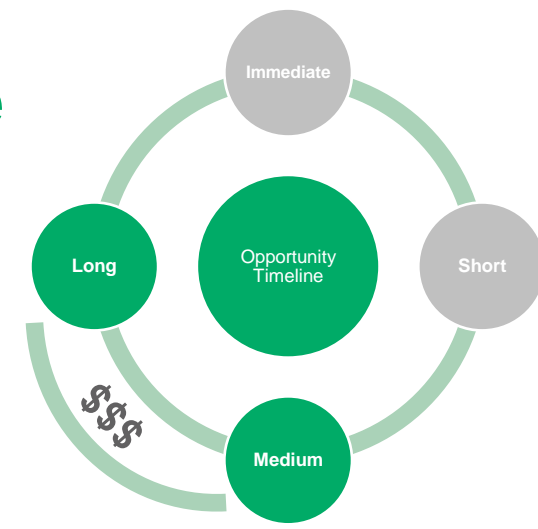


# Electric Mobility

## Key Opportunities

# Emerging opportunities in the electric mobility space

Four emerging opportunities exist in the Electric Vehicle Space in South Africa



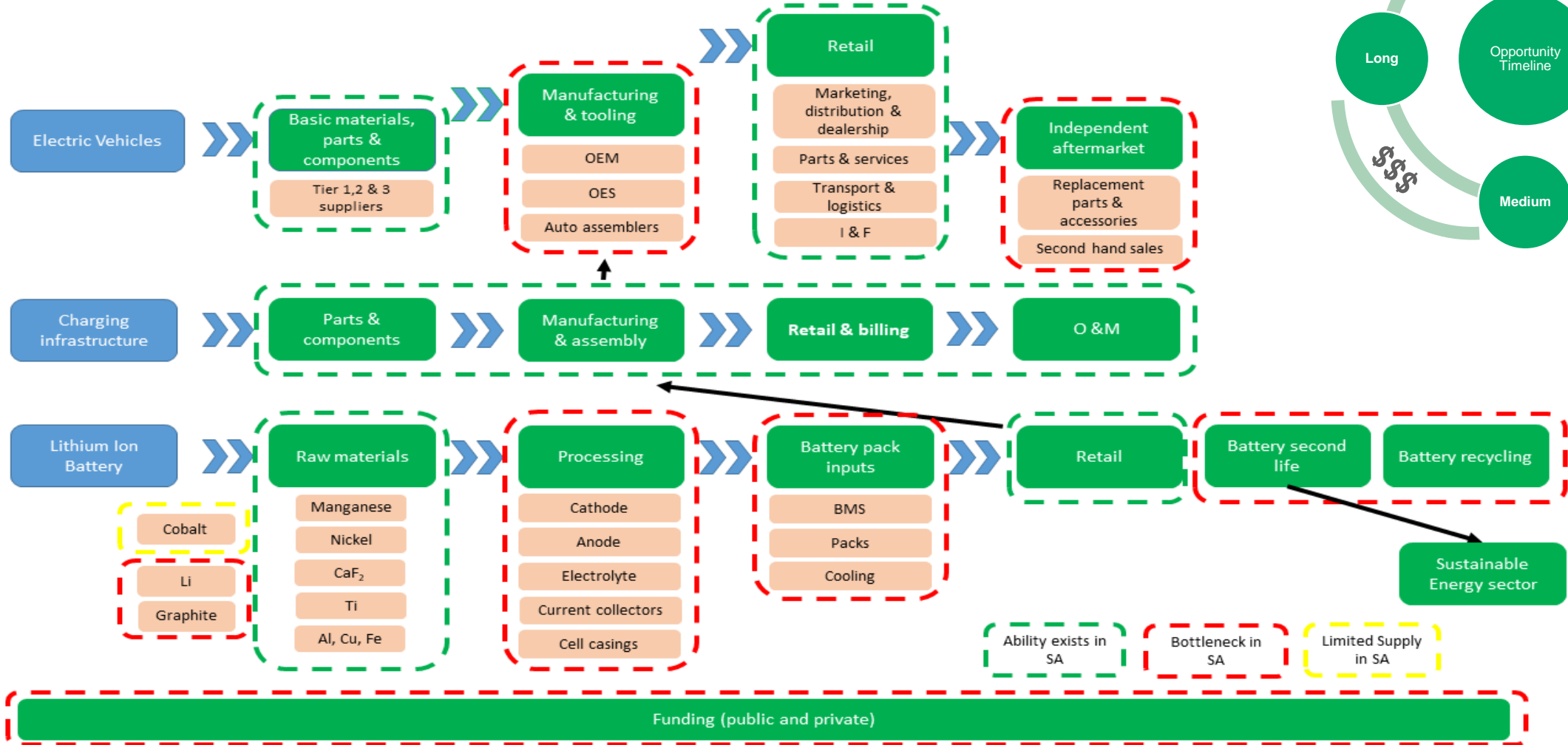
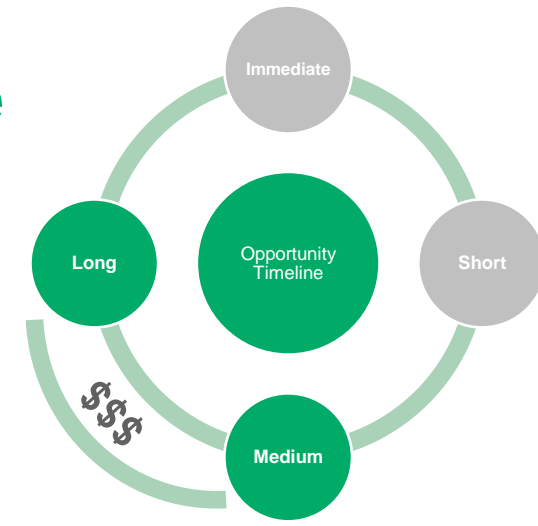
## Opportunity

- EV use in construction, retail, and in underground mining
- Manufacturing and increased uptake of electric buses
- Lithium-ion batteries (LIB) production
- Passenger vehicle manufacturing

## Term

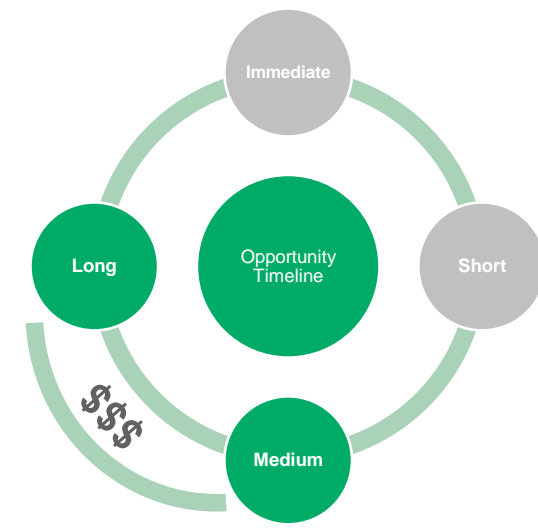
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# Emerging opportunities in the electric mobility space



# The electric bus opportunity

Public transport presents the best business case for electrification and decarbonization of transport in South Africa

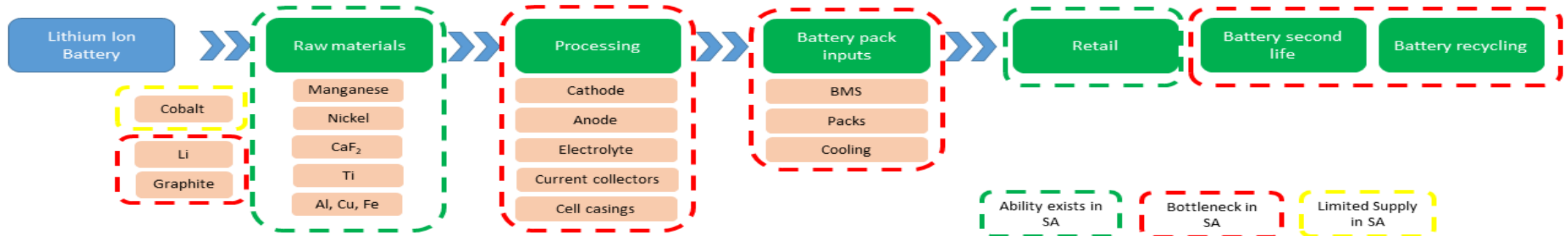
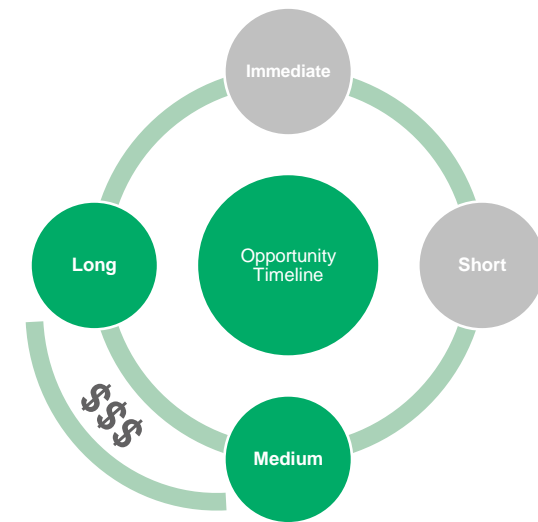


- Increasing urbanisation, a failing rail network that has pushed commuters onto the road network, and congestion, are factors that are forcing cities to expand their bus routes.
- Cities / municipalities are looking at mechanisms to finance electric buses. **Pay as You Save (PAYS)** presents an attractive innovative finance approach that transit companies can employ to finance electric buses cost effectively.

OPPORTUNITY	KEY DRIVERS	BARRIERS	TERM
Manufacturing and increased uptake of electric buses	<ul style="list-style-type: none"> <li>The need to meet greenhouse gas reduction targets</li> <li>Public transport demonstrates the best business case for alternative fuel applications and decarbonisation</li> <li>Decreasing battery pricing which reduces the upfront capital cost of EVs</li> <li>Increase uptake in renewable energy from the Just Energy Transition</li> </ul>	<ul style="list-style-type: none"> <li>Slow local uptake of EVs</li> <li>Public procurement system</li> <li>Poor precedent created by the unsuccessful Cape Town bus tender</li> <li>Lack of innovative and cost-effective financing mechanisms and access to capital</li> <li>Insufficient skills throughout the value chain</li> </ul>	Medium – Long

# Lithium-ion battery production

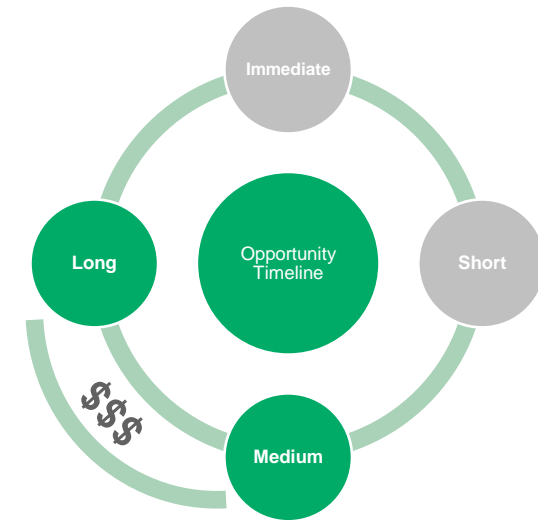
- SA possesses 78% of the world's manganese. Moreover, other raw materials required in the cathode are mined in sub-Saharan Africa.
- In light of the safety challenges of transporting Lithium-Ion Batteries (LIBs), manufacturing in SA also represents a strong entry point to the wider African market.



OPPORTUNITY	KEY DRIVERS	BARRIERS	TERM
<b>Lithium-ion batteries (LIB) production</b>	<ul style="list-style-type: none"> <li>Increasing demand for lithium-ion batteries</li> <li>Availability of key minerals in South Africa for LIB production</li> <li>Availability &amp; relative ease of access to lithium &amp; cobalt</li> <li>Emerging need of Mn-rich electrodes that can compete with 'in vogue' Nickel-rich compositions (security of supply)</li> </ul>	<ul style="list-style-type: none"> <li>Establishing strong public-private partnerships. In particular, partnerships that extend beyond South Africa, as with Argonne and University of Limpopo</li> <li>Better understanding of global Manganese-oxide demand</li> <li>Policy uncertainty</li> </ul>	Medium – Long

# Passenger vehicle manufacturing

Long standing policy certainty and strong government support are the two factors driving the growth of SA's auto industry



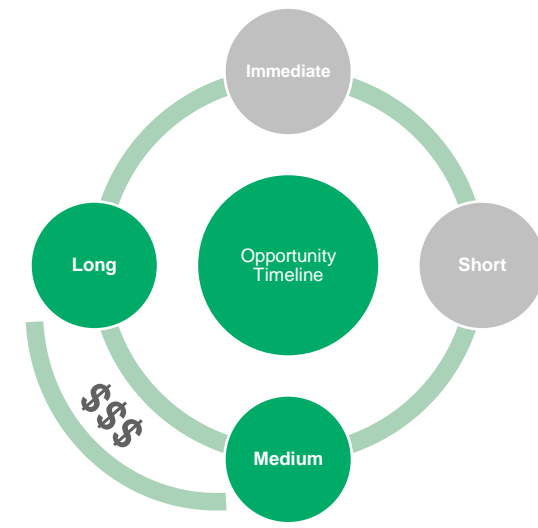
- Medium- to long-term opportunity for SA to be used as a manufacturing hub for electric passenger vehicles – Atlantis Special Economic Zone for greentech manufacturing (Tax, land, import, export, skills)
- South Africa has a very strong automotive market as a dominant player in the country's manufacturing sector.
- Automotive industry is identified as a priority industry under the Industrial Policy Action Plan.
- Investor confidence is growing, as can be highlighted by recent OEM Investments into manufacturing in RSA

OPPORTUNITY	KEY DRIVERS	BARRIERS	TERM
Passenger vehicle manufacturing	<ul style="list-style-type: none"> <li>– Government efforts to increase local content, volume outputs, and jobs</li> <li>– Potential loss of existing trade markets</li> <li>– Existing automotive industry in SA</li> </ul>	<ul style="list-style-type: none"> <li>– Lack of local market demand (insufficient uptake)</li> <li>– Lack of innovative and cost-effective financing mechanisms and access to capital</li> <li>– Insufficient skills throughout the value chain</li> </ul>	Medium – Long

# EVs in construction, underground mining and retail

Climate change is a critical global challenge, and a growing need to reduce GHG emissions

- Large mining equipment currently makes up around 30-50% (and up to 80%) of the scope 1 emissions at a mine
- Almost all underground mine equipment is diesel-powered



OPPORTUNITY	KEY DRIVERS	BARRIERS	TERM
EV use in construction, retail, and in underground mining	<ul style="list-style-type: none"> <li>– Cost-saving since one of the highest costs in underground mining operations is getting air underground. EVs produce no tail-pipe emissions compared to emissions from using ICE vehicles underground.</li> <li>– Demand for lithium-ion-powered forklifts increasing locally, owing to companies wanting to reap the benefits of energy efficiency and cost-effectiveness, as well as to prepare for changing legislation regarding emissions, such as the recently-enacted carbon tax regulation.</li> </ul>	<ul style="list-style-type: none"> <li>– Lack of a local manufacturing industry for construction, retail, and mining vehicles.</li> <li>– Lack of innovative and cost-effective financing mechanisms and access to capital</li> <li>– Insufficient skills throughout the value chain</li> </ul>	Medium – Long

