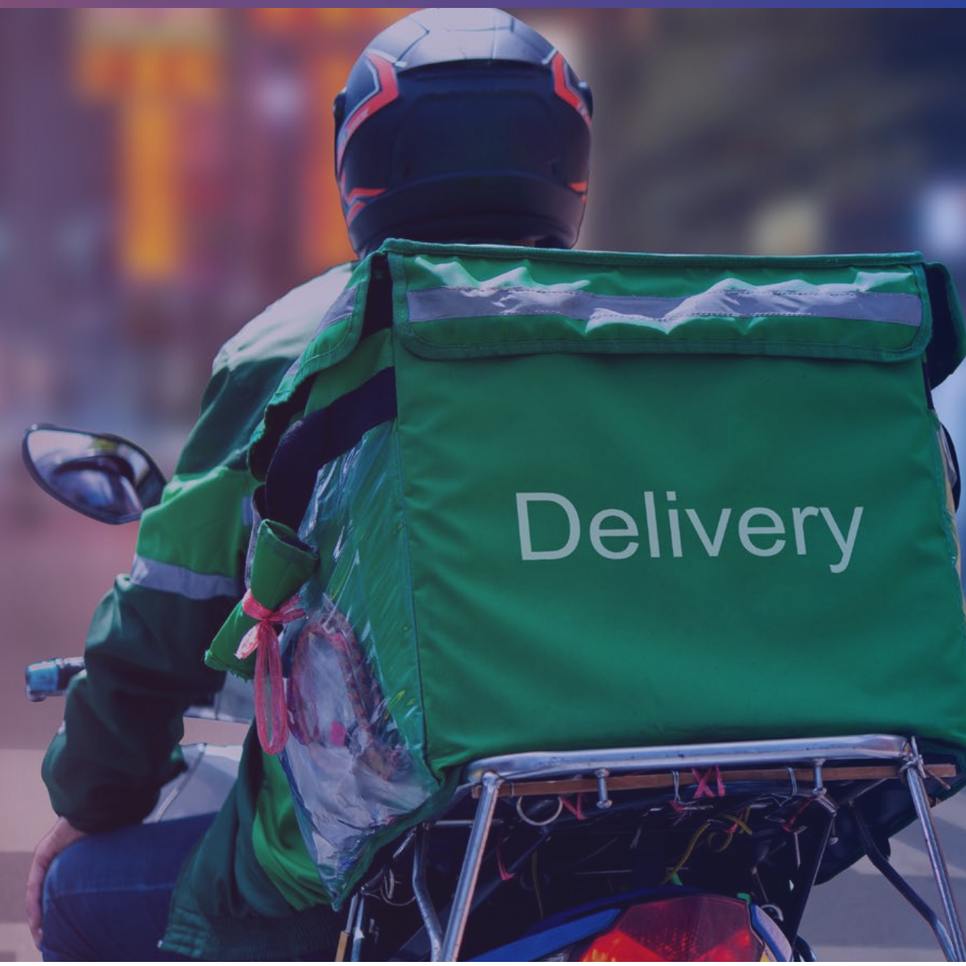
ELECTRIFYING PROGRESS

South Africa



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In an era marked by growing concerns over carbon emissions, climate change, air pollution, urbanisation and the pressing need for sustainable solutions, our global society is grappling with a dilemma: how to reconcile convenience with environmental responsibility. The food, grocery and etail delivery sectors, fuelled by rapid expansion and growing popularity, find themselves at the nexus of this challenge.

ELECTRIFICATION OF DELIVERY IS AN EFFECTIVE ANSWER TO ADDRESSING THESE CHALLENGES.

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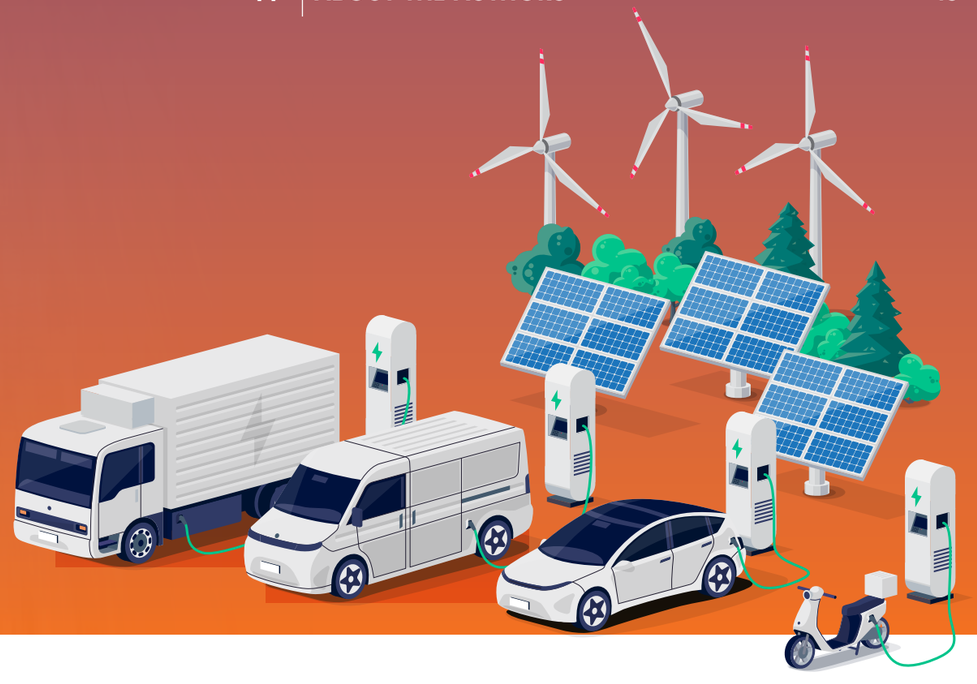


01

VOICES OF SUPPORT

"The planet cannot wait for change. Mother Nature is speaking to us, and the signs are clear: we, as humans, need to take accountability and reverse our mistakes. Micro-mobility is the most affordable form of EV. The delivery industry, whether using ICE vehicles or EVs, spends around 10 hours a day on the road, compared to the average commuter who spends about two hours a day traveling. Given the significant carbon emissions from delivery vehicles, transitioning to EVs in this industry is imperative."

Craig Atkinson, Founder, Green Riders

"The team at Go Electric Mobility (GEM) and I are deeply committed to electrifying last-mile delivery in South Africa. This transition is crucial in addressing the climate crisis and reducing urban pollution. Also, it will drive economic growth, improve public health, and create jobs, all while tackling environmental concerns. This report underscores the pivotal role delivery platforms play in this transformation, offering actionable insights that resonate with our mission for a sustainable, low-carbon future. We fully endorse the report's call to scale up EV adoption and are dedicated to driving this essential change."

Saul Cohen, Managing Director, Go Electric Mobility

"As the world grapples with the urgent challenges of climate change and pollution, it's clear that scaling EVs is not just an option but a necessity. The insights and calls to action in this report are invaluable as we commit to transforming our operations and embracing sustainable practices that will shape a better future."

Mahomed I E Jeewa, CEO, Valternative Energy

"Switching to electric delivery vans (like the MellowVan) is a smart move for businesses and the environment. By replacing traditional delivery vans, businesses can save money and reduce their carbon footprint. Embracing electric delivery vehicles is a win-win for companies, customers, and our planet."

Neil Du Perez, Founder, MellowVans

"Corporates are experiencing global pressure to reduce carbon emissions, and industries like logistics have had limited options prior to EVs crossing the economic viability threshold. Commercial EVs can now save considerable cost per kilometre travelled, above 3 500km per month. The concept of electric vehicles as a service (EVaaS) is a way in which commercial fleets can reduce risk when transitioning. The solution provides a fully maintained EV, access to a network of charging infrastructure and supplying all the energy required for operations. EV access becomes easy, convenient, and affordable.

These kinds of solutions are risk free for the user. In return, the user gets to meet its ESG goals with a cost-effective solution that returns savings when considering the total cost of ownership."

Ndia Magadagela, CEO, Everlectric

"Zimi proudly endorses this report for its vital insights and actionable strategies that will accelerate South Africa's transition to zero-emission vehicles. This report serves as a critical guide for businesses and policy-makers, highlighting the economic, environmental, and social benefits of embracing sustainable mobility. We stand with its call to action and remain committed to driving real change in the transport sector through innovative EV charging solutions."

Michael Maas, CEO, Zimi

"I was using a petrol engine vehicle. My petrol engine vehicle broke down and I was introduced to the electric vehicle, and I'm impressed so far.

It's cheaper to use an electric car compared to using a petrol engine.

It has saved me money that I would have had to use to buy petrol. The maintenance of the electric car is cheaper and easier to manage than a petrol engine."

Thembelani Moyo, Takealot Delivery Team Cresta, MellowVan 3-wheeler

"I was using a petrol engine vehicle, and I decided to go electric because I was trying maximise profits. With no petrol worries, I am able to reduce my costs.

Fuel costs are always increasing and service of a petrol engine becomes expensive with all the travelling one does in a day.

I would like to see batteries that last longer or more charging ports in areas that I work, as it is sad to stop offering services to go charge/swap your battery."

Tumelo Msimanga, Takealot Delivery Team Centurion, E-EM electric 2-wheeler

"I was not using a petrol bike before. This was my first time on a bike. There is no stress for petrol, as long as your battery is charged you are good to go. I also have two batteries, so there are no concerns for me. I feel bike drivers do need to be more informed of electric bikes and their advantages."

Mzimase Puteni, Takealot Delivery Team Soweto, E-EM electric 2-wheeler

02

FOREWORD

The transition to electric vehicles (EVs) represents a pivotal moment in South Africa's journey towards a sustainable and resilient future.

As the world grapples with the pressing challenges of climate change, air pollution, and the depletion of fossil fuels, the adoption of EVs offers a promising solution that aligns with global sustainability goals and national priorities.

South Africa, with its unique socio-economic landscape and rich natural resources, stands at a crossroads. The country's reliance on coal for energy production has long been a double-edged sword, providing economic benefits while contributing significantly to greenhouse gas emissions. The shift to EVs presents an opportunity to reduce the carbon footprint of the transportation sector, which is a major contributor to air pollution and climate change.

Moreover, the transition to EVs can stimulate economic growth and job creation. Through the social lens, relevant within our within our country context, EVs present an opportunity to directly impact the livelihoods of the drivers within the ecommerce ecosystem. Reducing the effective cost per kilometre or mile directly increases the take-home cash, resulting in a virtuous social cycle, especially in the context that digital platforms and ecommerce is still in its infancy in South Africa.

By investing in the development of EV infrastructure, such as charging stations and renewable-energy sources, South Africa can foster innovation and attract investment in green technologies. This, in turn, can lead to the creation of new industries and employment opportunities, particularly in the manufacturing and service sectors.

The adoption of electric vehicles also holds the potential to improve public health. Reduced emissions from EVs can lead to cleaner air, mitigating the adverse health effects associated with air pollution, such as respiratory and cardiovascular diseases.

This is particularly important in urban areas, where air quality is often compromised by high levels of vehicular emissions.

Furthermore, the transition to EVs aligns with South Africa's commitments under international agreements, such as the Paris Agreement, which aims to limit global warming to well below 2 degrees Celsius. By embracing EVs, South Africa can demonstrate its commitment to global climate action and position itself as a leader in the transition to a low-carbon economy.

I believe that the transition to electric vehicles is not merely a technological shift but a comprehensive strategy that addresses environmental, economic, and social challenges.

Fred Zeitsman, CEO Takealot

"Reduced emissions from EVs can lead to cleaner air, mitigating the adverse health effects associated with air pollution, such as respiratory and cardiovascular diseases."

03

EXECUTIVE SUMMARY

Transforming South Africa's last-mile delivery sector to embrace low-impact and zero-emission vehicles (ZEVs) presents a significant national task and a multi-faceted opportunity to advance economic growth, improve public health, and create job opportunities, all while addressing environmental concerns.

In South Africa, the transportation sector, which accounts for 12% of the nation's total greenhouse gas (GHG) emissions (as of 2021), relies heavily on road transport for both passengers and freight, with 90% of all cargo being delivered by road [1]. This reliance on road transport is significant in the context of the country's rapidly growing ecommerce sector, where online sales surged by 66% from 2019 to 2020, reaching over US$1.8bn (R30bn). While data and airtime purchases dominate online transactions, clothing and apparel are the next most popular categories. Notably, grocery sales saw a 54% increase due to the pandemic, with food-delivery platforms also expanding, further contributing to the demand for road-based logistics [2].

Vehicle electrification promises transformative benefits across the environment, economy, and society. Environmentally, electric vehicles (EVs) adoption at scale helps reduce greenhouse gas emissions and air pollution, contributing to cleaner air and fighting climate change.

In the context of South Africa, a current reliance on traditional energy sources is being gradually addressed through a shift towards renewables. As the energy grid incorporates more renewables, the environmental advantages of EVs will grow significantly.

Economically, EVs offer lower operational costs due to reduced fuel and maintenance expenses, stimulate innovation in green technologies, and create new job opportunities across the value chain.

As global markets shift towards EVs, aligning local production with international trends is crucial to maintain export competitiveness. Scaling local assembly programmes for EV components, including battery packs, can further reduce costs, stimulate economic growth, and enhance technological self-reliance, ultimately making EVs more affordable and accessible. Additionally, developing and maintaining a localised electricity production and charging network will not only enhance infrastructure but also promote technological innovation and sustainability. This shift will support the reduction of the nation's reliance on imported petrol, increasing economic stability and lowering overall transportation costs. As a result, businesses, particularly in the ecommerce sector, will benefit from reduced logistics expenses and improved operational efficiencies, fostering a more dynamic and resilient economy. Socially, the transition to EVs is leading to a significant reduction in the total cost of ownership (TCO) for transportation, despite the vehicles' higher initial purchase price, and this trend is expected to continue. Over time, the savings from lower fuel and maintenance costs make EVs even cheaper to operate, providing South African citizens with an opportunity to increase their income and livelihoods, particularly in delivery-related work, allowing more people to benefit financially from the growing demand for delivery services. This shift will also create a diverse range of job opportunities, from the assembly line to infrastructure development and maintenance, catering to a wide spectrum of skill levels. Moreover, the emergence of e-bicycles and other micro-mobility vehicles presents unique prospects for unskilled workers while offering pathways for career advancement.

Embracing the electrification of last-mile delivery fleets offers South Africa a promising route to a thriving transportation sector that supports economic, social, and environmental needs. However, overcoming country-specific challenges such as energy shortages exacerbating charging anxiety, slow deployment of charging infrastructure, high purchase costs of EVs, and lack of awareness requires innovative business models, advanced technology, and efforts to scale up promising solutions.

Interviews conducted with delivery drivers for the writing of this report reveal that early adopters of EVs are generally positive about their experiences, particularly noting the financial benefits, such as cost reduction and easy maintenance. Moreover, they have expressed a strong interest in exploring and understanding more about the broader advantages of EVs.

Our research explores strategies to facilitate the transition of last-mile delivery fleets to ZEVs, addressing the specific needs and challenges of two, three and four-wheeled vehicles (2/3/4Ws). Each vehicle type offers distinct opportunities and obstacles, requiring customised approaches to ensure effective and successful electrification across different delivery modes. The success of the transition needs a multi-faceted approach that addresses challenges, which we group under the themes of price, practice, and public adoption.

OVERCOMING PRICE CHALLENGES

- **EVaaS models:** Leasing and rent-to-own forms of EV-as-a-Service (EVaaS) models are increasingly recognised as effective strategies for enhancing the accessibility of EVs. By reducing upfront costs and offering a one-stop solution that typically includes vehicles, maintenance, insurance, and often the use of charging infrastructure, these models encourage adoption among drivers and delivery companies.
- **Leveraging advanced technologies:** Utilising sophisticated diagnostics kits, GPS tracking, and the internet of things (IoT) set-ups can significantly reduce risks of vehicle abuse and theft, enhancing the appeal of EVs to both drivers and companies. These technologies improve safety, security, and operational efficiency.
- **Microfinance solutions:** Affordable and flexible financing options from intermediary asset finance institutions can facilitate EV ownership for delivery drivers, many of whom operate on a freelance basis. This approach not only promotes sustainable mobility but also supports economic empowerment and financial stability in ommunities.
- **Local assembly initiatives:** Encouraging local assembly of 2/3Ws can reduce costs and accelerate deployment. Exemptions from high import duties and ad valorem goods taxes make these vehicles financially attractive. Completely knocked-down (CKD) kits[1] enable easy local assembly, allowing for vehicle customisation to meet local needs and potentially qualify for tax rebates.
- **Mileage-optimised electrification:** The ideal adoption point for e-4Ws in last-mile delivery, particularly during the early transition phase, is when daily mileage is sufficient to achieve cost savings without requiring en-route charging.

1 CKD kits refer to a method of exporting products, particularly vehicles, in a disassembled form. This practice involves delivering all the necessary parts for assembly at the destination, allowing for local assembly rather than importing fully assembled products.

This balance ensures operational efficiency and maximises the economic benefits of EVs. As mileage increases, EVs become more cost-effective, particularly as they approach their single-charge range, typically around 300km per day. However, exceeding this range may introduce operational challenges related to charging infrastructure. Therefore, a strategic and phased approach to fleet electrification is essential, supported by robust vehicle routing, maintenance strategies, and continuous testing. It is critical to align the appropriate vehicle with the right route and driver profile, therefore optimising the match between driver and vehicle performance, or integrating EVs into businesses with peak delivery times – such as food services – to manage operational demands for charging within the times between delivery slots.

OVERCOMING PRACTICE CHALLENGES

- **Developing purpose-built vehicles:** Rigorous research and testing are essential for identifying the most suitable EV models for distribution within the local market. This process ensures that the selected vehicles effectively meet specific delivery and geographic requirements. For example, EVs must be capable of navigating the hilly terrains common in many areas of South Africa, they should provide comfort and safety for drivers while being well-suited for transporting goods and parcels.
- **Integrating solar energy and energy storage:** Solar systems for charging stations, coupled with energy storage solutions, provide more sustainable energy sources. Off-grid solar-powered charging stations for electric 2Ws can meet daily energy requirements, enhancing cost-effectiveness. While solutions for 4Ws are more challenging, innovative approaches are currently being explored in the country.
- **Overcoming infrastructure limitations:** Enhancing public charging infrastructure, particularly in high-traffic areas, can benefit on-demand last-mile delivery operations, although existing stations mainly cater to 4Ws and require adaptation for smaller EVs. Battery swapping addresses financial and infrastructure constraints for 2Ws by providing quick, space-efficient solutions that minimise downtime. For 3Ws, which often have heavier batteries with longer ranges, swapping is less common due to operational constraints, leading many manufacturers to prefer built-in batteries. Additionally, equipping drivers with extra batteries for home charging or developing batteries with dual functionality – allowing them to power household appliances during electricity outages – could improve uptake. However, challenges like limited charging infrastructure in shared accommodations remain.

- **Exploring shared mobility solutions:** Vehicle-sharing services that provide 2/3Ws for both the public and delivery drivers can enhance EV usage by taking advantage of off-peak demand differences between private and commercial users. Although this model is not yet implemented in South Africa, conducting trials in specific areas could help test its effectiveness, potentially improving resource utilisation while addressing safety and theft concerns.
- **Standardising and accelerating charging infrastructure:** AC chargers are suitable for overnight charging, while DC fast chargers offer rapid top-ups but come with higher installation costs and require strong electrical connections. E-LCVs can use both types of chargers and can access various public and private networks, making them highly practical for delivery operations. Although South Africa has a favourable ratio of EVs to charging stations and a balanced mix of chargers, coverage remains uneven. Standardising charging infrastructure is crucial for compatibility and ease of use. South Africa has adopted universal charging standards, which, along with high-quality, compatible equipment, will help future-proof investments and support EV integration into delivery fleets

OVERCOMING PUBLIC ADOPTION CHALLENGES

- **Establishing training programmes:** Comprehensive training for drivers on EV technology, route optimisation, and battery usage is essential to ensure safe operation, maximise range and reduce downtime. Raising awareness about the benefits of EVs among potential adopters is fundamental to enhancing public adoption.
- **Passive income-generating vehicles:** EVs offer the opportunity to function as mobile billboards, creating additional revenue streams through advertising. By customising the exterior of the vehicles or the delivery boxes, these vehicles can maximise visibility and brand exposure while on the move. This not only benefits advertisers by reaching a broader audience but also provides drivers and delivery platforms with extra income opportunities.

Policy, localisation, and financing

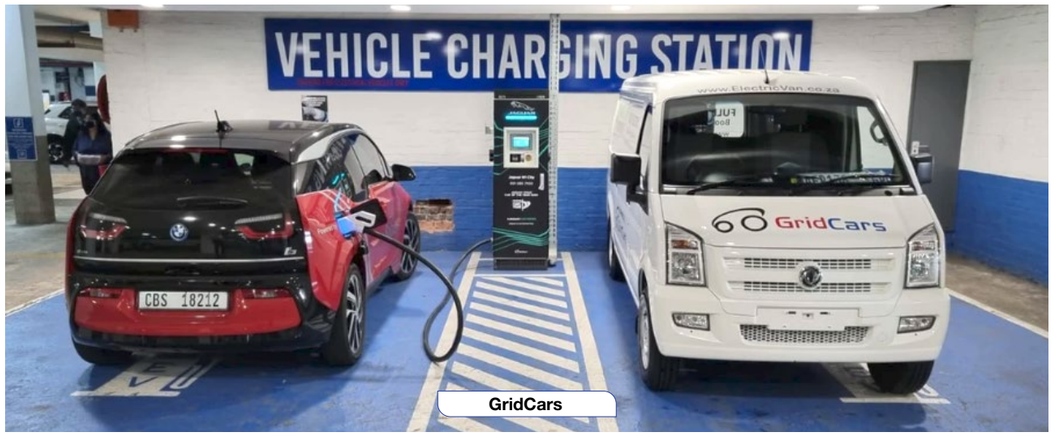
Transitioning to EVs necessitates urgent and decisive policy action. Examples from other countries illustrate that supportive policies and regulations – such as emissions reduction mandates, incentive schemes, purchase subsidies, and tax concessions – have been pivotal in boosting EV adoption. Ethiopia, for example, has recently introduced a ban on importing non-EVs [3]. At present, South Africa has only one piece of legislation – announced in 2024 – that provides specific investment incentives for the production of electric and hydrogen-powered vehicles under the Automotive Production Development Programme [3]. In contrast, countries like China and India have demonstrated greater commitment, with China implementing 10 policies[2] since 2018 and India enacting five since 2019. However, the South African Department of Trade, Industry and Competition (the DTIC) has announced plans to provide incentives and financial support to the automotive manufacturing industry, including the development of an electric battery regional value chain.

Localisation strategies for EV development and local value chains are essential for establishing a viable EV business model and ensuring a fair transition. South Africa's well-developed automotive assembly industry must transition towards EV manufacturing to maintain its export market share, particularly as international markets phase out internal combustion engine (ICE) vehicles. At present, South Africa does not have any locally manufactured EV models, which means adopters rely on imported EVs.

The transition demands substantial capital investment across the value chain. Innovative financing models, such as those leveraging a shared asset economy – where charging stations and even vehicles are utilised by multiple users – offer practical solutions to overcoming the high initial costs of EVs and their support system. Collaboration between commercial banks, finance institutions, and the private sector can enhance the viability of EV financing by gathering real-world data on EV fleet performance which can inform risk assessments, optimise lending criteria, and create tailored financial products that better meet the needs of businesses and consumers.

In conclusion

The transition to EVs for last-mile delivery in South Africa promises significant benefits but requires navigating several challenges. Collaborative efforts between businesses, individuals, and policy-makers are essential for overcoming economic and systemic barriers. Public-private partnerships can accelerate the deployment of EV solutions, enhancing their reliability and reach. Innovative financing models and supportive government policies are critical to making the transition economically viable. By integrating these strategies and adopting a holistic, value chain approach, South Africa can create a sustainable, economically viable, and environmentally beneficial future for electric mobility in last-mile delivery.



2 Policy type: legislation.

04

INTRODUCTION

Vehicle electrification promises transformative benefits across the environment, economy, and society. Environmentally, the adoption of electric vehicles (EVs) at scale helps reduce greenhouse gas (GHG) emissions and air pollution, contributing to cleaner air and climate change mitigation.

Economically, EVs offer lower operational costs due to reduced fuel and maintenance expenses, stimulate innovation in green technologies, and create new job opportunities across the value chain. Socially, EVs help improve public health by reducing air and noise pollution. The cost savings associated with operating EVs – due to lower fuel and maintenance expenses – can enhance delivery drivers' living conditions. Additionally, EVs provide job opportunities for individuals without driver's licences and allow delivery companies to access a more diverse and inclusive workforce by expanding the available driver pool.

In many low and middle-income countries, the transport sector is evolving rapidly with a notable surge in the use of two and three-wheeler vehicles (2/3Ws). While Asia holds the largest share of the global motorcycle fleet, African nations are witnessing some of the highest growth rates in usage worldwide. These 2/3Ws, used extensively for personal transport, taxis, and delivery services, vary significantly in terms of price, usage, durability, and the degree of local manufacturing [4]. However, a significant portion of these internal combustion engine (ICE) vehicles are outdated and inefficient, leading to considerable emissions, and experts agree that transitioning these vehicles to electric mobility is crucial to mitigating GHG emissions and air pollutants.

The South African transport sector still relies predominantly on road transport for passengers and freight, with 90% of all freight occurring by road. This heavy reliance on road transport significantly contributes to the country's carbon emissions, accounting for 91% of the total emissions from the transportation sector [5].

In the rapidly evolving South African market, the landscape of last-mile delivery is experiencing significant transformation, fuelled by the exponential rise of ecommerce. Spurred by growth, improved logistics networks, and changing consumer behaviour, on-demand delivery platforms have become an integral part of the country's retail landscape. Global companies like Amazon and local players such as takealot.com and Massmart have catalysed this shift, particularly in online food delivery.

At a global level, social and environmental concerns, regulatory pressures and technological advancements are driving a growing momentum towards a more sustainable transportation system, with increasing interest in electric mobility solutions, especially in the last-mile delivery and e-hailing sectors.

Despite this interest, the adoption of electric 2/3Ws in South Africa and across the continent has been slow, primarily due to inadequate financing and barriers in policy and infrastructure for charging and swapping [4]. However, growing trends are accelerating, with small vehicles expected to see the most significant increase. Their flexibility, compact size and low operating costs make them particularly well-suited for delivery purposes. Electric 2/3Ws, in particular, have a sufficient range to complete most urban delivery trips, at a lower total cost of ownership (TCO) compared to four-wheeled vehicles (4Ws). While the addressable market for electric light commercial vehicles (LCVs) is estimated to be larger, the electric 2/3W vehicle sector offers the easiest market entry in South Africa [6].

State of electrification across selected regions

Electrification in South Africa is in the early stages of development compared to other regions. This nascent phase means that comprehensive data on electrification progress is still being compiled, leading to gaps or limitations in the available information. Consequently, some data for South Africa is not yet fully reported.

Addressable EV market in South Africa

GreenCape estimates that by 2030, the market for electric micro-mobility 2/3Ws will grow to R21.5bn, while the market for e-LDVs is projected to reach R41.6bn [6]:

	Micro-mobility 2/3Ws	E-LDVs
Active delivery drivers[3] (2024)	50 000	47 000
(Addressable) EV market size[4] (2024)	R14bn	R37.6bn
CAGR 2023-2030	8.45%	
Projected number of vehicles on the market (2030)	90 000	52 000
Projected (addressable) EV market size (2030)	R21.5bn	R41.6bn

South Africa	China	India	Brazil	Europe	World
2Ws (2023) EV sales [7]					
n/a	5 900 000	880 000	n/a	200 000	7 500 000
2Ws (2023) EV sales [7]					
n/a	320 000	580 000	n/a	24 000	945 000
Cars* (2023) EV sales [8]					
1 080	8 100 520	82 270	52 000	3 300 820	13 808 900
Cars* (2023) EV sales share (%) [8]					
0.3%	38%	2%	3%	21%	18%
LCVs (2023) EV sales** [8]					
n/a	240 000	350	690	150 000	460 000
LCVs (2023) EV sales share (%)** [8]					
n/a	12%	0.1%	0.2%	7.2%	4.4%
Electricity access rate (%) (2022) [9]					
86%	100%	99%	100%	100%	91%
EV charging points (2023) [8, 10]					
350	2 700 000	10 900	3 800	700 000	3 900 000
Fiscal incentives for EVs (2024) [11, 12]					
No	Yes	Yes	Yes	–	–

* Battery electric vehicle (BEV) + plug-in hybrid electric vehicle (PHEV).
** Defined as 'vans' by IEA, refers to LCVs with gross vehicle weight (GVW) below 3.5 tons.

Battery EV sales in South Africa grew 74% in 2023 compared to 2022. Rising inland fuel prices over the past four years have further strengthened the business case for electrification in last-mile delivery, public transportation, and freight and logistics. To incentivise the shift, South Africa's Department of Transport (DoT) launched its Green Transport Strategy (GTS) aiming to reduce the country's total transportation-related GHG emissions from 10.8% to 5% by 2050.

The shift to electric involves more than just adopting battery-powered vehicles; it requires a comprehensive and structured approach that systematically supports all modes of transportation that are not dependent on petrol and combustion engines. And this framework has to be scaled so electric mobility can compete with the efficient ICE system. This includes addressing commercial vehicles and the crucial last-mile delivery segment.

The last-mile delivery sector presents an ideal opportunity for electrification due to its ease of market entry, including short daily driving ranges and well-defined routes with predictable schedules. When considering the electrification of last-mile fleets, the choice between 2Ws, 3Ws, and 4Ws depends on various factors such as the type of goods being delivered, the distance and terrain of the delivery route, the cost and environmental impact of each option.

3 ICE and EV.
4 Market size: number of vehicles times unit cost.

TWO AND THREE-WHEELERS 2W 3W

2Ws often stand out as the premier choice for meeting the requirements of on-demand, last-mile delivery services due to their inherent advantages. Offering both cost-effectiveness and minimal maintenance requirements, 2Ws can swiftly enhance the operational sustainability of delivery operations. Ideal for transporting small packages and lightweight goods, they excel in manoeuvrability, allowing them to navigate city streets, narrow lanes, and congested urban areas with ease. While 2Ws are highly effective in on-demand scenarios and quick commerce operations, 3Ws are an optimal choice for efficient parcel delivery. With the capacity to accommodate substantial cargo volumes – often comparable to the volume of 4Ws – they frequently emerge as the ideal solution. The rise of pick-up points in cities shifts delivery logistics towards a hub-based model rather than street-level delivery. While this may reduce the need for vehicles in certain aspects of parcel delivery, 3Ws will likely become more crucial for efficiently transporting large quantities of parcels from hubs to pick-up locations. The overall impact will depend on factors such as the density of pick-up points, consumer preferences, and the specific operational requirements of delivery companies.

The category of 2/3W electric delivery vehicles encompasses both micro-mobility vehicles and higher-speed, more powerful electric motorbikes and rickshaws.

"Research shows more than 80% operational cost savings when using an electric bicycle or electric 3W for last-mile delivery compared to an ICE motorcycle [6]."

2/3Ws offer a distinct advantage in navigating infrastructure limitations, as their smaller size and agility make them more adaptable to urban environments and enable innovative solutions such as battery swapping and home charging options to be implemented effectively. While micro-mobility vehicles don't require a licence, motorcycles and 3Ws do, with the same type of licence covering both vehicles.

What is micro-mobility?

According to the Institute for Transportation and Development Policy (ITDP), **micro-mobility is defined as**:

Human-powered or electric
Privately owned or shared
Low (25km/h) to moderate top speed (45km/h)
Bicycles
Scooters
3-wheeler rickshaws

Source: [14] based on ITDP.

Motorcycles and some 3Ws are not considered micro-mobility as they are not lightweight and have top speeds above 45km/h [13].

FOUR-WHEELERS 4W

For last-mile delivery operations of larger quantities and bulkier items, 4Ws offer significant advantages. They are better suited to handling rough terrain and adverse weather conditions, and they offer easy loading and unloading due to their larger cargo space and practical design features, which can improve efficiency and reduce the physical strain on delivery personnel. However, 4Ws are more expensive to operate and maintain than smaller vehicles primarily due to higher fuel needs, maintenance requirements, and insurance premiums. Furthermore, their larger size can be a disadvantage in crowded urban areas, where manoeuvrability is limited.

E-4Ws provide key advantages compared to their ICE counterparts. Their adoption lowers operating and maintenance costs, produces no tailpipe emissions, and significantly cuts GHG, improving air quality. They enhance delivery efficiency with quieter operation and contribute to reduced traffic congestion, making them an ideal choice for urban environments.

POWERING ZERO-CARBON DELIVERIES – SOUTH AFRICA

As described in Electrifying progress: scaling zero carbon deliveries of food, groceries and parcels, stakeholders in the food, grocery, and etail delivery sectors, regardless of their business model or location, encounter operational and strategic hurdles related to three challenges: price (primarily linked to high purchase costs), practice (operational viability of electric fleets), and public adoption (drivers making the switch to EVs).

These challenges acquire specific intricacies when examined within the framework of South Africa's logistics system and last-mile delivery operations.

In the South African context, the challenges of transitioning to EVs in the logistics system and last-mile delivery operations are influenced by several unique factors. According to The Department of Trade, Industry and Competition [15], those factors can be attributed to:

- Critical energy shortages leading to loadshedding.
- Slow deployment of charging infrastructure.
- Financial and fiscal constraints across South African private and commercial users and the public sector, due to the high purchase costs of EVs.
- Necessity to transition towards a low-carbon economy, given the energy mix is still predominantly reliant on fossil fuels.

Additionally, it is fundamental for the system to evolve to ensure a fair transition, which involves more than just incentivising EV ownership. A fair transition requires measures to ensure that the benefits and burdens are distributed fairly across society. As affordability is a major barrier, policies are needed to make EVs more affordable and ensure inclusivity. The overall transition should also address broader transportation needs like public transit and commercial operations, rather than focusing solely on EV adoption. The impact on workers must be considered, ensuring that new EV manufacturing jobs provide fair and equitable wages, and that training and support are available for workers transitioning from traditional automotive jobs. Finally, the environmental and social impacts of EV production, including emissions from electricity generation and the mining of battery materials, must be addressed to ensure the transition is truly sustainable and equitable.

The following section includes a deep dive into each of these four influencing factors.

Energy shortages

Issues with charging infrastructure are often attributed to grid instability. Despite Africa hosting 80% of the global population without electricity access [16], South Africa has a relatively high share of the population connected to the grid (86% in 2022) [17] (see graph on the next page). However, the country is also struggling with an enduring energy crisis marked by pervasive and extended energy shortages leading to frequent blackouts, commonly referred to as 'loadshedding' (strategic blackouts on a rotating schedule, stemming from inadequate electricity-generation capacity). The erratic grid and frequent power outages represent a perceived[5] obstacle to EV adoption in the country, exacerbating concerns surrounding charging anxiety. Instability adversely impacts the cost, accessibility, and dependability of power for EV charging, dissuading prospective EV adopters.

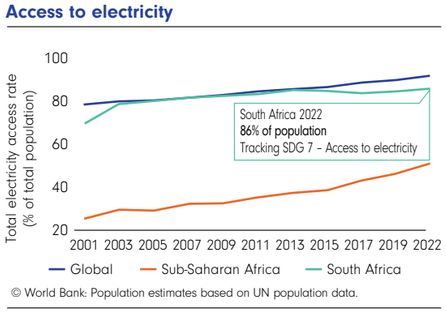
South Africa's primary electricity provider, Eskom, operates most of the country's power grid, making it the largest electricity producer in Africa. Due to problems with both generation and transmission infrastructure, Eskom has resorted to implementing scheduled loadshedding since 2007. In 2022, the situation worsened significantly, with a record-breaking nearly 300 instances of loadshedding [18], tripling the previous high from 2020. These blackouts affect both commercial and residential properties indiscriminately. In this challenging landscape, numerous businesses and facilities have turned to diesel generators for power supply.

Loadshedding in South Africa is, however, becoming increasingly (relatively) predictable. While its frequency and duration vary among different municipalities, each metropolitan municipality can implement loadshedding based on Eskom's guidelines and parameters. This predictability allows residents and businesses to plan and adapt to the power cuts [19]. Additionally, South Africa has recently recorded 50 consecutive days without loadshedding as of 15 May 2024, marking the longest period of uninterrupted power supply in nearly three years [20].

5 E-mobility companies have shown that they can provide EV-as-a-Service (EVaaS) even during loadshedding, and the inconsistent electricity supply has not posed a practical obstacle.

The transition to EVs is anticipated to significantly increase electricity demand on the grid, adding strain to the infrastructure. Therefore, it is crucial to strategically plan for distribution grid upgrades and power-generation enhancements to support EVs' widespread adoption [15]. Power utilities are at the moment feared to be financially ill-equipped to meet the demands for additional power stations necessary to support a transition to more reliable energy sources. Alternative solutions like battery swapping and solar-powered stations could help, but they also contribute to cost concerns [15].

South Africa has relatively strong access to electricity compared with the sub-Saharan Africa average, and aligned with the global average.



Source: [17].

Charging infrastructure limitations

The availability of charging infrastructure is essential for increasing adoption rates. South Africa currently has 250 public EV charging stations (freely accessible for the general public). However, the coverage and visibility of these stations remain uneven and limited, hindering market growth beyond last-mile adoption, and still much too low to support the development of the market [15]. These chargers are also predominantly geared toward passenger vehicles and are generally not compatible with 2/3Ws. Increasing the coverage of the network and accommodating vehicles with smaller battery capacities can help reduce range anxiety and lower costs.

Achieving a widespread charging infrastructure rollout requires training and upskilling professionals and adopting standards for charging plugs to ensure consistency and interoperability. South Africa has taken proactive steps to embrace standards for EV charging plugs, fostering uniformity in charging infrastructure and supporting interoperability. However, challenges persist regarding the interoperability of privately funded charging systems [15].

6 Data primarily relevant for the electric passenger vehicles market.

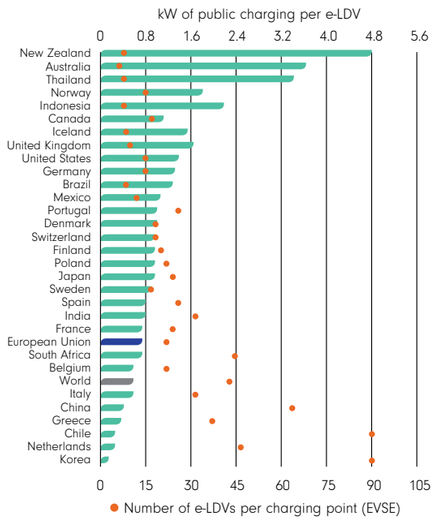
Research has identified links between the adoption of EVs and the development of charging infrastructure. During the initial phases of market growth, public chargers play a crucial role in alleviating range anxiety rather than solely providing charging services, as range anxiety predominantly affects potential new buyers and tends to diminish significantly among active EV users [15]. Among EV drivers, concerns around charging barriers drop significantly. Even those who did initially worry about charging say it wasn't a lasting issue: 65% say they had range anxiety when they first purchased an EV, but it went away after a few months [22][6].

CASE STUDY: GridCars

Leading provider of EV charging infrastructure in South Africa, GridCars, in 2018 collaborated with Jaguar to lay the groundwork for the future of electric and plug-in hybrid vehicles in the country by installing 82 public charging stations nationwide. Since then, through their partnerships with various players in the industry, including original equipment manufacturers (OEMs), GridCars has effectively grown the national network to over 350 EV charge points. Their most recent partnership with Audi includes four 150kW DC super-charging stations as part of a national roll-out of 70 new EV charge connectors across 33 sites [10].

Go Electric Mobility

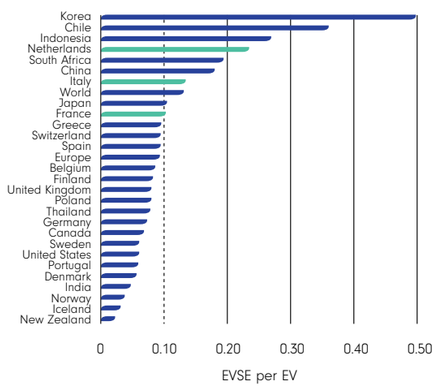
Although South Africa currently boasts a high charging capacity for LDVs, factors such as sparse coverage and high taxes contribute to a low adoption rate. This creates a discrepancy between the available charging infrastructure and the actual number of LDVs on the road.



Source: [7].

In 2020, South Africa ranked fifth in the global ratio of public chargers to EVs, with approximately 1.8 chargers per 10 EVs [21]. However, this ranking is partly due to the relatively small number of EVs on the roads. As the market matures and utilisation increases, the capacity per EV tends to decrease [7].

Ratio of public chargers per EV stock by country, 2020



Notes: Green colour represents the European Union countries fulfilling the AFID target. Vertical dotted line denotes the AFID target ratio. EVSE Sources: IEA analysis based on country submissions, complemented by EAGP (2021) and EV Volumes (2021).

Source: [21].

Financial and fiscal constraints

EVs are currently at premiums above equivalent ICE models, primarily driven by the cost of their batteries. Yet, those premiums are anticipated to decrease over time [15], further enhancing the positive impact of the lower TCO of EVs through the vehicle's use phase. However, despite those long-term benefits, price-sensitive individuals cannot afford to wait years to see the benefits of their investments. Immediate affordability is crucial, posing a significant challenge to be addressed. Consumers and businesses need incentives to participate in the transition, while delays in industrial policy grants for the domestic and export manufacturing of EVs are adding to fiscal constraints.

"Securing financing for EVs in South Africa presents a significant hurdle, primarily because of the absence of comprehensive market data regarding the long-term residual value of EVs and risks related to operations and assets."

MellowVans

Securing financing for EVs in South Africa presents a significant hurdle, primarily because of the absence of comprehensive market data regarding the long-term residual value of EVs, and risks related to operations and assets. Operational risks include uncertainties in the performance and maintenance of EVs over time, while asset-related risks encompass potential depreciation rates and limited resale value. Therefore, commercial banks are presently establishing the residual value of leased electric commercial vehicles at 0% after five years. This practice results in increased financing requirements, which consequently leads to higher interest rates on loans, thereby increasing the overall cost of ownership for EV providers and owners [23]. Ensuring cost-effectiveness is crucial for widespread acceptance and adoption. While consumer subsidies have been widely used in other countries, the current cost of such subsidies is currently beyond South Africa's financial capacity [15]. As a result, alternative measures are being explored, with careful consideration given to fiscal priorities, including stimulating a robust manufacturing sector in the country [15].

Transitioning towards a low-carbon economy

The current energy mix in South Africa is heavily dependent on fossil fuels. In 2020, only 9.8% of South Africa's total energy consumption was renewable energy [17], consequently diminishing the overall decarbonisation benefits associated with EV adoption in the country[7] when compared to nations boasting a more substantial renewable-energy presence [15].

However, South Africa is making progress in shifting towards renewables. with an increase in both annual electricity production from renewable sources and renewable energy operating capacity [24]. The country plans to continue expanding its renewable-energy capacity, with several new energy projects under development [24] [25].

Ensuring a fair transition

A fair transition strives to enhance the quality of life for all South Africans, considering the necessity to better cope with the negative effects of climate change, promote climate resilience, and attain net-zero GHG emissions by 2050 [15]. Moreover, a fair transition aligns with objectives such as ensuring decent employment opportunities for everyone, fostering social inclusion, and combatting poverty. It prioritises placing individuals, particularly those most affected, at the forefront of decision-making processes [15]. Electrification can drive job creation, offering opportunities for last-mile delivery drivers, as well as expanding the assembly and production capacity of EVs. This shift not only supports economic growth but also enhances the nation's capacity for sustainable development.

Electrifying last-mile delivery involves unique challenges and opportunities depending on vehicle types and their specific uses. Recognising how different vehicles meet various delivery requirements is crucial for successful fleet electrification.

7 Even on a grid depending on fossil fuels, the overall efficiency of EVs still results in lower emissions per kilometre compared to ICE vehicles. EVs convert between 60% and 77% (sometimes more) of the electrical energy from the grid to power the wheels, while ICE vehicles typically convert only about 20% of the energy in fuel to motion [45] [46].

05

OVERCOMING **PRICE** CHALLENGES

PRICE revolves around cost-effectiveness: The issues of investing in EVs stem from significant financial barriers faced by both delivery platforms and their independent contractors. Ensuring cost-effectiveness is essential for the widespread adoption of EVs. This encompasses considerations, including upfront purchase costs, rental fees, and ongoing running costs that influence the TCO. Especially for gig workers, the costs and risks of electrification are critical. Excessively high costs and risks can threaten their income and ability to sustain their livelihoods, which may ultimately deter them from participating in the transition.

The adoption of EVs in urban delivery fleets hinges significantly on their cost competitiveness and financing options. At present, South Africa does not have any locally manufactured EV models, which means users rely on imported EVs. One of the key factors contributing to the high cost of acquisition EVs, specifically 4Ws, is a 25% customs duty on imported passenger vehicles, bakkies[8], and LCVs, coupled with an ad valorem tax on those valued over R600 000[9]. However, despite the price challenges, TCO advantages for EVs are undisputable, underscored by the disruptive innovations and emerging business models reshaping the industry globally. E-LCVs, for example, are projected to deliver a minimum 10% TCO advantage for commercial applications over the coming decade [26].

Gig workers, the primary users of these vehicles for last-mile delivery, often encounter significant financial challenges that hinder their ability to invest in EVs. The upfront purchase costs of EVs are prohibitive for many, exacerbated by the absence of a second-hand market: the EV market is still nascent, therefore lacking a well-established supply of affordable, used EVs. This makes it particularly challenging for gig workers to find cost-effective options when seeking vehicles for their delivery needs. Scarcity is also compounded by local restrictions on importing used vehicles, which are intended to protect the local automotive manufacturing industry. Additionally, obtaining credit for the purchase can be challenging, further hindering their ability to procure a vehicle.

From the perspective of other stakeholders in the industry, such as EV operators, EV distributors, charging station operators, and delivery platforms, financing fleets and infrastructure are the main challenges. These companies require subsidies, tax concessions, and clear information about such initiatives.

STRATEGIES FOR 2W 3W 4W

- **EVaaS ENABLING FLEET TRANSITION**

  EVs can be offered through innovative approaches that help overcome EVs' traditional barriers. Due to financial constraints, many delivery drivers in South Africa resort to renting entry-level petrol-powered motorbikes and scooters on a weekly or monthly basis, which they must insure and maintain themselves. Similarly, fleet managers face significant barriers, including high upfront costs, uncertainties surrounding charging infrastructure, and limited support services [23].

  EVaaS models offer a promising solution by addressing these challenges. They mitigate the initial purchase cost of EVs, making fleet electrification more financially viable. They provide an economical and low-risk approach to EV charging, reducing the upfront investment in charging hardware, and their leasing models reduce business risk through dedicated technical support and servicing: under EVaaS models, vehicles are leased under a subscription that includes maintenance, insurance, and often use of charging infrastructure. However, and especially in the realm of 2Ws, a significant reluctance of gig workers towards the model lies in the lack of a pathway to ownership.

8 Small truck or pickup vehicle characterised by its open load area and low sides.
9 Because of a Free Trade Agreement with the European Union, South Africa offers a 7% reduction on importing vehicles from that region, but the reduction does not cover EVs.

To mitigate this concern, certain EVaaS providers offer rent-to-own plans, allowing their users the opportunity to own the vehicle after a specified timeframe. This rent-to-own framework may be extended directly to drivers or facilitated through fleet operators.

CASE STUDY: takealot.com and MellowVans

Acknowledging the efficacy of electric 3Ws in last-mile delivery, South Africa's leading online retail platform takealot.com has initiated an incentive scheme designed to encourage its franchise partners responsible for last-mile delivery to incorporate MellowVans 3W vehicles into their operational frameworks. Under this programme, takealot.com extends financial rebates to franchise partners opting to lease MellowVans' electric 3Ws. By subsidising a portion of the expenses, the platform alleviates the financial burden on its franchise partners, making adoption more accessible and appealing. Furthermore, takealot.com participates in the expenses associated with branding the vehicles, bolstering their visibility and recognition within the market.

takealot.com and MellowVans

EVaaS models can offer differing levels of affordability, particularly depending on the option of the provision of charging infrastructure (or battery swapping) to the drivers. When free charging or swapping is included in the rental fee, users avoid daily or weekly fuel costs and are shielded from potential increases in energy prices. In instances where this is not provided, gig workers are still required to cover charging expenses separately. Despite the overall cost-effectiveness compared to traditional petrol vehicles, drivers must maintain a certain volume of orders weekly to ensure profitability.

- **LEVERAGING ADVANCED TECHNOLOGIES FOR COST SAVINGS**

  Cost mitigation involves more than just fuel savings and reduced upfront costs. This is particularly relevant for EVs, which, being more expensive than ICE vehicles, lead to greater concern among potential buyers. In South Africa, advanced technologies such as GPS tracking and IoT systems are enhancing security and helping reduce vehicle abuse. These measures make EVs more appealing to both drivers and companies.

In the realm of transitioning towards EVs under an EVaaS system, targeting new drivers or ICE vehicle renters presents a more straightforward path than attempting to convert existing owners of ICE vehicles.

- The process of recruiting individuals new to the driving scene for EV adoption holds inherent advantages. These drivers typically lack the deep-rooted attachment to traditional vehicles and are more open to exploring alternative options.
- Persuading ICE owners to switch to EVs faces substantial challenges. Unlike renters, who are accustomed to ongoing expenses like rent or lease fees, ICE vehicle owners tend to focus primarily on costs like fuel and maintenance, and might overlook additional ownership costs and risks. Switching to an EVaaS model or lease often means accepting a reduction in immediate income, until the vehicle's loan is repaid.
- When targeting ICE vehicle renters, the proposition becomes more feasible. Even though the rental or lease fees for an EV might initially appear higher, the operational cost savings with EVs present a compelling financial incentive.

The focus on those users aligns with a more receptive audience and results in fewer financial barriers compared to converting existing ICE vehicle owners.

The business case for EVs – Valternative

EVaaS provider Valternative offers electric motorcycles through a model that incorporates both subscription and rent-to-own fees. The table below compares the estimated weekly running costs of an ICE bike versus a Valternative electric bike plan:

	Fossil fuel bike (R per week	Valternative electric bike (R per week
Rent-to-own fee	**659–750**	**649**
Subscription fee	**n/a**	**640**
Fuel/energy	**750–900**	**Unlimited battery swaps included in subscription**
Insurance	**Included in rental**	**Included in rental**
Service and repairs	**150**	**Included in rental**
Tyres and brakes	**57**	**Included in subscription**
TTL running costs	**1 607**	**1 289**

Source: Valternative, 2024.

STRATEGIES FOR 2W 3W

- **MICROFINANCE SOLUTIONS**

  Microfinance can play a pivotal role in accelerating the adoption of electric 2Ws among gig workers. By offering affordable and flexible financing options, intermediary asset finance institutions can facilitate EV ownership, empowering individuals to embark on entrepreneurial ventures and contribute to their communities. Asset-based finance can foster economic empowerment and financial stability by promoting ownership rather than temporary use and accelerating the adoption of sustainable mobility solutions. Beyond financing, these intermediaries often prioritise initiatives that enhance financial literacy and accelerate digital payment adoption among gig workers.

- **LOCAL ASSEMBLY INITIATIVES**

  As recently mentioned, currently, no electric vehicle models are produced in South Africa, leaving adopters reliant on imported EVs. Import duties for these vehicles are approximately 25%, and an ad valorem tax applies to all vehicle imports valued at R600 000 or more. Given their purchase value, among the financial advantages provided by 2/3Ws is this exemption from taxes applied to the import of larger vehicles. Additionally, completely knocked-down (CKD) kits[10] of 2/3Ws facilitate easy local assembly, especially for micro-mobility vehicles, leading to faster deployment, customisation to local needs, and potential tax rebates [27]. Even though a set of benefits is accessible to OEMs and importers in some cases, the requirements for application, such as minimum production volumes within specific time frames (50 000 units a year), currently limit accessibility for smaller importers and distributors.

Despite their current higher-than-average price, EVs prove to be more cost-effective than ICE vehicles over the long term. The initial expense is typically outweighed by considerably lower running and maintenance costs. The payback period depends on the cost difference per kilometre and the intensity of use, with EVs proving particularly advantageous in high-mileage scenarios.

The business case for e-motorcycles (illustrative example)

Metric	ICE motorcycle	E-motorcycle
Fuel/electricity price	US$1.50 per litre	US$0.20 per kWh
Efficiency	33.3km per litre	25km per kWh
Distance	100km	100km
Cost for 100km	US$4.50	Home charging: US$0.80 Public charging/Swapping: US$0.80 to US$3.00
Cost difference per km		US$1.5–3.7

Source: Adapted from UNEP 2023 [4].

The business case for EVs in South Africa

According to recent estimates [28], over a span of six years, the total cost (including both capex and opex) of operating an ICE motorcycle in South Africa exceeds that of an electric 2/3W, based on an average annual mileage of 100km per day. An e-motorcycle is up to 30% cheaper compared to an ICE motorbike:

	Capex	Opex/year	Opex 6 years	Capex + opex x 6 years
E-bicycle	R40 000	R4 551	R27 307	**R67 307**
E-motorcycle	R90 000	R6 645	R39 868	**R129 868**
Electric 3W	R150 000	R4 551	R27 307	**R177 307**
ICE motorcycle	R17 000	R28 375	R170 252	R187 252

Similarly, an e-LCV also achieves TCO parity after the sixth year of usage, based on an annual mileage of 25 000km, reaching a 17% advantage at year 10:

	Capex	Opex/year	Opex 6 years	Capex + opex x 6 years
E-LCV	R800 000	R20 527	R123 164	**R923 164**
Petrol LCV	R500 000	R71 420	R428 518	R928 518

Source: Calculation based on GreenCape [28].

10 CKD kits refer to a method of exporting products, particularly vehicles, in a disassembled form. This practice involves delivering all the necessary parts for assembly at the destination, allowing for local assembly rather than importing fully assembled products.

STRATEGIES FOR 4W

- **MILEAGE-OPTIMISED ELECTRIFICATION**

  The ideal adoption point for EVs in last-mile delivery, particularly during the early stages of transition, occurs when daily mileage is sufficient to realise cost benefits without necessitating en-route charging. This balance ensures operational efficiency and maximises the advantages of EVs.

  Petrol vehicles are initially more cost-effective than diesel ones for lower mileage. Then, as mileage increases, the diesel option becomes more economical, eventually surpassing petrol in cost-efficiency. EVs follow a similar pattern but with a different economic threshold. Proof-of-concepts demonstrate that EVs become more cost-effective as the daily distance increases. As the distance approaches the vehicle's single-charge range, typically around 300km per day, EVs become operationally, commercially, and technically more interesting to operate. However, exceeding this range introduces operational implications related to adequate charging infrastructure. Therefore, and especially at the early stages of electrification, the optimal adoption point for EVs in a commercial fleet is when the daily mileage is high enough to leverage their cost benefits but within the single-charge range to avoid additional operational burdens. This necessitates that adopters and fleet operators embrace a strategic approach to fleet management, which requires a deep understanding of vehicle routing and maintenance, underpinned by robust analytics and iterative testing. Ways to enhance efficiency include aligning the appropriate vehicle with the right route and driver profile, therefore optimising the match between driver and vehicle performance, or integrating EVs into businesses with peak delivery times, such as food services. In these cases, the operational demands of peak periods – such as lunch and dinner rushes – could be managed within the available charging time between delivery slots.

takealot.com and MellowVans

Parcel delivery vans in Europe serve as a prime example of achieving TCO parity. With an average annual mileage of up to 35 000km, these vans are ideal candidates for electrification. Their typical usage pattern, mainly within densely populated areas, necessitates a moderate operating range of around 150km per day. Therefore, integrating a smaller-capacity battery, approximately 60kWh, is often sufficient. This approach enabled TCO parity for electric parcel delivery models as early as 2022, with the potential for a 10% cost advantage over conventional vehicles by the current year (2024) [26]. Purpose-built designs tailored to delivery requirements could further enhance operational cost savings[11].

An analysis from Transport and Environment [30] reveals how in six European countries, which collectively represent 76% of the EU and UK electric van market, electric vans purchased in 2022 offer superior cost-effectiveness on a TCO-basis compared to their diesel counterparts, especially when considering purchase subsidies. Over a five-year ownership period, the average cost per kilometre for an electric van is €0.15, notably lower than the €0.20 per kilometre for a diesel van. Even without factoring in purchase subsidies, the TCO for an electric van amounts to €0.18 per kilometre, still presenting a more economical option. Additionally, the cost calculation already incorporates the installation expenses for an EV charger.

11 Estimates accounts for existing EV tax purchase incentives in EU.

CASE STUDY: Everlectric

Everlectric provides EVs and charging equipment to businesses looking to transition to electric 4Ws, fully managed and supported through technicians at EV centres of excellence and via the Everlectric Cloud/app with both onsite and offsite support. The company offers an all-inclusive EVaaS service model that covers EV leasing, fast charging infrastructure, 100% renewable energy and a real-time support system, all designed to remove barriers to adopting cleaner and more efficient transportation. Clients benefit from no upfront costs for EVs or charging infrastructure, no maintenance costs, and no technology risk. Geographically distributed charging networks address range anxiety and ensure convenient access to charging points across operational areas. This comprehensive approach allows businesses to focus on their core operations while Everlectric handles the complexities of fleet electrification. With an optimal range designed to cover last-mile delivery without requiring en-route charging, the vehicles can be charged overnight at any charging facility and be ready for drivers to pick up in the morning.

Everlectric currently has a partnership with OEM Shanghai Automotive Industrial Corporation (SAIC), to lease out their eDeliver 3 Panel Van – featuring a range of 240–320km and a payload of up to 945kg. Additionally, Everlectric offers the MAXUS T90EV, the first electric double-cab bakkie available in South Africa with a range of 354km. Proofs of concept with MAXUS vehicles indicate that operating costs are around 30c/km to run a MAXUS EV compared to around R2.30/km for a combustion engine [29].

South African retailer, Woolworths, recently rolled out its vehicle electrification programme for its online delivery fleet in partnership with DSV, a transport and logistics company, and Everlectric. After their 18-month pilot in 2021, Woolworths has engaged in electrifying their fleet by launching 42 EVs in 2023. With Woolworths' ambitious sustainability goals, which include zero net carbon emissions by 2040, the fleet electrification of these 42 vehicles has the potential to save over 400 000kg of tailpipe carbon emissions every year. To power the vans, DSV will primarily utilise electricity from renewable sources by leveraging their extensive solar infrastructure at the Gauteng and Cape Town facilities. If renewable sources are not available for recharging, DSV and Everlectric procure Renewable Energy Certificates (RECs) to offset any indirect grid energy emissions.

Everlectric

06

OVERCOMING **PRACTICE** CHALLENGES

PRACTICE revolves around the operational viability of electric fleets. EVs must be well-suited for commercial use and need to meet stringent safety, speed, and longevity requirements essential for logistics operations. This needs to consider factors such as vehicle characteristics and battery range. Additionally, adequate coverage and speed of charging infrastructure, along with the reliability of the power grid, are essential. For gig workers, technological and infrastructural challenges are particularly pressing due to the industry's nature favouring those completing more deliveries.

Drivers considering EVs are faced with several concerns of which range anxiety is a major one. As described on page 15, research indicates that these worries tend to diminish as drivers become accustomed to the technology. Initially, many new EV owners experience significant apprehension about charging availability, with public chargers playing a crucial role in easing these fears. Over time, as drivers gain experience, the majority report that their range anxiety fades, showing that familiarity and regular use help resolve the initial challenges associated with operating EVs.

Micro-mobility holds significant potential for advancing sustainable last-mile logistics in South Africa. Its adoption for delivery purposes has been on the rise, driven by factors such as affordability, minimal import duties, exemption from requiring a driving licence, ease of local assembly, and swift deployment on a fleet-wide scale. Those vehicles are particularly suitable for eco-friendly deliveries in compact, densely populated areas, having a sufficient battery range to complete most urban delivery trips, and can be used in low-emission zones due to their zero-emission nature[12]. Electric bicycles benefit from regenerative braking, which minimises energy consumption, and in case of battery depletion, they can still be propelled manually, providing a crucial backup that ensures continued operation. However, they are not ideal for the hilly terrains found in many parts of South Africa, and infrastructure limitations, such as the lack of traffic crossings and dedicated bicycle lanes in delivery areas, limit their seamless integration into the logistics network.

E-motorbikes are suited for drivers who require higher speeds, longer battery ranges, and enhanced durability. In hilly areas, they perform better than their ICE counterparts, making them a more viable option for diverse terrains. In contrast to 4Ws, electric motorcycles offer a relatively simple and inexpensive manufacturing process when produced locally, potentially allowing to avoid some import tariffs. Additionally, the price disparity between electric and ICE models is considerably smaller than that observed in cars and other 4Ws [37]. On the other hand, ICE motorbike drivers have shown resistance to transitioning to EVs due to a perceived lack of speed compared to their petrol-powered counterparts.

E-3Ws offer a carrying capacity comparable to 4Ws while maintaining manoeuvrability similar to motorbikes and providing better stability, and they are generally cheaper to operate and insure than 4Ws. Their larger size can lead to higher operational costs than 2Ws, but they compensate with larger cargo capacity, making them ideal for parcel deliveries.

E-3/4Ws are less suitable for battery swapping and more reliant on grid charging, as swapping their significantly larger and heavier batteries demands a more complex infrastructure, specialised equipment and more stringent safety protocols. Swapping is also more challenging due to the greater diversity of vehicle models, making it harder to achieve the same level of uniformity seen in the 2W segments [38]. This dependency on grid charging can be problematic given South Africa's grid instability. Additionally, urban public charging infrastructure, though standardised, is primarily designed for passenger vehicles and is often situated in locations like shopping malls or highways, which are inconvenient for overnight charging.

There is no one-size-fits-all solution. By leveraging the strengths of each vehicle type and adopting appropriate business models, businesses can create a versatile and efficient delivery fleet tailored to diverse operational needs.

CASE STUDY: Enviro Automotive

Enviro Automotive, based in Pretoria, is a pioneering multi-brand EV importer and distributor. The company offers a diverse range of EVs, including light commercial, heavy commercial, and passenger vehicles, with different models currently available in the South African market. The company specialises in facilitating the transition to EVs for businesses. Understanding the complexities of running costs, load capacity, and charging needs, Enviro Automotive offers comprehensive solutions that integrate solar energy to power fleets sustainably. Partnering with various experts, the company assists clients with assessing charging needs, installing chargers, monitoring energy consumption, tracking vehicles, and overall transitioning to a green fleet. It can develop a full solution incorporating solar energy into the charging set-up, ensuring fleets are powered by green energy. Offering a full turnkey solution, they advise businesses on which parts of their fleet are ready for electrification, reducing costs and promoting sustainability.

Enviro Automotive

CASE STUDY: MellowVans

MellowVans is a South African electric delivery vehicle OEM based in Stellenbosch. MellowVans, an early pioneer in electric mobility, initially introduced its EV to the South African market for passenger transport. However, the company has shifted its focus to serving the rapidly growing last-mile delivery industry. MellowVans currently offers its 3Ws on a monthly leasing model, which also assists with upfront capex costs as a market entry barrier, and some of its largest clients include DHL, takealot.com, and Spar. With manufacturing facilities in Stellenbosch and Strand, the company currently has a production capacity of 4 EVs per day with almost 70% local component usage. Additionally, MellowVans offers branding and advertising opportunities for its clients which have proven to be very effective in creating a meaningful response from consumers.

MellowVans' 3W is well suited for short deliveries as it has a 2 500-litre delivery capacity[13] with an average delivery cost of between R15 and R16.94 per 100km. According to GreenCape, the operational cost of ICE motorcycles stands at R57.36 per 100km, indicating significant operational cost savings [6]. The top speed of the vehicle is about 80km/h, but due to vehicle class speed limitations in South Africa, it is limited to 60km/h. The vehicle's cargo area is highly customisable to meet specific delivery needs. It can be outfitted with cooler boxes for food transport or various racking systems for different types of goods. Additionally, the vehicles feature a three-point safety harness, rollover protection, a comfortable seat, heating elements for winter, and weather protection for the driver, ensuring a comfortable and secure driving experience.

MellowVans

MellowVans can be charged using any standard electrical outlet, eliminating the need for specialised charging stations. The vans can be fully charged from 20% to 100% in approximately 2.5 hours, providing a range of 130km. This allows the vehicles to be used throughout the day for deliveries and conveniently recharged overnight.

Fleet operators work with MellowVans to optimise routes for delivery to stay within vehicle capacity. This reduces range anxiety and stimulates efficient charging operations.

12 In South Africa, micro-mobility vehicles are not allowed on freeways and arterial roads.

13 Ten times the delivery capacity (2 500 litres) of a traditional motorbike (250 litres).

CASE STUDY: Zero Carbon Charge

EV charging network Zero Carbon Charge plans to build a national network of green energy-powered ultra-fast chargers, covering all the strategic highways and major routes in South Africa. In April 2024, Zero Carbon Charge launched its new subsidiary, Zero Carbon Logistics, aimed at rolling out 120 solar PV electric truck charging sites on national highways across South Africa [34]. These stations would house 720 'ultra-fast' DC charging points and 240 slower AC chargers [35]. The company began building its first off-grid EV charging station in late November 2023 with completed estimation by June 2024. However, Zero Carbon Charge announced that the rollout was pushed back to September 2024. The company said it was still on track to complete the first 60 stations by February 2025, with the second half ompleted by September 2025 [35].

CASE STUDY: SESA and uYilo

Smart Energy Solutions (SESA) South Africa Living Labs has teamed up with uYilo, a prominent e-mobility programme focused on government lobbying and industry engagement, and GREEN Solar Academy, an independent training institute accredited by the German Solar Energy Society (DGS) that offers practical and theoretical solar installation courses. Together, they are building a network of solar installers across Africa to deploy sustainable electricity production and storage solutions. GREEN Solar Academy will develop a build-operate-share business model for a self-sufficient rural solar energy hub and analyse its replication potential. Meanwhile, uYilo will create a business model for micro-EVs charged with renewable energy for transporting goods and services. The partnership aims to test and validate a containerised off-grid renewable energy system that uses second-life EV batteries for energy storage. The objective is for the results and insights gained to enable the replication of these solar hubs throughout rural Africa [36]. The hub will feature an Info Spot for internet access and two micro-utility EVs – one passenger vehicle and one cargo vehicle – that can be charged at the off-grid hub. This project also explores the potential for repurposing EV batteries for stationary storage applications [36]. The Living Lab incubator will validate and evaluate the performance of this containerised off-grid solar energy system.

STRATEGIES FOR 2W 3W 4W

- **DEVELOPING PURPOSE-BUILT VEHICLES**

  EVs, regardless of their application, demonstrate greater reliability and experience fewer technical issues and breakdowns compared to their ICE counterparts. Electric LCVs, for example, are ideal contributors to a cleaner urban logistic system, as they have access to low and zero-emission zones, operate with low noise levels, exhibit high energy efficiency at low speeds, and feature regenerative braking, which is well-suited to the stop-and-go nature of last-mile delivery routes [31]. However, these features alone are not sufficient. Consumer-oriented vehicles, despite appearing cost-effective and readily available for delivery tasks, often need modifications to meet the demands of their new role. They often require upgrades to brakes, motors, tires, and battery performance to ensure operational effectiveness and bolster the long-term financial viability of the asset. Therefore, from the perspective of fleet managers, importers, and distributors, selecting the ideal vehicle for the market demands thorough research and testing. This process involves identifying and adapting vehicles to meet the specific mobility and logistics needs of the local context while balancing performance in local conditions with cost considerations.

- **INTEGRATING SOLAR ENERGY AND STORAGE**

  Integrating solar energy into charging infrastructure can provide a sustainable and cost-effective power source for electric fleets. However, the financial costs associated with these systems may impact the pace of rollout and the cost of usage [15]. Strategic investments and partnerships with renewable-energy companies can help mitigate financial hurdles and accelerate the deployment of green charging infrastructure.

  The rollout of solar-powered charging stations holds relevance across vehicle types, but their implementation is simpler for 2Ws, which typically have lower energy requirements for charging compared to bigger vehicles. Designed off-grid solar power charging stations for electric 2Ws can supply sufficient energy for daily charging requirements [32], enhancing the efficiency and cost-effectiveness of solar solutions. 2W batteries can also be easily swapped out at solar-powered battery swap stations, allowing for quick charging without the wait associated with direct solar panel charging. This is more challenging with the larger, heavier batteries in 4Ws. In grid-constrained settings, distributed solar generation for EV charging faces challenges due to the low power output of photovoltaic panels, which often cannot meet the high energy demands of electric 4Ws [33]. Additionally, these sites would require an on-site battery to store generated

Enviro Automotive

electricity, as a lack of battery infrastructure would hinder charging potential during intermittency periods. Despite these challenges, microgrid solutions to support the EV system are being implemented in South Africa.

STRATEGIES FOR 2W 3W

- **OVERCOMING INFRASTRUCTURE LIMITATIONS**

  2/3Ws offer a distinct advantage over 4Ws in navigating infrastructure limitations, as their smaller size and agility make them more adaptable to urban environments and enable innovative solutions such as battery swapping and home charging options to be implemented effectively.

  1. **Improving publicly accessible charging infrastructure:** Improving he availability of public charging infrastructure for 2Ws, particularly in high-traffic areas for on-demand last-mile delivery, presents a significant advantage. While this may not directly address the needs of larger vehicles or parcel delivery operations concentrated around distribution centres, it greatly benefits the on-demand segment, especially in areas such as shopping malls, supermarkets or restaurant districts. This approach enhances accessibility and convenience for drivers, supporting efficient operations and minimising downtime. However, public charging stations are primarily built for electric 4W and largely do not serve the 2/3W vehicle segments, therefore, a strategic adaptation of infrastructure is required to accommodate the unique needs of smaller EVs.
  2. **Battery swapping:** Battery swapping provides a flexible solution for overcoming not only financial but also infrastructure limitations for 2Ws. These stations can be strategically placed in both public and commercial locations, need limited space and can efficiently cater to both on-demand and parcel delivery needs. As 2Ws face limitations with quick charging – relying on batteries that still entail substantial waiting times of 20–40 minutes – swapping offers significant advantages for delivery routes that exceed the vehicle's range. The situation differs for 3Ws. Batteries that provide a suitable range for last-mile delivery are heavier, limiting the model's operational and economic efficiency. Consequently, many OEMs opt for built-in batteries in their vehicles.

3. **Increasing battery usability**
   Equipping drivers with a second battery for convenient home charging or developing batteries with dual functionality allowing to power household appliances during electricity outages are promising approaches. However, challenges such as limited access to charging infrastructure in shared accommodation settings and the risk of battery theft highlight the need for standardised protocols and robust security measures.

   Acting on those elements will significantly enhance the viability of EVs in the last-mile, as it will offer drivers the convenience of recharging their vehicles during idle periods or between deliveries, thereby ensuring uninterrupted serviceability. Despite their advantages, challenges persist in establishing an adequate number of charging and swapping stations, requiring significant capital investment and standardised protocols to ensure compatibility across various vehicle models.

While solutions such as EVaaS business models and battery swapping present promising paths to alleviate financial burdens on drivers and fleet operators and overcome infrastructure limitations, compatibility issues pose significant considerations. To ensure seamless implementation and operation, factors like battery compatibility must be carefully addressed. Currently, major OEMs are exploring agreements with battery manufacturers to establish a uniform standard for batteries, alleviating concerns about compatibility in the future. Until such agreements are reached, achieving a uniform system remains challenging.

The benefits of battery swapping

- **Lower upfront costs:** Decouple battery costs from the upfront costs of purchasing. Providing EVs without batteries under EVaaS business models reduces upfront costs by 40-50%, thereby driving adoption in price-sensitive segments [39].
- **Minimal downtime:** Minimise downtime for users by allowing them to easily swap out depleted batteries for fully charged ones, ensuring continuous use of their vehicles.
- **Lower space requirements:** Reduce the physical space required for battery storage, making it more feasible for urban environments.
- **Increased efficiency:** Increase the efficiency of energy deployment by leveraging the networked batteries, allowing for more efficient use of renewable-energy sources and reducing the need for backup power generation.
- **Improved sustainability:** Promote better life cycle management of batteries, by reducing the environmental impact of disposal and increasing the potential for recycling.
- **Enhanced customer experience:** Provide a more convenient and reliable experience for customers by ensuring easy access to batteries, reducing range anxiety, and offering greater insights into energy usage through data.

takelot.com and MellowVans

CASE STUDY: Valternative

Valternative

Valternative is an EVaaS solution provider offering e-mobility products specifically designed for the South African market. Valternative offers electric motorcycles, smart swapping stations (Swap & Go), and subscription-based battery-swapping services for on-demand services and last-mile delivery businesses.

The Swap & Go solution enables users to quickly exchange depleted batteries for fully charged ones, significantly reducing downtime compared to traditional charging methods. These stations are equipped with intelligent systems that manage and optimise the battery-swapping process, featuring automated battery recognition, charge level monitoring, and efficient allocation of charged batteries. Valternative deploys its software on the Amazon Cloud Server in Cape Town, South Africa. This local deployment ensures fast access for managing riders and assets, optimising both performance and safety.

The company operates two business models: Fleet management in a partnership with Uber, and lease and maintenance with aggregators such as takealot.com, Checkers, and Sixty60. Valternative's fleet management partnership with Uber introduced a global-first product, where Valternative manages Uber's EV fleet dedicated to Uber Package – Uber's on-demand package delivery service in South Africa. Drivers are equipped with two types of 'Valt-bikes': the V1 with 1.5kW of power, up to 90km of range and a top speed of 55km/h; and the V1 Max with 4.0kW of power, up to 90km of range and a top speed of 90km/h. Batteries are linked to the Valternative smart app, providing constant connectivity and easy management. Valt-bikes are also fitted with independently developed smart chips linking the rider's bike and battery, discouraging battery theft.

Valternative's partnership with Uber has already upskilled and trained 100 people in South Africa, with plans to train an additional 400 by the end of October 2024, and another 600 riders set to be deployed by February 2025. Through a partnership with various training authorities in South Africa, drivers participate in a comprehensive three-month programme covering driving behaviour, Valternative's operations, battery usage, and vehicle maintenance. Upon successful completion and licensing, each driver undergoes a thorough background check.

To enhance area coverage, Valternative has partnered with Shell, to install stations at strategic locations in the Cape Town City Bowl and surrounding areas. Currently, 35% of Valternative stations are powered by solar – with ambitions to be 100% solar-powered by 2027.

Valternative has been selected for the Climate Finance Accelerator (CFA) South Africa Phase 3: Core Cohort and nominated in the Just Energy Transition programme. The CFA is a global technical assistance programme funded by the UK government to directly support climate projects to access finance [40]. The Just Energy Transition programme funds projects with a focus on 2/3Ws, LDVs (excluding passenger vehicles), medium and heavy commercial vehicles, mining and agriculture vehicles, and industrial vehicles [41].

- **EXPLORING SHARED MOBILITY SOLUTIONS**

  Shared mobility provides a valuable opportunity to optimise the use of electric 2/3Ws. Globally, there are numerous examples[14] of micro-mobility vehicle-sharing services available to both the public and delivery drivers. These models enhance the effectiveness of EV usage by taking advantage of off-peak demand differences between private and commercial users, leading to more efficient resource utilisation and contributing to the mitigation of urban congestion challenges.

  Although this model is not yet implemented in South Africa, conducting trials in specific areas could help test its effectiveness, potentially improving resource utilisation while addressing safety and theft concerns. By focusing on small suburbs and specific areas where fleets can be closely monitored, companies can maintain control and minimise risks. Shared mobility not only maximises the utilisation of EVs but also provides a flexible and cost-effective solution for drivers.

14 A notable example is iFood Pedal, a programme launched by Brazil's food-delivery platform iFood. For details: Electrifying Progress, page 24.

STRATEGIES FOR 4W

- **STANDARDISING AND ACCELERATING CHARGING INFRASTRUCTURE**

  In South Africa, the widespread adoption of e-LCVs for last-mile delivery hinges significantly on two critical factors: the standardisation of charging infrastructure and the enhancement of charging speed. Charging speed plays a pivotal role, with AC charging suitable for overnight replenishment while DC fast chargers enable rapid top-ups. Although DC fast chargers offer quicker recharging, they entail higher installation costs and necessitate robust electricity connections. E-LCVs can utilise both rapid DC chargers and access public and private charging networks, enhancing their viability for last-mile delivery operations. As previously noted, South Africa is well-positioned on the global stage regarding EV charging infrastructure, with a favourable ratio of EVs to charging stations. The country also offers a balanced mix of slow and fast chargers. However, the coverage remains uneven across different regions.

  Standardisation is also imperative. Ensuring compatibility with various vehicle models promotes accessibility and ease of use. South Africa has taken proactive steps by adopting standards for EV charging plugs [15]. Standardising solutions for fleet operators ensures interoperability across different fleets, eliminating compatibility issues and streamlining the charging process. By partnering with providers offering high-quality equipment compatible with all vehicles, not limited to specific models, delivery companies can future-proof their charging infrastructure investments and facilitate the seamless integration of e-LCVs into their fleets.

CASE STUDY: Zimi

Zimi is an EV charging solution designed specifically for commercial fleets. It offers a comprehensive, integrated hardware and software solution that simplifies the deployment and management of EV charging infrastructure, significantly reducing costs, and tracking carbon emissions effectively. Zimi Charge facilitates the rapid deployment of EV charging infrastructure by eliminating the complexity associated with multiple suppliers by providing a single, all-encompassing solution. This streamlines the process, enabling operational teams to efficiently set up and manage charging stations while significantly reducing costs and offering more than 35%[15] reduction in overall expenses. Zimi is also pioneering algorithmic charging, which helps reduce energy costs for charging by up to 50% and increase EV battery life via its 'Just-in-time' charging model, integrated into all its web and mobile platforms. Additionally, the company has partnered with an existing onsite solar PV installer, Versofy, integrating renewable-energy sources into their charging solutions and further promoting sustainability.

15 Estimate includes both capital and operational expenditures, thanks to Zimi's innovative integration of software and hardware, as well as flexible leasing options for charging [47].

07

OVERCOMING **PUBLIC ADOPTION** CHALLENGES

PUBLIC ADOPTION relates to building an extensive uptake at sector and national scale, while ensuring an ecosystem-wide alignment and coordinated development, with a particular focus on users' engagement and satisfaction. It is not only about greener, quieter, and more comfortable transportation. Particularly in the context of micro-mobility, electrification can bring about various societal benefits such as job creation, improved accessibility for individuals without a driver's licence, and enhanced mobility for people with various physical abilities.

Micro-mobility vehicles offer significant advantages that can enhance public adoption, primarily by expanding the driver base and creating job opportunities by lowering entry barriers for potential drivers. EVs that do not require a driver's licence present wider employment opportunities and benefit a broader demographic. However, their adoption in South Africa faces challenges, such as the lack of dedicated bike lanes and traffic crossings, which can hinder their integration into existing traffic systems and affect rider safety.

Electric motorcycles and 3Ws present a significant drawback due to the legal requirement for a separate licence, distinct from a car licence. This adds time, effort, and financial costs to the certification process, potentially reducing the number of drivers willing or able to get certified. However, various operators are developing programmes to help prospective drivers obtain their motorbike licences, which also qualify them to drive 3Ws.

Nevertheless, and for all vehicle types, the main concerns regarding public adoption revolve around the need for enhanced safety and road training for drivers. While operating a vehicle is relatively straightforward, a lack of understanding of road rules can compromise safety. Additionally, there is a general lack of awareness about the financial benefits that EVs can offer, which significantly affects their acceptance.


Green Riders

STRATEGIES FOR 2W 3W 4W

- **ESTABLISHING TRAINING PROGRAMMES**

  To enhance public adoption, strategies should focus on raising awareness about the financial benefits of EVs over time, to incentivise fleet owners and managers in the transition and provide targeted training to drivers. Awareness campaigns should highlight the environmental, social and economic advantages of EVs, helping to build a positive perception among the public and prospective adopters. Driver training should be designed to cover key areas such as driving and route optimisation, and efficient charging practices. These programmes equip drivers with the skills to operate EVs safely and efficiently, maximise battery life and range, and troubleshoot common issues to minimise vehicle downtime. Results encompass a reduction in operating costs for fleet owners, enhanced driving experience for operators, and improved safety measures, collectively fostering better acceptance and adoption.

- **PASSIVE INCOME-GENERATING VEHICLES**

  Companies are turning their EVs into revenue-generating assets by leveraging strategic advertising and branding to offset price barriers. Riders can earn additional income by displaying ads on their EVs, effectively turning them into mobile billboards. The high visibility and mobility of these vehicles enhance their advertising potential. Custom-designed delivery boxes or side panels with elevated sides allow for larger ads, ensuring extensive exposure across various locations. This approach benefits companies with widespread reach while providing drivers with a source of passive income.

CASE STUDY: Green Riders

Green Riders is a social enterprise with a bold mission: to transform the last-mile delivery industry while creating 50 000 jobs for unemployed, underprivileged youths – both men and women – within the next five years.

As part of the programme, the Green Riders Academy recruits and trains future delivery riders, placing them in secure employment with Green Riders' aggregator partners. Each trainee is provided with a Mach 2 and Mach 3 Cargo E-Bike, which features a 100kg cargo capacity and advanced IoT tracking for enhanced safety and operational efficiency. The bikes, equipped with intelligent battery management systems, can cover over 100km on a single charge.

To boost earning potential, Green Riders has introduced new income streams through advertising partnerships. The company recently secured a 12-month advertising deal with Pick n Pay, and further deals with Telkom, and MTN. These advertising agreements enable hundreds of riders to earn additional passive income. Green Riders has customised a unique delivery box that optimises advertisers' exposure with clever geometry that captures attention and increases viability.

Green Riders has so far successfully integrated over 1 500 youths into the workforce, providing them with stable employment and growth opportunities. The initiative not only promotes eco-friendly transportation but also empowers disadvantaged youths to build careers in the growing logistics sector.

Green Riders has launched their community-based delivery eco-system that gives power back to the community by creating a full-stack delivery platform and tech that is locally operated.

Green Riders

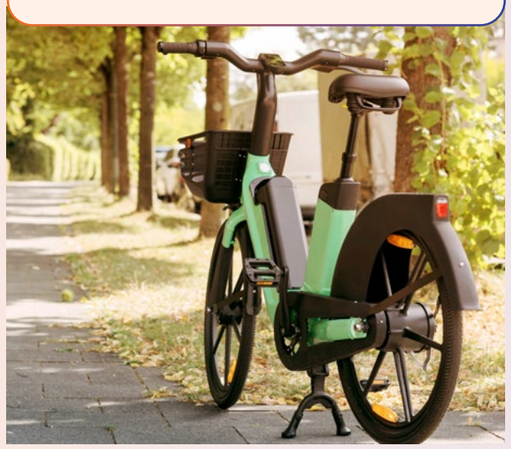
08

POLICY, LOCALISATION AND FINANCING

Transitioning to EVs can profoundly impact the country and requires urgent, decisive policy action. To capitalise on this opportunity, policy-makers must ensure the effective implementation of supportive policies and regulations, utilising various incentives to facilitate the shift to EVs. At a global level[16], examples include emissions reduction regulations, incentive schemes, purchase subsidies, and tax concessions. These tools have been used worldwide for several years to enhance EV affordability and boost market adoption.

Clarity in policies and incentives, particularly regarding tax benefits, is crucial to driving widespread EV adoption. Establishing clear regulatory standards for safety, interoperability and environmental sustainability of EVs and their charging infrastructure will ensure a cohesive and sustainable transition to electric mobility. By providing transparent and consistent guidelines, policy-makers can create a stable environment encouraging investment, innovation, and consumer confidence.

Progress is underway in South Africa, as the Department of Transport (DoT) released the Electric Vehicles Regulations Framework for public comment in 2023 [6].



At present, South Africa has only one piece of legislation – announced in 2024 – that provides specific investment incentives for the production of electric and hydrogen-powered vehicles under the Automotive Production Development Programme [3]. In contrast, countries like China and India have demonstrated greater commitment to this sector, with China implementing 10 policies since 2028 and India enacting five since 2019. However, in its latest white paper, the Department of Trade, Industry and Competition (DTIC) announced a plan to provide government incentives and financial support to the automotive manufacturing industry [15]. This initiative aims to bolster local electric passenger cars and e-LCVs production and includes the facilitation and development of an electric battery regional value chain.

Localisation strategies for developing EVs and creating local value chains are crucial for capitalising on opportunities and establishing a viable EV business model. These efforts also help ensure a fair transition, making them an essential component of the overall electrification process. South Africa has a well-developed automotive assembly industry that will need to transition towards EV manufacturing. Given South Africa's significant role as an exporter of automotive vehicles and parts, aligning with global EV trends is imperative to avoid losing market share. As international markets, particularly the EU, phase out ICE vehicles, South Africa must adapt by ramping up its EV production [15]. This strategic shift will cater to export markets and positively impact the pricing and availability of EVs for local use, making them more affordable and accessible [42]. Clear and direct policies are needed to encourage businesses throughout the value and supply chains to embrace EV production and technologies.

16 For an overview of key policies and measures by country, see the IEA Global EV Policy Explorer tool.

CASE STUDY: MellowVans

MellowVans manufactures its EVs using approximately 70% locally produced components at their facilities in the Western Cape. The company is now expanding into Europe and will soon have a semi-knocked-down (SKD)[17] assembly facility in Italy, with a satellite assembly facility in Germany.

In 2023, MellowVans secured investments from a consortium of investors, including a major South African bank, the IDC and two family offices. The funding will enable MellowVans to expand its operations and increase production, creating significant job opportunities and advancing the EV industry in South Africa. Over the next three years, this funding is expected to generate 47 skilled jobs and 4 000 driver positions. The funding will expand MellowVans' factory and production capacity, enabling the company to meet the rising demand for EVs. This expansion will facilitate the creation of new skilled positions and additional driver jobs, fostering employment and economic growth. Additionally, the funding will support the expansion of MellowVans' operating network from South Africa to Europe, North Africa, and other regions. This will broaden their reach and impact, contributing to the growth of the EV industry in South Africa and enabling cleaner deliveries globally.

From a national policy perspective, the focus is currently on the automotive industry vehicle production, especially passenger cars, and it is driven by job creation opportunities. However, South Africa also has significant capabilities in EV component assembly, including those used for delivery and logistics vehicles. **Scaling the implementation of local assembly programmes for EV components, including battery packs through favourable regulatory frameworks and reduced import duties** has a strong potential to stimulate economic growth and foster technological self-reliance. Assembly programmes can significantly reduce the acquisition costs of EVs and strengthen the competitive position of OEMs and distributors, by making transport and logistic operator's investments in commercial EVs more affordable and sustainable. This is especially relevant for e-2/3Ws, which, due to their modular design, can be easily imported as CKD kits and assembled locally. CKD kits could be also potentially exported to other African countries, leveraging South Africa's robust automotive supply chain and regional trade agreements.

17 SKD kits refer to partially disassembled products, particularly vehicles, that are exported for assembly at the destination. Unlike completely knocked-down (CKD) kits, which contain all the loose parts required for full assembly, SKD kits have some components pre-assembled at the origin before being shipped.

takealot.com and MellowVans

Moreover, governments can **incentivise the establishment of swap and charging stations by offering perks such as free land leases**, thereby spurring private investment in critical EV infrastructure. **Addressing knowledge gaps related to EV technologies**, particularly regarding battery performance in challenging conditions such as uphill driving and range limitations, is equally essential. This initiative could encompass educational campaigns, increased research funding, and collaborative partnerships aimed at advancing innovation and awareness. Additionally, the government should actively incentivise standardisation and foster the development of uniform battery solutions.

> *"The Department of Trade, Industry and Competition (DTIC) announced a plan to provide government incentives and financial support to the automotive manufacturing industry. This initiative aims to bolster local electric passenger cars and e-LCV production and includes the facilitation and development of an electric battery regional value chain."*

The transition demands substantial capital investment across the value chain. The landscape of early-stage investments for start-ups and innovation in the sector is still developing. Innovation entails a risk component that has created challenges for relatively new companies trying to scale up their activities, which are typically very capital-intensive. Often, the financing criteria adopted by financial institutions in South Africa do not yet fully reflect the evolving cost dynamics of EVs compared to traditional ICE vehicles. Additionally, new business models like EVaaS make it challenging for these institutions to predict future revenue streams, leading to difficulties in financing early-stage EV start-ups. Incorporating the long-term financial advantages of EVs into the evaluation framework is necessary to support both private and business customers in the transition to more sustainable transportation. However, this remains a challenge due to several risk factors, including the lack of reliable market data concerning the long-term residual value of EVs. For example, as mentioned before, currently commercial banks in the region are setting the residual value of leased electric commercial vehicles at 0% after five years [23]. This conservative approach contributes to elevated interest rates on financing loans, thereby increasing the TCO. To address this challenge, commercial banks and other finance institutions must collaborate closely with the private sector. Together, they can gather real-world and location-specific data on EV fleet performance, enabling more accurate modelling of residual values, informing risk assessment, and optimising lending criteria. This collaborative effort would not only enhance the viability of EV financing but also support the growth of sustainable transportation solutions in the country [23].

09

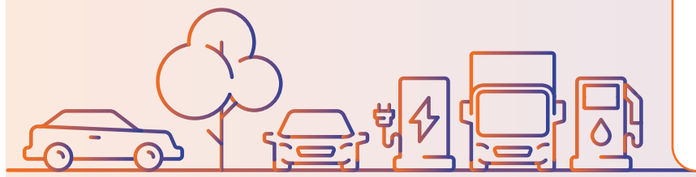
CONCLUSION

Transitioning South Africa's last-mile delivery sector to low-impact ZEVs offers a substantial opportunity to drive economic growth, enhance public health, create jobs, and tackle environmental challenges. However, to fully capitalise on the potential of EVs, both economic and systemic barriers must be addressed.

The success of electrifying last-mile delivery relies heavily on collaborative partnerships between public and private sectors. Government bodies, private companies, and utility providers must work together to distribute the costs and benefits of the transition. Such public-private partnerships can accelerate the large-scale deployment of EV solutions, enhancing their reliability and reach. By pooling resources and expertise, these collaborations can reduce costs and boost the overall efficiency of the system.

Despite rapid technological advancements, financing remains a significant hurdle. Although the progress in technology and charging infrastructure is noteworthy, the immediate financial feasibility of EVs is not always apparent. Ensuring economic viability requires a coordinated effort to develop a comprehensive EV ecosystem. Innovative financing and business models, such as those leveraging a shared asset economy – where charging stations and even vehicles are utilised by multiple users – offer practical solutions to overcoming economic obstacles and maximising efficiency. Encouraging local production and making incremental improvements across all relevant systems will further enhance the appeal of e-mobility in South Africa. Finally, a shift in societal attitudes towards electric mobility and supportive government policies are essential to facilitate the transition.

The successful electrification of last-mile delivery in South Africa will depend on the combined efforts of businesses, individuals, and policy-makers. By integrating these systems and adopting a holistic, value chain approach, we can create a sustainable, economically viable, and environmentally beneficial future for electric mobility.



ABBREVIATIONS AND ACRONYMS

2/3/4W	Two, three and four-wheeler vehicles
BEV	Battery electric vehicle
CKD	Completely knocked-down
E-LCV	Electric light commercial vehicle
EV	Electric vehicle
EVaaS	Electric vehicle as a service
EVSE	Electric vehicle supply equipment
GHG	Greenhouse gas
GVW	Gross vehicle weight
IDC	Industrial Development Corporation of South Africa
ICE	Internal combustion engine
LCV	Light commercial vehicle
LDV	Light duty vehicle
OEM	Original equipment manufacturer
PHEV	Plug-in hybrid electric vehicle
SKD	Semi-knocked-down
TCO	Total cost of ownership
ZEV	Zero-emission vehicle

10

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