles starting from 2030 onwards. This presents a potential risk of trade market losses, should the South African automotive industry not transition towards electric vehicle manufacturing in order to satisfy the new international demand in core export markets.

3.7.2. Local demand drivers
Although the South African EV market is tracking international trends, there are four particular drivers that accelerate the demand for electric vehicles in South Africa.

Climate conscious consumers
SA’s EV market is currently driven by a small percentage of high-income customers that are able to prioritise the cost to the environment in purchase decisions. As the climate change and renewable energy narrative becomes the norm, and the efficiency and affordability of electric vehicles improve, it is expected that the market will shift from consumers that are primarily climate conscious to a much broader base.

Rising fuel costs
Price security concerns are highlighting that electric vehicles are an attractive alternative to ICE vehicles for commuters.

Consumers feel the impact from oil price increases more so that other commodities. As the price increases, it also becomes noticeable that consumers have very little flexibility in the short term to change consumption patterns in response to changes in fuel prices. Most commuters are captive users and are therefore locked into the market.

SA’s dependency on oil from high risk regions that are predisposed to geopolitical instability exposes the country to economic and energy security challenges. Figure 11 (BusinessTech 2016) shows the volatility in fuel prices over the past 10 years.

Factors that affect the SA fuel price
SA’s fuel prices are heavily influenced by trends in the global oil market and the local exchange rate. These can be typically seen as domestic and international factors. The Basic Fuel Price (BFP) which constitutes 43% of the retail price of fuel in SA, is determined by taking into account the movement of petroleum product price, as well as the United States dollar/rand exchange rate. The domestic factor (57%) is subject to government’s control and includes fuel tax, RAF levy, customs, excise levy, and transport costs.
Energy storage innovations
The growth of the distributed generation market and increasing global demand for EVs is driving the demand for Lithium Ion Batteries (LIBs) as seen in Figure 12 (BNEF 2016). Economies of scale and technical advances have seen battery prices fall by more than 70% since 2010. When the first mass-market EVs were introduced in 2010, the batteries cost more than US$1 000/kWh. In 2018, Tesla’s Model 3 battery pack cost $190/kWh and the Chevrolet Bolt battery pack ~$205/kWh. Prices are expected to continue to fall as demand rises for LIBs in other sectors.
Falling cost of electric vehicles
Currently batteries make up between 40% and 50% of the total cost of an electric vehicle. Falling battery prices mean that EVs will be cost comparable with ICE vehicles by 2022 (~$125–$150 is the range in which price parity may be achieved). It is at this point that the business case for owning EVs moves from operational cost savings to include capital price savings.

Reduced range anxiety
The limited driving range of EVs is one of the key reasons for prospective buyers not to buy them. While most of the charging happens at home for private vehicles, consumers want the comfort of knowing they can safely travel on a single charge. Improvements in battery management systems have resulted in batteries with a significantly higher driving range, approximately 150 km to 400 km. The ability to consistently travel more than 350 km to 450 km is an expected minimum in South Africa.

3.8. Market barriers
As is the case with many new markets, there are more barriers to economic growth that drivers. This represents an exciting opportunity for intervention and focus areas for government and private sector support over the next 10 years.

3.8.1. Products not fit for the South African market
Current EVs cannot compete with ICE vehicles for the following reasons:

- South Africans have a high ability and willingness to pay for vehicles. However, electric vehicles cost more than R450 000 and look nothing like ICE vehicles in the same price range.

- Unlike the conventional car market, the electric vehicles currently available in the market do not cater for the emerging middle class and middle-income group. These are individuals who purchase vehicles that cost between R150 000 and R350 000, and constitute a larger portion of the market compared to the high-income group.

In light of the high purchase costs of EVs compared to ICE vehicles, there is a need for original equipment manufacturers (OEMs), dealerships and commercial banks to develop innovative vehicle ownership models, such as mobility, as a service and/or enabling finance terms specifically tailored for EVs.

That said, with very limited product choice, even once someone is comfortable with the idea of owning an electric vehicle, they are unlikely to find one that fits their lifestyle. As a result, some brands that currently have a high market share in the ICE vehicle market have a much lower share of the electric vehicle market.

3.8.2. High import duties
Even with the overall cost of the electric vehicles falling due to decreasing battery prices, the cost of electric vehicles remains high relative to ICE vehicles. In South Africa one of the key reasons for this is the high import duties imposed on EVs.

Currently, electric vehicles are subjected to 25% import duties, while buses and trucks carry a 20% duty. In comparison, ICE vehicles incur 18% import duties. Electric vehicles are further subjected to 17% ad valorem (luxury tax duty) because the battery price pushes the overall cost of the vehicle into a luxury threshold. Total taxes on electric vehicles and hybrids are 42%.

The dti is in negotiations with the EU to reduce the import tariff on electric vehicles down from 25%. In return, South Africa will increase the import tariff on vehicles with an engine size smaller than 1 000 cc, which currently stands at 0% to 18%. These vehicles hold a large segment of the new vehicle market and are not produced in South Africa. The timelines of an outcome from these negotiations are as yet unknown.

BMW has also submitted an application to the International Trade Administration Commission (ITAC) for the reduction of import duties to stimulate vehicles sales. The application was for a reduction in duties on imported electric vehicles to 0% for a period of three years with an increase to 10% thereafter. The outcomes of this application were unsuccessful.

3.8.3. Lack of policy certainty
The incumbent automotive sector works effectively because investors have the comfort of longstanding policy certainty and government support as outlined in the Automotive Production and Development Programme (APDP). While there are enabling policy frameworks in place to support ICE vehicle manufacturing, those policies have not been adapted to incorporate EV manufacturing. As such, the lack of policy directives on local EV manufacturing presents an investment risk to the country.
3.8.4. Lack of local skills to facilitate market growth
There is currently insufficient skills in the automotive market and ancillary services to adapt to the growth of the EV manufacturing section. There is a need to upskill existing technicians to facilitate the transition towards electric mobility. This training is also important for first level emergency responders, dealerships, and aftermarket services as these sector also play an important role in a functioning transport sector.

3.8.5. Lack of enabling finance terms
There are currently very limited enabling finance products available for EV projects. The risk profile does not match lenders’ criteria, resulting in short tenors of debt and high interest rates. Investors just do not have enough equity to secure the debt they need. This speaks to the need for innovative finance tools and government assistance to absorb some of the risks associated with financing this nascent market.
The regulatory framework for transport is governed by the Department of Transport (DOT) in SA. The Department of Trade & Industry (the dti) is key to ensuring the policy environment is conducive to investment and trade. There are a number of policies that are relevant to the automotive industry:

4.1. Automotive Production & Development Programme (APDP)

The APDP was implemented on 1 January 2013 and will be in place until 2020. It consists of four pillars that drive the programme:

- **Import duty** (tax) – these tariffs are meant to provide protection to support continued domestic vehicle manufacturing. Unlike traditional tax, this is non-revenue generating.
- **Production Incentives** (rebate mechanism) – this is to encourage increasing levels of local value addition along the automotive value chain, with positive spin-offs for employment creation.
- **Vehicle Assembly Allowance** (rebate mechanism) – this is targeted at doubling domestic vehicle production lines by providing lower duty rates for domestic vehicle manufacturers.
- **Automotive Investment Scheme** (cash grant) – effective from 2009, this support is available to encourage investments by OEMs and component manufacturers in a manner that supports productive capacity upgrading.

The APDP applies only to light vehicles (passenger cars and light commercial vehicles), although components produced for heavy commercial vehicles also qualify for the Production Incentive (PI).

While the automotive industry has not gone backwards since the introduction of the APDP in 2013, it has not shifted SA’s global position as a second tier player. Aggregated vehicle sales have increased, but production for the local and regional market has declined. The local market is far from having sufficient demand to attract local assembly exclusively for domestic market supply.

This policy does not make provision for EV manufacturing, but outlines taxes, rebate mechanisms, and incentives in the traditional automotive industry.

4.2. The South African Automotive Masterplan (SAAM) 2021-2035

The SAAM is under development at the time of writing, and will guide policy on growing and supporting the domestic automotive industry from 2020 to 2035. It will replace the APDP, addressing some of the latter’s shortcomings.

Developed by government and the automotive industry, the SAAM will cover car and light commercial vehicle manufacturing, medium, heavy, extra-heavy truck, and bus production (potentially including off-highway vehicles, yellow metals), motorcycles and the South African component supplier industry. Vehicle importers and distributors will also be covered. The Masterplan will create a framework for securing even higher levels of investments and production.

SAAM’s goals include:

- growing SA’s **vehicle production** to 1% of global output (projected to reach 140 million units annually by 2035);
- increasing **local content** of vehicles assembled in South Africa to 60%, from a 38.74% base.
- doubling total **employment** in the automotive value chain from 112 000 to 224 000 jobs.
improving automotive industry competitiveness levels to that of leading international competitors, such as Turkey and Thailand;

achieving transformation of the South African automotive industry by employing black South Africans, upskilling black employees, empowering dealerships and authorised repair facilities, and substantially increasing the contribution of Black-owned automotive component manufacturers within the automotive supply chain; and

deepen value addition within South African automotive value chains, across selected commodities/technologies.

Notable changes in the SAAM:

Vehicle Assembly Allowance (VAA), which is a one of the four legs of the APDP, will be phased out and replaced by Volume Assembly Localisation Allowance (VALA). VALA will be phased in between 2021 and 2026 to ensure no disruptions to existing OEM investment models.

By 2026, the VALA is set at 35% of local value-add for OEM volumes above 10 000 units, but in 2021 it is set at 40%. This is different from the VAA, which gave vehicle manufacturers component import allowances of 20% (2013) of the ex-factory vehicle price. This reduces to 19% and 18% in 2014 and 2015 respectively for all light multirole vehicles produced domestically. In short, the VALA advocates for the use of local content in the components that manufacturers use by removing credits for imported contents.

The Production Incentives (PI) benefit has been increased to 25% on components. The production rebate credit certificates (PRCCs) will be replaced by duty credits that are tied to local value addition. This is expected to help mop up the current surplus of PRCCs, which are used by OEMs and importers to bring new vehicles into South Africa duty-free.

The Automotive Investment Scheme (AIS) cash grant for capital investments has been retained, but will be reduced by 5% in those instances where non-South African tooling and machinery is employed. Incentives for investment into new technologies such as EVs and hybrids will be covered under this scheme. These incentives are, however, still subject to approval by National Treasury.

SA is seeking a one-tariff regime across all light vehicles, including EVs. This will potentially address the high import duty challenge.

Previously, the APDP only applied to light vehicles (passenger cars and LCVs). The new-look APDP has been amended to also include medium and heavy commercial vehicles, as well as motorcycles, but the VALA formula would not be applied in either category.

Incentives for investment into new technologies such as EVs and hybrids are expected to be covered under the Automotive Investment Scheme (AIS). The potential of a single tariff for all light vehicles, including EVs, is expected to be covered in this masterplan as well.

4.3. Green Transport Strategy (GTS) for South Africa: (2018 – 2050)

To address the significant contribution of transport to national GHG emissions, the Department of Transport (DoT) has developed a green transport strategy. The GTS, which is based on sustainable development principles, aims to minimise the impact of transport on the environment, and meet current and future transport demands. It promotes green mobility and is the first national government-led strategy that makes provision for sustainable transport.

In order to radically grow the uptake of EVs in South Africa, in conjunction with dti and National Treasury, the DoT will:

- offer producers of EVs manufacturing incentives to both produce and sell affordable EVs in South Africa, for both the local and export markets;
- work with local research institutions to conduct research on EV batteries;
- work with national, provincial and local government departments and authorities and the automobile industry to set annual targets for the uptake of electric vehicles and hybrid electric vehicles in the government vehicle fleet, as well as monitoring the local content of the manufacturing of cars locally, in line with the Industrial Policy Action Plan (IPAP);
- introduce the conversion of old technology vehicles with higher emission factors to be retrofitted with EV technology;
- consider providing incentives related to the beneficiation of using local resources in the manufacturing of key machineries and or components (e.g. fuel cell); and
- assist in establishing and developing local EV OEMs.
4.4. Procurement Policy Framework Act (PPPFA)

The revised regulations came into effect on 7 December 2011 to empower the dti to designate industries, sectors and sub-sectors for local production at a specified level of local content. Buses are one of the industries that have been designated for local production with minimum local content thresholds.

As such, the Preferential Procurement Regulations prescribe a 70% and 80% local content of the bus body for city and commuter buses respectively (the dti, 2016). In case of electrical vehicles, the regulations are not clearly excluding the battery from the bodywork, creating an import barrier.
5 Market opportunities

There are a number of emerging opportunities in SA’s nascent EV market.

SA has a very strong automotive market as a dominant player in the country’s manufacturing sector. Under the Industrial Policy Action Plan (IPAP), the automotive industry is identified as a priority industry. This is all largely driven by strong government support and long-standing policy certainty that improves investor confidence.

Through the automotive production and development programme (APDP), government aims to leverage higher private investment to make the sector more globally competitive, while also creating jobs. Key to this shift will be the growth and development of EV market opportunities.

The following are emerging investment opportunities identified in SA’s EV market:

5.1. Passenger vehicle manufacturing
There is a medium- to long-term opportunity for SA to be used as a manufacturing hub for electric passenger vehicles for the export market, with manufacturing for the domestic market being a longer term opportunity as demand increases. This opportunity is particularly attractive to Greenfield investors.

SA has a very strong automotive market, which is a dominant industry in the country’s manufacturing sector, backed by a relatively cheap labour force. The SA government is faced with the task of securing higher investments and increasing vehicle production volumes to stimulate the local market and remain internationally competitive. This manufacturing base, combined with the significant tax incentives offered in the Atlantis SEZ for Green Technologies, contribute to cheaper manufacturing costs. The trade agreements that SA has with the EU (which allow vehicles and parts to be exported custom free to 28 countries) and SADC, coupled with cheaper manufacturing, position SA as a suitable manufacturing destination for companies targeting Africa, US and countries in the EU.

5.2. Manufacturing and increased uptake of electric buses
There is a medium term opportunity for the uptake of electric buses in South Africa. This opportunity is relevant to local investors and investors looking to enter the South African market.

Trade agreements with the EU and SADC and cheaper manufacturing, make SA suitable as an investment destination for EV manufacturing companies targeting Africa, the US and EU.

Electric public transport
Buses are designated in SA and subject to between 70%-80% local content requirements by the dti for public procurement. The assembly of buses further receive the benefit of duty free importation of all driveline components. SA assembled 1 131 units in 2017 with 54 (4.7%) of those for the export market. While this is a fairly flat market in SA, there is scope to revitalize this space and the incorporation of e-bus manufacturing is a more economically viable way of achieving that.

Led by the aggressive e-bus growth rate in China, e-buses are surpassing the growth of every other EV segment globally with a compound annual growth rate of 100% since 2013, compared to 60% for passenger vehicles. Taking the SA context, public transport presents the best business case for electrification. This is especially true for the
bus market as it is already produces buses largely for the domestic market.

- Increasing urbanisation, failing rail networks that have pushed commuters onto the road network, and congestion, are factors that are forcing cities to expand their bus routes. Unlike private transport, buses are mass-based transit systems that are accessible across all income groups. Buses are also space, energy, and emissions efficient.
- Cities/Municipalities are already looking at mechanisms to finance electric buses. Pay as You Save (PAYS) presents an attractive innovative finance approach that transit companies can employ to finance electric buses cost effectively.

5.3. Lithium Ion batteries (LIB) production
LIB manufacturing is a medium- to long-term opportunity for the global LIB market (including South Africa’s domestic market), based on the diversification of the LIB market and increasing demand from the electric vehicle industry.

There are a number of different chemistries used in batteries by EV manufacturers. Lithium Iron Phosphate (LFP), Lithium Nickel Cobalt Aluminium Oxide (NCA), and Nickel Manganese Cobalt Oxide (NMC) are the three leading cathode chemistry types. Of the three, NMC is the most prevalent and the fastest growing. This is due to its high specific energy and low internal resistance. NMC cathodes currently account for about 28% of global EV sales, which is expected to grow to 53% by 2027.

South Africa is an attractive manufacturing destination for lithium ion batteries because of its existing battery manufacturing (and recycling) industry. In addition, South Africa’s mining sector is able to provide some of the raw materials required for the NMC cathode battery chemistry, especially manganese. SA possess 78% of the world’s manganese. Moreover, other raw materials required in the cathode are mined in sub-Saharan Africa. In light of the safety challenges of transporting LIBs, manufacturing in SA also represents a strong entry point to the wider African market.

In terms of activity in the country, the names listed below are partners in the dti Technology and Human Resources for Industry Programme (THRIP) project that is looking at SA’s potential in the LIB manufacturing space:

- University of the Western Cape (UWC) is responsible for providing the lithium ion cell manufacturing facility with the best available lithium ion cell assembly process conditions and human resource skills, quality control protocols and processes to support the assembly of lithium ion cells in partnership with Zellow.
- uYilo e-mobility programme is responsible for defining the Lithium Ion cell testing protocol for the Project and execute testing in accordance with international standards for Lithium Ion cell testing.
- Council for Science & Industrial Research (CSIR) is responsible for providing cathode

Be that as it may, the lead acid battery is the current dominant player in the country’s battery market. This battery is typically used in motor vehicles and as a backup power source. With the uptake of EVs expected to happen at a slow but steady pace due to the absence of incentives and subsidies, the lead acid battery market is expected to continue dominating the motor vehicle market for the next 3-5 years.

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- Council for Science & Industrial Research (CSIR) is responsible for providing cathode

Figure 13: LIB manufacturing value chain
material manufactured using South African intellectual property and raw materials, to be consumed in the Lithium Ion assembly process.

- **Zellow Technology** is responsible for the development of a local lithium ion cell manufacturing competency, driving commercialisation of the final product by identifying customers and using cases through off-take agreements.

- **Metair** is responsible for providing a use case for the final product and agreeing to utilise the product once all safety and quality standards have been met.

According to the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008): Effective from 23 August 2013, **lead acid batteries disposal is banned** from landfill. All “other batteries” will be banned from landfill by 2021.

The lead acid battery market has seen an increase in recycling capabilities (29 016 t) as a result of this piece of legislation. This legislation is also a key driver for the incorporation of LIB reuse and recycling by LIB manufacturing companies looking to set up in SA.
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.

6.1. General database web page
The GreenCape Finance Desk hosts a web page2 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.

6.1.1. 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 online3.

6.1.2. Government funding and incentives database
An updated document focused on South African government funding and incentives is available to view and download online4.

6.1.3. Finfind database
Finfind5 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.

6.1.4. AlliedCrowds database
AlliedCrowds6 is the first complete aggregator and directory of alternative finance providers in the developing world. Sign-up is free and allows users to access a global database where one can filter for sector (including greentech, agriculture and social impact), type of capital (equity, lending, grant), and type of funding (crowdfunding, angel investing, venture capital, impact investing). In addition:

- Themed databases around the Sustainable Development Goals (SDGs) and the World Green Economy Organisation (WGEO) are available.
- Reports, including a number specifically about African funding sources, can also be downloaded for free.
- 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.

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2 https://www.greencape.co.za/content/focusarea/green-finance-databases
3 https://www.greencape.co.za/assets/Uploads/GreenCape-Finance-Database-v6.xlsx
5 www.finindeasy.co.za
6 https://alliedcrowds.com/
The Western Cape: Africa’s green economy hub

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.
Major market opportunities: Western Cape and South Africa

**Agriculture**

**Precision agriculture**
Tools, data analysis, local manufacturing & financing.

**Solar energy for agriculture**
Minimum market of R120 million (WC) and R420 million (SA) for solar PV in agri & agri-processing.

**Controlled environment agriculture**
R600 million potential market (WC), 15% annual growth (WC).

**Energy services (SA-wide)**

**Solar PV systems & components**
600MWp installed capacity; R1.7bn additional investment in 2018 (R7.7bn to date)

**Local manufacturing & assembly**
Solar PV systems and components – systems require compliance with local content regulations

**Energy storage**
Keystone of future energy services market; ~R5bn market for demand side management and back-up power by 2035

**Utility scale renewable energy (SA-wide)**

**Independent power production**
6.3GWp independent power procured, 13.7GWp additional capacity by 2030, based on updated IRP (5.67GWp solar, 8.1GWp wind).

**Rest of Africa**
Greater uptake of RE & decentralized systems. Off-take guarantees and local currency debt innovation needed.

**Local manufacturing**
Refined local content requirements, with specific components obligated to be locally manufactured e.g. wind towers, tower internals, panel laminating, PV mounting structures

**Waste**

**Municipal PPP**
Public-private partnership projects of R1.3bn (WC)

**Organic waste treatment**
Landfill ban require treatment technologies to process 1 m/t p.a. of organic waste (WC)

**Alternative waste treatment**
Cape Town has highest landfill cost in SA & good business case for AWT. R1bn+ invested by solution providers since 2016 (SA)

**Water**

**Industrial and Commercial**
Water intense food & bev sectors expected gross capital formation of ~R14bn by 2021

**New developments**
Green building certifications increased 25-fold since 2010 (SA)

**Municipal**
Significant opportunities in metro markets incl. new R5.8bn (417 MLD) Cape Town augmentation programme (WC)

**Bioeconomy & resource efficiency**

**Food value retention**
At least R600m retained through improved cold chain management & waste reduction (SA)

**Solar thermal**
Already installed: R33m (WC), R135m (SA); ~R3.7bn potential market in agri-processing

**Biogas**
For electricity, heating & transport; R100m of installations expected by 2023
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 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 Investment Promotion Facilitator, Jarrod Lyons: jarrod@greencape.co.za
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 14 on page 39 shows the different focus areas within each of our programmes.

Benefits of becoming a GreenCape member
We currently have over 1 100 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, electric vehicles, alternative basic electrification, incentives & financing options.

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

Figure 14: 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).

**4. 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.

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

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

To become a member or to get your ICN passport, please contact GreenCape or visit our website: [www.greencape.co.za](http://www.greencape.co.za)
References


