



Nigeria: Powering Electric Mobility

Developer Guide

In collaboration with



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A NOTE TO THE READER

This Developer Guide is meant to be a 'reference document' to inform early market exploration. The Guide is supplemented with Model Business Cases accessible at www.get-invest.eu.

ABOUT GET.INVEST MARKET INSIGHTS

The first series of GET.invest Market Insights were published in early 2019 covering four renewable energy market segments in three countries, namely: renewable energy applications in the agricultural value-chain (Senegal), captive power/behind the meter generation (Uganda), mini-grids (Zambia) and standalone solar systems (Zambia).

Each Market Insight package includes **a)** a 'how to' Developer Guide and **b)** Model Business Cases. The Developer Guide enables the reader to navigate the market and its actors, to understand the current regulatory framework and lays down the step-by-step process of starting a new project or business. The Model Business Case analyses project economics and presents hypothetical, yet realistic, investment scenarios. It hence indicates the criteria for a viable project or business to enable the reader to identify the most cost-effective project/business opportunities.

GET.invest Market Insights therefore summarise a considerable amount of data that may inform early market exploration and pre-feasibility studies. It is recommended to cross-read all three products (Developer Guide and two Model Business Cases) to gain a comprehensive overview. The products are accessible at www.get-invest.eu.

ABOUT GET.INVEST

GET.invest is a European programme that mobilises investments in renewable energy. The programme targets private sector businesses, project developers, financiers and regulators to build sustainable energy markets in partner countries.

Services include market information, a funding database, match-making events and access to finance advisory. Since 2022, GET.invest powers the Team Europe One-Stop-Shop for Green Energy Investments, an access point for information about and facilitated access to European support and financing instruments for energy projects and companies in Africa.

The programme is supported by the European Union, Germany, Norway, the Netherlands, Sweden and Austria, and works closely with initiatives and business associations in the energy sector.

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ABBREVIATIONS

AfDB	African Development Bank	FCDO	Foreign, Commonwealth & Development Office
AMDA	Africa Mini-Grid Developers Association	FEI	Facility for Energy Inclusion
AREF	Africa Renewable Energy Fund	FGN	Federal Government of Nigeria
BaaS	Battery-as-a-Service	FI	Financial institution
BII	British International Investment	FiT	Feed-In-Tariff
BMZ	German Federal Ministry for Economic Cooperation and Development	FX	Foreign exchange
BOI	Bank of Industry	GEF	Global Environment Facility
BRT	Bus rapid transit	GFIPF	Green Fiscal Incentives Policy Framework
CAC	Corporate Affairs Commission	GHG	Greenhouse gas
CAPEX	Capital expenditure	GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
CBN	Central Bank of Nigeria	GMFA	Green Mobility Facility for Africa
CETUD	Conseil Exécutif des Transports Urbains de Dakar (Executive Council of Urban Transport in Dakar)	GMG	Green mini-grid
DBN	Development Bank of Nigeria	GWh	Gigawatt hour
DEG	German Investment Corporation	ICE	Internal combustion engine
DFC	Development Finance Corporation	IEA	International Energy Agency
DFI	Development finance institution	IFC	International Finance Corporation
DisCo	Distribution company	IOT	Internet of Things
EEGF	Energy Entrepreneurs Growth Fund	IPP	Independent power producer
EIB	European Investment Bank	Km	Kilometre
EIRR	Economic internal rate of return	KSH	Kenyan shilling
EPSRA	Electric Power Sector Reforms Act	kWh	Kilowatt hour
ESMAP	Energy Sector Management Assistance Program	LAMATA	Lagos Metropolitan Area Transport Authority
ETP	Energy Transition Plan	LASEPA	Lagos State Environmental Protection Agency
EU	European Union	LCV	Light commercial vehicle
EUR	Euro	MBC	Model Business Case
EV	Electric vehicle	MSME	Micro, small and medium-sized enterprise
		MST	Minimum Subsidy Tender

MW	Megawatt	SHS	Solar home systems
NADDC	National Automotive Design and Development Company	SME	Small and medium-sized enterprise
NAIDP	National Automotive Industry Development Plan	SRADev	Sustainable Research and Action for Environmental Development
NEP	Nigeria Electrification Project	SUMP	Sustainable urban mobility plan
NEPP	National Electric Power Policy	TA	Technical assistance
NERC	Nigerian Electricity Regulatory Commission	TCN	Transmission Company of Nigeria
NESP	Nigerian Energy Supply Programme	TIN	Taxpayer Identification Numbers
NGN	Nigerian naira	TUMI	Transformative Urban Mobility Initiative
NGO	Non-governmental organisation	UN	United Nations
NIDF	Nigerian Infrastructure Debt Fund	UNEP	United Nations Environment Programme
NNPC	Nigerian National Petroleum Corporation	USADF	United States African Development Foundation
NSIA	Nigerian Sovereign Investment Authority	USAID	United States Agency for International Development
O&M	Operations and maintenance	USD	United States dollar
OEM	Original equipment manufacturer	VC	Venture capital
OPEX	Operating expenses		
PayGo	Pay-as-you-go		
PBG	Performance-based grant		
PE	Private equity		
PHCN	Power Holding Company of Nigeria		
PPA	Power purchase agreement		
PPIAF	Public–Private Infrastructure Advisory Facility		
PPP	Public–private partnership		
PUE	Productive use of electricity		
R&D	Research and development		
RBF	Results-based financing		
RE	Renewable energy		
REA	Rural Electrification Agency		
REF	Rural Electrification Fund		
REPP	Renewable Energy Performance Platform		
SEFA	Sustainable Energy Fund for Africa		

EXECUTIVE SUMMARY

Globally, investment in electrified transport reached USD 1.8 trillion in 2023, up 17% on the previous year and a new record.¹ In sub-Saharan Africa, emissions from the transportation sector account for approximately one-quarter of the region's total greenhouse gas (GHG) emissions. Motorcycles – which are widely used in both urban and rural areas and are the fastest-growing mode of transportation on the continent – emit three times more particulate matter per km than cars and represent the largest source of GHG emissions and local pollutants in the region's transport sector.² Taking into account riders, owners and those involved in servicing the commercial motorcycle industry, motorcycles directly support the livelihoods of over 100 million people in sub-Saharan Africa.³ These trends highlight an urgent need for countries to transition away from fossil fuels in the transportation sector and encourage the adoption of electric vehicles (EVs) and sustainable mobility in order to reduce emissions in line with sustainable development goals.

Electric mobility (e-mobility) has wide-ranging environmental, social and economic benefits and enables countries to pursue low-emission, climate-resilient development. The African e-mobility sector, which is still nascent, is growing rapidly in West Africa, led by Ghana, Benin and Togo, and continues to develop in East Africa, where Kenya, Rwanda, Tanzania and Uganda are the largest markets. Ethiopia adopted a ban on the import of non electric vehicles, becoming the first country worldwide to prohibit ICE vehicle imports. This policy, combined with additional tax incentives to catalyse EV market growth, led to the addition of 100,000 EVs in Ethiopia in only two years, the fastest penetration rate of any country in Africa to date.

Section 2 of this Guide provides context for e-mobility development in different countries across sub-Saharan Africa, including

an overview of the sector's policies, market segments, business models and financing mechanisms. The African e-mobility sector encompasses several market segments, including two- and three-wheel EVs (bicycles, motorcycles), four-wheel EVs (cars, light commercial vehicles), buses and trucks. To date, the most progress in the African EV market has been made in the two-wheel segment – mainly commercial EVs used for taxi, delivery, fleet, and logistics purposes – and in passenger buses, as these tend to be the most prevalent forms of transportation in the region. Several innovative business models have emerged in the African e-mobility sector in recent years, with different financing approaches being deployed by e-mobility businesses to serve a wide range of end-users. While EV sales are growing in many countries across the region, the EV market across sub-Saharan Africa still remains largely untapped.

Scaling up the adoption of EVs in sub-Saharan Africa will require significant investment across the entire EV value chain. Limited charging infrastructure, unreliable electricity supply, and poor road networks and transportation infrastructure remain key challenges facing the region's e-mobility sector. To expedite market development, governments will need to develop and implement enabling policies, regulations and incentives to support the private sector and encourage EV uptake, including import duty and tax exemptions for EVs and their components; reduced electricity tariffs for EV charging; the adoption of policies to limit the importation of ICE vehicles; and pro-business trade policies and regulations to encourage in-country EV manufacturing.

Section 3 of this Guide examines the e-mobility market in Nigeria, including its enabling environment, business models, financing mechanisms and the opportunity for e-mobility to support rural economic development. In Nigeria, rising urbanisation levels have

1) "Energy Transition Investment Trends 2024," BloombergNEF, (January 30, 2024):

<https://about.bnef.com/blog/global-clean-energy-investment-jumps-17-hits-1-8-trillion-in-2023-according-to-bloombergnef-report/>

2) Ayetor, G.K., Mbonigaba, I., and Mashele, J., "Feasibility of electric two and three-wheelers in Africa," Green Energy and Intelligent Transportation, 2, (August 2023): <https://doi.org/10.1016/j.geits.2023.100106>

3) Bishop, T. and Courtright, T., "The Wheels of Change: Safe and Sustainable Motorcycles in Sub-Saharan Africa," Fédération Internationale de l'Automobile (FIA) Foundation, (November 2022): <https://www.amend.org/2022/11/24/the-wheels-of-change/>

created a demand/supply imbalance that has led to widespread road congestion, overcrowding, delays and high levels of pollution.⁴ Nigeria's e-mobility sector is still in its early stages of development, but many pathways exist for the market to grow and for the country to lead West Africa's EV transition. Government policy, infrastructure development, and macroeconomic conditions are variables that will impact the pace of market growth. Global trends in e-mobility and advancements in technology may also influence the local market.

Key barriers inhibiting e-mobility in Nigeria include the absence of a defined roadmap to guide EV development, limited access to financing, poor road infrastructure, an unreliable power grid, FX risks, the economy's outsized reliance on fossil fuels and market access issues due to conflict and security concerns in certain parts of the country. Additionally, EV charging network infrastructure is expensive to build and would also need to scale in peri-urban and rural areas. To overcome these challenges, with support from its development partners, the Federal Government of Nigeria (FGN) can strengthen the enabling environment for e-mobility by developing an integrated, long-term roadmap for the sector; providing fiscal incentives to the sector; maintaining the elimination of fuel subsidies; raising consumer awareness of the wide-ranging benefits of e-mobility; and by introducing mechanisms to promote asset financing solutions.

Alongside supportive government policy, the pace of EV market growth will depend on whether customers can realise cost savings (through cheaper fuel, reduced maintenance etc.) by switching from an internal combustion engine (ICE) vehicle to an EV. A comparison of the total annualised cost of owning an e-motorcycle compared to an ICE motorcycle over the expected life of an average motorcycle in Nigeria found that e-motorcycles have an annualised cost of approximately EUR 734 compared to EUR 958 for ICE motorcycles. This represents an estimated savings of approximately EUR 224, or **23% per year**, that can be achieved by switching to an EV.⁵

Electric mobility relies on a stable supply of electricity for battery charging. In off-grid settings throughout Nigeria, or where grid-supplied electricity is unreliable, green mini-grids (GMGs) can provide a clean and cost-effective solution for EV charging. Growth in the e-mobility sector can in turn reinforce the GMG business model by scaling up productive use of electricity (PUE), reducing tariffs, increasing access to finance, and taking advantage of other synergies in O&M and the procurement of battery storage technologies.

Section 4 of this Guide identifies investment opportunities across different e-mobility market segments in Nigeria and reviews some of the key challenges that e-mobility companies face in the country. Scaling up the adoption of EVs in urban, peri-urban, and rural areas of Nigeria will require integrated planning and coordination among all key public and private stakeholders involved. Supportive government policy, regulation and tax incentives for the private sector by the FGN, tailored e-mobility business models by project developers/businesses, innovative financing solutions by private financiers, guarantee and risk instruments by DFIs and capacity building across the entire supply chain will enable e-mobility market development in Nigeria. Advocacy should extend to all relevant stakeholders including policymakers, regulators, urban planners, automotive/e-mobility companies, GMG project developers, commercial banks, investors and financiers. The FGN and its partners can also work with the academia to support further R&D into e-mobility.

This Guide has captured input from a wide range of market actors, partners and stakeholders, and therefore serves as a manual for the private sector. It also serves as a conversation starter to support collaborative work across Nigeria's burgeoning e-mobility sector.

4) Onokala, P., and Olajide, C., "Problems and Challenges Facing the Nigerian Transportation System," *Transportation Research Procedia*, 48, (2020): <https://doi.org/10.1016/j.trpro.2020.08.189>

5) See **Table 5** in **Section 3.3.3**.

SECTION 1

Introduction



Source: [GOGO Electric](#)

This Developer Guide is a reference document intended to inform project developers, private sector technology suppliers, innovators, and entrepreneurs about opportunities in Nigeria's electric mobility sector. The Guide explores the status of the e-mobility market and its potential role in economic growth and development in Nigeria. The Guide examines who the key market actors are, what business models are being deployed, what the potential market size is for e-mobility, what is driving or hindering market growth, who are the potential financiers, and other opportunities and challenges that exist for e-mobility market development in the country.

The Guide is organised into three main sections (following this introduction):

- 1) **E-Mobility in sub-Saharan Africa:** This section provides context for e-mobility development in different countries across sub-Saharan Africa, including an overview of the sector's policies, market segments, business models and financing mechanisms.
- 2) **Potential for E-Mobility in Nigeria:** This section looks specifically at e-mobility market development in Nigeria and examines its enabling environment, business models, financing mechanisms and the opportunity for e-mobility to support rural economic development.
- 3) **Route-to-Market:** This section explores how to leverage the market research presented in this Guide to contribute to e-mobility development in Nigeria.

This Guide is part of a package of products under the GET.invest Market Insights. Each package is country specific and covers a certain renewable energy market segment. In addition to this Developer Guide, the Market Insights package also includes corresponding Model Business Cases (MBCs).

There are two MBCs that accompany this Guide:

- 1) **Mini-grid Powered Rural E-Mobility Project:** The first MBC examines a partnership between an e-mobility company and a mini-grid developer who work together to provide e-mobility solutions to small businesses in rural areas in Nigeria.
- 2) **Urban E-Mobility Business:** The second MBC analyses an e-motorcycle company that produces lithium-ion batteries and e-motorcycles and operates grid-connected battery-swapping stations in urban areas in Nigeria.

SECTION 2

E-Mobility in sub-Saharan Africa



Source: [BasiGo](#)

The transportation sector is one of Africa's most energy-intensive sectors and a major consumer of fossil fuels. Africa's transportation emissions – which account for approximately one-quarter of the region's total greenhouse gas (GHG) emissions – are growing rapidly, driven by factors such as increasing urbanisation, the widespread import of inefficient used vehicles and a lack of fuel economy standards across the region.⁶ These trends highlight an urgent need for countries to transition away from fossil fuels in the transportation sector and encourage the adoption of electric vehicles (EVs) and other sustainable mobility solutions in order to reduce emissions in line with sustainable development goals.

Electric mobility (e-mobility) has wide-ranging environmental, social and economic benefits and enables countries to pursue low-emission, climate-resilient development. In sub-Saharan Africa, the transition away from fossil fuels in the transport sector is critical, especially for countries with large, densely-populated urban centres where pollution from transportation often accounts for about half of CO₂ emissions.⁷ The advent of EVs allows countries to reduce their reliance on imported fossil fuels, providing cost savings, boosting productivity and improving air quality and public health by decreasing emissions from internal combustion engine (ICE) vehicles. When compared to petrol or diesel-powered ICE vehicles, EVs are eco-friendly, reduce noise pollution and have low O&M costs. The African e-mobility sector, which is still nascent, is growing rapidly in West Africa, led by Ghana, Benin and Togo, and continues to develop in East Africa, where Kenya, Rwanda, Tanzania and Uganda are the largest markets.

2.1 POLICY AND REGULATORY FRAMEWORK FOR E-MOBILITY

In many countries across sub-Saharan Africa, the e-mobility sector lacks sufficient policy and regulatory support, as it is often left out of national energy policies or electrification plans. Government policies, regulations, strategic roadmaps and incentives can help guide development of the sector and de-risk much-needed investment across the EV value chain. Several countries across the region have already adopted policy and regulatory frameworks to promote e-mobility, led by Benin, Togo, Ghana, Ethiopia, Kenya, Rwanda, South Africa and Uganda (Table 1).

A key policy challenge for sub-Saharan Africa will be to promote sustainability in the transport sector and avoid the risk of becoming a dumping ground for the world's used ICE vehicles. Specifically, with developed countries rapidly adopting four-wheel EVs, used ICE vehicles will be available for export into sub-Saharan Africa. To address this, African countries can impose restrictions on the importation of used ICE vehicles, provide tax exemptions and credits for EVs, and set long-term targets for a percentage of all registered vehicles to be electric powered by a certain year.⁸ Governments can also set up carbon pricing schemes to incentivise e-mobility adoption.

Donor agencies are also assisting governments across sub-Saharan Africa with development of supportive policy and regulation to scale up e-mobility. For example, the African Development Bank (AfDB) Sustainable Energy Fund for Africa (SEFA) provided a EUR 1M grant to the Green Mobility Facility for Africa (GMFA) to support the creation of an EV enabling environment, the design of EV business models and guidelines for the public and private sector, and the development of a bankable pipeline of e-mobility projects in seven African countries.⁹ Under its Global Electric Mobility Programme, the UN Environment Programme (UNEP) is helping more than 10 African countries develop e-mobility policies, roadmaps and standards for vehicle fuel economy, batteries and charging infrastructure.¹⁰

6) "Transport and Climate Change Global Status Report – 2nd Edition: Africa Regional Overview," Partnership on Sustainable, Low Carbon Transport (SLOCAT), (2021): <https://tcc-gsr.com/wp-content/uploads/2021/06/1.2-Africa-Regional-Overview.pdf>

7) "Ngoufanke, T., Stolz, E., and Koschitzky-Kimani, M., "A dozen markets and counting: The opportunity for two-wheel e-mobility in sub-Saharan Africa," Persistent Energy, (2022): https://persistent.energy/wp-content/uploads/2022/02/Publication_The-opportunity-for-Two-Wheel-e-Mobility-in-Sub-Saharan-Africa.pdf

8) Conzande, J., Engel, H., Kendall, A., and Pais, G., "Power to move: Accelerating the electric transport transition in sub-Saharan Africa," McKinsey & Company, (2022): <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/power-to-move-accelerating-the-electric-transport-transition-in-sub-saharan-africa>

9) "\$1 million: Sustainable Energy Fund for Africa grant to drive electric mobility shift in seven African countries," African Development Bank, (31 January 2023): <https://www.afdb.org/en/news-and-events/press-releases/1-million-sustainable-energy-fund-africa-grant-drive-electric-mobility-shift-seven-african-countries-58650#>

10) UNEP Global Electric Mobility Programme: <https://www.unep.org/explore-topics/transport/what-we-do/global-electric-mobility-programme>

TABLE 1. Enabling e-mobility policies and regulations in sub-Saharan Africa

COUNTRY	DESCRIPTION
Benin and Togo	<ul style="list-style-type: none"> — In Benin and Togo, a favourable e-mobility policy environment has led the EV company, Spiro, to launch twin assembly plants in the two countries to boost localised EV production in the region.¹¹ — In Benin, Zed Motors also assembles imported e-motorcycles and converts ICE motorcycles to EVs.
Ghana	<ul style="list-style-type: none"> — In December 2023, the Ghanaian Ministry of Transport launched a National Electric Vehicle Policy to create an enabling environment for the sector. — The policy aims to provide market signals and help decarbonize the transport sector in line with Ghana's National Energy Transition Plan 2022-2070 and commitments on climate change.¹²
Ethiopia	<ul style="list-style-type: none"> — The Ethiopian Ministry of Transport and Logistics adopted a ban on the import of non electric vehicles, becoming the first country worldwide to prohibit ICE vehicle imports. It also adopted a number of incentives to catalyse EV market growth, including exemptions for all EVs from VAT and excise tax. — As a result of these policies, Ethiopia has added more 100,000 EVs in less than two years, the fastest penetration rate of any country in Africa to date.¹³
Kenya	<ul style="list-style-type: none"> — The government of Kenya reduced excise duties on EVs from 20% to 10% and approved discounted electricity tariffs for EVs. — The country has also adopted several strategies and action plans that include measures to stimulate development of the sector, such as EV technical standards, pilot projects, and public procurement initiatives to support the rollout of charging infrastructure. — In 2024, the Ministry of Roads and Transport adopted a Draft Electric Mobility Policy, which, among other measures, provides incentives for the import, manufacture and assembly of EVs in Kenya.¹⁴ — Kenya's third largest city, Kisumu, introduced a sustainable urban mobility plan (SUMP) in 2020, which establishes long-term targets to reduce the city's transport emissions.¹⁵
Rwanda	<ul style="list-style-type: none"> — In Rwanda, policymakers have implemented a range of fiscal and non-fiscal incentives to support e-mobility. These include import duty and tax exemptions for EVs and their components, reduced electricity tariffs for EV charging stations, provisions for EV charging stations in building codes and city planning rules, and enforcement of existing emission standards to discourage the purchasing of polluting vehicles. — The government of Rwanda is also developing a National Sustainable Mobility Policy to facilitate the country's EV transition. The country aims to convert 20% of all buses to electric by 2023.¹⁶
South Africa	<ul style="list-style-type: none"> — In South Africa, the government launched the Green Transport Strategy (2018-2050), a comprehensive, long-term national policy framework that provides a clear vision for the country's transition to green transport infrastructure and electric mobility.

11) Komminoth, L., "New plants in Benin and Togo underpin Africa's EV potential," African Business, (August 3, 2023): <https://africanbusiness/2023/08/trade-investment/new-plants-in-benin-and-togo-underpin-africas-ev-potential>

12) "President Launches Ghana's Electric Vehicle Policy," Ministry of Transport, (5 December 2023): [https://www.mot.gov.gh/10/16/1/150/president-launches-ghanas-electric-vehicle\(ev\)-policy](https://www.mot.gov.gh/10/16/1/150/president-launches-ghanas-electric-vehicle(ev)-policy)

13) Kuhudzai, R.J., 2024. "Ethiopia Shows Us Just How Fast The Transition To Electric Mobility Can Happen In Africa," CleanTechnica, <https://cleantechnica.com/2024/05/13/ethiopia-shows-us-just-how-fast-the-transition-to-electric-mobility-can-happen-in-africa/>

14) "Dawn Of New Era as Ministry Launches Draft Electric Mobility Policy," Ministry of Roads and Transport, (March 27, 2024): <https://transport.go.ke/dawn-new-era-ministry-launches-draft-electric-mobility-policy>

15) "Transport and Climate Change Global Status Report - 2nd Edition: Africa Regional Overview," Partnership on Sustainable, Low Carbon Transport (SLOCAT), (2021): <https://tcc-gsr.com/wp-content/uploads/2021/06/1.2-Africa-Regional-Overview.pdf>

16) Supercharging Rwanda's E-mobility Transition: <https://www.environment.gov.rw/index.php?eID=dumpFile&t=f&f=55460&to-ken=6003242e29667513f33c128466ffc760c62d81d8>

TABLE 1. *Continued*

COUNTRY	DESCRIPTION
Uganda	<ul style="list-style-type: none"> — In Uganda, the government is actively engaged in supporting the growth of e-mobility, including with policy and regulatory support as well as through partnerships with the private sector. — The government has established a robust national policy framework to promote e-mobility, which ultimately became part of Vision 2040, the country's long-term sustainable development strategy that promotes climate friendly technologies. — The government has waived import duties for two- and three-wheel EVs, exempted all EVs from paying VAT and introduced a special electricity tariff for charging stations. — In 2023, the Ugandan Regulatory Authority announced further tax exemptions for imported EVs, hybrid vehicles and their component parts.¹⁷ — State-run Kiira Motors Corporation manufactures EVs and low-emission vehicles. The green mobility start-up, Spiro, has partnered with government to introduce 140,000 e-motorbikes in Uganda and is establishing 30,000 charging and battery-swapping stations across the country.¹⁸ — Soleil Power is building East Africa's first production-scale lithium-ion battery assembly plant in the country.¹⁹

2.2 REGIONAL MARKET CHARACTERISTICS

The African e-mobility sector encompasses several market segments, including two- and three-wheel EVs (bicycles, motor-cycles), four-wheel EVs (cars, light commercial vehicles), buses and trucks. EVs are typically classified as either passenger or commercial EVs, with commercial EVs largely used for delivery, fleet, and logistics purposes. EVs can be further categorised as battery electric vehicles, hybrid electric vehicles or plug-in hybrid electric vehicles. To date, the most progress in the region's EV market has been made in the two-wheel EV segment, led by companies such as Ampersand, Arc Ride, Max, Roam, Spiro and Zembo, among others. While sales are growing in many countries (e.g., Benin, Togo, Kenya, Rwanda and Uganda), the EV market across sub-Saharan Africa remains largely untapped.

2.2.1 Two- and three-wheel EVs

E-bicycles

Battery-powered electric bicycles and three-wheelers are an important and rapidly-growing market segment in the region. E-bicycles are widely used in both urban and rural areas of Africa for personal transportation, as taxis, and for other uses, such as delivery services and medical services. E-bicycles are relatively easy to acquire, cheap to operate, have low maintenance costs and can navigate congested and challenging road terrains. They can be particularly helpful for improving access to markets and other basic services for isolated rural communities, where road networks are often in poor condition and may not be conducive to vehicles. In addition to e-bicycles, three-wheel cargo bicycles are also being deployed by e-mobility operators in the region, particularly to support traders and farmers across the agricultural value chain.

17) Koigi, B., "Inside Africa's EV Revolution," Fair Planet, (January 16, 2024): <https://www.fairplanet.org/story/africa-electric-vehicle-charging-station-startup/>

18) Nnamani, C., "Green mobility start-up Spiro to deploy 140,000 electric motorcycles in Uganda," Techcabal, (April 4, 2023): <https://techcabal.com/2023/04/04/green-mobility-startup-spiro-to-deploy-140000-electric-motorcycles-in-uganda/>

19) Soleil Power: <https://soleilpower.ug>

Several e-bicycle companies operate in countries in East Africa (e.g., in Kenya, Rwanda, Uganda) as well as in West Africa (e.g., in Ghana, Nigeria, Togo). For example, in Kenya, e-bicycle start-ups include eBee and eWaka. In Ghana, Wahu Mobility designs and manufactures their e-bicycles locally. A few nascent e-bicycle companies in Nigeria include ThinkBikes and Orbit Bikes (see [Table 8](#) and [Annex 2](#) for more information on these and other e-mobility companies).

E-motorcycles

Motorcycles are a widely used mode of transportation in both urban and rural areas of Africa and transport 80% of passengers and goods on rural roads across the region.²⁰ Motorcycles and scooters (referred to as *boda bodas* in East Africa or *okadas* in Nigeria) are commonly used as taxis and for delivery services, while motorised three-wheel vehicles (referred to as *tuk-tuks* or *kekes* in Nigeria) are also used to carry passengers or cargo. As of 2022, out of approximately 60-70 million vehicles in use in Africa, there were an estimated 27 million registered motorbikes across the continent.²¹ Taking into account riders, owners and those involved in servicing the commercial motorcycle industry, motorcycles directly support the livelihoods of over 100 million people in sub-Saharan Africa.²² Motorcycles, which are the fastest-growing mode of transportation in sub-Saharan Africa, emit three times more particulate matter than cars and represent the largest source of GHG emissions and local pollutants in the region's transport sector.²³

There is a huge opportunity for e-motorcycles to replace millions of ICE motorcycles across the region. In addition to reducing emissions, e-motorcycles support economic growth and job creation, as for-hire motorbikes are commonly run as small businesses and are a leading source of employment for young Africans with limited higher education.²⁴ E-motorcycles will play an important role in Africa's EV transition; an analysis of

the EV markets of five sub-Saharan African countries (Ethiopia, Kenya, Nigeria, Rwanda and Uganda) estimates that two-wheel vehicles will account for more than half of forecasted EV market growth through 2040. In Kenya and Nigeria, two of the largest EV markets in the region, electric two-wheeler sales are expected to reach three to four million per year by 2040.²⁵

2.2.2 Four-wheel EVs

While two and three-wheel EVs offer an affordable way to get access to mobility for a large share of the population in sub-Saharan Africa, affordability remains a key barrier to the uptake of electric cars in the region. The market for electric light commercial vehicles (LCV) faces similar issues around affordability and may require more robust charging infrastructure, especially if being used for commercial purposes. Given the vast supply of low-cost, used ICE vehicles in most African countries, adopting a new electric car or LCV will be challenging for most vehicle owners without significant incentives. Although up-front costs remain high, the lifetime cost of a four-wheel EV is lower than a comparable ICE four-wheel vehicle, even in countries with relatively high electricity tariffs.²⁶ This suggests that government policy can play an important role in expediting the EV transition, for example by gradually phasing out old and inefficient vehicles and providing incentives to promote the uptake of fuel efficient, zero-emission, hybrid and electric vehicles.

Ghana has a large and growing four-wheel EV market. The country's domestic supply of EVs is likely to grow rapidly thanks to a supportive policy framework (see [Table 1](#)). SolarTaxi is a leading Ghana-based start-up that offers green commuting solutions, assembling and maintaining a range of EVs.²⁷ In East Africa, EV companies active in the four-wheel EV segment include Drive Electric (Kenya, Tanzania and Uganda), UTU Cars (Kenya) and Kabisa (Rwanda), among others.

20) "Transport and Climate Change Global Status Report – 2nd Edition: Africa Regional Overview," Partnership on Sustainable, Low Carbon Transport (SLOCAT), (2021): <https://tcc-gsr.com/wp-content/uploads/2021/06/1.2-Africa-Regional-Overview.pdf>

21) International Organization of Motor Vehicle Manufacturers (OICA): <https://www.oica.net/wp-content/uploads/Total-World-vehicles-in-use-2020.pdf>; and Ayetor, G.K., et al., "Investigating the state of road vehicle emissions in Africa: A case study of Ghana and Rwanda," Transportation Research Interdisciplinary Perspectives, 11, (2021): <https://doi.org/10.1016/j.trip.2021.100409>

22) Bishop, T. and Courtright, T., "The Wheels of Change: Safe and Sustainable Motorcycles in Sub-Saharan Africa," Fédération Internationale de l'Automobile (FIA) Foundation, (November 2022): <https://www.amend.org/2022/11/24/the-wheels-of-change/>

23) Ayetor, G.K., Mbonigaba, I., and Mashele, J., "Feasibility of electric two and three-wheelers in Africa," Green Energy and Intelligent Transportation, 2, (August 2023): <https://doi.org/10.1016/j.geits.2023.100106>

24) Ngoufanke et al., 2022.

25) Conzande et al., 2022.

26) Ibid.

27) "Catalyzing Investment in Electric Mobility: The case for Africa and the Middle East," Dalberg, (April 2022).

2.2.3 Electric buses

In some African cities, up to 80% of the population relies on paratransit (sometimes called “informal transport”), which is often provided by ICE mini-bus taxi fleets.²⁸ As these vehicles travel through congested cities, they emit trails of soot that pose serious health risks to the local population. Given the rapid pace of urbanisation across the region, this problem will only worsen unless African cities take steps to decarbonise their public transportation sectors and transition to cleaner buses.²⁹

In January 2024, the Executive Council of Urban Transport in Dakar, Senegal (Conseil Exécutif des Transports Urbains de Dakar, CETUD) launched an electric bus public transit system – the first of its kind in sub-Saharan Africa (Box 1). The city of Lagos, Nigeria is pursuing a similar e-bus initiative to help ease congestion and reduce emissions (see Section 3.3). E-buses are also a growing segment in Kenya, where companies like BasiGo and Roam have

launched pilots and are securing financing to scale-up their operations.³⁰ In Uganda, state-run Kiira Motors Corporation, the country’s first EV manufacturer, has been delivering electric buses to the market since 2022. With its Kayoola Solar Bus and electric Kayoola EVS, the company aims to provide emission-free mass transport solutions to the African continent.

With funding from the German Federal Ministry for Economic Cooperation and Development (BMZ), the Transformative Urban Mobility Initiative (TUMI) (see Box 7 in Section 2.6) is working to accelerate the rollout of e-buses globally through its E-Bus Mission. The mission is providing roadmaps and technical assistance to cities to support their transition to e-bus fleets. In sub-Saharan Africa, the TUMI E-Bus Mission has partnered with the cities of Nairobi, Kenya, Durban, South Africa and Kampala, Uganda.³¹

BOX 1. Electric Bus Rapid Transit (BRT) system in Dakar³²

In January 2024, Senegal launched a new electric Bus Rapid Transit (BRT) system in Dakar – the first all-electric bus transit system in sub-Saharan Africa. The BRT project features 120 e-buses and exclusive bus lanes between the suburbs and the city centre, servicing approximately

300,000 passengers daily. The total cost of the BRT project was about FCFA 300 billion (EUR 450 million). The project was financed by the World Bank, the European Investment Bank and the State of Senegal and built by the French infrastructure developer, Meridiam.

28) “Transport and Climate Change Global Status Report – 2nd Edition: Africa Regional Overview,” Partnership on Sustainable, Low Carbon Transport (SLOCAT), (2021): <https://tcc-gsr.com/wp-content/uploads/2021/06/1.2-Africa-Regional-Overview.pdf>

29) “African cities turn to ‘green’ buses in fight against pollution,” United Nations Environment Programme (UNEP): <https://www.unep.org/news-and-stories/story/african-cities-turn-green-buses-fight-against-pollution>

30) Guguyu, O., “Kenyans order 100 electric buses as KCB inks financing,” Business Daily Africa, (October 5, 2022): <https://www.businessdailyafrica.com/bd/corporate/companies/kenyans-order-100-electric-buses-kcb-inks-financing-3973456>

31) Transformative Urban Mobility Initiative (TUMI) E-Bus Mission: <https://transformative-mobility.org/focus-area/tumi-e-bus-mission/>

32) BRT Senegal: <https://www.meridiam.com/assets/bus-rapid-transit-brt-dakar/>

BOX 2. OX Delivers electric truck service in Rwanda



In rural Rwanda, customers of OX Delivers – mostly smallholder farmers and small-scale traders – can access the transportation service by booking space on the truck via a basic app built for 2G phones. Truck drivers, who negotiate prices and build face-to-face relationships with the customers, are the growth drivers for the business. The company charges around USD 0.50 to transport a 100-kilogram sack 10 kilometres, same as cargo bicycles, but can travel further and offers a discount for return trips. The company says it keeps its costs down by owning and streamlining every stage of the supply chain. The truck parts are flown into Rwanda from the UK for assembly, and the company has installed private charging depots to make up for the lack of public charging infrastructure in the country.

2.2.4 Electric trucks

The adoption of electric trucks in sub-Saharan Africa remains in its very early stages. Some of the region's early adopters include Shoprite in South Africa³³ and LaFarge in Nigeria,³⁴ who each added their first heavy duty electric truck to their fleets in order to improve the sustainability of their supply chains. In Rwanda, a delivery start-up, OX Delivers, has introduced an innovative pay-as-you-go (PayGo) electric truck service that transports a wide range of produce and equipment for smallholder farmers and traders (**Box 2**).³⁵

2.3 E-MOBILITY BUSINESS MODELS

Several innovative business models have emerged in the African e-mobility sector in recent years. Successful business models vary by country and depend on a number of factors, such as urbanisation levels, population density, terrain and the evolution

of the built environment. In many countries across the continent, e-mobility companies offer two-wheel motorbikes and passenger buses, as these tend to be the most prevalent forms of transportation in the region.

There are several different business models that can be applied to e-mobility, including (but not limited to) Battery-as-a-Service (BaaS)/battery-swapping stations, charging infrastructure, pay-as-you-go (PayGo) options, leasing, fulfilment, on-demand logistics and pay-as-you-drive options. Other business models in nascent stages of deployment include battery assembly and e-motorcycle assembly and manufacturing.

Table 2 summarises how different e-mobility business models can impact the approach to financing of both the underlying business and the end-user consumer.

33) "Electric trucks can invigorate South Africa's transport industry," Scania, (December 2022): <https://www.scania.com/group/en/home/electrification/e-mobility-hub/electric-trucks-can-invigorate-south-africa-transport-industry.html>

34) "Lafarge Africa Pioneers Green Mobility in Africa with the Introduction of an Electric Truck in its Supply Chain," Lafarge, (October 24, 2023): <https://www.lafarge.com.ng/lafarge-africa-pioneers-green-mobility-africa-introduction-electric-truck-its-supply-chain-fleet>

35) O'Callaghan, T., "A pay-as-you-go electric truck is making deliveries on Rwanda's dirt roads," CNN, (October 17, 2023): <https://edition.cnn.com/2022/07/20/africa/ox-delivers-electric-off-road-truck-rwanda-spc-intl/index.html>

TABLE 2. E-mobility business models in sub-Saharan Africa³⁶

BUSINESS MODEL	FINANCING MECHANISM	DESCRIPTION	EXAMPLE(S) OF COMPANIES DEPLOYING MODEL
Battery-as-a-Service (BaaS)/ battery-swapping stations	Asset-finance purchase	<ul style="list-style-type: none"> Under this model, commercial boda drivers or consumers purchase an e-motorcycle or e-scooter without the battery outright or through asset-finance. Drivers swap the drained battery for a charged one at a swapping station for a fixed amount, or per mile, or per kWh used/charged. 	Ampersand, Powerhive, ARC Ride, Spiro, Zembo, GOGO, Mazi, Stima
Battery charging stations/home charging	Asset-finance purchase	<ul style="list-style-type: none"> Boda drivers purchase e-motorcycle and battery, charge at home or at a charging station. 	Roam, Fika, SAFIRIDE
Pay-as-you-go (PayGo)	PayGo financing	<ul style="list-style-type: none"> Under the PayGo model, commercial boda drivers purchase the e-motorcycle or e-scooter without batteries and pay a small rental fee to carry the charged battery in their e-motorcycle/e-scooter. An IOT smart battery allows operation of the vehicle and battery when the battery is topped off through a mobile app. 	Ecobodaa
Leasing	Lease financing	<ul style="list-style-type: none"> An EV, e-motorcycle or e-scooter leasing model involves fleets of vehicles that are leased to corporate or delivery fleet operators The fleet operators hire drivers. 	Kiri
Fulfilment	Fee-based	<ul style="list-style-type: none"> The fulfilment model involves an e-mobility company providing E-bikes or EVs to corporations or delivery app operators together with the driver. The drivers pay a small fee for the use of the bicycle or vehicle and earns wages from the corporation or delivery app operator. 	eBee, Ewaka, Karaa, Wahu Mobility
On-demand logistics	Pay per kg or per km	<ul style="list-style-type: none"> This model provides on-demand logistics in emerging markets. Customers pay per kg or per km for goods to be transported to specific locations. For example, the on-demand logistics trucking company, OX Deliveries, provides services in Rwanda with zero-emission electric OX trucks, which are built to handle extreme terrain (Box 2). There is a web app for dispatching, routing and scheduling vehicles and a pay-as-you-go app that allows mobile phone users to utilise the service. 	OX Deliveries

36) Shell Foundation, 2022; and "Mobilising Finance for EVs in India," Rocky Mountain Institute, (2021): https://www.niti.gov.in/sites/default/files/2023-02/RMI-EVreport-VF_28_1_21.pdf; and "Charge up! Battery-as-a-Service: A pioneering business model for driving the e-mobility transition in Africa," Imperial College of London and Mercy Corps, (June 2023): https://sun-connect.org/wpcontent/uploads/Charge-Up-report_web.pdf

TABLE 2. *Continued*

BUSINESS MODEL	FINANCING MECHANISM	DESCRIPTION	EXAMPLE(S) OF COMPANIES DEPLOYING MODEL
Pay-as-you-drive/ e-bus financing	Pay-as-you-drive financing models including a purchase option and a lease option	<ul style="list-style-type: none"> — This model offers a ‘pay-as-you-drive’ battery subscription model. Typically, bus operators purchase the e-bus without the battery and then pay per km to lease the battery and for the energy used. — For example, BasiGo, a Kenyan e-mobility company that launched passenger e-buses in 2022, offers an e-bus designed for Kenya’s transportation sector with the ability to recharge in less than two hours and can operate up to 400 km per day, making it a viable option for intra-county transit. Under the company’s pay-as-you-drive battery subscription model, the owner pays Kes 20 (approximately EUR 1.50) per km for all battery-related costs, including charging, warranty, service and maintenance. — In Rwanda, IZI Electric has signed agreements to deliver 100 minibuses that operate under a pay-as-you-drive model. 	BasiGo, IZI Electric

2.4 FINANCING E-MOBILITY

Access to financing is critical to the success of the EV transition in sub-Saharan Africa. Scaling up growth of the sector will require various forms of financing from donors, DFIs and investors, including grants, results-based financing (RBF), guarantee facilities, trade finance, project financing, corporate debt, equity, asset and consumer financing. Development finance institutions have an important role to play in nascent or higher-risk markets, while more developed markets can rely on private sources of financing (venture capital, private equity) and corporate debt once the market matures.

E-mobility companies that operate across sub-Saharan Africa typically import or assemble e-bicycles, e-motorcycles, three-wheel EVs and e-buses and supply and maintain batteries for these vehicles. Companies that provide the full ecosystem of EV products and services must secure a large amount of financing to import parts, assemble EVs and batteries, then either sell their EVs to corporate fleet managers or partner with asset finance companies to sell their products to end users. These companies hence require up-front CAPEX.

Other companies that specialise in providing battery maintenance, charging infrastructure and digital monitoring and support services require CAPEX to build out manufacturing/assembly facilities and battery-swapping stations. Typical OPEX for these companies includes employee wages (corporate, assembly, battery-swapping station attendants, EV and battery engineers and system designers), and electricity costs for assembly facilities, among others.

Charging infrastructure and electricity grid development are also essential to enable growth in the e-mobility sector. Electricity grid operators require large-scale infrastructure financing to invest in expanding and upgrading power networks. A range of financing options exist for charging infrastructure, including commercial finance, leasing and traditional project finance structures. Innovative financing models such as carbon credits are another option receiving greater consideration in the e-mobility space. Where grid tariffs are high, a concessional grid tariff for EV charging can also encourage EV uptake.

2.4.1 Financing needs for e-mobility companies

The various business models discussed in [Section 2.3](#) are key areas where financing is needed to catalyse EV market development. Investment in these models includes (but is not limited to) the following three main methods and vehicles:

- **Patient capital** allows e-mobility start-ups time to build their business and become profitable. Start-up e-mobility operators (importers, assemblers, suppliers) require significant investment, as the CAPEX required to purchase or manufacture EVs and/or batteries is high
- **Asset finance** helps consumers overcome the high up-front costs of switching from an ICE vehicle to an EV, provided that certain consumer credit criteria are met.
- **Trade finance** leverages e-mobility companies' limited finances with working capital solutions to expedite the importation of more EVs to Africa.

E-mobility companies at different stages of development require different types of financing. Early-stage e-mobility companies require seed capital (typically either equity or venture debt), grant funding and various forms of technical assistance (TA) and networking support. Growth/expansion stage e-mobility companies require private equity capital and/or DFI growth capital, concessional finance (e.g., blended finance that uses development finance for the mobilisation of additional funding), FI loan guarantees and TA. Mature e-mobility companies tend to require traditional FI lending.

The capital needs for early-stage e-mobility companies also depend on their products/services and business model (see [Table 2](#)). For companies that sell EVs with batteries through an asset financing model (e.g., Roam), the product (e-bikes with batteries) can be sold under a purchase order, meaning that

almost the entire CAPEX for the business can be met through trade finance.

For companies that sell EVs without batteries and operate battery-swapping stations (e.g., Ampersand, ARC Ride, Powerhive), while the e-bikes can be sold to offtakers through a similar short-term trade finance scheme, financing the swapping station batteries and infrastructure is more challenging because repayment relies on sufficient cash flows. At an early stage, without enough bikes on the road to provide comfort to investors/lenders on unit economics, these companies need equity to provide the CAPEX to build out their charging networks. As they become more mature with sufficient proof of concept, the charging infrastructure can be financed with traditional project debt of at least 3-5 year tenors, with the assets placed in SPVs.

Leasing and fulfilment models also face similar challenges as the vehicles, batteries and charging stations all must be amortised from cash flows.

While the e-mobility sector has generated excitement as an impact investment class that could eventually produce a handful of “unicorn” companies, the growth for most companies in Africa is already much slower than projected, largely due to faltering global and local economies, steep learning curves in consumer awareness and acceptance, and early experimentation with product designs and business models. This means that for most companies in the space, early-stage investment needs to be patient capital with 5-10 year time horizons. Moreover, when financing infrastructure for low-income populations, it would be prudent to seek investment that expects infrastructure level rather than venture type returns.

2.4.2 Financial instruments

A variety of financial instruments are required to meet the financing needs of e-mobility companies, depending on their business model and stage of development. These include debt for CAPEX/growth, equity and convertible note financing, grant funding, asset finance and trade finance (Table 3).

E-mobility companies can additionally benefit from other support mechanisms that can be provided by the public and private sectors, including the following:

- **Business incubators and technical assistance** can help nascent technologies or business models develop with support from industry expertise, networking, knowledge-sharing and capacity building (Box 3).
- **Foreign exchange (FX) risk management** is an important consideration for many companies operating in sub-Saharan Africa due to frequent currency devaluation. There are mechanisms that companies can employ to manage and mitigate FX risk, including forward contracts, options contracts, FX insurance products, currency diversification and the use of local currency financing.
- **Green corporate bonds** have become common financial instruments in developed and emerging markets since the first green bond was issued by the World Bank in 2008. For e-mobility, some of the proceeds from the issuance of a green corporate bond or a green sovereign bond could be used to fund an incubator, set up an inventory financing mechanism or fund direct investments into e-mobility enterprises or related e-mobility infrastructure. To launch a successful green bond issue, an e-mobility company would have to show some scale and strong cash flows demonstrating sound unit economics.

TABLE 3. Financial instruments for e-mobility companies³⁷

FINANCIAL INSTRUMENT	DESCRIPTION
Debt	<ul style="list-style-type: none">— CAPEX/growth debt financing is necessary for e-mobility companies to import EVs, batteries and parts as well as to build out battery charging infrastructure/swapping stations.— If debt financing can be obtained in local currency-denominated debt, companies can to some extent reduce exposure to foreign exchange (FX) risk. Companies that import EVs and sell them to an off-taker are only exposed to FX risk if the purchase order is denominated in local currency. If they run charging or battery-swapping stations or if they own and lease the EVs, then FX risk is much higher.
Equity	<ul style="list-style-type: none">— Equity and convertible notes are needed most by start-ups.— Once the company is up and running and achieves a degree of scale (with proven revenues and good unit economics), then debt becomes a viable instrument.

37) Imperial College of London and Mercy Corps, 2023

TABLE 3. *Continued*

FINANCIAL INSTRUMENT	DESCRIPTION
Grants	<ul style="list-style-type: none"> — Grant funding is also desirable for nascent e-mobility companies, technologies, products and markets where investment is lacking due to perceived risk and/or unproven business models. — Grants or other forms of blended finance provided by donors, DFIs or other development partners and institutions may be the only way a developer can access capital to grow their business with nascent technologies and/or in frontier markets.
Asset finance	<ul style="list-style-type: none"> — Asset finance allows e-mobility companies to get their EVs to market, while overcoming the high up-front cost of purchasing an EV, by moving their main products to a third party and de-risking their operations. In many cases, asset finance companies will purchase the EV and lend to the consumer on a PayGo basis at high interest rates. — Such companies are challenged when they start to see defaults (which can be up to 30% in the sector), which lead to more risk. Additionally, companies largely borrow to run their operations with hard currency loans and lend out in local currency. Any future depreciation in local currency needs to be factored into pricing for consumers. — The asset finance market for commercial boda purchases is robust in Kenya and Uganda. Watu and Mogo are examples of asset finance companies in Kenya that have traditionally served ICE motorbikes and have entered the e-mobility marketplace. In Kenya, new entries into e-mobility asset finance include M-Kopa, BBOX, 4G Capital and Fortune MFI. In Uganda, Tembo Auto, Tugende and Asaak are leaders in the space. — Other models for asset finance that are being explored can further reduce risk. Asset finance with a first-loss guarantee backstopped by a DFI or other third party guarantor would allow for a reduction of portfolio risk for asset finance companies, which could result in increased funding available for asset finance at lower pricing for the EV market.³⁸ — An Internet-of-Things (IoT)-based payment model could leverage vehicle data to reduce asset-finance risk and increase the amount of funding available as well as potentially lower asset finance rates. In certain instances, motorcycle asset financiers like Mogo, Watu and M-Kopa, are willing to decrease interest rates if there is enhanced traceability/increased touchpoints available at swap stations.³⁹
Trade finance	<ul style="list-style-type: none"> — Trade finance can be set up as an instrument that allows companies to afford up-front CAPEX (e.g., importing e-motorcycle parts or battery components) at reasonable interest rates with a promise to pay back once the inventory is used and the end-products are sold. This instrument promotes growth and reduces risk. — Given the limited working capital available to start-up e-mobility companies in Africa, trade finance can be a critical barrier. In Kenya, GreenShift Africa is a trade facilitation platform launched by GreenMax Capital Advisors that has partnered with Tradeable House Africa to address a critical funding gap for African e-mobility companies and accelerate development of the sector (Box 4).

38) As an example, GreenMax Capital Group's Green-for-Access First Loss Facility (G4A) is resulting in interest rates up to 700 bps lower from lenders in Nigeria and Kenya to purchasers of e-bicycles and solar cooling devices.

39) Imperial College of London and Mercy Corps, 2023

BOX 3. GET.invest Finance Access Advisory



Through the GET.invest Finance Access Advisory (and its two support facilities - the Finance Catalyst and the Finance Readiness Support), e-mobility companies are able to receive tailored, free-of-charge assistance throughout their access to finance journey. Services include customised business development support, advisory on investment strategy, financial structuring and financial modelling, introduction to suitable financiers, transaction advisory and post-investment support. To date, over 30 e-mobility companies across East and West Africa, the Caribbean and the Pacific regions have received support. (Applications can be submitted at any time through the GET.invest website: www.get-invest.eu/finance-access-advisory)

BOX 4. GreenShift Africa e-mobility trade facilitation platform⁴⁰



GreenShift is a trade facilitation platform for the e-mobility sector that aims to address a critical funding gap for African e-mobility companies and accelerate the development of low-carbon mobility across the continent. Through a partnership with Tradeable House Africa, a standard trading arrangement can be delivered to leverage the e-mobility company's limited working capital and offtaker relationships to substantially increase the number of EVs they can import. GreenShift is being piloted in East Africa due to the high concentration of e-mobility companies active in the market and a supportive government policy environment, with plans to expand to West and Southern Africa.

40) GreenShift Africa: <https://greenmaxcap.com/service/greenshift-africa/>

2.4.3 Sources of financing

A variety of financial institutions and investors have invested and will be needed to invest in the African e-mobility sector. These include donors and DFIs, impact investors, strategic investors, venture capital, specialised debt funds and trade financiers.

Donors and DFIs

Donors and DFIs such as the AfDB, World Bank, European Investment Bank (EIB), European Union (EU), GIZ and UN, among others, are increasingly active in the African e-mobility space – both directly through donor programmes and initiatives and indirectly through DFI-invested funds. Development financiers are providing a range of funding and TA to support urban e-mobility and infrastructure development, including electrification of buses and public transport systems. The Transformative Urban Mobility Initiative (TUMI), funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by GIZ, is a leading global sustainable mobility platform that provides funding for climate-friendly mobility in cities. TUMI is currently supporting the rollout of e-bus initiatives in Nairobi, Kenya, Durban, South Africa and Kampala, Uganda (see [Box 7](#)). Through its Global Electric Mobility Programme, UNEP is helping several African countries develop e-mobility policies, roadmaps and standards, and is supporting knowledge-sharing and capacity building in the sector through engagement with technology providers and investors.⁴¹

Notable DFI investments in the e-mobility sector include (but are not limited to) the following:

- In 2021, IFC provided USD 10M to Moove, a Nigerian mobility start-up, to invest in energy efficient vehicles.⁴²

- US International Development Finance Corporation (DFC) provided USD 10M in debt funding to Roam to support the development of electric motorcycles, buses and charging stations in Kenya.⁴³
- DFC provided USD 9M in debt funding to Ampersand to scale its e-motorcycle operations in Kenya and Rwanda.
- In 2023, British International Investment (BII) signed a USD 5M debt financing agreement with BasiGo to scale its electric bus assembly operations in Kenya.⁴⁴

Impact investors and strategic investors

Impact investors and strategic investors are focused on directly supporting e-mobility start-ups across the continent. Ampersand, ARC Ride, BasiGo, Roam and others have received funding from numerous impact and strategic investors (see [Annex 1](#)).

A few examples of **impact investors** active the African e-mobility space include (but are not limited to) the following:

- Siemens Stiftung has invested in e-mobility incubation programmes for pilot projects and new business models in sub-Saharan Africa.⁴⁵
- Persistent Energy, an equity investor in early-stage climate-focused companies, has invested in several EV companies, including Solar Taxi in Ghana,⁴⁶ Ecobodaa in Kenya⁴⁷ and Tri in Tanzania.⁴⁸
- In 2023, Mercy Corps Ventures, the impact investing arm of Mercy Corps, invested in Kofa, a Ghanaian e-mobility company that manufactures portable batteries and operates a distribution network of battery-swapping stations, managed through a digital software platform.⁴⁹

41) UNEP Global Electric Mobility Programme: <https://www.unep.org/explore-topics/transport/what-we-do/global-electric-mobility-programme>

42) "IFC, Moove Join Forces to Boost Urban Mobility, Drive Growth in Nigeria's Megacity, Lagos," International Finance Corporation (IFC): <https://pressroom.ifc.org/all/pages/PressDetail.aspx?ID=26567>

43) "Scaling E-mobility in East Africa," Medium, (June 7, 2023): <https://powerafrica.medium.com/scaling-e-mobility-in-east-africa-428d50e20c7d>

44) Abuya, K., "BasiGo gets \$5 million loan to ramp up e-bus assembly in Kenya," TechCabal (December 5, 2023): <https://techcabal.com/2023/12/05/basigo-gets-5-million-debt-funding/>

45) Siemens Stiftung: <https://www.siemens-stiftung.org/en/foundation/social-entrepreneurship/e-mobility/>

46) "Persistent's e-mobility venture building expands to West Africa with Solar Taxi partnership," Persistent Energy, (July 4, 2022): <https://persistent.energy/news/persistents-e-mobility-venture-building-expands-to-west-africa-with-solar-taxi-partnership/>

47) Ecobodaa: <https://persistent.energy/investee/ecobodaa/>

48) Tri: <https://persistent.energy/investee/tri/>

49) "Powering African Economies Through Distributed, Climate-Smart Energy," Mercy Corps Ventures, (April 11, 2023): <https://medium.com/mercy-corps-social-venture-fund/powering-african-economies-through-distributed-climate-smart-energy-1872345d1929>

A few examples of **strategic investors** active in the African e-mobility space include (but are not limited to) the following:

- In 2022, TotalEnergies formed a strategic partnership with Ampersand that will utilise Total's existing retail network in Kenya to support the roll out of Ampersand's electric motorcycle battery-swapping and charging stations in the country.⁵⁰
- In 2022, ARC Ride announced a strategic partnership and equity investment by Musashi Seimitsu and Watu – with Musashi to expand ARC Ride's e-motorcycle fleet to include additional products (electric personal transport vehicles and a last-mile goods delivery vehicle) and Watu to utilise its financing experience to help ARC Ride grow its business in Nairobi's transport network.⁵¹
- In 2022, Toyota Tsusho invested in BasiGo to support the rollout of its electric bus sales and battery leasing business in Kenya.
- In 2024, Dodai, an Ethiopian EV start-up that assembles and distributes e-motorbikes in Addis Ababa, raised USD 4M in its Series A funding round with support from Nissay Capital and Musashi Seimitsu.⁵²

Venture capital

Venture capital (VC) funds have also been active in funding e-mobility start-ups in sub-Saharan Africa. In 2021-2022, e-mobility companies in Kenya, Nigeria, Rwanda, South Africa and Uganda received over USD 50M in VC funding. An increasing number of

VC funds and investors are entering the space, attracted by the growth opportunity forecasted in the region's e-mobility sector. Funds are also attracted by the potential to gain first mover advantage, as the scarcity of players means early movers could obtain a large market share.⁵³ A few examples of VC investors active the African e-mobility space include (but are not limited to) the following:

- In 2021, Ampersand secured USD 3.5M from Ecosystem Integrity Fund (EIF), a venture capital firm that invests in early-stage companies contributing to environmental sustainability;⁵⁴ in 2024 the company received additional funding from Beyond Capital Ventures, an emerging markets venture capital firm.⁵⁵
- In 2021, Nigerian mobility start-up MAX raised a USD 31M round to expand into Ghana and Egypt. This Series B round was co-led by Lightrock, a global private equity platform, and Global Ventures, a UAE-based international venture capital firm. Other existing investors Novastar Ventures and Yamaha also participated in the round.⁵⁶
- In 2022, BasiGo secured KES 800M from Mobility54, the corporate venture capital arm of Toyota Tsusho; Trucks VC, a transportation-focused VC fund in Silicon Valley; and Novastar Ventures, a global VC supporting entrepreneurs transforming markets in Africa.⁵⁷ In 2024, BasiGo raised another USD 3M in equity funding from CFAO, an affiliate of Toyota Tsusho with operations in over 40 African countries.⁵⁸

50) Kuhudzai, R.J., "Ampersand Partners With TotalEnergies Kenya To Roll Out Electric Motorcycle Battery Swapping Stations In Kenya," CleanTechnica, (June 22, 2022): <https://cleantechnica.com/2022/06/22/ampersand-partners-with-totalenergies-kenya-to-roll-out-electric-motorcycle-battery-swapping-stations-in-kenya/>

51) Kuhudzai, R.J., "ARC Ride Partners With Musashi Seimitsu & Watu," CleanTechnica, (2022): <https://cleantechnica.com/2022/07/28/arc-ride-partners-with-musashi-seimitsu-watu/>

52) "Addis Ababa EV Startup Dodai Secures \$4 Million in Series A Funding," Empower Africa, (March 15, 2024): <https://empowerafrica.com/addis-ababa-ev-startup-dodai-secures-4-million-in-series-a-funding/>

53) Dalberg, 2022.

54) Kuhudzai, R.J., "Ampersand Secures Sub-Saharan Africa's Largest-Ever Private Investment In Electric Mobility," CleanTechnica, (April 8, 2021): <https://cleantechnica.com/2021/04/08/ampersand-secures-sub-saharan-africas-largest-ever-private-investment-in-electric-mobility-3-5-million/>

55) "Beyond Capital Ventures Invests in Ampersand E-Mobility," Beyond Capital Ventures, (February 15, 2024): <https://www.prweb.com/releases/beyond-capital-ventures-invests-in-ampersand-e-mobility-302060242.html>

56) "MAX raises \$31 million Series B funding to expand across Africa and build electric vehicle infrastructure," (December 21, 2021): <https://www.benjamindada.com/max-raises-31m-expand-africa-build-electric-vehicle-infrastructure/>

57) "BasiGo bags Sh800 million venture capital to drive electric motoring," Business Daily, (November 15, 2022): <https://www.businessdailyafrica.com/bd/markets/capital-markets/basigo-bags-sh800-million-venture-capital-to-drive-electric-motoring-4021188>

58) Jackson, T., "Kenyan electric bus startup BasiGo raises \$3m funding," Disrupt Africa, (April 3, 2024): <https://disruptafrica.com/2024/04/03/kenyan-electric-bus-startup-basigo-raises-3m-funding/>

- In 2023, On.Capital invested in STIMA, a Kenya-based software-as-a-service provider for the e-mobility sector.
- In 2023, Moove raised USD 76M in funding, consisting of USD 28M in equity, USD 10M in venture debt, and USD 38M in additional funds to support its global expansion. BlackRock manages the venture debt, while Mubadala Investment Company led the equity round.⁵⁹
- In 2021, InfraCo Africa, DOB Equity and Mobility54 committed USD 3.4M to support the growth of Zembo, an e-motorcycle business in Uganda.

2.4.4 Recent capital raises

Given the nascent stage of the market, financing rounds of sub-Saharan Africa e-mobility companies have been led by venture capital equity and debt from DFIs, including U.S. International Development Finance Corporation (DFC), British International Investment (BII), USAID and DEG (the German Development Finance Institution), among others.⁶⁰ **Annex 1** summarises financing rounds of e-mobility companies in sub-Saharan Africa (as of January 2024).

2.4.5 Challenges for e-mobility investors

Throughout sub-Saharan Africa, the e-mobility sector faces different supply- and demand-side financing challenges.

On the supply side, investors face a challenge to meet a risk-return ratio that justifies their investments in the sector. Investors also face barriers with the time to realise any investment returns and the lack of transparency with information and data required to properly assess risks and market potential. Feedback from e-mobility investors has been that the first round of funded companies are not meeting their numbers, leaving potential investors wary. Many business models are also being introduced and investors may wait until some have been proven and there are clear 'winners.'⁶¹

On the demand side, while several countries in sub-Saharan Africa offer opportunities for investment in the e-mobility sector, the financial products offered by investors and financial institutions may not match up well with the start-up financing needed by many e-mobility companies (e.g., type, tenor). Investors may also have more stringent investment criteria (e.g., collateral, managerial capabilities) than most e-mobility start-ups can meet.⁶² For example, most e-motorcycle assemblers and importers operating in Africa are still small, early-stage companies that often face cash-flow constraints because they are unable to negotiate favourable payment terms from suppliers. A Shell Foundation study carried out in 2022 found that some assemblers must make a six-month advanced payment for imported e-motorcycle kits.⁶³

2.5 EMERGING E-MOBILITY TECHNOLOGIES AND INNOVATORS

Sub-Saharan Africa has become a hub for innovation in the e-mobility space, with companies launching business models that aim to fill gaps in transportation services without waiting for infrastructure and grid expansion to catch up.⁶⁴ Business models often vary by country and depend on urban settings and enabling conditions. Many innovative models and technologies are being tested in Kenya and in other East African countries, although market activity is also ramping up in parts of West Africa.⁶⁵ Innovation is sometimes less about the technology and more about innovative ideas to make e-mobility more accessible to consumers through the business model, advocacy or awareness raising, or through the deployment of unique financing mechanisms that resolve structural hurdles.

59) "Moove raises \$76 million in new funding to support global expansion," Techpoint Africa, (August 10, 2023): <https://techpoint.africa/2023/08/10/moove-76m-funding/>

60) Power Africa, 2023.

61) "Catalyzing Investment in Electric Mobility: The case for Africa and the Middle East," Dalberg, (April 2022).

62) Ibid

63) "Financing the transition to electric vehicles in sub-Saharan Africa," Shell Foundation, (January 2022): <https://shellfoundation.org/app/uploads/2022/02/EV-Report-McKinsey.pdf>

64) "Scaling E-Mobility in East Africa," Power Africa, (June 7, 2023): <https://powerafrica.medium.com/scaling-e-mobility-in-east-africa-428d50e20c7d>

65) Surrat, L. Y., Singh, S., and Fikresilassie, A., "Kenya's electric mobility transformation can offer a model for other countries," GreenBiz, (2022): <https://www.greenbiz.com/article/kenyas-electric-mobility-transformation-can-offer-model-other-countries>

2.5.1 Local assembly and supply chain

Some e-mobility companies, such as Siltech in Nigeria,⁶⁶ Roam in Kenya,⁶⁷ and SolarTaxi in Ghana,⁶⁸ focus on assembling EVs locally, which in some cases enables them to access tax benefits or subsidies, depending on the country. This method can be less expensive than importing bikes. If local supply chains can also be established for some of the parts, this would help shield companies from global supply chain interruptions (although nearly all parts still come from Asia).

2.5.2 Battery technology services and manufacturing

There is on-going research and development into battery technologies. Battery performance has steadily improved in the recent years, which combined with falling costs improves the economics for e-mobility companies. Emerging technologies and innovators in the e-mobility sector are concentrated in the

battery supply chain and in battery assembly and manufacturing. Two examples of innovators in the battery segment include GOGO in Uganda (Box 5) and Mobile Power (MOPO) (Box 6), which currently operates in Chad, DRC, Gambia, Liberia, Nigeria, Sierra Leone, Uganda and Zambia.

2.5.3 EV charging stations and infrastructure

The buildout of EV charging infrastructure is still in its very early stages in sub-Saharan Africa. E-mobility companies are developing charging stations, which are essential for scaling e-mobility, especially in rural settings. In addition to battery charging stations, battery-swapping stations have become commonplace in most e-mobility markets across the region. PayGo financing models, e-motorcycle and e-bicycle leasing, commercial fulfillment services, on-demand logistics and other business models are being employed in e-mobility markets (Table 2).

In 2022, 'Charge Up!', a collaborative project between Mercy Corps, ARC Ride, Fika Mobility, Imperial College London and Strathmore University was awarded USD 300,000 to establish a network of charging stations across Nairobi to provide convenient, affordable battery-swapping stations for e-scooters and e-motorcycles.⁶⁹ Since the inception of this project, e-mobility companies have expanded the number of swapping stations. As of 2024, ARC Ride has expanded to 76 swapping stations powered by solar energy. Ampersand currently serves 1,700 users from 32 battery-swapping stations in Kigali and Nairobi.⁷⁰

EV companies are working to improve the technology by learning from pilot projects, integrating elements such as customer feedback, road quality and needs. As an example, in Nigeria, MAX was able to significantly improve its e-motorbikes during a pilot conducted with the Nigerian GMG developer, Rubitec, under the Nigerian Energy Support Programme (NESP).

2.5.4 E-mobility companies in sub-Saharan Africa

Investment in companies, expanded electricity access and supportive government policy and regulation have contributed to the growth of start-ups in the African EV industry. Annex 2 describes several of these e-mobility companies, including their products, services and business models.

66) Siltech is the manufacturer of the Falcon, a 65% made-in-Nigeria three-wheeler. Silicon Africa: <https://silicon africa.org/there-is-high-consid-eration-for-electric-vehicle/>
67) "FG enables 10-year tax relief for electric vehicle manufacturers in Nigeria," Nairametrics, (May 2023): <https://nairametrics.com/2023/05/27/fg-enables-10-year-tax-relief-for-electric-vehicle-manufacturers-in-nigeria-dg-naddc/>
68) "Local Company Awarded Electric Bus Assembling Tender," Kenya News Agency, (September 20, 2023): <https://www.kenyanews.go.ke/local-compa-ny-awarded-electric-bus-assembling-tender/>

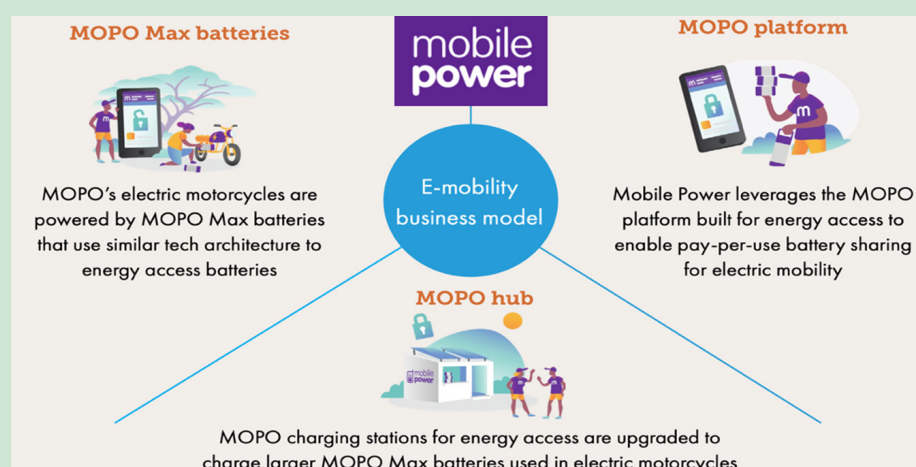
69) "New e-mobility charging stations will help bring cleaner and greener transportation to Kenya and beyond," Mercy Corps, (Aug. 2, 2022): <https://energy4impact.org/news/new-e-mobility-charging-stations-will-help-bring-cleaner-and-greener-transportation-kenya-and#:~:i>
70) "Ampersand is amping up e-motorcycles in Africa and is developing next-gen battery tech with taxi drivers in mind," Footprint Coalition, (January 9, 2024): <https://www.footprintcoalition.com/post/ampersand-is-amping-up-e-motorcycles-in-africa-and-is-developing-next-gen-battery-tech-with-taxi-dri>

BOX 5. GOGO EV battery manufacturing

GOGO (formerly Bodawerk), a Uganda-based e-motorcycle and smart battery assembly company, is the sole manufacturer of lithium-ion battery packs in East Africa, with in-house development and production, as well as internet of things (IoT) integrated systems that enables PayGo financing. GOGO's batteries can also be used for multiple applications including e-motorcycles, boats and tractors. GOGO has plans to recycle lithium-ion batteries but is currently focusing on their core competencies: smart battery assembly, e-motorcycle manufacturing and the operation of on-grid battery-swapping stations in the capital, Kampala. In 2023, GOGO announced a partnership Watu Credit Uganda to finance its expansion initiatives as well as provide credit for boda boda riders to switch to EVs.⁷¹

BOX 6. Mobile Power (MOPO) battery charging

Mobile Power (MOPO) is a UK-based e-mobility operator that manufactures e-motorcycles and MOPO Max batteries. MOPO has identified accessing high-quality battery technology as a critical challenge, as most batteries accessible to African e-mobility companies discharge more rapidly than higher quality batteries, causing them to reach their end of life sooner than the number of cycles the battery was rated for when sold. MOPO has invested millions of dollars into R&D efforts and is working on its fourth iteration of e-mobility batteries. MOPO operates MOPO hubs – solar-powered charging stations used to collect discharged batteries, store the batteries securely and recharge them. These charging stations were initially designed for energy access and later upgraded to charge larger MOPO Max batteries used in e-motorcycles. MOPO is also engaging with asset-financiers to provide integrated pay-per-use battery solutions for its customers.⁷²



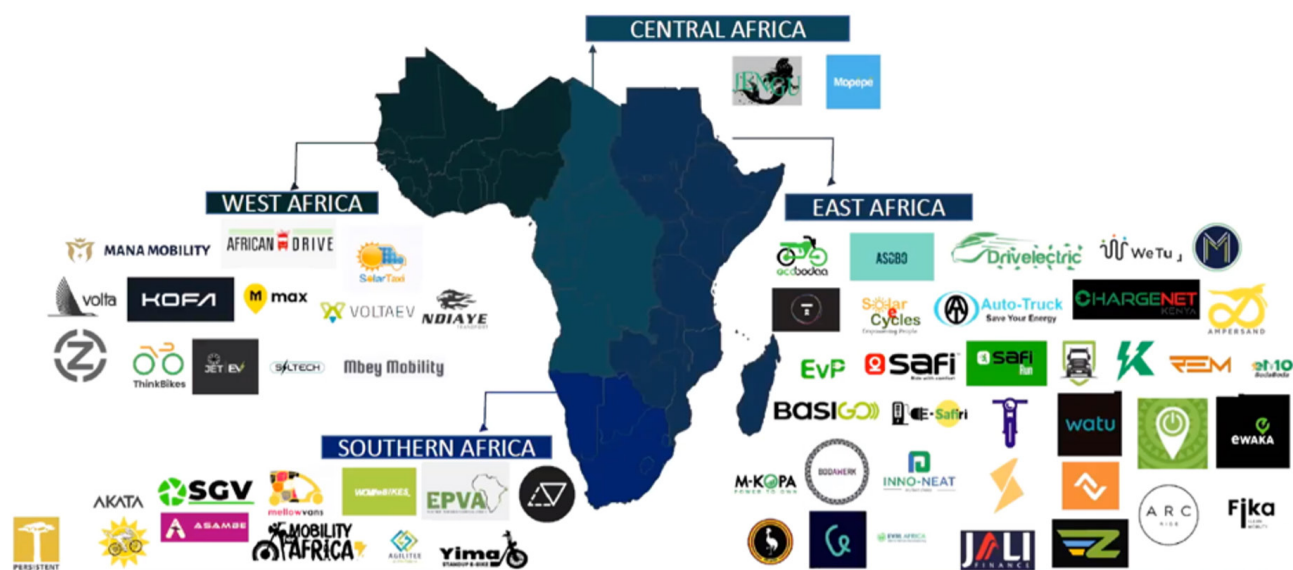
Source: Adapted from "Charging Ahead Accelerating E-Mobility in Africa," Powering Renewable Energy Opportunities, 2023.

71) Kuhudzai, R.J., "BODAWERK Rebrands To GOGO, Launches New Electric Motorcycle & Partners With Watu To Fund Expansion in Uganda," CleanTechnica, (August 2023): <https://cleantechnica.com/2023/10/06/bodawerk-rebrands-to-gogo-launches-new-electric-motorcycle-partners-with-watu-to-fund-expansion-in-uganda/>

72) "Charging Ahead Accelerating E-Mobility in Africa," Powering Renewable Energy Opportunities, (2023): https://www.preo.org/wp-content/uploads/2023/03/PRE_E-mobility-report.pdf

FIGURE 1. E-mobility start-ups across sub-Saharan Africa

As of 2022, at least 64 e-mobility start-ups were identified in sub-Saharan Africa, with the largest concentration of companies operating in East Africa (Figure 1).⁷³



Source: Persistent Energy Webinar: Business Readiness for E-mobility Start-ups in Africa

73) Please note that Figure 1 was completed in 2022 and does not include many of the players that have risen to prominence in 2023-2024, which can be found in Annexes 1-2 and Table 8.

2.6 CHALLENGES AND OPPORTUNITIES FOR THE E-MOBILITY SECTOR

2.6.1 Challenges and market barriers

E-mobility in sub-Saharan Africa is growing but the market is still in its nascent stages. A number of challenges hinder wider adoption and uptake of EVs across the region. **Table 4** summarises the key challenges facing the sector and includes proposed market interventions/risk mitigation measures.

TABLE 4. Summary of e-mobility market barriers and risks and proposed mitigation measures⁷⁴

BARRIER/RISK	DESCRIPTION	PROPOSED INTERVENTION/RISK MITIGATION MEASURE
Enabling policy and regulatory environment	<ul style="list-style-type: none"> — A conducive e-mobility policy and regulatory environment is critical, particularly given the early stage of the market throughout sub-Saharan Africa. Yet, most countries across the region lack specific policies, strategies or incentive frameworks in place for e-mobility. — The e-mobility sector requires extensive coordination and long-term planning among numerous market actors, including manufacturers, service providers, urban planners, grid network operators, end users etc., which cannot be done successfully without clean framework in place. — Many countries in sub-Saharan Africa continue to subsidise liquid fuels (gasoline and diesel), which inhibits development of alternative clean energy technologies, including e-mobility. 	<ul style="list-style-type: none"> — A conducive e-mobility policy and regulatory environment should include incentives to promote EVs over ICE vehicles (such as tax exemptions for EV components and a concessional grid tariff for EV charging) as well as integrated long-term electrification planning to support the roll out of charging infrastructure.⁷⁵ — Donor organisations can support the development of e-mobility policies and provide associated capacity building. For example, UNEP's Global Electric Mobility Programme is working with 50 low- and middle-income countries (including in Africa), to support their development of e-mobility policies, plans and incentive mechanisms.⁷⁶ — Governments are gradually reconsidering fossil fuel subsidies (e.g., Nigeria). In addition to eliminating subsidies, governments can increase taxes on polluting fuels to discourage the purchase of ICE vehicles, and place restriction on importing used vehicles.

74) Ayetor, G.K., Mbonigaba, I., and Mashele, J., "Feasibility of electric two and three-wheelers in Africa," Green Energy and Intelligent Transportation, 2, (August 2023): <https://doi.org/10.1016/j.geits.2023.100106>

75) Dalberg, 2022.

76) UNEP Global Electric Mobility Programme: <https://www.unep.org/explore-topics/transport/what-we-do/global-electric-mobility-programme>

TABLE 4. Continued

BARRIER/RISK	DESCRIPTION	PROPOSED INTERVENTION/RISK MITIGATION MEASURE
High up-front costs/purchase price	<ul style="list-style-type: none"> — The relatively high up-front cost for the acquisition of an electric vehicle is a common barrier to e-mobility uptake. — The average purchase price for EVs and electric motorcycles is higher than their ICE alternatives. The upfront cost for an e-motorbike costs about EUR 1,800 compared to EUR 1,300 for ICE equivalents.⁷⁷ The battery component in e-motorcycles accounts for 40% of this cost.⁷⁸ — Sub-Saharan Africa is the world's largest market for used vehicles. — Africans exhibit a high price elasticity of demand for goods and services generally, and the cost of owning a new vehicle is almost triple the cost of buying a used one. 	<ul style="list-style-type: none"> — Subsidy programs and/or concessional debt can improve e-mobility accessibility. Prices will also decline as the sector matures, with improvements in standardisation, cost reductions in technology and efficiency of battery systems. — Investment in charging infrastructure, Battery-as-a-Service (BaaS) and battery-swapping station models can help address the issue of battery costs. — Governments can adopt policies to limit the importation of ICE vehicles (and promote EVs) as well as pro-business trade policies and regulations that encourage in-country or in-region manufacturing.
Limited investment in the sector	<ul style="list-style-type: none"> — E-mobility does not attract as many investors as other renewable energy projects or sectors. — Given the nascent stage of the sector, a diverse range of funding is needed to support e-mobility companies, including concessional funds, growth and working capital to meet investee needs. 	<ul style="list-style-type: none"> — Donors and impact-focused investors can directly support start-ups to catalyse broader financing and stimulate market growth. — For example, GET.invest provides tailored support to help e-mobility and other clean energy companies get investor ready and access suitable financing. The programme also creates an enabling environment by collaborating with industry associations and other partners to build private sector capacity and mobilise investment for the (clean energy) sector; see Box 3. — Deploying the right mix of commercial and concessional capital is key to unlocking growth of the sector, including the use of blended finance approaches to de-risk investments and encourage investors to enter the market. — For example, IFC provided Moove – an African finance firm that provides vehicle financing to mobility entrepreneurs – with EUR 10M to invest in energy efficient vehicles in Lagos, Nigeria.⁷⁹

77) "Financing the transition to electric vehicles in sub-Saharan Africa," Shell Foundation, (January 2022): <https://shellfoundation.org/app/uploads/2022/02/EV-Report-McKinsey.pdf>

78) Imperial College of London and Mercy Corps, 2023.

79) "IFC, Moove Join Forces to Boost Urban Mobility, Drive Growth in Nigeria's Megacity, Lagos," International Finance Corporation (IFC): <https://press-room.ifc.org/all/pages/PressDetail.aspx?ID=26567>

TABLE 4. *Continued*

BARRIER/RISK	DESCRIPTION	PROPOSED INTERVENTION/RISK MITIGATION MEASURE
Limited investment in the sector (<i>continued</i>)		<ul style="list-style-type: none"> — Persistent Energy, an equity investor in early-stage climate-focused companies, has invested in several EV companies (e.g., Solar Taxi in Ghana, Ecobodaa in Kenya and Tri in Tanzania). — In 2023, Watu Credit Limited, an asset-finance company, announced strategic partnerships with Kenyan BaaS provider, ARC Ride,⁸⁰ and with Ugandan EV battery technology and service provider, GOGO.⁸¹
High cost of asset financing	<ul style="list-style-type: none"> — Asset finance is required for e-mobility companies to move their products to a third party and de-risk their operations. In many cases, asset finance companies will purchase the EV and lend to the customer on a PayGo basis at high interest rates. In a good economy, commercial drivers can afford to pay the daily or monthly financing charges; however, there is risk during economic downturns. — Once defaults begin, asset finance companies must charge higher interest rates; asset finance providers to the boda industry have seen default rates up to 30%. 	<ul style="list-style-type: none"> — Other models for asset finance can be explored to mitigate/reduce risk and decrease the high cost of asset financing (see Annex 1). — Asset finance with a first-loss guarantee backstopped by a DFI or other third party guarantor would allow for a reduction of portfolio risk for asset finance companies, which could result in increased funding available for asset finance at lower pricing for the EV market. — An Internet-of-Things (IoT)-based payment model could leverage vehicle data to reduce asset-finance risk and increase the amount of funding available as well as potentially lower asset finance rates.
Foreign exchange instability/risk	<ul style="list-style-type: none"> — Foreign exchange (FX) risk management is an important consideration for many companies operating in sub-Saharan Africa due to frequent currency devaluation. — Asset finance companies largely borrow to run their operations with hard currency loans and lend out in local currency. 	<ul style="list-style-type: none"> — There are mechanisms that companies can employ to manage and mitigate FX risk, including forward contracts, options contracts, FX insurance products, currency diversification and the use of local currency financing. — Any future depreciation in local currency needs to be factored into pricing for consumers.

80) Kuhudzai, R.J., "Watu Credit Partners With ARC Ride to Increase Number of EV Battery Swap Stations in Nairobi," CleanTechnica, (August 2023): <https://cleantechnica.com/2023/09/22/watu-credit-partners-with-arc-ride-to-increase-number-of-ev-battery-swap-stations-in-nairobi/>

81) Kuhudzai, R.J., "BODAWERK Rebrands To GOGO, Launches New Electric Motorcycle & Partners With Watu To Fund Expansion in Uganda," CleanTechnica, (August 2023): <https://cleantechnica.com/2023/10/06/bodawerk-rebrands-to-gogo-launches-new-electric-motorcycle-partners-with-watu-to-fund-expansion-in-uganda/>

TABLE 4. Continued

BARRIER/RISK	DESCRIPTION	PROPOSED INTERVENTION/RISK MITIGATION MEASURE
Lack of charging infrastructure, range limitations and poor road quality	<ul style="list-style-type: none"> — Across sub-Saharan Africa, limited or unreliable electricity supply, as well as an overall lack of investment in charging infrastructure hinder e-mobility uptake. — Although more charging and battery-swapping stations are being developed, urban planning will need to improve around the integration of e-mobility, as there are large capital and financing needs for this infrastructure. — Most EV charging ports remain limited to urban areas with consistent electricity supply and internet connectivity. — Due to limited charging infrastructure, e-mobility models are only suitable for short and medium distances, ranging 100 km to 700 km depending on the EV model. — Poor road quality is another key barrier to widespread EV deployment in the country. 	<ul style="list-style-type: none"> — Governments, donors and development partners can support the construction of enhanced charging infrastructure. — Outside of urban centres, mini-grids can integrate EV charging and battery swapping into their operations/networks to increase electricity demand and drive capacity utilisation, which improves the financial viability of the project. — Surveys of available road infrastructure should be undertaken in order to deploy tailored EVs best fit for certain terrain/road quality.
Limited technical expertise	<ul style="list-style-type: none"> — E-mobility is a new market, particularly in sub-Saharan Africa, so there is limited indigenous technical expertise in the sector. — Many countries across the region lack engineers and technicians with the skill sets needed for EV production and maintenance (including batteries and charging infrastructure). 	<ul style="list-style-type: none"> — Governments, donors and development partners can facilitate knowledge transfer and provide capacity building support to e-mobility public and private sector stakeholders. — Governments can partner with donors, NGOs, academia and industry associations to build local capacity and technical expertise in the sector, e.g., by establishing platforms for knowledge sharing, entrepreneurship support and technical certification programmes (e.g., for vehicle maintenance, battery charging etc.). — One such platform is provided by the Transformative Urban Mobility Initiative (TUMI), which serves as a network of information from academia, businesses, civil society and industry associations in the e-mobility space (Box 7).
Consumer awareness/acceptance	<ul style="list-style-type: none"> — Lack of consumer awareness/confidence in e-mobility technology solutions. 	<ul style="list-style-type: none"> — Develop strategies and marketing campaigns at the national and local level to raise public awareness of e-mobility technology solutions and benefits. — Raise awareness of e-mobility policy/regulation and associated programmes and initiatives among automotive industry associations, engineers and project developers. — Publish guidelines for the automotive industry around EVs.

BOX 7. Transformative Urban Mobility Initiative (TUMI)⁸²

The Transformative Urban Mobility Initiative (TUMI) is a leading global sustainable mobility initiative that supports climate-friendly, inclusive, safe and affordable mobility in cities. TUMI is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by GIZ. TUMI works with policymakers globally to transform urban mobility through its core pillars of innovation, knowledge and investment. TUMI supports innovative pilot projects, shares knowledge with planners about modern mobility concepts, and invests in construction and modernisation of sustainable urban infrastructure. TUMI has several global focus areas:

- **TUMI Challenges:** TUMI provides funding to cities to support the implementation of innovative pilot projects to start the urban mobility transformation.
- **TUMI Data:** TUMI provides mobility data and digital tools to policymakers and urban planners to support informed and evidence-based sustainable transport planning in cities across Africa, Latin America and Asia.
- **TUMI E-Mobility:** TUMI works with cities in the global south to introduce e-mobility solutions and promote the growth of sustainable public transport systems. TUMI E-Mobility has launched pilots in Asia and Latin America, supporting cities with development of integrated e-mobility plans.
- **TUMI E-Bus Mission:** Through its E-Bus Mission, TUMI is working to accelerate the rollout of e-buses globally by providing roadmaps and technical assistance to cities to support their transition to e-bus fleets. In sub-Saharan Africa, the TUMI E-Bus Mission has partnered with the cities of Nairobi, Kenya, Durban, South Africa and Kampala, Uganda.
- **TUMI Friends:** TUMI Friends serves as a guide for sustainable mobility and green logistics solutions for developing countries by providing a platform for knowledge-sharing and information from academia, businesses, civil society and industry associations in the e-mobility space.
- **Women Mobilize Women:** In 2018, TUMI launched 'Women Mobilize Women' as a network of female change makers from around the world, seeking to transform the mobility sector to become more diverse. The initiative also aims to raise awareness on the topic of gender and transport among planners and decision-makers in the transport sector.

82) Transformative Urban Mobility Initiative (TUMI):
<https://transformative-mobility.org/about/>

2.6.2 Opportunities and market drivers

Some of the key drivers for e-mobility adoption include rise in demand for clean energy and sustainable transport solutions in line with sustainable development goals; fluctuations in liquid fuel prices and growing congestion and pollution levels in cities stemming from increased urbanisation, among others. Growth in the e-mobility sector is expected to continue with improvements to standardisation, cost reductions in technology, greater efficiency of battery systems, increased awareness and demand, policy reform around fuel subsidies, improved supply of lower-cost electricity and investment in battery charging and swapping station infrastructure.⁸³ Above all, the pace of this growth across Africa will depend on whether customers can realise cost savings (through cheaper fuel, reduced maintenance etc.) by switching from an ICE vehicle to an EV (see [Table 5](#) in [Section 3.3.3](#)) – as well as the supportive policies, regulations, incentives and financing mechanisms that are put in place to promote EV market development.

Governments and their development partners can provide additional funding and assistance to the private sector. To date, most of the funding that has been made available by donors and DFIs for e-mobility has been from matching grant programmes such as UK Energy Catalyst, Transforming Energy Access (TEA), EEP Africa and Partnering for Green Growth and the Global Goals 2030 (P4G). Government tax incentives can be structured to encourage local assembly and manufacturing to boost local EV supply chain development. Access to sufficient sources of manufactured inputs, such as batteries, can boost the value proposition for local and regional e-mobility companies. Public sector participation and support will be essential to build out reliable EV charging infrastructure. Governments can also promote the sector's growth by raising public awareness and informing end-users about the benefits of e-mobility.

83) Bishop and Courtright, 2022.

SECTION 3

Potential for E-Mobility in Nigeria



Source: MAX

3.1 COUNTRY OVERVIEW

Nigeria is Africa's most populous nation and largest economy. The country relies heavily on oil exports as the primary source of government revenue, while other important sectors driving economic growth include agriculture, telecommunications and banking. Nigeria faces wide-ranging economic and development challenges, including high rates of poverty and income inequality, as well as ongoing conflict and insecurity, particularly across northern Nigeria and in the Lake Chad region. The country's macroeconomic outlook remains uncertain, as fluctuating oil prices, security concerns, and the economic impacts of the pandemic have led to periods of slow growth and recession. Economic growth remains below the population growth rate, posing challenges for job creation and poverty reduction.⁸⁴

3.2 ELECTRICITY SECTOR PROFILE

The liberalisation of Nigeria's electricity sector began in 2001 with the introduction of the National Electric Power Policy (NEPP), followed by the National Energy Policy framework in 2003 and the Electric Power Sector Reforms Act (EPSRA) in 2005. The EPSRA established the Rural Electrification Agency (REA) and the Power Holding Company of Nigeria (PHCN) – which was eventually unbundled into 19 companies, comprising six generation companies, one transmission company and 12 distribution companies (DisCos).⁸⁵ The Nigerian Electricity Regulatory Commission (NERC) was created to regulate the sector.

The Electricity Act of 2023, which replaced the EPSRA of 2005, established a comprehensive legal and institutional framework for electricity supply in the country. The act aims to decentralise the generation, transmission, and distribution of electricity, giving states the authority to grant licenses to

private developers for mini-grid and power plant operations within their jurisdictions, excluding inter-state or transnational distribution.⁸⁶ The NERC adopted the 2023 Mini-Grid Regulations, updating a previous version of the regulations from 2016, which introduced changes aimed at building the confidence of financiers and mini-grid developers by providing legal clarity around the takeover protocols for main grid operators and addressing issues of operational jurisdiction between DisCos and mini-grid operators.⁸⁷

Despite these reforms, Nigeria's power sector continues to face longstanding challenges. The national electrification rate is approximately 60%, with a considerable difference between rates of access in urban areas (89%) and rural areas (26%).⁸⁸ Where grid connections exist, power supply is often unreliable, as Nigeria has a massive electricity supply deficit. The grid delivers less than 10% of daily peak demand, leaving tens of millions of Nigerian homes and businesses to resort to producing their own power using on-site diesel generators. This has significant implications for the e-mobility sector, as it means that all charging infrastructure (whether urban or rural) needs to have a backup source of power.

Nigeria's electricity access and supply deficit poses a key barrier to economic development, with annual economic losses estimated at USD 26.2B, equivalent to about 2% of GDP.⁸⁹ In response, the Federal Government of Nigeria (FGN) has set a target to increase the national electrification rate to 90% by 2030 and to achieve universal access by 2040.⁹⁰ The government is collaborating with multiple development partners who have launched programmes to support the country in its efforts to address these challenges and meet its long-term energy access goals.

84) "Poverty and Equity Brief, Nigeria," World Bank, (2023): <https://www.worldbank.org/en/topic/poverty/publication/poverty-and-equity-briefs>

85) Including Nigeria's newest electricity distribution company, Aba Power Limited Electric (APLE).

86) Adu, D., and Olawepo, S., "Unveiling the Electricity Act, 2023: Changes In The Power Sector, Opportunities and The Next Steps", Famsville Solicitors, (July 2023): <https://www.mondaq.com/nigeria/renewables/1336450/unveiling-the-electricity-act-2023-changes-in-the-power-sector-opportunities-and-the-next-steps>

87) Nigerian Electricity Regulatory Commission (NERC) Mini-Grid Regulations, 2023: <https://nerc.gov.ng/wp-content/uploads/2024/01/MINIGRIDREGULATIONS.pdf>

88) "Tracking SDG7: The Energy Progress Report 2023," IEA, IRENA, UN, World Bank, and WHO, (2023): <https://www.irena.org/Publications/2023/Jun/Tracking-SDG7-2023>

89) "Nigeria to Improve Electricity Access and Services to Citizens," World Bank, (February 5, 2021): <https://www.worldbank.org/en/news/press-release/2021/02/05/nigeria-to-improve-electricity-access-and-services-to-citizens>

90) Federal Republic of Nigeria: Rural Electrification Strategy and Implementation Plan (RESIP), Rural Electrification Agency, (July 2016): <https://rea.gov.ng/wp-content/uploads/2017/09/RESIP.pdf>

3.3 E-MOBILITY MARKET DEVELOPMENT IN NIGERIA

Transportation infrastructure and services in both urban and rural areas of Nigeria remain inadequate. This is particularly true in cities, where inefficient transportation systems combined with rising urbanisation levels have created a demand/supply imbalance that has led to widespread road congestion, overcrowding, delays and high levels of pollution.⁹¹ The transport sector accounts for 28.4% of total GHG emissions in Nigeria, the second-largest contributor after the energy industries (40.7%).⁹² The government's Energy Transition Plan (ETP) aims to achieve net zero emissions by 2060 by gradually reducing the country's high dependence on fossil fuel-based vehicles and shifting to a sustainable, low-emission transportation system in the coming decades.⁹³ In 2021, the FGN unveiled the first made-in-Nigeria EV – the Hyundai Kona by Stallion Motors.

3.3.1 Policy and regulatory framework⁹⁴

The National Automotive Design and Development Company (NADDCC) will play a leading role in fostering Nigeria's EV transition, mainly through the development and implementation of supportive policies for the sector, the introduction of fiscal reforms and stronger fuel economy measures.⁹⁵ The NADDCC is also working to establish EV charging infrastructure, with three pilot 100% solar-powered EV charging stations located at Nigerian universities.⁹⁶

In 2023, the NADDCC adopted a new 10-year Nigerian Automotive Industry Development Plan (NAIDP), which includes incentives

for automotive industry manufacturers, investors and developers to scale up EV adoption in Nigeria. The plan also promotes local EV production, with tax relief for EV manufacturers and licensing requirements established for auto assembly plants in the country.⁹⁷ The plan aims to position Nigeria as a regional EV market leader and includes a target of achieving at least 30% local EV production by 2030.⁹⁸ Additional fiscal incentives are under development, including import duty and tax exemptions for EVs and their components – measures that could significantly reduce costs for e-mobility operators in Nigeria.⁹⁹ In July 2023, the NADDCC announced that an Electric Vehicle Development Plan has entered the final stages for ratification and implementation (the plan has yet to be adopted as of mid-2024).¹⁰⁰

In addition to the NAIDP, the government's Energy Transition Plan (ETP), which aims to achieve net zero emissions by 2060, also plans to gradually shift Nigeria away from fossil fuel-based vehicles to a sustainable, low-emission transportation system in the coming decades. The ETP aims to deploy electric buses, electric two- and three-wheelers, and EV charging infrastructure. It also calls for fiscal incentives such as the removal of import duties and VAT to incentivise local EV market development.¹⁰¹

Several donors and development partners are engaged in supporting the FGN with development of policies and strategies for the EV space. The Public–Private Infrastructure Advisory Facility (PPIAF), funded by the World Bank Energy Sector Management Assistance Program (ESMAP), is implementing a 'Sustainable Green e-Mobility Solutions' programme in Nigeria, which aims to support the FGN with development of an integrated e-mobility strategy, including policy and regulatory incentives to promote

91) Onokala, P., and Olajide, C., "Problems and Challenges Facing the Nigerian4Transportation System," *Transportation Research Procedia*, 48, (2020): <https://doi.org/10.1016/j.trpro.2020.08.189>
92) "E-Mobility in Nigeria: A Step towards a Cleaner Mobilization," *Clean Technology Hub*, (July 30, 2021): <https://cleantechhub.medium.com/e-mobility-in-nigeria-a-step-towards-cleaner-mobilization-be214dd2e01d>
93) Nigeria Energy Transition Plan: <https://www.energytransition.gov.ng/transport-2-2/>
94) **Table 1** provides an overview of enabling e-mobility policies and regulations that have been implemented in other African countries to date.
95) "Transport and Climate Change Global Status Report - 2nd Edition: Africa Regional Overview," *Partnership on Sustainable, Low Carbon Transport (SLOCAT)*, (2021): <https://tcc-gsr.com/wp-content/uploads/2021/06/1.2-Africa-Regional-Overview.pdf>
96) "NADDCC inaugurates solar-powered electric vehicle charging station in UNN," *Premium Times Nigeria*, (Aug. 18, 2023): <https://www.premium-timesng.com/news/more-news/616664-naddcc-inaugurates-solar-powered-electric-vehicle-charging-station-in-unn.html>

97) "Nigerian Automotive Industry Development Plan (NAIDP)," *National Automotive Design and Development Company (NADDCC)*, (May 2023): <https://naddcc.gov.ng/wp-content/uploads/2023/06/Nigerian-Automotive-Industry-Development-Plan-2023.pdf>
98) "Nigeria's e-mobility ambitions: COP28 and bridging the gap with climate finance," *Environews Nigeria*, (February 2, 2024): <https://www.environewsnigeria.com/nigerias-e-mobility-ambitions-cop28-and-bridging-the-gap-with-climate-finance/>
99) Dioha, M., "Accelerating Electric Mobility in Nigeria," *Energy for Growth Hub*, (2022): https://www.researchgate.net/publication/359228479_Accelerating_Electric_Mobility_in_Nigeria
100) Alu, K., "Electric Vehicle Development Plan Enters Final Stage For Ratification, Implementation," *Leadership*, (August 2023): <https://leadership.ng/electric-vehicle-development-plan-enters-final-stage-for-ratification-implementation/>
101) Nigeria Energy Transition Plan: <https://www.energytransition.gov.ng/transport-2-2/>

private sector participation and mobilise private sector financing for the sector.¹⁰² At the state level, the World Bank is supporting Lagos State with development of a green energy e-mobility strategy as well as technical and economic feasibility studies for the introduction of electric public buses.

One of the key policy challenges that will need to be addressed is the issue of motorcycle bans that have been implemented in parts of the country. In response to a wave of crime (where motorcycles were being used by perpetrators), state governments across Nigeria have implemented increasingly stringent measures to regulate motorcycles, culminating in the criminalisation of motorcycle taxis (both riders and passengers) in some cities and an outright ban in Lagos, which forced several bike-hailing companies out of business.¹⁰³ The restrictions do not apply to delivery motorcycles, whose bikes are fitted with delivery boxes and riders wear helmets.¹⁰⁴ Given that motorcycle taxi services comprise a sizable share of the EV market, particularly in urban areas, it will be important to monitor how this regulation evolves in Nigerian cities.

3.3.2 Market segments

The Nigerian e-mobility market closely resembles that of other countries in sub-Saharan Africa (see [Section 2.2](#)) and can be generally divided into four segments: (i) two- and three-wheel EVs (e-bicycles, e-motorcycles); (ii) four-wheel EVs (electric cars and light commercial vehicles); (iii) electric buses; and (iv) electric trucks. In Nigeria, motorcycles used for commercial purposes are referred to as *okadas*, while three-wheel vehicles are known as *kekes*. Two- and three-wheelers and buses are the prevailing means of transportation in Nigeria; these two EV market segments are examined in further detail below. The other two segments – four-wheel EVs and

electric trucks – are not reviewed, as affordability remains a key barrier inhibiting the widespread uptake of four-wheel EVs in the country,¹⁰⁵ while the adoption of electric trucks remains very limited to date.

Two- and three-wheel evs

The two- and three-wheel EV market segment in Nigeria is comprised of electric bicycles, motorcycles and three-wheelers for both personal and commercial use. Nigeria has a large and growing stock of two- and three-wheel vehicles, which are widely used for commercial transportation in both urban and rural areas. In 2020, ICE two-wheel vehicles, including motorcycles and scooters, constituted approximately 44% of the total number of vehicles in the country (out of 11.6 million total registered motor vehicles in that year,¹⁰⁶ there were an estimated 5.1 million motorcycles in Nigeria).¹⁰⁷

A number of companies are engaged in the commercial EV segment, providing taxi, ride-sharing, delivery and logistics services to the market.¹⁰⁸ Bikee is a local provider of e-bikes for deliveries and ride sharing. Another start-up, ThinkBikes, which locally manufactures electric bikes and cargo tricycles, offers ride sharing and serves the country's burgeoning on-demand delivery and logistics industries.¹⁰⁹ Trekk Scooters has launched an e-scooter sharing service at Lagos State University with plans to expand to other universities and cities across Nigeria.¹¹⁰ Spiro recently entered the Nigerian market through a partnership with the Ogun State government, where it will deploy e-bikes and battery swap stations across the state.¹¹¹

The FGN and its development partners are also active in the two- and three-wheel EV segment. In 2022, the Federal Ministry of Power unveiled e-motorcycles manufactured by MAX Nigeria as part of an e-mobility pilot project within the framework of the

102) Nigeria: Sustainable Green e-Mobility Solutions, PPIAF: <https://ppiaf.org/activity/nigeria-sustainable-green-e-mobility-solutions-0>

103) Olowogboyega, O., "ORide, MAX.ng, Gokada and others banned from major areas in Lagos," TechCabal, (January 27, 2020): <https://techcabal.com/2020/01/27/oride-maxng-gokada-banned-in-lagos/>

104) Ackrill, R., et al., "Street level bureaucrats, policy entrepreneurship, and discretion in enforcing bans on motorcycle taxis in Lagos, Nigeria," European Policy Analysis, (November 2023): <https://onlinelibrary.wiley.com/doi/full/10.1002/epa2.1196>

105) As of January 2024, Stallion Motors had only sold 120 units of Kona, (Nigeria's first electric car) since its launch in 2020: <https://punchng.com/nigerian-market-not-mature-for-electric-vehicles-say-stakeholders/>

106) International Organization of Motor Vehicle Manufacturers (OICA): <https://www.oica.net/wp-content/uploads/Total-World-vehicles-in-use-2020.pdf>

107) Bishop and Courtright, 2022.

108) See [Table 8](#) in [Section 3.5](#) for a list of e-mobility companies operating in Nigeria.

109) Remeredzai, J. K., "ThinkBikes Nigeria is Launching Locally Produced Electric Tricycles," Clean Technica, (2022): <https://cleantechnica.com/2022/01/20/thinkbikes-nigeria-is-launching-locally-produced-electric-tricycles/>

110) Ogwo, C., "Trekk unveils e-scooters sharing service at Lagos State University," Business Day, (May 10, 2023): <https://businessday.ng/companies/article/trekk-unveils-e-scooters-sharing-service-at-lagos-state-university/>

111) Abeokuta, P., "Spiro Expands To Nigeria, Pioneers EV Motorbikes In Ogun," Daily Trust, (February 20, 2024): <https://dailytrust.com/spiro-expands-to-nigeria-pioneers-ev-motorbikes-in-ogun/>

NESP (see [Box 8](#)).¹¹² The UK Foreign Commonwealth and Development Office (FCDO) funded LINKS programme – Catalysing Economic Growth for Northern Nigeria – launched a three-wheel EV pilot project in Kano in partnership with Sterling Bank and two local women’s cooperatives (the programme closed in 2023 due to FCDO budget cuts).¹¹³ Nigeria is also one of the target countries under the AfDB-funded Green Mobility Facility for Africa (GMFA).

E-motorcycle taxis (okadas) and commercial tricycles (kekes) are an important source of employment for many young Nigerians and are heavily relied upon as a means of accessible and affordable transportation. As of 2022, there were an estimated 14 million registered members of the National Commercial Motorcycle and Tricycle Owners and Riders Association of Nigeria.¹¹⁴ In addition to employing riders who operate motorcycles as taxis or for delivery services, the sector also provides indirect employment to those who support the industry, including mechanics, repair shops, parts suppliers, petrol stations (and battery charging and swapping stations for EVs) and vendors providing goods and services along the routes.

Some of the major okada companies in Nigeria include SafeBoda, Gokada and MAX, among others. There is significant demand for these services in the country. In only its first year of operation in the city of Ibadan, SafeBoda had onboarded 2,500 drivers, served 40,000 customers and completed one million trips.¹¹⁵ MAX Okada, which operates in four Nigerian cities, has employed 2,500 drivers and served 400,000 unique users with over two million trips to date.¹¹⁶ While most operators use a mobile phone application to track customers and trips, millions of rides are also completed offline/through the informal market.

Okada drivers in Nigeria either purchase their bikes or lease/rent them if they are unable to make the full up-front payment. Purchasers of bikes often engage with an asset-finance company that may or may not be affiliated with the bike’s seller. Those

who lease or rent typically pay a daily, weekly or monthly fee, which may increase over time depending on the financing arrangement. As an example, MAX Okada offers low-cost financing for bikes that riders can fully own within a 12-18 month repayment cycle.

Nigeria would benefit from an EV policy that specifically focuses on supporting the two- and three-wheel EV segment, as these EVs are more affordable, easier to adopt and better suited to the country’s immediate needs. This approach has achieved some success in East Africa, where there is already significant investment in this market segment. Focusing on this segment would also allow Nigeria to test the viability of two- and three-wheel EVs before the four-wheel EV market matures.¹¹⁷

E-buses

Rapid urbanisation in megacities like Lagos has created a growing need for sustainable public transportation solutions. In 2019, the Lagos Metropolitan Area Transport Authority (LAMATA) implemented the Bus Reform Initiative (BRI), a state-wide programme to improve the bus transit network. The BRI entails the franchising of bus routes to private operators through a performance-based quality bus contract, whereby private operators are responsible for the procurement, operation and maintenance of buses, the provision of bus services and revenue collection, while the Lagos State Government is responsible for providing basic infrastructure such as bus depots, garages and terminals, and for construction and rehabilitation of roads. The Lagos State Government also supports the private bus operators in bus acquisition under a financing scheme, with the operator required to make 20% down payment to be eligible. LAMATA has also adopted an Electronic Fare Payment mechanism, with a mobile app to streamline the collection and processing of bus fares. As of 2021, the BRI initiative had served over 20 million passengers, deployed 358 buses carrying an average of 60,000 passengers daily, and created over 1,500 direct and indirect jobs.¹¹⁸

112) Douglas, F., “Nigeria, EU and German Government Unveil Electric Vehicles in Lagos,” Energy Focus Report, (April 8, 2022): <https://www.energyfocusreport.com/nigeria-eu-and-german-government-unveil-electric-vehicles-in-lagos/>

113) “Electric Vehicle Pilot Project,” LINKS, <https://links-nigeria.com/electric-vehicle-pilot-project/>

114) Sahara Reports, 2022: <https://saharareporters.com/2022/07/25/about-14million-nigerians-will-be-jobless-may-venture-crime-if-buhari-government-bans>

115) <https://techcrunch.com/2021/05/11/the-motorcycle-ride-hailing-wars-in-nigeria-and-uganda-is-safeboda-to-lose/>

116) Max Okada: <https://solve.mit.edu/challenges/elevateprize/solutions/32041>

117) Dioha, M., “Accelerating Electric Mobility in Nigeria,” Energy for Growth Hub, (2022): https://www.researchgate.net/publication/359228479_Accelerating_Electric_Mobility_in_Nigeria

118) Lagos Metropolitan Area Transport Authority Bus Reform Initiative: <https://www.lamata-ng.com/services/bus-reform-initiative/>

Electrifying Nigeria's public transportation system is a key priority of the government's Energy Transition Plan (ETP). In December 2023, at the COP-28 UN climate conference, the FGN announced plans to make Nigeria a leader in Africa's electric mass transit, signalling strong public commitment to the sector.¹¹⁹

In 2022, the Lagos Metropolitan Area Transport Authority (LAMATA) and Oando Clean Energy signed a memorandum of understanding to facilitate the deployment of 12,000 electric buses and associated charging infrastructure in Lagos, with a pilot phase set to commence in 2024 that will incorporate 50 e-buses into circulation. Oando has formed a joint venture with Chinese OEM, Yutong, to construct a local assembly plant for the e-buses. The project is projected to generate USD 2.6B in estimated cost savings, equivalent to 3.6% of the GDP of Lagos, and create an estimated 5,000 jobs for drivers and support staff.¹²⁰

In addition to Lagos, other states have also announced e-bus projects. In 2024, Edo State also announced a partnership with Oando Clean Energy to launch an e-bus pilot project in Benin City. In Borno State, Phoenix Renewables is converting petrol minibuses to solar-powered e-buses, while African Motor Works has partnered with the local government to deploy e-buses, with the company reporting over 21,000 passengers as of 2022.¹²¹

3.3.3 E-Mobility market opportunity in Nigeria

Overcoming barriers to unlock e-mobility market potential in Nigeria

Widespread e-mobility adoption in Nigeria has the potential to drastically reduce emissions from ICE vehicles and, in the longer-term, to decrease the need for costly petroleum subsidies. Petroleum subsidies had been in place in Nigeria since the 1970s but were finally ended in May 2023 by a newly-elected government citing huge costs to the economy and debt concerns.¹²² This policy shift has direct implications for the country's EV market, as rising fuel costs increase the operational costs of ICE vehicles, thus improving the value proposition of switching to an EV.

There is a significant opportunity for Nigeria to expand investments in e-mobility and leverage EVs to drive economic growth. However, affordability and access to stable electricity supply remain key market barriers, as a large share of the country's population lives below the poverty line and approximately 40% of the population lacks access to electricity. Despite some promising developments in the sector to date, the enabling environment for e-mobility in Nigeria still remains limited. The FGN does not have a designated roadmap or strategy to guide future development of the sector, which will be critical, together with supportive policies, regulations and incentives.

Consumer awareness of the benefits of EVs in Nigeria is also generally low. Awareness about solar energy, mini-grids, and PUE is comparatively higher, with companies in these segments having large customer bases and market growth over the last decade. Awareness of e-mobility is higher in urban areas than rural areas, but the benefits of the technology still need to be better communicated, especially to alleviate concerns over higher pricing compared to ICE vehicles.

119) "COP28: Nigeria to have largest electric mass transit fleet in Africa, says Tuggar," The Cable, (December 5, 2023): <https://www.thecable.ng/cop28-nigeria-to-have-largest-electric-mass-transit-fleet-in-africa-says-tuggar/amp/>

120) Manthey, N., "Nigeria wants to launch 12,000 electric buses in Lagos State," Electrive, (27 April 2023): <https://www.electrive.com/2023/04/27/nigeria-targets-introducing-12000-electric-buses-in-lagos-state/>

121) Eleanya, F., "Electric buses lure Nigerian policy makers despite roadblocks," Business Day, (January 17, 2024): <https://businessday.ng/technology/article/electric-buses-lure-nigerian-policy-makers-despite-roadblocks/>

122) Sauvage, G., "A necessary 'sacrifice': Nigeria ends almost 50 years of fuel subsidies," France 24, (June 14, 2023): <https://www.france24.com/en/africa/20230614-a-necessary-sacrifice-nigeria-ends-almost-50-years-of-fuel-subsidies>

Opportunity in the e-motorcycle market segment

Nigeria can take steps to improve the economic viability of EVs, particularly e-motorcycles. E-motorcycles allow for daily energy savings on fuel and maintenance but the cost of switching from an ICE-motorcycle to an EV must not exceed the fuel savings. The up-front cost of purchasing an e-motorcycle remains approximately twice as high as purchasing an ICE motorcycle.¹²³ Although the cost of batteries continues to decline as technological advancements are made, battery cost remains the primary reason for the price difference between an ICE motorcycle and an e-motorcycle, accounting for about 40% of the overall cost of the electric vehicle.¹²⁴ The annualised cost of ownership of an e-motorcycle over the life of the vehicle (e.g., four years) is usually lower than its ICE counterpart – despite the high up-front purchase cost of an e-motorcycle (although artificially low petrol prices in Nigeria render the economics of EVs to be less favourable than they would be without fuel subsidies). The more km that an okada driver travels per day, the more economical the e-motorcycle becomes. Renting is usually more expensive than purchasing via asset-finance (see [Section 3.3.2](#)).

In some situations, the economics for e-motorcycles are not at cost parity with their ICE counterparts. In these situations (e.g., areas without access to asset-finance or areas that have higher electricity prices), the pace of market growth for e-motorcycles may depend on innovative solutions. Tailored financial instruments that use blended finance and risk mitigation strategies are necessary to keep financing costs manageable. Given the relatively high cost of borrowing in Nigeria, loan guarantees and other risk mitigation mechanisms can be effective tools. There is also a need for donor, DFI and commercial financing to support the rollout of EV charging infrastructure.

Annualised cost comparison

Table 5 compares the total annualised cost in Nigeria of owning an e-motorcycle and an internal combustion engine (ICE) motorcycle over the expected four-year life of the average motorcycle. The cost of petrol when consumed in high-mileage urban settings can be expensive. The maintenance costs of ICE motorcycles are also estimated to be twice as high as e-motorcycles. These two variables help explain how e-motorcycles, even with higher up-front capital costs than ICE motorcycles, have a lower annualised capital cost over the four-year expected life modelled in both motorcycles.

In the existing body of research that compares e-motorcycles to ICE motorcycles, the selection of which variables to use in the analysis is critical. Indicators such as petrol prices, electricity tariffs, FX volatility, the size and efficiency of batteries, the km driven each day (varies from commercial taxi riders vs. personal consumers), the fuel efficiency of the ICE motorcycle and the life-span of the motorcycle are all variables that can lead to different outcomes. The analysis presented in **Table 5** assumes an urban setting in Nigeria, where both petrol prices and electricity tariffs are relatively inexpensive.

The results of the analysis (converted into euro from naira) found that **e-motorcycles have an annualised cost of approximately EUR 734 compared to EUR 958 for ICE motorcycles, representing an estimated savings of approximately EUR 224, or 23% per year by switching to an EV.**

This analysis and the variables considered are a starting point for developers and existing early-stage e-mobility companies in Nigeria. While the economics of EVs are indeed favourable (cheaper e-motorcycle lifecycle ownership), there are still challenges to EV adoption in the context of sub-Saharan Africa that require policy intervention, including a lack of consumer awareness and acceptance of EVs, access to financing, preconceived notions that EVs are complicated and not as reliable as ICE vehicles, among others.

123) The cost of motorcycles and e-motorcycles vary widely due to a number of factors, including whether new or used, the quality of the bike and the batteries in the e-bike. In our analysis comparing the annual cost of ownership (see [Table 5](#)), we estimate the cost of a new e-motorcycle at approximately USD 1,300 and the cost of a new ICE motorcycle at USD 726.

124) Imperial College of London and Mercy Corps, 2023.

TABLE 5. E-motorcycle vs. ICE motorcycle cost comparison analysis

INDICATOR	E-MOTORCYCLE	ICE MOTORCYCLE
Bike Capital Cost		
EV Capital Cost per Unit (NGN)	N 1,627,759	N 960,000
EV Capital Cost per Unit (EUR)	EUR 1,199.75	EUR 707.57
Average Life (Years)	4	4
Annualised Bike Capital Cost (EUR)	EUR 299.94	EUR 176.89
Additional Battery Capital Cost		
Additional Unit Battery Cost (EUR/kWh)	EUR 165.48	N/A
Battery Size (kWh)	3.6	N/A
Additional Battery Cost (EUR)	EUR 595.74	N/A
Average Life (Years)	5	N/A
Annualised Additional Battery Capital Cost (EUR)	EUR 119.15	N/A
Battery Charger Capital Cost		
EV Charger Capital Cost per Unit (EUR)	EUR 415.30	N/A
Average Life (Years)	7.0	N/A
Annualised Battery Charging Cost	EUR 59.33	N/A
Fuel Cost		
Petrol Consumption Rate (km/litre)	N/A	33.33
Avg. Petrol Usage per Day (Litres)	N/A	3.00
Avg. Price of Petrol per Litre (NGN)	N/A	N 650.00
Total Fuel Expense per Day (NGN)	N/A	N 1,950.00
Annualised Fuel Cost (EUR)	N/A	EUR 524.60

TABLE 5. Continued

INDICATOR	E-MOTORCYCLE	ICE MOTORCYCLE
Battery Charging Cost		
Electricity Tariff (NGN/kWh)	N 64.1	N/A
Electricity Tariff (EUR/kWh)	EUR 0.05	N/A
Vehicle Efficiency (Wh/km)	53.0	N/A
Charging Efficiency	90%	N/A
Daily Electricity Consumption (kWh)	5.89	N/A
Annualised Battery Charging Cost	EUR 101.50	N/A
Maintenance Cost		
Maintenance Cost (EUR/100km/Year)	EUR 0.32	EUR 0.65
Avg. Distance Travelled per Day (km)	100.00	100.00
Annualised Maintenance Cost (EUR)	EUR 117.90	EUR 235.80
Insurance Cost		
Insurance Cost (% of EV Capital Cost)	3%	3%
Annualised Insurance Cost (EUR)	EUR 35.99	EUR 21.23
TOTAL Annualised Cost	EUR 733.81	EUR 958.52

3.4 E-MOBILITY AS A PRODUCTIVE USE OF ELECTRICITY FOR GREEN MINI-GRIDS

Electric mobility relies on a stable supply of electricity for battery charging. In off-grid settings throughout Nigeria, or where grid-supplied electricity is unreliable, green mini-grids (GMGs) can provide a clean and cost-effective solution for EV charging. Mini-grids can therefore significantly increase the uptake of e-mobility by allowing EV companies to expand their operations into rural and off-grid areas.

E-mobility is similarly beneficial to mini-grid operations. Mini-grids rely on productive use of electricity (PUE) to stimulate electricity demand and drive capacity utilisation, which improves the financial viability of the project. Electric mobility can provide GMG operators with one such PUE application, for example through a battery charging station, which can serve as an anchor client for mini-grids.

There is thus an opportunity for GMG developers and e-mobility companies to collaborate to provide clean and affordable electricity access and transportation to rural communities throughout Nigeria. Growth in the e-mobility sector can in turn reinforce the GMG business model by scaling up PUE, reducing tariffs, increasing access to finance, and taking advantage of other synergies in O&M and the procurement of battery storage technologies.

The economics for off-grid solar technology in Nigeria are advantageous, because a significant share of the economy is

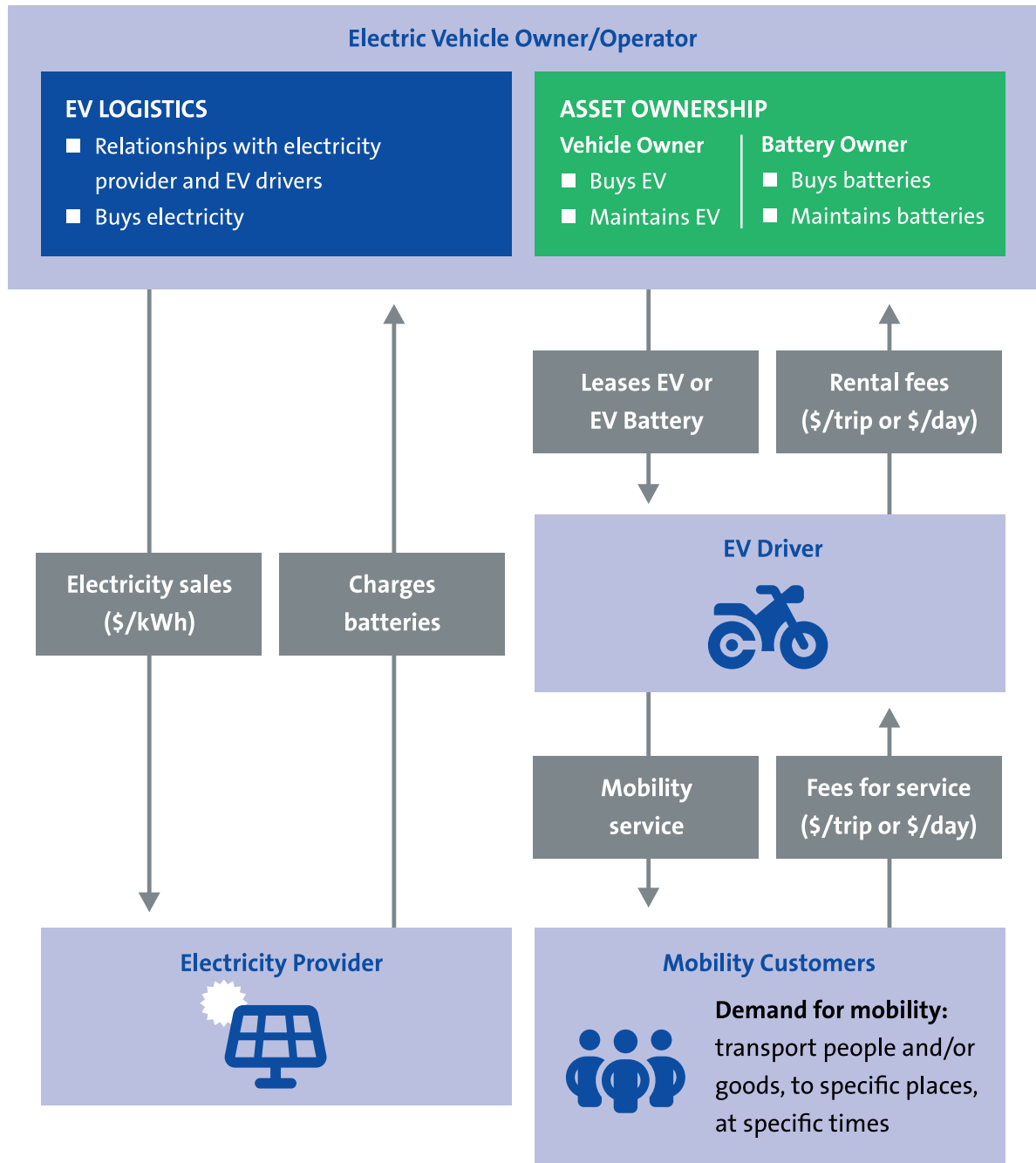
already powered by small-scale generators and nearly half of the population has limited or no access to the grid. As a result, a multitude of donor-funded programmes and initiatives target the country's off-grid and mini-grid sectors (see [Section 3.2](#)). For example, under the Nigeria Electrification Project (NEP), the AfDB and the REA partnered to provide grants to mini-grid developers who integrate PUE equipment into their operations, with REA subsidising up to 65% of the capital costs associated with integrating EVs and charging stations into mini-grid systems.

The combination of GMGs and e-mobility holds significant potential to drive rural economic development, particularly by electrifying rural vehicles, from e-bikes to minibuses, in areas with low private vehicle ownership. There are several promising and scalable business models that e-mobility companies and GMG developers can utilise ([Figure 2](#)). If implemented through a business model that meets customer specific needs, the addition of EV charging loads improves mini-grid economics and lowers the electricity price needed to recoup the mini-grid system.

One pilot that was implemented under the Nigeria Energy Support Programme (NESP) in Ogun State by MAX and Rubitec Nigeria Limited demonstrated how e-mobility and GMGs can complement each other to foster economic development and meet the electrification and transportation needs of rural communities ([Box 8](#)). Husk Power is also testing the commercial viability of operating an e-mobility business powered by its mini-grids, including motorcycle leasing and battery swapping, with a pilot underway in Idadu, Nasarawa State, Nigeria.¹²⁵

125) Tenenbaum, B., Greacen, C., and Shrestha, A., "Mini-Grid Solutions for Underserved Customers: New Insights from Nigeria and India," International Development in Focus, World Bank, (2024): <https://openknowledge.worldbank.org/server/api/core/bitstreams/d2992bfa-58a0-48c6-9815-6c181701572f/content>

FIGURE 2. EV-mini-grid business model components¹²⁶



Source: Powering Small-Format Electric Vehicles with Mini-Grids, RMI, 2022

126) Allee, A., Schroeder, J., and Sherwood, J., "Powering Small-Format Electric Vehicles with Mini-grids," Rocky Mountain Institute (RMI), (April 2022): https://rmi.org/wp-content/uploads/dlm_uploads/2022/04/powering_small_format_electric_vehicles_with_minigrids.pdf

BOX 8. Nigeria Energy Support Programme (NESP): MAX-Rubitec EV-mini-grid pilot project



The Nigerian Energy Support Programme (NESP) is co-funded by the EU and the German Federal Ministry for Economic Development and Cooperation (BMZ) and is jointly implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in collaboration with the Federal Ministry of Power. Under the first phase of the programme, six (6) solar PV mini-grids were developed and are providing sustainable electricity to more than 15,000 people. It is expected that NESP II will reach another 100,000 people under the Mini-grid Acceleration Scheme (MAS).

Under the NESP, the REA explored opportunities to advance the use of EVs and sustainable transport solutions in rural and peri-urban communities to ensure that the benefits of e-mobility extend beyond urban centres and reach rural areas, where over 70% of Nigerians live. In 2020, a pilot project was launched in Gbamu-Gbamu, Ogun State (one of the mini-grid sites supported by NESP during the first phase of the programme) to assess the potential for EVs to support rural economic development while also stimulating electricity demand for solar mini-grids. The pilot project involved a battery-swapping business model whereby Nigerian e-mobility company, MAX, leased electric two-wheel EVs to certified local drivers in the community, who used the vehicles to transport people and goods to hubs within a 20-km radius, using a solar mini-grid operated by Rubitec Nigeria Limited to charge the EV batteries (and consuming about 1 kWh of mini-grid electricity per daily rental). The battery swap charging model concentrated charging loads during daylight hours, which correlated well with surplus solar electricity generated by the mini-grid system. The pilot successfully demonstrated that the two clean technology solutions can complement each other to address both transportation and electrification needs in rural communities. An important finding of the study was that high vehicle utilisation is the key to strong revenues and to realising the EVs' operating cost advantage over ICE vehicles – even at the electricity prices required to sustain isolated rural mini-grids.¹²⁷ The accompanying Model Business Case on MiniGrid-Powered Rural E-Mobility Project is loosely based on this pilot and elaborates further on the financial viability of such a business model.

127) Allee, A., Schroeder, J., and Sherwood, J., "Powering Small-Format Electric Vehicles with Mini-grids," Rocky Mountain Institute (RMI), (April 2022): https://rmi.org/wp-content/uploads/dlm_uploads/2022/04/powering_small_format_electric_vehicles_with_minigrids.pdf

Table 6 describes the various co-benefits and synergies that exists between e-mobility and GMGs.

TABLE 6. Benefits of e-mobility uptake for green mini-grids

BENEFITS OF E-MOBILITY UPTAKE FOR GMGS	DESCRIPTION
Productive use scale-up	<ul style="list-style-type: none"> Transportation can include a wide pool of potential mini-grid customers, both in rural and urban settings, such as last mile delivery/logistics and courier services, two- and three-wheel EV passenger vehicles and taxis etc. All of these remain untapped potential customer markets and PUE ‘anchor loads’ for GMGs. Stakeholder consultations revealed that charging or battery-swapping stations for e-motorcycles can consume as much as 50kWh per day, the equivalent of 150 rural households (to be verified).
Tariff reduction potential	<ul style="list-style-type: none"> The potential to increase GMG asset utilisation, lower tariffs and increase adoption of mini-grids by communities given the increased social benefits.¹²⁸ From the MAX-Rubitec pilot in Nigeria, by powering a fleet of EVs, the GMG was able to increase capacity utilisation and a PUE application which led to a tariff reduction of about 1%.
Carbon finance	<ul style="list-style-type: none"> The transport sector has huge emissions due to the reliance on ICE vehicles burning fossil fuels. Mini-grids working with e-mobility business models can unlock additional benefits through the carbon credit markets, either as a direct or indirect beneficiary to such transactions. While there is limited data on carbon credits for the GMG sector and relative to the derived benefits from partnering with e-mobility providers, the use case is clear. A McKinsey study estimates that the global market for carbon credits by 2030 could be about EUR 50B.¹²⁹
Bulk procurement synergies for battery storage technologies	<ul style="list-style-type: none"> The cost of battery storage has hindered growth in renewable energy investments. Lithium-ion technology requires bulk purchasing to lower project costs. Thus, the potential collaboration of traditional mini-grid operations with e-mobility models can open joint procurement of such components, thereby possibly lowering costs. A CrossBoundary study analysed the potential benefits of bulk procurement for mini-grids. Although the study did not specifically test mini-grid battery procurement in the context of e-mobility, the results around other appliances demonstrate that this merits consideration going forward.¹³⁰
Synergies around maintenance	<ul style="list-style-type: none"> Given that the mini-grid sector employs highly technical professionals (engineers, technicians, software developers), a business model that has a mini-grid company with an e-mobility arm would potentially yield human resource synergies around product and equipment deployment, installation, maintenance, and decommissioning, thus saving costs
Gender and other economic co-benefits	<ul style="list-style-type: none"> Economic development resulting from mini-grid electrification leads to increased incomes and more household energy consumption (e.g., on e-mobility) Offers employment opportunities for underemployed young people, especially women.

128) Smith, T. “Small EVs can act as productive use of energy catalysts for rural mini grids,” ESI Africa, (April 21, 2022): <https://www.esi-africa.com/renewable-energy/small-ev-can-act-as-productive-use-of-energy-catalysts-for-rural-minigrids/>

129) Blaufelder et al., “A blueprint for scaling voluntary carbon markets to meet the climate challenge,” McKinsey & Company, (January 29, 2021): <https://www.mckinsey.com/capabilities/sustainability/our-insights/a-blueprint-for-scaling-voluntary-carbon-markets-to-meet-the-climate-challenge>

130) https://rmi.org/wp-content/uploads/dlm_uploads/2022/04/powering_small_format_electric_vehicles_with_minigrids.pdf

3.4.1 Business models for e-mobility as a productive use of electricity for GMGs

E-mobility start-ups, clean energy companies and GMG developers are experimenting with business models for e-mobility commercialisation. **Table 7** describes the business models for e-mobility as a PUE application for GMGs.

TABLE 7. Business models for e-mobility as a productive use of electricity for green mini-grids

BUSINESS MODELS	DESCRIPTION
Full integration	<ul style="list-style-type: none"> — The GMG developer owns and operates the EVs. — EV drivers pay a rental fee directly to the GMG developer who is responsible for servicing and maintaining the EVs with support from the manufacturer.
Partnership	<ul style="list-style-type: none"> — This involves partnership between an EV company and a GMG developer, whereby the EVs are owned, operated, and serviced by the EV company who purchases electricity from the GMG. This has proven successful for EVs in Nigeria with a pilot funded by the Shell Foundation. — The capital purchase of the EV, the battery costs, and electricity generation are provided by the EV company and the GMG. — The risks associated with EV technology, market evolution and infrastructure development are addressed by the EV company alone. — This model involves users paying for access to an EV for a specific length of time or mileage. This enables users to access EVs when needed, without the high upfront costs or the liabilities associated with ownership (e.g., purchase, maintenance, and repair costs).
Mini-grid facilitator	<ul style="list-style-type: none"> — EV manufacturers sell directly to local owners, who may choose to charge their EVs at a local GMG charging station. — This service is rendered by a third-party provider using a battery-swapping or leasing approach. — This was demonstrated in a pilot in India funded by the Shell Foundation which assessed the viability of GMG-powered three-wheel EV charging offered under a battery-swapping model — This model allows drivers to maintain vehicle ownership, which they strongly preferred, without taking on the up-front cost of upgrading to higher quality batteries.

3.5 PROFILES OF E-MOBILITY COMPANIES IN NIGERIA

The Nigerian e-mobility market is in its nascent stage of development, with asset finance for e-mobility is also in its early stages.

Table 8 describes a selection of companies that are currently active in Nigeria's e-mobility market, including their products, services and business models.

TABLE 8. E-mobility companies in Nigeria





COMPANY	LOCATION	DESCRIPTION	BUSINESS MODEL/SERVICE OFFERING
	Lagos	BIKEE offers full stack light electric vehicle starting from e-bikes to financing, servicing, and fleet management, which makes it easy for businesses to choose a carbon neutral solution. The company provides eco-friendly smart delivery e-bikes and a delivery management platform to power last-mile daily deliveries for businesses.	— Mobility Model: Service-based, asset financing
	Hong-Kong (with operations in Lagos)	Bob Eco is a global e-motorcycle manufacturer and leasing innovator with a mission to accelerate the transition to sustainable energy in emerging markets across Africa. Bob Eco provides accessible, affordable, and eco-friendly e-motorcycle taxis and deliveries on a lease-to-own model. Bob Eco is rapidly growing its battery-swapping network, featuring the easy-to-use swapping stations and hyper-efficient swappable, smart batteries, which are software enhanced and accessible to all Bob riders.	— Mobility Model: Lease-to-own, asset financing — Service Offering: E-motorcycles for taxi and logistics sectors — User Profiles: PUE sector, logistics companies
	Rivers State	Energy Batteries Nigeria Limited is a Nigerian-based company that distributes batteries nationwide.	— Mobility Model: Direct sales — Service Offering: Battery supplier — User Profiles: All sectors
	Lagos	Hamster Energy's goal is to build Africa's largest Electric Vehicle charging network. The company's solutions range from EV charging services to EV sales & deployment, and also smart solar energy services for both homes & businesses.	— Mobility Model: Direct sales, energy-as-a-service — Service Offering: EVs, charging infrastructure — User Profiles: All sectors

TABLE 8. *Continued*








COMPANY	LOCATION	DESCRIPTION	BUSINESS MODEL/SERVICE OFFERING
 JET MOTORS	Lagos	Jet Motor Company is a technology-focused automobile assembly and design company founded in 2018 with a unifying goal of leading Africa into the future of mobility by producing and distributing world-class vehicles. Jet Motors produces a variety of ICE vehicles ranging from passenger buses to ambulances, military vehicles, and delivery vans. In 2019, the company secured USD 9M from Canadian-based Africa Development Capital (ADC) Greatman Legend and a number of Asian investors, to build Africa's first all-electric minibus vehicle. Jet Motors also seeks to introduce other lines of vehicles, including pickups, SUVs and sedans in the coming years. In 2023, the Nigerian government, through the National Automotive Design and Development Council, acquired locally-assembled electric vehicles with their charging infrastructure from Jet Motors.	<ul style="list-style-type: none"> — Mobility Model: Direct sales — Service Offering: EVs — User Profiles: EV users
 max	Lagos	MAX is a mature ICE bike financing business that has recently launched an e-mobility component with aspirations to convert their whole portfolio to EVs. MAX currently provides electric vehicles, charging infrastructure, and battery-swapping stations. MAX has also created a platform for connecting individuals with e-motorcycle taxi riders, connects drivers to EVs and financial services.	<ul style="list-style-type: none"> — Mobility Model: PayGo, pay-per-use, direct sales — Service Offering: Electric powered cargo bikes for goods and PUE — User Profiles: PUE sector players, SMEs, logistics businesses
 Oando Clean Energy	Lagos	Oando Clean Energy is a clean energy company that roll-outed electric buses in 2023, aimed at establishing the viability of EVs for mass transportation in Lagos State. This will be followed by a pilot phase with expanded fleet and bus routes, and the eventual countrywide deployment creating employment for over 30,000 Nigerians.	<ul style="list-style-type: none"> — Mobility Model: Service-based model — Service Offering: Electric buses — User Profiles: Public transportation sector







TABLE 8. Continued

COMPANY	LOCATION	DESCRIPTION	BUSINESS MODEL/SERVICE OFFERING
	Lagos	Orbit eBikes assembles and deploys battery-powered e-bikes that enable logistics companies switch seamlessly from ICE vehicles. Orbit eBikes e-motorcycles come with 72v 32aH batteries which can last up to 80 km on full charge.	<ul style="list-style-type: none"> — Mobility Model: PayGo, pay-per-use, direct sales — Service Offering: Electric powered cargo bikes for logistics — User Profiles: Logistics businesses
	Lagos	Osquareteck is a clean energy company that develops optimised, scalable, integrated, and smart battery-swapping technologies and charging networks across the country using sustainable clean energy to accelerate daily transport and reduce time spent at charging stations.	<ul style="list-style-type: none"> — Mobility Model: PayGo, battery swapping, BaaS for all sectors — Service Offering: EVs — User Profiles: PUE sectors, delivery companies
	Maiduguri	Phoenix Renewables designs and manufactures solar-powered e-minibuses and e-tricycles known as “kekes”. Phoenix has also designed a 60kW solar-powered charging station in the city, looking to expand to other parts of the country. ¹³¹ The company has put structures in place to develop a mega factory producing up to 2,400 vehicles per annum. Phoenix Renewables buses are targeted at mass transit, while their light trucks are targeted at cargo and utilities around the towns. ¹³²	<ul style="list-style-type: none"> — Mobility Model: Service-based — Service Offering: E-mini buses and tricycles for commuting — User Profiles: Transports sector, logistics
	Abuja	Possible Electric Vehicle Solution (Possible EVS) is an e-mobility company in Abuja setting up plants to manufacture EVs in Nigeria. When fully operational, the plant will produce up to 10,000 EVs annually – including minibuses, LCVs and taxis. Possible EVS is primarily a manufacturer of EVs, but the company recently launched an EV taxi service. The electric taxis can go 400 km on a single charge. With an initial fleet of 30 units, the company has plans to expand to at least 20,000 electric taxis across major Nigerian cities by 2028. Possible EVS also offers a public charging station at its recently launched electric vehicle experience centre, which it launched in Lagos and Abuja. The start-up also runs a mobile charging station that can recharge EVs at any location in the event an EV runs out of battery in the middle of the road.	<ul style="list-style-type: none"> — Mobility Model: Direct sales, asset-financing, service-based — Service Offering: EV manufacturing, e-taxi services — User profiles: All sectors

131) Valentine, B., “This Nigerian EV entrepreneur hopes to go head-to-head with Tesla,” MIT Technology Review, (April 2023): <https://www.technologyreview.com/2023/04/21/1071359/mustapha-gajibo-nigeria-electric-vehicle-motorized-tricycles/>

132) “Making Nigeria an Electric Vehicle Exporter,” Valuechain, <https://www.thevaluechainng.com/51033-2/>

TABLE 8. *Continued*

COMPANY	LOCATION	DESCRIPTION	BUSINESS MODEL/SERVICE OFFERING
 	Lagos	Powered by Sterling Bank, Qore is a clean energy powered mobility solution that offers quality, cost-effective, reliable EV products. Qore offers its customers charging stations solutions (with one currently deployed in Victoria Island Lagos), mobility-as-a-service, Qore switch (conversion of vehicles from ICE to EV), Qore swap (battery swapping for 2- and 3- wheelers) and Qore financing solutions for EV acquisition.	<ul style="list-style-type: none"> — Mobility Model: Service-based, asset financing — Service Offering: EV Infrastructure, transition, battery swapping — User Profiles: All sectors
	Lagos	Sango Technology is an e-mobility start-up with a focus on electric micro-mobility for local logistics companies. Sango customers are majorly PUE customers, who use their bikes for day-to-day business. ¹³³ These customers purchase electric motorcycles outrightly, but they do not own the batteries which come with the vehicles. The batteries are supplied on an energy-as-a-service model to its customers.	<ul style="list-style-type: none"> — Mobility Model: Direct sales, energy-as-a-service, software-as-a-service — Service Offering: Electric powered bikes for goods and PUE — User Profiles: PUE sector, logistics companies
	Lagos	Siltech is an e-mobility ecosystem development company leading Africa with durable and innovative EVs. Siltech operates across the entire EV value chain, providing battery assemblage, vehicle manufacturing, ICE to EV conversion kits, charging infrastructure, consultancy, and after-sales services.	<ul style="list-style-type: none"> — Mobility Model: Direct sales. — Service Offering: Electric buses, EVs, e-motorcycles, e-cargo trucks — User Profiles: All sectors
	Lagos (with operations nationwide)	For over 25 years, Stallion Motors has worked closely with its auto OEM (Original Equipment Manufacturers) partners to develop the automotive industry in Nigeria. Stallion's automotive infrastructure consists of nationwide dealer showrooms, workshops, and spare parts warehouses. Stallion's Automobiles Division consists of a collective sub-group of companies which represent an array of globally renowned automobile brands on an exclusive basis for distribution, sales, and aftersales service. Stallion represents the following brands through independent management: Honda, Hyundai, Nissan, Changan, Ashok Leyland, Morris Garages and Bajaj RE, three and four-wheel intracity vehicles popularly called as Keke. In 2020, Stallion motors, in partnership with Hyundai Nigeria, unveiled Nigeria's first locally-assembled electric car – the Hyundai Kona.	<ul style="list-style-type: none"> — Mobility Model: Direct sales — Service Offering: EV sales and distribution — User Profiles: All sectors
	Ibadan	ThinkBikes Limited is an e-mobility company that is manufacturing two- and three-wheelers locally for last-mile transportation of goods and people. The company manufactures electric bicycles and scooters locally and makes them available for ride sharing and lease in higher institutions, estates, cities, and rural communities, and at an affordable rate.	<ul style="list-style-type: none"> — Mobility Model: PayGo, pay-per-use, direct sales — Service Offering: Electric powered cargo bikes for goods and PUE — User Profiles: PUE sector, SMEs

133) "CTH Business Case Study Series: Sango Technology," Clean Technology Hub, (August 2022): <https://cleantechnologyhub.com/wp-content/uploads/2022/08/CTH-Business-Case-Study-Series-SangoTech.pdf>

SECTION 4

Route to Market



Source: [OX Global](#)

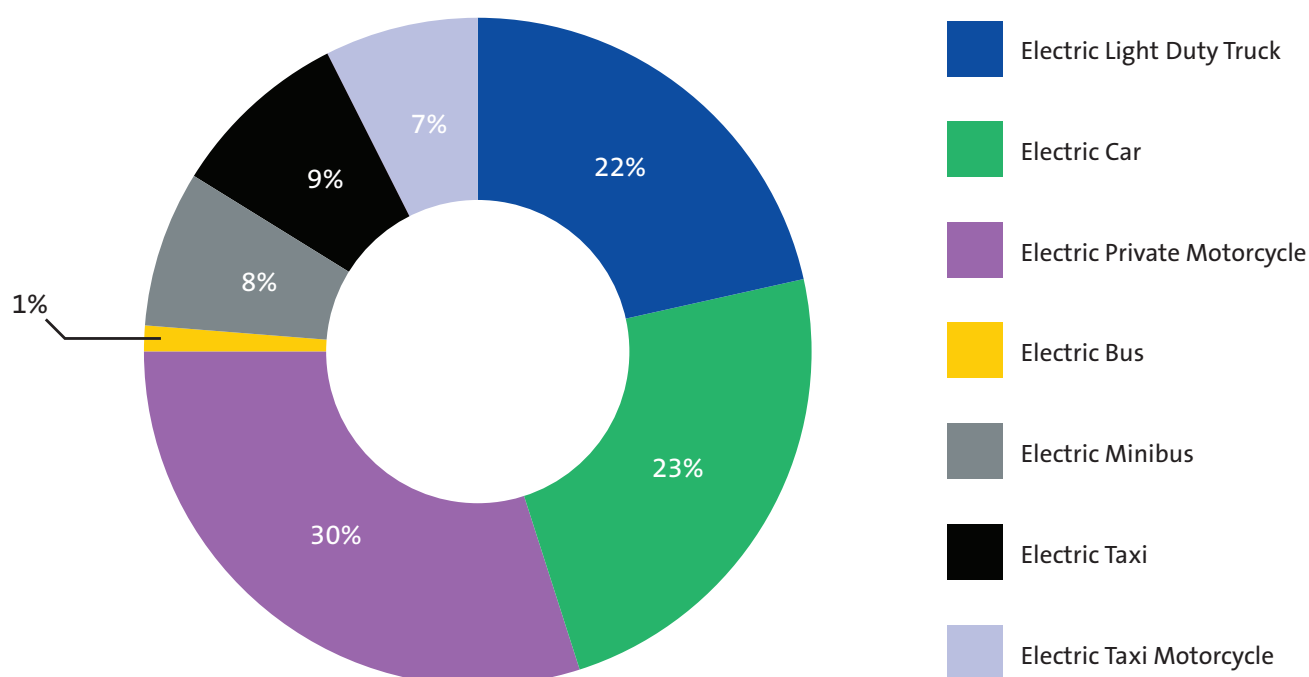
4.1 INVESTMENT OPPORTUNITIES AND MARKET SIZING FOR E-MOBILITY IN NIGERIA

Industry experts project large investment potential in Africa's EV sector, with growth anticipated to continue in the near and medium-term. The region's two-wheel EV market is expected to grow to USD 5.4B by 2028. Commercial and personal use e-motorcycles are expected to make up 37% of the total projected EV fleet in West Africa by 2050 (Figure 3).

There has been relatively limited direct investment in the Nigerian EV market to date, although there has been funding provided to support broader initiatives related to sustainable transportation in the country. There are opportunities for DFIs,

FIs, venture capital and financial market guarantee companies to invest in Nigeria's e-mobility sector. The AfDB, IFC, EIB, Development Bank of Nigeria (DBN) and the Green Climate Fund have supported some of these initiatives. The AfDB provided funding for the Nigeria Urban Transport Project, which supported investments into public transportation systems, including mass transit buses and related infrastructure. The DBN has provided funding for MSMEs in Nigeria involved in the production, distribution or servicing of EVs and related infrastructure. With support from UNDP, PJ & Company will develop a platform to provide both growth equity and small-scale asset finance for the African EV sector in East Africa, with plan to expand to Nigeria, Benin and Togo in West Africa.¹³⁴

FIGURE 3. Projected EV fleet by vehicle type in West Africa, 2050¹³⁵



134) "CAP Financial Innovation Challenge: E2W Africa, A Financing Platform for Electric Vehicles: Financial aggregation solutions by PJ & Company," United Nations Development Programme (UNDP), (2023): <https://www.undp.org/climate-aggregation-platform/e2w-africa-financing-platform-electric-vehicles>

135) Nana, J., "How can West Africa prepare for the 'EV revolution'?" Energy for Growth Hub, (September 10, 2021): <https://energyforgrowth.org/article/how-can-west-africa-prepare-for-the-ev-revolution/>

Table 9 summarises the different investment opportunities in Nigeria's e-mobility sector.¹³⁶

TABLE 9. Investment opportunities for e-mobility in Nigeria

MARKET SEGMENT	DESCRIPTION	INVESTMENT OPPORTUNITY
EV manufacturing and assembly	— Establishing or partnering with local EV manufacturing or assembly plants	<ul style="list-style-type: none"> — In 2023, the National Automotive Design and Development Company (NADDCC) adopted a new 10-year Nigerian Automotive Industry Development Plan (NAIDP), which includes incentives for automotive industry manufacturers, investors and developers to scale up EV adoption in Nigeria. The plan also promotes local EV production, with tax relief for EV manufactures and licensing requirements established for auto assembly plants in the country.¹³⁷ — The plan aims to position Nigeria as a regional EV market leader and includes a target of achieving at least 30% local EV production by 2030.¹³⁸ — Additional fiscal incentives are under development, including import duty and tax exemptions for EVs and their components – measures that could significantly reduce costs for e-mobility operators in Nigeria.¹³⁹ — In July 2023, the NADDCC announced that an Electric Vehicle Development Plan has entered the final stages for ratification and implementation (the plan has yet to be adopted as of mid-2024).¹⁴⁰ — The NAIDP 2023's objectives are to grow vehicle production to 200,000 units from ~10,000, focus on longer production runs, increase the local content of assembled vehicles, increase employment across the automotive value chain and attain 30% of total production with EVs (equivalent to 60,000 vehicles a year).

136) Investors should consider the evolving regulatory landscape, economic conditions, and quickly evolving technological advancements in the e-mobility space, among other factors

137) "Nigerian Automotive Industry Development Plan (NAIDP)," National Automotive Design and Development Company (NADDCC), (May 2023): <https://naddc.gov.ng/wp-content/uploads/2023/06/Nigerian-Automotive-Industry-Development-Plan-2023.pdf>

138) "Nigeria's e-mobility ambitions: COP28 and bridging the gap with climate finance," Environews Nigeria, (February 2, 2024): <https://www.environewsnigeria.com/nigerias-e-mobility-ambitions-cop28-and-bridging-the-gap-with-climate-finance/>

139) Dioha, M., "Accelerating Electric Mobility in Nigeria," Energy for Growth Hub, (2022): https://www.researchgate.net/publication/359228479_Accelerating_Electric_Mobility_in_Nigeria

140) Alu, K., "Electric Vehicle Development Plan Enters Final Stage For Ratification, Implementation," Leadership, (August 2023): <https://leadership.ng/electric-vehicle-development-plan-enters-final-stage-for-ratification-implementation/>

TABLE 9. *Continued*

MARKET SEGMENT	DESCRIPTION	INVESTMENT OPPORTUNITY
Charging infrastructure	— Establishing or partnering with federal, state, or local governments, existing e-mobility companies, or GMG developers	<ul style="list-style-type: none"> — Nigeria's EV market is projected to grow at a compound annual growth rate (CAGR) of 57.9% between 2024 and 2030.¹⁴¹ — In studying Ethiopia, Kenya, Nigeria, Rwanda and Uganda, the Shell Foundation and McKinsey found that in Nigeria, the estimated annual sales of e-motorcycles by 2030 would be between 100,000 and 330,000. In these five countries, USD 3.5-8.9B in costs will need to be financed by 2030 for e-motorcycles alone. Charging station infrastructure development and financing will account for a significant portion of the investment needed. — An estimated 9.9 million EVs could be in circulation in West Africa by 2050, with e-motorcycles making up 37% of the total (or 3.6 million EVs). — Charging millions of EVs will require many thousands of EV charging stations; there are plans to increase the number of charging stations significantly over the next several years by both public and private sector players.^{142, 143, 144, 145} — Deploying charging infrastructure at this scale will require significant capital investment, which in turn necessitates enabling policies, tax incentives and subsidies.
Two-wheel EVs	— A variety of opportunities exist including taxi services, battery charging/swap models, fleet vehicles, logistics and other commercial purposes	<ul style="list-style-type: none"> — Two-wheel EVs represent the largest EV market opportunity in Nigeria, driven by rising urbanisation levels and rapidly growing demand for transportation, delivery and logistics services. — By 2023, it is estimated that between 100,000 and 300,000 e-motorcycles will be sold annually in Nigeria.¹⁴⁶ — By 2040, it is estimated that there will be between 3.8 and 4.9 million EVs sold in Nigeria, about 80% of which (3-3.9 million) will be two-wheel EVs.

141) "Three lessons Nigeria can learn from India's bold EV policy," Techcabal, (March 22, 2024): <https://techcabal.com/2024/03/22/lessons-nigeria-can-learn-from-indias-ev-policy/>

142) Possible EVS, a pioneering African automotive start-up who recently opened a public EV charging station in Abuja Nigeria, has plans to deploy 10,000 stations in public places and highways across the country within the next five years.

143) Elebeke, E, "Auto firm opens electric vehicle charging station in Nigeria, (Aug. 22, 2023): <https://www.vanguardngr.com/2023/08/auto-firm-opens-electric-vehicle-charging-station-in-nigeria/>

144) "NADDC inaugurates solar-powered electric vehicle charging station in UNN," Agency Report, (Aug. 18, 2023): <https://www.premiumtimesng.com/news/more-news/616664-naddd-inaugurates-solar-powered-electric-vehicle-charging-station-in-un.html>

145) Addeh, E, "NNPC Plans Charging Ports for Electric Vehicles in Filling Stations Nationwide," (June 2023): <https://www.thisdaylive.com/index.php/2023/07/04/nnpc-plans-charging-ports-for-electric-vehicles-in-filling-stations-nationwide/>

146) "Financing the transition to electric vehicles in sub-Saharan Africa," Shell Foundation, (January 2022): <https://shellfoundation.org/app/uploads/2022/02/EV-Report-McKinsey.pdf>

TABLE 9. *Continued*

MARKET SEGMENT	DESCRIPTION	INVESTMENT OPPORTUNITY
E-buses	<ul style="list-style-type: none"> Establishing or partnering with local EV manufacturing or assembly plants 	<ul style="list-style-type: none"> There is a significant investment opportunity in Nigeria's e-bus market segment, with strong policy support from the FGN, emerging business models and PPP arrangements already in place, and a number of deals already in place in multiple states. Oando Clean Energy has partnered with the Lagos Metropolitan Area Transport Authority (LAMATA) to deploy infrastructure for e-buses including charging stations. In 2023, Oando announced a collaboration with Chinese bus manufacturer Yutong to deploy 12,000 e-buses and the necessary infrastructure in Nigeria within the next seven years. The e-buses are meant to be assembled locally, creating e-mobility related jobs in Nigeria.
Last-mile delivery service	<ul style="list-style-type: none"> Establishing or partnering with local fleet companies or independent contractors 	<ul style="list-style-type: none"> Several start-ups in Nigeria focus on meeting growing demand for delivery and logistics industries (see Section 3.3.2).
Battery manufacturing and recycling	<ul style="list-style-type: none"> Establishing or partnering with local manufacturers in the e-mobility supply chain or with e-mobility companies 	<ul style="list-style-type: none"> There are only a few e-mobility companies importing raw materials and assembling lithium-ion batteries. Battery recycling is also in its early stages although most e-mobility companies do plan to properly dispose of or recycle lithium-ion batteries when the lifespan (e.g., 10 years) has been depleted. In 2024, UK-based Mobile Power (see Box 6) signed a partnership agreement with Hinckley E-waste Recycling Nigeria to manage recycling of its batteries; Mobile Power estimates six million battery swaps per year in Africa. In 2023, Mobile Power entered into a partnership with financial company CrossBoundary Access to invest USD 10M in the company's operations in Nigeria.¹⁴⁷

147) Takoulev, J.M., "Electric batteries: Mobile Power sets course for recycling in Nigeria," Afrik21, (February 15, 2024): <https://www.afrik21.africa/en/electric-batteries-mobile-power-sets-course-for-recycling-in-nigeria/>

4.1.1 Market sizing for e-mobility in Nigeria

Figure 4 presents the estimated annual sales volume and adoption rate of two-wheel EVs in 2030 in select African countries. Nigeria’s sales adoption rate is between 5 and 15%.

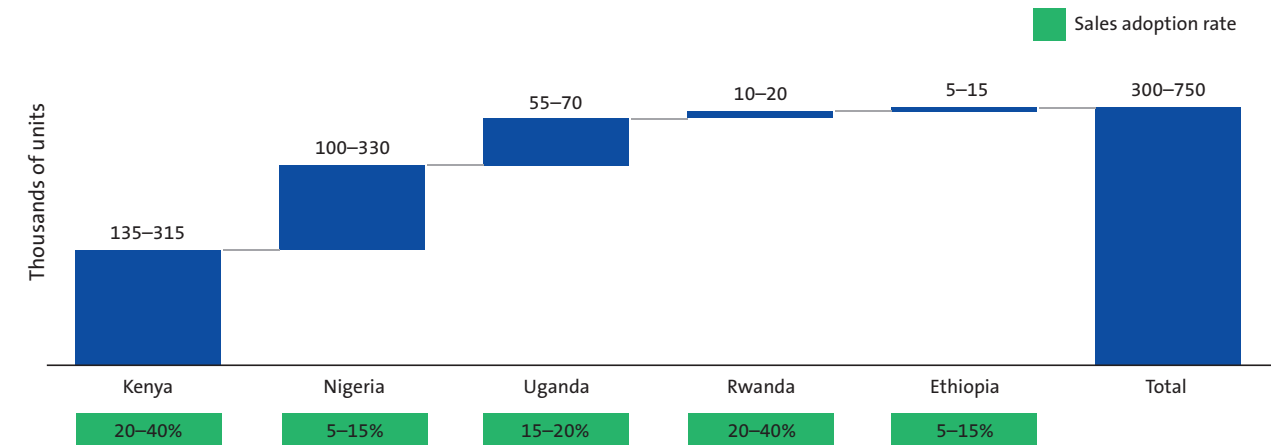
4.1.2 Market sizing for e-mobility as a productive use of electricity for GMGs in Nigeria

In Nigeria, the REA estimates a total market potential of 10,000 mini-grids and has successfully deployed approximately 100 mini-grids under the Performance-Based Grant¹⁴⁸ subcomponent of the NEP in Nigeria,¹⁴⁹ which aims to realise 200+ mini-grids (200,000+ connections). Plans for further scale-up are seen through the REA’s Minimum Subsidy Tender,¹⁵⁰ which aims to electrify 250 communities through mini-grids and approximately 23 communities through interconnected mini-grids¹⁵¹ which are currently under development by NESP’s IMAS programme.¹⁵²

To estimate the market size of e-mobility at GMGs in Nigeria, the following assumptions can be made:

- Assuming (conservatively) that 50% of the 10,000 GMGs estimated to be deployed in Nigeria are developed, and each GMG utilises five e-motorcycles per site, there is potential for approximately 25,000 e-motorcycles to be deployed at GMGs.
- With each e-motorcycle priced at about EUR 1,200,¹⁵³ the potential market size for the sale of these EVs as a productive use for GMGs in Nigeria is about EUR 30M.
- If 5,000 rural charging stations consume 50 kWh of electricity per day at EUR 0.30/kWh, EUR 75,000 would be generated per day (EUR 27.3M annually) in electricity sales for GMG operators.

FIGURE 4. Estimated annual sales volume and sales adoption rate of two-wheel EVs in 2030¹⁵⁴



Source: Financing the transition to electric vehicles in sub-Saharan Africa, Shell Foundation, 2022.

148) Nigerian Electrification Project (NEP), Rural Electrification Agency (REA): <https://nep.rea.gov.ng/performance-based-grant/>
149) Egboboh, C., “REA installs 103 mini-grids, powering 46,000 homes, businesses in Nigeria,” Business Day, (Aug. 23, 2023): <https://businessday.ng/news/article/rea-installs-103-mini-grids-pow-ering-46000-homesbusinesses-in-nigeria/>
150) Nigerian Electrification Project (NEP), Rural Electrification Agency (REA): <https://nep.rea.gov.ng/mini-grid-tender/>

151) The MST will be implemented in two phases. Under the MST-AfDB, NEP has prioritized 99 sites to be tendered in the first phase, and for the MST World Bank, NEP has also prioritized 250 sites to be tendered across ten states starting with a first phase pilot of 57 sites.
152) Ochayi, C, “FG, indigenous developers sign €9.3m agreement for 23-Mini-grids solar project,” Vanguard, (2022): <https://www.vanguardngr.com/2022/02/fg-indigenous-developers-sign-e9-3m-agreement-for-23-mini-grids-solar-project/>
153) “MAX.ng rolls out its E-Motorcycles in Nigeria,” TechGist Africa, Further Africa, (Aug. 17, 2020): <https://furtherafrica.com/2020/08/17/max-ng-rolls-out-its-e-motorcycles-in-nigeria/>
154) Shell Foundation, 2022.

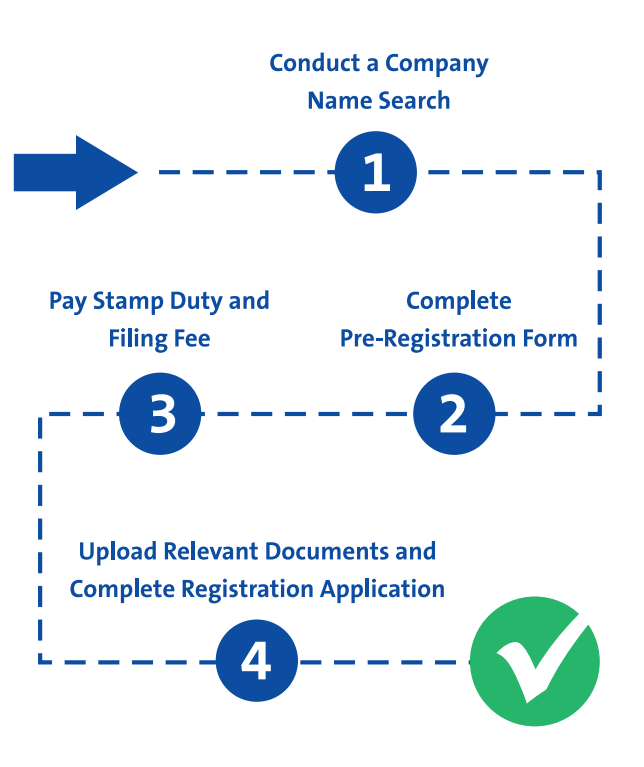
The Model Business Case that accompanies this Guide is a hypothetical business analysis of e-mobility applied as a productive use opportunity with GMGs, loosely based on the MAX-Rubitec EV pilot in Nigeria (Box 8). Under the EV pilot, Nigerian e-motorcycle manufacturer MAX deployed 10 e-motorcycles in a GMG-connected community in Ogun State operated by Rubitec Nigeria Limited, a Nigerian mini-grid developer. The rent-to-own business model successfully introduced two-wheel EVs into the rural community, as a result of which MAX upgraded its two-wheel EV into a more rugged design. The two-wheel EVs competed with ICE e-motorcycles in the region. The pilot data suggests that the two-wheel EV rent-to-own model can be deployed profitably with prevailing mini-grid electricity tariffs.¹⁵⁵

4.2 REGISTERING A BUSINESS IN NIGERIA

The Corporate Affairs Commission (CAC), which leads the business registration process in Nigeria, was established to regulate the formation and operations of companies in Nigeria.¹⁵⁶ Registered business names are connected to individual business or company Taxpayer Identification Numbers (TIN). The entire company registration processes is now done online through the CAC accredited agent portal or an individual portal created by self solely for the purpose of registration.

Figure 5 presents an overview of procedures to register a company in Nigeria.

FIGURE 5. Overview of procedures to register a company in Nigeria



COMPANY NAME SEARCH

If approved, an Approval Note is issued indicating the name has been reserved for registration by the applicant.

PRE-REGISTRATION FORM

Includes the Application for Registration of Company Form and Memorandum of Articles of Association.

STAMP DUTY/FILING FEE

Payment for business name registration, registration fee and stamp duty. Fees dependent on the number of shares the company will issue.

SUBMISSION OF REGISTRATION APPLICATION

Upload of relevant documents for directors and shareholders. Submission of final complete registration application.

155) "Powering Small-Format Electric Vehicles with Mini-grids," Rocky Mountain Institute, (2022): <https://rmi.org/wp-content/uploads/2022/04/powering-small-format-electric-vehicles-with-minigrids-report.pdf>

156) The CAC was established by virtue of the Companies and Allied Matters Act (CAMA) 2020. "Registration steps for Business Names," Corporate Affairs Commission, Nigeria's Corporate Registry: <https://www.cac.gov.ng/business-names/>

4.2.1 Procedures for registering a business in Nigeria

- 1) **Conduct a company name search:** The first step in company registration is to conduct a name search at CAC's company registration portal.¹⁵⁷ The applicant is to provide two options of different business names, which are used to conduct the search. The name search takes about 24 to 48 hours to be completed. If the name is approved, the CAC issues an Approval Note indicating the name has been reserved for registration for the applicant. If CAC disapproves both names submitted, payment will have to be made for another search of two new business names and the process repeats until a previously unused name is found.
- 2) **Complete pre-registration form and prepare other statutory forms:** The next step is to complete the online statutory forms, which include Application for Registration of Company Form and Memorandum of Articles of Association. To complete the forms, the applicant must provide the approved business name, the business address, details of the business owners, directors, and shareholders (addresses, passport photographs), shareholding structure, details of the company, objectives of the company, and other information.
- 3) **Pay the stamp duty and filing fee:** Payment is made for the business name registration, including the official CAC fee for availability check, registration fee and stamp duty. These fees are dependent on the number of shares the company will have; the higher the share capital, the higher the fees to be paid. It is important to note that the applicant does not need to pay or show evidence of having the share capital during the registration process.
- 4) **Upload relevant documents:** The next step is to upload relevant documents, such as identification cards of the directors and shareholders. In the case where a registered or existing company is a shareholder, it is important to upload the incorporation certificate of that company.
- 5) **Submit registration of application online:** Once all the statutory forms have been completed and necessary documentation uploaded online, the application can be submitted for registration.
- 6) If the registration is approved, the electronic incorporation certificates together with the TIN and other incorporation documents will be issued by the CAC to the company.
- 7) The applicant or its agent can then download the Certificate of Incorporation, Application for Registration Form and Memorandum and Articles of Association online.

4.2.2 Requirements for registering a business in Nigeria¹⁵⁸

Below is the information an applicant must provide to begin the registration of a limited liability company in Nigeria:

- 1) The registered address of the proposed company
- 2) Email and phone number of the proposed company
- 3) Forms of identification such as national identity card, international passport, driver's licence of the directors and shareholders
- 4) Approval notes of name reservation from CAC
- 5) Director(s) and shareholder(s) full names, residential address, copy of means of identification, occupation, and date of birth
- 6) Objective of the company: A statement of the business the company intends to be carrying out in Nigeria
- 7) Statutory fees and stamp duty
- 8) Incorporation certificate and company resolution, in the case where another registered company (either local or foreign) will be a shareholder or subscriber to the proposed company
- 9) The authorised share capital of the company: this will depend on the services the company intends to engage in Nigeria¹⁵⁹
- 10) The shareholding formula or percentage of each shareholder in the company, if the new company will have more than one shareholder

157) <https://pre.cac.gov.ng/home>

158) "Nigeria: Requirements for Registering a Company in Nigeria," Mondaq, (April 29, 2022): <https://www.mondaq.com/nigeria/shareholders/1187794/requirements-for-registering-a-company-in-nigeria>

159) It is important to note that there is a mandatory share capital threshold applicable to certain businesses in Nigeria. For instance, a company intending to engage in a payment gateway business must have a minimum of 100 million Naira authorised share capital, and where any foreign individual or foreign company is to be involved in the proposed company as a director or shareholder, the authorised share capital of the proposed company must be a minimum of 10 million Naira.

4.3 CHALLENGES FOR PROJECT DEVELOPERS IN NIGERIA

There are multiple project developers and e-mobility operators working to deploy various business models in Nigeria. Some competitors offer a full range of products and services, including asset finance, battery-swapping stations, charging infrastructure and e-motorcycle production. The market is expected to be large given the number of ICE two-wheel vehicles and the many commercial uses for either e-motorcycles or ICE motorcycles (see [Section 3.3](#)).

However, the adoption of EVs faces the challenge of high up-front costs compared to ICE vehicles. The challenge is exacerbated by a lack of affordable financing, including for manufacturing/assembly, retailing or purchase of the vehicles. Lack of affordable financing is due to several factors, including high returns demanded from equity investors, limited risk appetite of FIs in debt financing, limited understanding on the viability of the existing business models, nascent stage of the sector, and the absence of regulatory support.

Further, regulatory bans on two-wheelers for commercial purposes in Lagos and other cities, limits the use of two-wheeler EVs to personal purposes and for service delivery for logistics companies.

Education about the price-parity and convenience of a variety of types of EVs is yet another barrier given that many consumers have questions about the technology and already trust their ICE vehicles. A developer should utilise targeted marketing and awareness raising campaigns to reach commercial consumers and educate them about the long-term cost savings associated with fuel switching to electricity.

More government support is needed to reduce import tariffs, promote GMG-e-mobility partnerships, ensure transparent regulation and provide financing risk guarantees. The FGN can work closely with its development partners to design and launch RBF grant facilities and related subsidy programmes to support e-mobility companies. Local training is needed to ensure that human capital is not a constraint to local supply chain build out and local manufacturing. [Table 10](#) summarises the main challenges for project developers in Nigeria and offers possible solutions.

TABLE 10. Challenges for project developers in Nigeria

BARRIER/ CHALLENGE	DESCRIPTION	POSSIBLE SOLUTIONS
Governance and transparency	— Governance and transparency issues need improvement across all levels	— Awareness raising, legal reform
Policy, regulation and incentives	— Nigeria does not currently have specific policies, strategies or incentive frameworks in place for e-mobility	— Advocate for a comprehensive, long-term e-mobility roadmap to guide the country's EV transition and send a clear market signal to the private sector — The FGN can implement a range of fiscal and non-fiscal incentives to support e-mobility, including tax exemptions and a concessional grid tariff for EV charging

TABLE 10. *Continued*

BARRIER/ CHALLENGE	DESCRIPTION	POSSIBLE SOLUTIONS
Financing	<ul style="list-style-type: none"> While financing is available in the form of donor funding, asset-finance remains a nascent part of the e-mobility landscape, which is essential to reduce the high up-front cost of EVs Start-ups also need patient capital to offset significant CAPEX required to purchase or manufacture batteries or EVs 	<ul style="list-style-type: none"> Developers can advocate for more DFI or government support in securing asset-finance solutions A well-capitalised developer or FI with experience in asset-finance could establish relationships with e-mobility companies Investment in charging infrastructure, Battery-as-a-Service and battery-swapping station models can help address the issue of battery costs (which contributes most to the high cost of EVs)
Foreign exchange	<ul style="list-style-type: none"> The depreciation of the national currency poses a significant risk to developers and financiers 	<ul style="list-style-type: none"> The new government has taken steps to stabilise the FX market in the country, albeit with limited success
Awareness	<ul style="list-style-type: none"> Awareness of the potential of e-mobility to boost economic growth in Nigeria is low, but essential if the sector is to achieve the scale needed for large scale adoption 	<ul style="list-style-type: none"> Advocacy, formal training and capacity building for all market actors: public sector (federal, state, and local governments), consumers (raise awareness of the wide-ranging benefits of e-mobility products and services) and financiers
Technical expertise/ human capital	<ul style="list-style-type: none"> E-mobility is a new market in Nigeria, so there is limited indigenous technical expertise across the local EV supply chain 	<ul style="list-style-type: none"> The FGN and its development partners can facilitate knowledge transfer and provide capacity building support to e-mobility public and private sector stakeholders Government can partner with donors, NGOs, academia and industry associations to build local capacity and technical expertise in the sector (e.g., an e-motorcycle start-up that needs to either import e-motorcycles, the components to build e-motorcycles, or the components to build lithium-ion batteries).

4.4 FINANCING E-MOBILITY IN NIGERIA

Access to financing is a key enabler for the transition to e-mobility in Nigeria. As described in [Section 2.4](#), the three main methods and vehicles that the sector needs are patient capital, asset finance and trade finance. Asset finance, in particular, can help consumers overcome the high up-front costs of switching from an ICE vehicle to an EV. In the absence of asset financing solutions, innovative charging network and battery-swapping models (see [Section 2.3](#)) can help make projects economically feasible. E-mobility start-ups (importers, assemblers, suppliers) require significant investment, as the CAPEX required to import or manufacture batteries or EVs is high.

The e-mobility company, MAX, has legacy asset finance capabilities developed for its ICE two-wheel vehicles. MAX has leveraged this experience and applied it to its e-motorcycle business. Developments like this are important to prove to consumers that e-mobility products are affordable up front. The next layer of education comes in proving to consumers that the long-term usage and ownership costs are lower than ICE alternatives. Developers in the e-mobility sector in Nigeria need to build capacity/expertise and offer easy to use and understand asset-financing products. This is a hurdle that must be met for any e-mobility company to succeed.

Addressing these headwinds will require bringing local and regional equity investors and local FIs into the e-mobility financing ecosystem to encourage local currency lending to the sector. Nascent companies need CAPEX and working capital; trade or inventory finance to import vehicles or component parts; project finance for charging stations; and consumer/SME finance for end users. The availability and suitability of such instruments typically varies based on the stage of the business. Policies and regulations can bring in early-stage equity investors. In some cases, donors and DFIs can stimulate private sector investment by working with the FGN to address financing gaps with concessional finance, grants and RBF facilities, among other financial instruments. Additionally, private sector led risk mitigation mechanisms can bring more affordable local currency debt to the market through guarantee programs, for example.

4.4.1 Overcoming financing hurdles

E-mobility companies in Nigeria will need access to different types of financing instruments to grow. Early-stage equity investments in the form of seed capital from venture capital is an important mechanism needed for start-up companies. An improved enabling environment in Nigeria is essential for firms to see less risk in these types of investments.

Mature capital is needed when companies are in the growth and expansion stages of their development. This can come in the form of debt financing from FIs in local currency or private equity investments. Local currency financing and loan guarantee programs can help de-risk these larger private sector investments in Nigeria.

Innovative financial mechanisms can help e-mobility companies in Nigeria overcome financial hurdles. Certain financial support mechanisms are needed to stimulate private capital investment. These include capacity building, technical assistance and transaction advisory support to effectively deploy financial products for the sector, including asset financing, financing for vehicle import and batteries/charging infrastructure.

EV start-ups raised about EUR 100M in publicly-disclosed financing in 2021. This capital was raised from a variety of sources including commercial banks, venture capital (VC) funds,

PE funds, and DFIs (see [Section 2.4](#)). Support for developers can come in the form of guarantee facilities, grants, and VC to get their businesses off the ground.¹⁶⁰

A first-loss guarantee facility can unlock potential investment by de-risking for investors. A facility like this could also include RBF. Developers can also work with payment providers or asset-finance companies on payment models that work for consumers.

Within the manufacturing space, companies can collaborate with the government or private sector to set up an incubator for EV assemblers/importers. Grant financing can be combined in this stage given how capital intensive it is. Commercial banks can provide credit facilities more easily by working with DFIs or equity investors. Additionally, developers could work with equipment suppliers for better terms. This is where funding from DFIs and first-loss guarantees can be utilised to obtain financing.

Capital-intensive investments can also rely on raising capital through the issuance of green corporate bonds. The ticket sizes of these bond issuances need to be large (EUR 40–50M). DFIs have deep experience with green bonds and are best suited to support developers in the green bond issuance market.

Carbon finance/carbon credits can also be considered to help overcome financing barriers. Carbon credits (e.g., for charging infrastructure) can effectively act as subsidies to lower the amount of funding that an e-mobility company would have to be borrow or can be used for CAPEX and OPEX expenditures.¹⁶¹

4.4.2 The role of the public sector

A critical role for the public sector is to create an enabling environment that will support the risk levels of early-stage equity investment and once mature companies exist, private sector debt and large-scale capital. In addition to a strong enabling environment, federal, state and local government in Nigeria can also provide and unlock support for financing mechanisms similar to those described above. For example, a first-loss guarantee facility with backing from the FGN and an FI can unlock investment in nascent markets like e-mobility in urban, peri-urban or rural areas of Nigeria.

¹⁶⁰) Shell Foundation, 2022.

¹⁶¹) Shell Foundation, 2022.

The FGN is already providing similar facilities for investment in energy infrastructure. InfraCredit, backed by the Nigerian Sovereign Investment Authority (NSIA), provides local currency guarantees to enhance the credit quality of debt instruments to finance infrastructure projects. InfraCredit's guarantees can unlock private capital investment from large investors such as pension funds. InfraCredit was started in 2017 with initial investment from the FGN through the Nigerian Sovereign Investment Authority (NSIA) and GuarantCo. GuarantCo provides local currency credit solutions and is a subsidiary of the Private Infrastructure Development Group (PIDG). The Nigerian Infrastructure Debt Fund (NIDF) is an infrastructure fund backed by the FGN that provides debt financing for infrastructure projects and businesses in Nigeria. Through the NSIA, the FGN provides subordinated equity to the NIDF.

The Central Bank of Nigeria (CBN) operates facilities that provides credit to developers who are pre-qualified under the National Electrification Plan (NEP). One facility is the Solar Connection Facility and the CBN has also provided capital to lower the cost of borrowing from local FIs for green mini-grid projects.

The Bank of Industry (BOI) is Nigeria's oldest and largest DFI. The BOI provides financial and advisory support for the establishment of SMEs and other enterprises in the industrial sector. The BOI has also supported low cost credit lines in the renewable energy sector. The Development Bank of Nigeria has also supported MSMEs with partial credit risk guarantees and capacity building, also including lower cost credit to various enterprises.

The FGN can also implement a range of fiscal and non-fiscal incentives to support e-mobility, including import duty and tax exemptions for EVs and their components; reduced electricity tariffs for EV charging; the adoption of policies to limit the importation of ICE vehicles (and promote EVs) as well as pro-business trade policies and regulations that encourage in-country manufacturing. All of these measures can help start-up companies acquire the initial financing needed for CAPEX and OPEX (e.g., an e-motorcycle start-up that needs to either import e-motorcycles, the components to build e-motorcycles, or the components to build lithium-ion batteries).

Public-private partnerships (PPPs) are also important for the adoption of e-mobility, primarily to achieve risk sharing and unlock more private capital than would otherwise be available (e.g., for the rollout of EV charging infrastructure). The PPP model has been successful in the mini-grid market in sub-Saharan Africa and applying lessons learned to infrastructure projects such as battery charging would be an important step for unlocking private capital for e-mobility in Nigeria.

Examples of active financing vehicles and guarantee instruments in Nigeria's e-mobility sectors are:

- Lightwork, a global private equity platform (Investment in MAX e-mobility in Nigeria).
- Global Ventures, a UAE-based international venture capital firm (Modern Energy in Africa and the Middle East Thought Leadership).
- Novastar Ventures (Investment in MAX e-mobility in Nigeria and BasiGo (e-buses) in Kenya).
- Proparco (Digital Africa Initiative), the French development finance institution (financing and supporting the transition to clean public transportation in Colombia).
- British International Investment, the UK's DFI and impact investor which started a USD 100M trade finance facility with the Eastern and Southern African Trade and Development Bank (TDB).
- InfraCredit in Nigeria, which provides local currency guarantees to unlock long-term infrastructure financing.
- FSD Africa Investments, which invests to improve the financial instruments supporting Africa's green economic growth, specifically the Africa Green Finance Coalition (AGFC), which aims to catalyse technical assistance funding and eventually investment capital in Africa and Nigeria.
- The Climate Finance Accelerator, which is a public-private finance initiative that supports low-carbon projects to help middle-income countries meet their NDCs. Nigeria is one of three pilot countries that involved pilot activities between 2017 and 2020.

4.5 MARKET OUTLOOK

E-mobility in Nigeria is still in its early stages of development, but many pathways exist for the market to grow and for the country to lead the EV transition in West Africa. Government policy, infrastructure development, and economic conditions are variables that will impact the pace of market development. Global trends in e-mobility and advancements in technology may also influence the local market.

Nigeria's high poverty rates currently inhibit its ability to be Africa's leader in technology, industry and trade. While experts believe that a progressive transition from ICE vehicles to EVs can open the nation to untapped market opportunities in e-mobility, other challenges and uncertainties exist that may prevent the sector from reaching its potential.¹⁶² Key barriers include the absence of a defined roadmap to guide EV development, limited access to financing, outdated infrastructure, an unreliable power grid, FX risks, the economy's outsized reliance on fossil fuels and market access issues due to conflict and security concerns in certain parts of the country. Additionally, EV charging network infrastructure is expensive to build and would also need to scale in peri-urban and rural areas. Incentive mechanisms are currently lacking the strength needed to scale-up widespread adoption. To overcome these challenges, the FGN, with support from its development partners, can strengthen the enabling environment for e-mobility through the development of an integrated, long-term roadmap for the sector, fiscal incentives and import duty exemptions, and the introduction of mechanisms to unlock private financing and promote asset financing solutions. Consumer education is also essential to raise awareness of the wide-ranging benefits of e-mobility products and services.

Alongside supportive government policy, the economics also need to work. A pilot project implemented under the Nigeria Energy Support Programme (NESP) in Ogun State by MAX and Rubitec Nigeria Limited, where EVs were used in conjunction with a GMG demonstrated how e-mobility and GMGs can complement each other to foster economic development and meet the electrification and transportation needs of rural communities. Husk Power is another operator testing the commercial viability of operating an e-mobility business powered by its mini-grids in Nigeria. Growth in the e-mobility sector can in turn reinforce the GMG business model by scaling up PUE, reducing tariffs, increasing access to finance, and taking advantage of other synergies in O&M and the procurement of battery storage technologies.

Scaling up the adoption of EVs in urban, peri-urban, and rural areas of Nigeria will require integrated planning and coordination among all key public and private stakeholders involved. Supportive government policy, regulation and tax incentives for the private sector by the FGN, tailored e-mobility business models by project developers/businesses, innovative financing solutions by private financiers, guarantee and risk instruments by DFIs and capacity building across the entire supply chain will enable e-mobility market development in Nigeria. Advocacy should extend to all relevant stakeholders including policy-makers, regulators, urban planners, automotive/e-mobility companies, GMG project developers, commercial banks, investors and financiers. The FGN and its partners can also work with the academia to support further R&D into e-mobility.


This Developer Guide is complemented by two Model Business Cases that analyse the financial feasibility of two hypothetical e-mobility companies: (i) a mini-grid powered rural e-mobility project; and (ii) an urban e-mobility business.

162) Adelaja, R., "Experts seek adoption of e-mobility for fight against climate change," Ripples Nigeria, (March 26, 2022): <https://www.ripplesnigeria.com/experts-he-seek-adoption-of-e-mobility-for-fight-against-climate-change/>

ANNEX 1



Financing Rounds of E-Mobility Companies in sub-Saharan Africa

ANNEX 1.

COMPANY	COUNTRY/COUNTRIES OF OPERATION	INVESTORS/FINANCIERS	DESCRIPTION
 AMPERSAND	Kenya	<ul style="list-style-type: none">— Ecosystem Integrity Fund (EIF)— Acumen— Hard-Edged Hope Fund— Alphamundi VC,— Societe Petrolieries du Rwanda— TotalEnergies— Beyond Capital Ventures— Africa Go Green Fund	<ul style="list-style-type: none">— In 2021, Ampersand secured USD 3.5M from Ecosystem Integrity Fund (EIF), a venture capital firm that invests in early-stage companies contributing to environmental sustainability.— In January 2024, Ampersand raised USD 19.5M in equity and debt funding to expand its operations. The USD 19.5M funding round was led by EIF and joined by Acumen and Hard-Edged Hope Fund. Other investors include Alphamundi VC, Societe Petrolieries du Rwanda, TotalEnergies and Beyond Capital Ventures.— It also includes a USD 7.5M debt facility from Cygnum Capital's Africa Go Green Fund.¹⁶³

163) Jackson, T., "Rwandan e-bike startup Ampersand banks \$19.5m funding," Disrupt Africa, (January 4, 2024): <https://old.disruptafrica.com/2024/01/04/rwandan-e-bike-startup-ampersand-banks-19-5m-funding/>

ANNEX 1. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	INVESTORS/FINANCIERS	DESCRIPTION
	Kenya	<ul style="list-style-type: none"> — Musashi Seimitsu — Watu 	<ul style="list-style-type: none"> — In 2022, ARC Ride announced a strategic partnership and equity investment by Musashi Seimitsu and Watu – with Musashi to expand ARC Ride's e-motorcycle fleet to include additional products (electric personal transport vehicles and a last-mile goods delivery vehicle) and Watu to utilise its financing experience to help ARC Ride grow its business and ensure EVs are an affordable part of Nairobi's transport network.¹⁶⁴ — In August 2023, Musashi made an additional strategic investment in ARC Ride to focus on the hardware side of the two- and three-wheel EV business, and to expand their focus on software, with access to data that can be extracted from the vehicles. Such insights are planned to assist the riders with their performance, as well as gaining important information about the status of the vehicles themselves.¹⁶⁵
	Kenya	<ul style="list-style-type: none"> — Novastar Ventures — Moxxie Ventures — Nimble Partners — Spring Ventures — Climate Capital — Third Derivative — Mobility54 — Trucks.vc — My Climate Journey — Susquehanna Foundation — Keiki Capital — On.Capital — USAID — British International Investment (BII) 	<ul style="list-style-type: none"> — In 2021, BasiGo raised USD 930,000 in a pre-seed round. — In 2022, the company raised nearly USD 11M in funding and secured USD 4.3M in seed funding, with Novastar Ventures leading the round supported by various investors, including Moxxie Ventures, Nimble Partners, Spring Ventures, Climate Capital, and Third Derivative.¹⁶⁶ — In November 2022, BasiGo raised USD 6.6M in equity funding, with Novastar, Mobility54, and Trucks.vc jointly leading the round. The round also included investment from Moxxie Ventures, My Climate Journey, Susquehanna Foundation, Keiki Capital, and On.Capital. — In November 2023, BasiGo received a USD 1.5M grant from USAID to support its recently launched pilot initiative in Kigali. — In December 2023, BasiGo announced a USD 5M debt financing agreement with British International Investment (BII), to scale its electric bus assembly operations in Kenya and accelerate its mission to deliver 100 e-buses to the country.¹⁶⁷




164) Kuhudzai, R.J., "ARC Ride Partners With Musashi Seimitsu & Watu," CleanTechnica, (2022): <https://cleantechnica.com/2022/07/28/arc-ride-partners-with-musashi-seimitsu-watu/>

165) "Musashi Announces Additional Investment for ARC Ride," Musashi, (August 8, 2023): https://www.musashi.co.jp/en/newsrelease/musashi_announces_additional_investment_for_arc_ride.html

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ANNEX 1. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	INVESTORS/FINANCIERS	DESCRIPTION
	Ethiopia	<ul style="list-style-type: none"> — Nissay Capital — Musashi Seimitsu 	<ul style="list-style-type: none"> — Dodai, an Ethiopian EV start-up that assembles and distributes e-motorbikes in Addis Ababa, has raised USD 4M in its Series A funding round. — The funding round attracted prominent investors, including Nissay Capital, the venture capital arm of a USD 500B Japanese asset management firm, marking their first investment in Africa. Musashi Seimitsu also participated.¹⁶⁸
	Kenya	<ul style="list-style-type: none"> — Verdant Capital 	<ul style="list-style-type: none"> — In June 2023, the Verdant Capital Hybrid Fund completed a USD 7M dual tranche investment comprising a subordinated loan and senior secured loan to Mogo Kenya to help the company expand its portfolio of petrol motorbikes (boda-bodas), petrol tuk-tuks (three-wheeler), ICE cars and car logbook or leaseback financing throughout the country.¹⁶⁹
	Kenya	<ul style="list-style-type: none"> — At One Ventures — Factor[e] Ventures — Ambo Ventures — Equator Africa — TES Ventures 	<ul style="list-style-type: none"> — In November 2023, Roam raised USD 7.5M (USD 5M in equity and USD 2.5M in additional grants) in a funding round to continue to scale its operations in electric motorcycle and bus manufacturing in Africa.¹⁷⁰ — This USD 7.5M funding round was led by At One Ventures, and supported with funding from Factor[e] Ventures and Ambo Ventures managed by former Google and Uber executives. — In February 2024, Roam secured USD 14M in Series A equity funding led by Equator Africa, with notable contributions from At One Ventures, TES Ventures, and others, alongside an additional USD 10M debt commitment from the Development Finance Corporation (DFC).¹⁷¹



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ANNEX 1. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	INVESTORS/FINANCIERS	DESCRIPTION
 STIMA	Kenya, India, France	<ul style="list-style-type: none"> — On.Capital — DEG 	<ul style="list-style-type: none"> — In June 2023, On.Capital SAS invested in STIMA, alongside a group of experienced business angels, to support STIMA's open platform approach for its software as a service (SaaS) for electric mobility and traditional fleet managers.¹⁷² — STIMA also secured EUR 100K in investments, issued in the form of a grant, from DEG Impulse, a subsidiary of the German Development Bank DEG with funds from the German Federal Ministry for Economic Cooperation and Development (BMZ). The investment is aimed at demonstrating the economic viability of battery-swapping systems at the scale of 100 motorbikes and 11 battery swap stations in Nairobi, and further developing the swapping platform licensing.¹⁷³ The funding makes Stima the newest addition to the develoPPP Ventures e-mobility portfolio.
 TUGENDE	Uganda	<ul style="list-style-type: none"> — Partech — Enza Capital — Mobility 54 (a corporate VC subsidiary of Toyota Tsusho Corporation and CFAO group) — Women's World Banking 	<ul style="list-style-type: none"> — In March 2021, Tugende raised USD 3.6M in additional equity financing to close its Series A round in a round led by Partech, with participation from Enza Capital and regionally based angel investors. Partech and Enza joined Toyota Tsusho's Mobility 54, which led the first close announced in September 2020, as Tugende's investors. This investment is to build up Tugende's asset financing tech platform, fine-tune the model and expand in new markets.¹⁷⁴ — The investment, which was agreed on and structured in 2020 following the USD 6.3M raised in November 2020 and led by Toyota Tsusho investment fund Mobility 54, brought Tugende's total Series A financing to USD 9.9M.¹⁷⁵ — In October 2022, the company raised USD 10M in pre-Series B equity and debt funding. The funding was provided by Partech and Women's World Banking, as well as another unnamed investor, to strengthen Tugende's balance sheet and allow it to increase portfolio growth as well as address significant credit demand amongst MSMEs.¹⁷⁶

172) "On.Capital invests in e-mobility-SaaS pioneer STIMA in Kenya," On.Capital, (June 2023): <https://oncapital.vc/2023/06/16/on-capital-invests-in-e-mobility-saas-pioneer-stima-in-kenya/>


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ANNEX 1. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	INVESTORS/FINANCIERS	DESCRIPTION
	Uganda	<ul style="list-style-type: none"> — Mobility 54 — DOB Equity — InfraCo Africa — EEP Africa 	<ul style="list-style-type: none"> — Zembo raised in November 2021 USD 3.4M to help grow its electric motorcycle business in Kampala, Uganda, from Mobility 54 Investment SAS, DOB Equity and InfraCo Africa who all participated in the investment deal.¹⁷⁷ — The increased funding is to help Zembo expand while also instilling high health and safety and commercial growth standards, allowing the company to grow and attract more private sector investment. — In 2019, Zembo scored a USD 1.5M grant funding round from EEP Africa, Agence de l'Environnement et de la Maîtrise de l'Énergie, French Facility for Global Environment, and Bond'innova, to roll out over 200 electric bikes and 10 battery recharging stations in the market in Uganda.¹⁷⁸



177) "InfraCo Africa, DOB Equity and Mobility 54 announce investment to scale Zembo's vision for electric mobility in Uganda," InfraCo Africa, (11 November 2021): <https://infracoafrica.com/infraco-africa-dob-equity-and-mobility-54-announce-investment-to-scale-zembos-vision-for-electric-mobility-in-uganda/>

178) "12 African startups that have used grants as catalysts to unlock further funding," Digest Africa, (December 18, 2020)

ANNEX 2




E-mobility Companies in sub-Saharan Africa¹⁷⁹

ANNEX 2.



COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
 AMPERSAND	Rwanda and Kenya	E-motorcycles, smart batteries and battery swap stations	Ampersand sells e-motorcycles that are slightly more expensive upfront than gasoline models. The company partners with asset finance companies to make them more accessible. Ampersand operates battery swap stations in Kigali and Nairobi. As of June 2023, the fleet reached 1,000 e-motorcycles in Kenya and Rwanda and 115,000 monthly swaps. Each battery delivers 350,000 km of range over its lifetime, and 50-110 km per swap, depending on the terrain and usage.	E-motorcycles via asset finance and battery swap stations (Battery-as-a-Service)
 ARC RIDE	Nairobi, Kenya	E-motorbikes, smart batteries and automated battery swap cabinets	ARC Ride offers e-motorbikes via the asset finance model, including with firms such as Watu, Hakki, Aspira, Mosmos and Mogo. ARC Ride's flagship e-motorbike, The Corbett, cannot be charged at home with a conventional charger. The e-motorbike has a swappable battery that can be exchanged at ARC Ride swapping cabinets. The Corbett was designed and tested for a wide range of applications, including last mile delivery. ARC Ride offers automated swap cabinets for batteries, smart batteries, and an easy-to-use rider app. The swap stations are solar powered and contain 12 battery lockers.	E-motorcycles via asset finance and battery swap stations (Battery-as-a-Service)

179) NOTE: This table does not include companies that operate in Nigeria; please refer to [Table 8](#) in [Section 3.5](#) for a list of e-mobility companies in Nigeria.

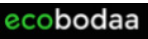



ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Kenya, Tanzania, Uganda	E-Boarders (electric outboard engines and a 'propulsion-as-you-go' model)	ADOBO is a start-up developing sustainable platforms for e-mobility services on the water in emerging markets. ADOBO e-Boarders are electric outboard engines for small fishing boats powered by renewable energy. E-Boarders are offered as 'propulsion-as-a-service'	Affordable leasing via a propulsion-as-a-service model on a propulsion-as-you-go basis
	Kenya	Passenger e-buses	BasiGo is a Kenyan e-mobility company that launched passenger e-buses in 2022. Public transport mini-bus owners receive a cost-effective electric alternative to diesel. The latest offering from BasiGo is an e-bus designed for Kenya's transportation sector. The E9 Kubwa is a 9-meter, fully-electric bus with a seating capacity for 36 passengers and a safe standing capacity for an additional 18 passengers. The E9 has the ability to recharge in less than two hours and can operate up to 400 km per day, making it a viable option for intra-county transit. The company's pay-as-you-drive battery subscription model protects the operator from the high upfront cost of the e-bus. The owner pays Kes 20 (approximately EUR 1.50) per kilometre to cater for all battery-related costs, including charging, warranty, service and maintenance. BasiGo is committed to delivering electric buses that are 100% assembled in Kenya.	Pay-as-you-drive financing models including a purchase option
	Uganda, Nigeria, Senegal, Kenya, DRC, South Africa	EV manufacturing, battery swapping	Bob Eco is a global e-motorcycle manufacturer and leasing innovator with a mission to accelerate the transition to sustainable energy in emerging markets across Africa. Bob Eco provides accessible, affordable, and eco-friendly e-motorcycle taxis and deliveries on a lease-to-own model. Bob Eco is rapidly growing its battery-swapping network, featuring the easy-to-use swapping stations and hyper-efficient swappable, smart batteries, which are software enhanced and accessible to all Bob riders.	Battery-swapping stations, pay-as-you-drive financing models including a purchase option and a lease option





ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Kenya, Tanzania, Uganda	Purchase and lease of EVs, e-mobility consulting, charging infrastructure development and fleet electrification and analysis	Drive Electric operates in Kenya, Tanzania and Uganda and provides a variety of services and expertise to the e-mobility market. The company offers purchase and leasing of automobile EVs such as the Nissan Leaf and Nissan e-NV200. In addition, the company offers e-mobility consulting, charging infrastructure development and fleet electrification and analysis.	EV sales and leasing, charging infrastructure
	Kenya, Uganda, Rwanda	E-bicycles	eBee was launched in 2021 and provides e-bicycles to consumers and businesses through sales, rentals and a green delivery fleet. eBee offers the Nyuki e-bicycle for commercial purposes and the eBX, which is an e-mountain bike for personal consumer use. The commercial fleet business allows for cost savings through reduced petrol and maintenance costs, enabling a flow of goods across locations more affordably. eBee offers a full-service delivery model for outsourced delivery services for e-commerce platforms, restaurants and supermarkets. It also offers a service rental model on a monthly basis to pharmacies, logistic companies, large compounds and security companies. The consumer e-bicycles are available for purchase. All of the EVs are sold or rented with the battery intact and it is the responsibility of the consumer/fleet operator to charge. The battery can be charged from 20% to 80% in two hours. The XL battery can attain 90 km per charge while the large battery covers a range of 50 km per charge depending on the load, weight and terrain.	E-bicycle sales and rentals; self-charging



ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Kenya	E-motorcycles, battery swapping	Ecobodaa is an e-mobility start-up providing affordable, connected electric motorcycle taxis (boda bodas) to riders in Nairobi available on a lease-to-own payment plan. Ecobodaa is responsible for controlling every part of the customer experience from motorcycle design, maintenance, revenue collection, and battery-swapping stations.	Lease-to-own e-motorcycle sales
	Kenya	E-vehicle sales	Equator Mobility, established in 2021, rents four-wheel EVs and two-wheel EVs, including electric motorcycles, together with smart batteries and operates battery-swapping stations.	Rental model for EVs
	Kenya	EV charging infrastructure	EVChaja is Kenya's first network of electric vehicles charging stations for electric car owners, drivers, fleets operators, business owners, utilities. EVChaja also developed an app for customers to access a network of convenient charging locations, and monitor real-time status updates. The company offers different payment methods to meet customer needs, including full membership, pay-as-you-go, or guest charging.	Service-based; charging infrastructure
	Kenya, Rwanda	E-bicycles	eWAKA is an innovative e-mobility platform in Africa, offering sales and rentals of electric cargo bikes and motorcycles perfectly suited for deliveries and commuting, complemented by a pay-per-use charging infrastructure and advanced fleet management software. The electric bikes come with real-time tracking and geofencing for security, remote control and driver behaviour monitoring, and efficient route planning and operational reports. eWAKA also provides accessible financing options for customers.	E-bicycle sales and rentals



ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Uganda	Lithium-ion battery packs manufacturing, e-motorcycles manufacturing, battery-swapping stations	GOGO, formerly known as BodaWerk, provides batteries on a pay-as-you-go basis, sells e-motorcycles, deploys battery-swapping stations, and manufactures batteries for its swapping stations locally. GOGO also provides battery-powered three-wheelers for larger cargo and battery-powered engines for boats, catering to fishermen. The company has also partnered with Watu for its PayGo asset financing.	Service-based model, asset-finance offering for batteries, e-motorcycle sales
	Rwanda	Four-wheel EV sales	Kabisa is a Rwandan-based mobility company that sells and leases EVs, in addition to deploying charging networks across the country. Kabisa also installs EV charging points for homes and businesses on request. The company offers its four-wheel EVs on direct sales and lease-to-own options and works with financial partners such as BBOX and NCBA to offer vehicle financing for businesses and private individuals.	EV sales and charging infrastructure
	Kenya	E-scooters, e-motorcycles, battery swap stations	Kiri is an EV start-up based in Nairobi, Kenya. Kiri offers the product lifecycle (Kirigo) of e-mobility including a smart app to locate swap stations and reserve batteries, smart e-scooters, e-motorcycles and e-three wheelers with smart vehicle control, smart IOT batteries and smart swapping cabinets that provide 24-hour automated battery swapping. Kiri is accepting pre-orders for its e-scooters, e-motorcycles and e-three-wheelers. The EVs offered can also be charged at home or any location with a standard electrical outlet.	
	Uganda	EVs, Hybrid EVs, e-buses, petrol vehicles	Kiira Motors Corporation is a State Enterprise established in part by the Government of Uganda to establish a motor vehicle industry in Uganda through technology transfer, contract manufacturing and supply chain localization. Kiira Motors produces two e-buses, one EV, and one hybrid EV.	EV manufacturing and sales




ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Ghana	Electric motorcycles, battery-swapping networks	KOFA is a start-up based in Accra developing networks of battery-swapping stations to increase customer value and adoption of cleaner solutions. KOFA has designed lightweight batteries and inverters that can be used to power multiple applications, such as transportation, off-grid power supplies, tools and appliances as well as to serve as back-up power in shops, offices and homes. The company operates a pay-per-swap model, operated through its “Swap & Go” app, which enables customers to see battery availability at every swap station in real-time, and gives customers the option of ordering batteries to be delivered directly to their home or business. The app also allows for motorcycle tracking and fleet management.	<i>E-motorcycles and battery swap stations (Battery-as-a-Service)</i>
	Sierra Leone, Liberia, DRC, Nigeria	High-quality lithium-ion batteries, pay-per-use battery sharing hubs, platform for tracking batteries through the sales cycle	Mobile Power (MOPO) is a UK-based e-mobility operator that manufactures e-motorcycles and high-quality batteries (MOPO Max) batteries. MOPO operates MOPO hubs – pay-per-use solar-powered charging stations used to collect discharged batteries, store the batteries securely and recharge them. MOPO is also engaging with asset-financiers to provide integrated pay-per-use battery solutions for its customers (see Box 6).	<i>Service-based model, asset-finance offering</i>



ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Rwanda	E-motor trucks	<p>OX Delivers, founded in 2020, is a UK-based e-mobility start-up (registered in Rwanda) that created a solution designed for areas with poor road infrastructure and low access to capital, and uses its fleet of electric trucks and an as-a-service model to unlock a vast market of businesses, from micro-traders to coffee plantations. Customers books a delivery, OX Delivers collects and transports the cargo with its OX electric truck, and payment is made via mobile money upon delivery. The OX truck has a unique Completely Knocked Down (CKD) kit, that enables efficient shipping; up to six trucks per container. The OX truck can then be assembled within local markets.</p>	<i>Delivery service-based model</i>
	Kenya	E-motorcycles, battery-swapping networks	<p>Powerhive is a technology venture founded in 2011 developing innovative energy solutions for emerging markets, enabling energy access and productive use for off-grid households and businesses. Drawing on its track record in the mini-grid industry in East Africa, Powerhive has begun to roll out its electric motorcycles “Spark”, and a smart swappable battery network, powered by solar PV arrays and the national grid. These e-motorcycles are manufactured and assembled locally in partnership with Mobius Motors. Riders lease-to-own the motorcycles and pay per battery swap, while Powerhive manages and maintains the batteries for swapping.</p>	E-motorcycle lease-to-own sales and battery-swapping stations (Battery-as-a-Service)



ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Kenya	Mass transit buses, e-motorcycles	Roam, a Swedish–Kenyan technology company, launched mass transit buses to target the large public transport sector. In the mass transit sector, Roam offers the Roam Rapid (90-seat capacity) and is being implemented in Nairobi. Roam also offers a smaller e-bus, the Roam Move (51-seat capacity), that competes with companies like BasiGo in Kenya. In 2022, Roam offered e-motorcycles like the Roam Air, which is adapted and designed in detail for the African use case. To manage costs of production, the company aims to manufacture the bikes in Kenya and market them more broadly across sub-Saharan Africa. The goal is a more affordable option compared to European and Asian imported e-motorcycles.	Roam has also partnered with a financier, M-Kopa, to provide e-motorcycles under an asset finance programme enabling current ICE motorcycle users to transition to e-motorcycles on a flexible pay-as-you-go structure.
	Rwanda	E-mobility rideshare platform	Safiride, founded in Rwanda in 2018, is an e-mobility rideshare company using technology to provide on-demand ride request services, products for mobile app solutions and transport services for corporate businesses and organisations.	Service-based model
	Benin, Togo, Rwanda, Uganda	E-motorcycle and scooter manufacturer	Spiro, founded in 2019, manufactures e-motorcycles and e-scooters locally in Africa, and provides these EVs to customers on a pay-as-you-go model, while also providing battery-swapping infrastructure and networks across Benin and Togo. To date, the company has sold more than 12,000 electric bikes across Africa. In Uganda, Spiro, has partnered with government to deploy 140,000 e-motorbikes and is establishing 30,000 battery charging and swapping stations across the country.	Service-based model, pay-as-you-drive subscription model

ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
 STIMA	Kenya	Battery swapping	STIMA Boda operates smart batteries and battery-swapping infrastructure in Kenya. In 2022, STIMA began collaborating with Indian e-motorcycle manufacturer One Electric. This partnership combines OneElectric's high-performing and premium e-motorcycles with STIMA's instant recharge infrastructure that can be deployed at a large scale. The first phase of the partnership was to deploy 3,000 e-motorcycles in Nairobi, with a planned expansion to other towns based on successful performance.	Battery-as-a-Service
	Benin, Togo	Battery swapping, e-motorcycle, and scooter manufacturer	Zed Motors is a micro-mobility start-up that deploys battery-swapping stations for two and three-wheelers in West Africa. Zed Motors deploys e-motorcycles, scooters, and solar powered EV charging solutions. The company also maintains a network of battery-swapping cabinets for its e-motorcycle riders. Zed Motors, through its financial partners, offers e-bike financing at a low flat rate of 9.99% APR. Zed Motors also recycles ICE motorbikes and use components, such as frames, as raw materials to build new e-motorbikes. At end of life, Zed Batteries from EVs are used in solar home systems. At complete end of life, a disassembling plan is in place to extract minerals from dead lithium-ion batteries to build new ones. By digitalising decentralised mobile power, ZED is building Africa's EV charging network one nation at a time.	Battery swapping, e-motorcycle sales and rent-to-own.

ANNEX 2. Continued

COMPANY	COUNTRY/COUNTRIES OF OPERATION	PRODUCTS/SERVICES	DESCRIPTION	BUSINESS MODEL
	Uganda	E-motorcycle	Zembo is an e-motorcycle company in Uganda that sells motorcycles on a Pay-as-you-Go (PayGo) basis to boda boda drivers and provides Battery-as-a-Service (BaaS) through a network of battery-swapping stations. Zembo has leveraged public and private partnerships to fund its operations. The company raised venture capital to scale its operations in Africa. Zembo also partnered with Untapped, an asset-finance company, which bought loans off Zembo's books, freeing up capital for the company to invest in battery-swapping stations. Zembo also engaged with Uganda's Ministry of Science, Technology, and Innovation to advocate for lower electricity rates for e-mobility charging and battery-swapping stations.	Service-based model, asset-finance
	Ghana	Locally manufactured e-bicycles	Wahu Mobility, originally founded as Mana Mobility in 2022, provides eco-friendly fleet solutions for both riders and drivers. Wahu Mobility's major offering is its Wahu e-bike, equipped with a dual-swappable battery, tracking device, battery management system and a smart lock controllable via a mobile app. Wahu has also partnered with platforms such as Bolt and Glovo, offering e-bike-based delivery services. Wahu's mobile application also allows for riders to track the bike's location, mileage, battery status, carbon savings and payment subscriptions. In addition to these services, Wahu is also developing a charging station locator within the app, to allow riders keep their e-bikes constantly on the go.	Rent-to-own offering

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