



DESIGNING A FINANCING MECHANISM FOR THE E-MOBILITY SECTOR IN EAST AFRICA

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Executive Summary

Africa is home to over 1.1 billion people, the world's youngest and fastest-growing population. With rapid increase in population, the continent is also urbanizing more rapidly than any other part of the world. The 1.1 billion citizens will likely double in number by 2050, and more than 80% of that increase will occur in cities, especially informal settlements. Rapid urban growth coupled with limited public transport and dependence on fossil fuels for vehicular transport has led to congestion and poor air quality in cities. Africa has also experienced an increased penetration of ICE two wheelers both in rural and urban areas. Motorcycles have become increasingly popular in rural areas where accessibility of public transport is a challenge largely because of poor road infrastructure and high costs of vehicle transport. The 2-wheeler market in Africa is expected to be USD 9 billion by 2022.

The infrastructure gap also remains high with infrastructure investments pegged at 2% of GDP compared to 5.2% in India and 8.8% in China¹. While this underspending is certainly a challenge, Africa can leapfrog by investing in a decarbonized infrastructure ecosystem (including transportation) that not only meets the needs of growing economies but also more importantly addresses the current climate crisis. Electric mobility powered by renewable energy is a possible pathway to realise individual and collective SDGs across economies. These include improved healthcare (SDG 3), employment opportunities (SDG 8), sustainable cities and communities (SDG 11) just to mention a few. Currently, 17 countries have announced 100% zero emission vehicle targets or the phase out of internal combustion engines (ICE) by 2050. It includes rapid shift to battery powered electric vehicles which can achieve a driving range of 350-400 km with high energy dense batteries in the 70-80 kWh category (as short range is currently a matter of concern for lot of customers).²

One of the main challenges in the adoption of electric vehicles (EVs) is high upfront cost compared to ICE vehicles. Challenge of high cost of asset(s) is further aggravated with lack of affordable financing with both lack of affordable financing both for manufacturing and with purchase of the vehicles. Lack of affordable finance is due to several factors including limited risk appetite of financial institutions (FIs), limited understanding on the viability of the existing business models, nascent stage of the sector, absence of regulatory support, among others. To determine the appropriate financing mechanism for an enterprise, consumer, region, technology, or business model, it is important to understand the spectrum of capital instruments that are available in the market. The availability and suitability of such instruments typically varies with the stage of the business. Thus, it is expected that as the business models and markets mature, the cost of capital would become competitive and attractive for the enterprises as well as consumers (given the perceived reduced risk).

While designing financial instruments, we understand that there are different classes of capital namely, grants, debt, and equity. Grants are often referred to as part of risk mitigation instruments whereas debt and equity are form of commercial capital. Thus, below is a brief overview of the various financial instruments that are typically available for enterprises.

- **Risk mitigation Instruments:** These are government or donor backed financing instruments that mostly support in the early life cycle of a company. Early-stage grants are usually the most common type. Grants may also be deployed as research and development (R&D) funding, results-based financing (RBF), technical assistance support, publicly funded demand side and supply side subsidies, etc.
- **Equity Instruments:** This funding seeks to take minority or controlling stake in a business where rewards are either through periodic dividends or monetised capital gains through exits.

¹ <https://www.weforum.org/agenda/2018/06/Africa-urbanization-cities-double-population-2050-4%20ways-thrive/>

² <https://aemda.org/knowledge-hub/>

- **Debt Instruments:** Debt investments usually require a fixed or variable interest rate over and above the principal amount as compensation for the risk undertaken. Other layers of protection such as collateral, share pledges, charge/lien/debenture over bank accounts may be part of the negotiation depending on the perceived risk of the borrower.
- **Hybrid instruments:** These contain a mix of different types of capital or characteristics. Examples include venture debt, mezzanine funding, preferred equity, convertible debt, debt with grant layers, blended financing etc. Social impact bonds are also categorized as a hybrid-instruments given the social and commercial expectations of such investors.

While the above summary is not exhaustive, it shows that addressing financing requirements is an ongoing activity throughout the lifecycle of a business or project.

Overall, we have ranked different financing mechanisms based on ease of implementation, appropriateness for the African landscape, and scalability to identify the possible financial mechanism that would be a reasonable proposition within the context of early stage EV sector in Africa. In terms of ease of implementation, we considered the relative ease of different financing options for implementation both from a fund manager's perspective and an enterprise fit perspective. We have also considered the potential scale of such options in the future. The second assessment criteria include appropriateness of the instrument for the countries in Africa (or market consideration). In this we analysed how the different financing mechanisms are developed in other countries and whether a given instrument can be contextualized specifically for Africa. The key parameters for such consideration were evaluated and studied. Lastly, we also analysed market positioning factors for instance, government policy, and other macroeconomic variables such as corporate policy actions current ICE vehicle manufacturers have towards energy transition of transportation infrastructure. This approach, methodology and overall understanding was an output of extensive literature reviews from secondary sources, in-house analysis, as well as stakeholder interviews.

Post analysis, we understand that there is a case to promote and launch a blended finance mechanism as the appropriate financing mechanism for e-mobility sector in Africa. The first step for the design of the blended finance structure would be to identify the jurisdiction of the fund. Some of the key considerations in assessing potential locations where the fund would be domiciled include aspects of tax incentives for fund managers, flexibility of the legal framework, potential restrictions on capital flows or exchange controls, political stability, and governance aspects as well as investor sentiments.

The second step in developing the blended instrument is to appropriately structure the fund. Here, in addition to identifying the fit-for purpose fund manager, the mechanism would need a hybrid stage gate approach where early-stage enterprises could receive more catalytic grant financing while mature stage enterprises would be financed from a possible combination of milestone-based funding and/or debt and equity capital instruments. This allows for the fund to respond to the multiplicity of funding needs in the EV sector while at the same time maintaining its low-cost characteristics. Lastly, we provided a landscape view of potential financiers for the blended fund given their current risk appetite, mission, and strategic fit with respect to the intended objective of the mechanism (i.e., to achieve low-cost capital and unlock scale).

In the next sections, we have captured relevant information concerning trends across different financial instruments whilst appreciating the variations across regions and business models where the data was available.

Introduction

The EV sector in East Africa represents a small proportion of the transportation sector as highlighted in an earlier report titled “*Accelerating E-Mobility Solutions for Social Change in Africa*” which was prepared in May 2021 as part of this project. Access to finance has been identified as one of the main challenges impacting the growth of the EV sector in East Africa. This study aims to compare and analyse existing and previously applied financing mechanisms regarding their suitability and success for the EV sector in East Africa.

A study by the Association of Electric Mobility & Development in Africa (AEMDA) identified that there are 18 EV companies in Kenya where 86% of the ones surveyed have been in operations for less than three years. Furthermore, equity and crowdfunding accounted for 33% of total funding, 34% from grants, and 33% are bootstrapped (surviving on founders’ equity).³ This indicates the early stages of EV businesses in Africa. A separate study focusing on the Ugandan market, mapped that there are only two private sector companies and one parastatal company focusing on e-mobility⁴.

Further, financing of EVs in East Africa is quite low compared to the flow of finance into other clean energy sectors. Given that e-mobility involves understanding of different technologies across 2-wheelers, 3-wheelers, 4-wheelers, and e-boats, the approach to financing needs to be specific and generally vary due to the different business models. The scope of the report broadly highlights the type of financing mechanisms that can be best aligned with the emerging business models across segments in the region. 2-wheelers have become more common compared to other technologies like e-buses in the region. The figure below highlights some of the publicly documented potential sources of EV financing for the transportation segment.

Figure 1: EV Financing options

Funding Source	Example	Financial Products	What is Financed
Multilateral Development Banks	World Bank Inter-American-, African- and Asian Development Banks	Concessional loans, grants, guarantees, results-based financing	Bus and infrastructure acquisition and operations
Climate Finance (including for NDCs)	Clean Technology Fund, Green Climate Fund, Global Environmental Facility	Concessional loans, grants guarantee, equity	Incremental cost of low carbon investments
National Development Banks	China Development Bank, Bancoldex (Colombia), Development Bank of the Philippines	Loans to buyers, credit lines to manufacturers	Intermediary for co-financing, blending of governmental and commercial sources
Export-Import Banks	OECD list of official export credits agencies; Berne Union association	Loans, guarantees, and insurance to exporters	Supports exporters
Commercial Banks	Large banks (eg. IDCBY, JPMorgan Chase, JPHLF, CICHY, BAC, ACGBY, CRARY, WFC)	Loans, lease financing, insurance	Supports exporters
Manufacturer Leasing	Scania, Proterra	Lease financing for bus, infrastructure or batteries	Largest volume of financing
Specialized Leasing Companies	Connect through manufacturers		Partial or full coverage of purchase cost

Source: [UNEP](#)

³ <https://aemda.org/knowledge-hub/>

⁴ <https://sun-connect-ea.org/wp-content/uploads/2021/05/Electric-Mobility-in-Uganda.pdf>

The above figure provides an indicative list of potential public and private sector EV financiers. Further, we have explored examples of the financing approaches in the region which shows that most of the above players largely remain untapped. The next section briefly captures the approach and methodology that was used in undertaking the study.

Approach and Methodology

While developing the financing mechanism, the first step was to map the state of the sector in the region which included understanding of challenges as well as opportunities across different segments. The earlier report “*Financial needs, growth and scale-up strategies per commercial partner organization*” incorporated insights from desk research and primary interviews with enterprises in the EV sector in East Africa. It also included discussions with development partners, financial institutions, and research organizations to understand the need and requirement to solve financing challenges in the region.

The report at hand has been prepared to suggest the appropriate financing mechanism that could be adopted for the promotion of EVs in East Africa addressing bottlenecks around the unavailability and unaffordability of capital. The overall approach adopted by us to prepare the report is highlighted below:

Approach and Methodology	Key Considerations
Stakeholder Interviews & discussions	Some of the stakeholders include. <ul style="list-style-type: none"> ● EV players: Asobo, Bodawerk, Opibus, Anywhere.Berlin, Tugende, and PowerHive. ● Development Partner: Siemens Stiftung (Foundation), UNEP, Shell Foundation ● Investors: Factor-E Ventures, and InfraCo Africa ● Other key players: World Resources Institute (WRI), Association of Energy Professionals Kenya, and Association of Electric Mobility & Development in Africa (AEMDA)
Literature review: Global EV Financing	<ul style="list-style-type: none"> ● EV financing across the globe - U.S., Europe (e.g., case study of Valeo), Asia (focus on different business models for financing EVs in India). ● EV financing in East Africa (with understanding of case studies on Tugende, among others).
Report writing	<ul style="list-style-type: none"> ● Contextualized insights from the literature review and primary research. ● Developed a framework that assessed different financing approaches. The framework used three important facets to establish a mechanism’s applicability for the EV market in East Africa. <ul style="list-style-type: none"> ○ Ease of implementation: i.e., whether the mechanism has been implemented earlier and if it has shown successful proof of concept; has the structure been used in East Africa and in the EV sector given the existing regulatory limits; and how many stakeholders and agencies are involved to operationalize the mechanism. ○ Appropriateness for the Africa EV landscape: i.e., if the structure could meet the financing needs of EV enterprises in Africa including if the mechanism considered future uncertainties (potential risks) in the EV sector in the region. ○ Scalability: i.e., how many financing institutions including DFIs are promoting the structure and whether the structure is applicable across stages, business models and products/solutions. ● Incorporated quantitative assessment of the future EV market size to estimate the amount of funding gap (i.e., using Kenya as a base case due to limited data in other markets). ● Validated outputs through internal peer reviews. ● Prepared final report

Overview of Global Financing Trends and Business Models in E-mobility

To appreciate the appropriate financing mechanism for EV applications, it is critical to understand the emerging as well as existing business models across the globe. Some of the emerging and existing business models that are supporting the development/ flourishing of the global electric mobility sector include⁵;

- *Product sales/Direct sale*: EV is sold as a product. For example, Tesla and others sell EVs for personal/professional use.
- *Mobility-as-a-service*: Payments are made for rides or temporary usage of vehicles, also known as car/ride-sharing model. EkoRent who pioneered the Nopea rides vehicle is an E-taxi in Nairobi that applies this model.
- *Deployment of Alternative Fuel Infrastructure* (e.g., hydrogen, electricity sales): This is common in Japan where Toyota through government incentive is providing the technology to the market (more details in the subsequent chapters).
- *Battery-As-a-Service*: Customers pay for vehicle except battery and leases battery on rent. It reduces upfront cost of EVs making it more affordable for users. Nio (in China) has launched battery as a service model for EVs, offering charging and swapping of batteries for EV owners. Users buy car without the battery and can subscribe to a 70-kWh battery for \$142 per month

In Africa, these models have also been introduced in the recent past. For example, companies like Ampersand (in Rwanda) combine two models i.e., selling 2-wheelers (direct product sales) and offering a battery swap option for a small fee (i.e., battery as a service where the rider will swap his/her battery depending on the usage/requirement).

Moreover, given that the sector is still at a nascent stage, monetization of data (i.e., allow third parties to use the rider's data) is still yet to be explored and optimized. However, companies are using algorithms and data gathered (using GPS) and other applications to optimize route plans or to track system performance such as battery usage thereby communicating with the rider or driver. This can also become some form of monetization since it helps lower operational costs whilst increasing the productivity of the underlying assets.

It is important to note that each of the above business models may require different types of capital to align with the nature of cash-flows. For instance, product sales require an upfront capital for building production lines and distribution channels. Whereas for mobility-as-a-service model, working capital at low/affordable rates is required to secure a significant threshold of market share. As for electricity sales, upfront investment is required for the infrastructure. Here, usage of electric vehicles is necessary to provide the data that would define the financing needs.

In East Africa, several EV start-ups are deploying grants into multiple assets such as charging infrastructure, electric vehicles, and remote monitoring software. The consequence of this mode of operation is that such start-ups would often need long term patient capital which may not be readily available in the market.

⁵ Access to Finance study [[Link: https://www.eib.org/attachments/pi/access_to_finance_study_on_innovative_road_transport_en.pdf](https://www.eib.org/attachments/pi/access_to_finance_study_on_innovative_road_transport_en.pdf)]

Further we mapped different business models and the different type of financing needs across them, along with data from other markets like India which provided some use cases of how to design financing mechanisms for more nascent regions like East Africa. This is mainly due to the comparability of the economic status of India with most of the countries in East Africa. The EV sector in India knows three popular business models that influence the financing of the EV sector. These are:

- **Upfront purchase model:** Ownership of the asset is transferred to the buyer either through upfront self-financing or debt from banks.
- **The lease business model:** The payment for the asset is structured in a lease arrangement. Risks such as operation and maintenance may be shared or owned by one entity depending on the nature of the lease arrangement.
- **The battery (separate) PAYG model:** In this model, the battery component is not priced into the purchase value of the EV to lower upfront costs. It is provided on a pay-as-you-go battery as a service system that enables the customers to replace the batteries of their EVs at the swapping stations – like refuelling at a petrol station.

The table below shows the purchase business model and compares different financing mechanisms common across India as well as the key benefits and drawbacks concerning each financing approach. It is also important to note that the current challenge in India concerning debt financing is the low loan-to-value ratio. Banks are only open to financing a lower proportion of the total EV's value as opposed to what they would advance to the ICE vehicles. This trend is likely to be the case if banks in E. Africa were to consider lending to EVs; similar risk averseness would be expected, evidenced by low LTV funding. The role of the government in unlocking access to finance is also pivotal for the EV sector in India.

PURCHASE BUSINESS MODEL				
Approach	Description	Key benefits	Key drawbacks	Examples
Equity/ personal funds	Fleet operators/owners buy vehicles through equity or personal funds.	One has control over assets and is not dependent on other stakeholders	High upfront costs for self-funding	Lightning Logistics (Bangalore) purchased its final-mile delivery fleet entirely through equity.
Debt/ corporate loans	Fleet operators/owners buy vehicles through debt.	Lowers entry barriers due to access to external funding	Reduces capacity to raise debt for operations/ expansion	In 2017, EESL issued green bonds worth INR640 crore (USD100 million) to support its environmentally focused initiatives including EVs ⁶ .
Retail loans/ vehicle financing	Individuals buy vehicles using specific vehicle loans.	Loans are linked to vehicle prices only. Room to raise debt for other functions.	Subject to high interest. Low loan-to-value (LTV) ratios.	The SBI Green Car Loan programme offers finance for e-4Ws ⁷ .
Demand aggregation/ bulk procurement	A third-party purchase vehicle in bulk, to leverage economies of scale. The vehicles are sold	The higher volume reduces transaction and unit costs. Diversified risk exposure is across	Success is dependent on procurement volume.	EESL leased electric cars to ride-hailing company BluSmart. ~300 EVs, procured in bulk from Mahindra & Mahindra and

⁶ ET Bureau, The Economic Times, <https://economictimes.indiatimes.com/markets/stocks/news/eesl-to-raise-100m-via-green-bonds/articleshow/59263823.cms?from=mdr>

⁷ State Bank of India; <https://www.sbi.co.in/web/personal-banking/loans/auto-loans/green-car-loan>

	or subleased to fleet operators or drivers.	the customer pool if the technology is underutilised	Requires interagency coordination	Tata Motors, have been leased.
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Source: [RMI India](#)

The lease business model reduces the burden of upfront financing for the consumer by spreading payments over time. There are two modes of leases in India as shown in the table below. There is involvement of Government institutions (e.g., Department of Heavy Industry) which promotes this financing model among OEMs with strong operational and financial capabilities (to be able to offer lease financing). Notably, India has a more local manufacturing footprint than East Africa and is more likely to have a larger pool of OEM players being keen on leasing vehicle.

THE LEASE BUSINESS MODEL				
Approach	Description	Key benefits	Key drawbacks	Examples
Dry lease/ end-to-end lease	Fleet operators or owners lease vehicles from OEMs. End-to-end contract options include repair and maintenance services.	Spread payments over time. Longer lease term payments comparable to ICE segments	Require OEMs to develop financial and after-sale service capacities	Areon Mobility, a logistics company leased 30–40 e-2Ws to last-mile delivery companies. EESL offers a dry lease model on electric sedans to State governments at INR 22,500 a month for six years ⁸ . However, in Africa, lease to own or asset financing models is more common. For example, Tugende, Jali Finance and Max Nigeria are some of the companies incorporating this model.
Wet lease/ operating expense (OPEX)	The transit authority or fleet owner procures the EV from fleet operators and pays for service on a per-kilometre basis. The authority or owner keeps the fare revenue, handles scheduling, routing, service standards. The operator oversees operations and maintenance.	The transit authority or owners take revenue risk. Operators take financial, technology, and operational risks.	Relies on institutional capacity and interagency co-ordination. Requires greater technical assistance	The Department of Heavy Industry (DHI) and NITI Aayog has recommended the wet-lease model to India's State Transport Undertakings (STUs). They propose deploying 5,595 e-buses under FAME II via a Gross Cost Contract (GCC).

Source: [RMI India](#)

Upfront high cost of EV is a key consideration for consumers as it is compared to ICE vehicles (which have higher operational costs). One cost component that adds to high upfront cost is the battery of EVs. Hence separating the cost of the battery from the EVs is a potential way by which OEMs may lower the total cost of ownership to their target customers. The table below shows the different battery separation business models currently been piloted in India. In East Africa, Ampersand and other players are offering battery swap options

⁸ <https://auto.economicstimes.indiatimes.com/news/industry/eesl-plans-to-set-up-ev-charging-stations-in-kolkata/70964366>

at swap stations where the rider purchases the e-bike on cash or a lease-to-own option known as pay-as-you-go (PAYG).

BATTERY SEPARATION BUSINESS MODEL				
Approach	Description	Key benefits	Key drawbacks	Examples
Battery swapping	Fleet operators give access to (owned, leased, or shared) battery swapping stations. Affiliated drivers can purchase vehicles without batteries.	Separating the battery cost to make EVs less capital intensive for the vehicle owners. Better battery management by involving a battery provider.	A high upfront cost for the infrastructure provider.	Ola Electric has set up battery-swapping stations for two-and-three-wheelers in Delhi in partnership with DISCOMs BSES Yamuna and BSES Rajdhani.
Battery leasing	A utility, OEM, or third-party buys batteries and leases them to a fleet owner or operator. The vehicle is financed separately.	Improves the potential to monetise grid services such as demand response.	Nascent legislative environment. Policies are still being formulated.	Proterra, a US e-bus manufacturer, offers a battery-leasing programme. A city procures the bus without the battery and leases the battery from Proterra through fixed-service payments. Bengaluru-based, Autovert is an IoT enabled leasing firm for personal two-wheeler EVs. In addition to full vehicle subscriptions, it is setting up a battery subscription facility.
Pay-as-you-save (PAYS)	Utilities purchase batteries and provide charging infrastructure. Bus operators repay them over time at a PAYS tariff.	Procure the battery at minimum cost. Leveraging the utility's balance sheet, and cost-recovery mechanisms. Reduce the cost of bus operators.	Heavily dependent on the financial health of the utility. Relies on the utility's ability to pass on increased rates to offset battery costs.	Clean Energy Works has designed PAYS schemes for e-buses in the US and South America. This yet to be seen in India, however. PAYS for segments such as two-wheelers can be piloted through private distribution companies.

Source: [RMI India](#)

The next sub-section highlights the innovative financing mechanisms being experimented across the globe.

Emerging EV financing mechanisms/support across the world

The EV market is nascent not just in Africa but across the globe (currently ICE vehicles have a larger pie of market share). However, it is at different stages across countries and financing options thus vary from region to region (also influenced by the level of demand of EV in the respective regions). However, there are certain similarities like provision of government incentives and catalysing low-cost private sector capital for initial

investment. The section below analyses some of the available financing support (by government) provided to EVs across the globe.

Government Funding

Government funding either directly (subsidy) or indirectly (tax incentive, etc.) is one of the mechanisms to enable finance for EVs. For example, in America, EVs have received support from Government in the form of tax incentives, subsidies, rebates as well as tax credits that have encouraged consumers to consider EVs and lowered market barriers for EV manufacturers. Some of these initiatives were started in as early as 2009, and Government keep launching new programs to support EVs currently as well.⁹ This shows long-term government commitment is critical to develop the market especially before the market achieves commercial viability. Some of the federal and state-level government initiative programs are highlighted below:

- **Federal Car Allowance Rebate System (CARS):** This was launched to permanently get inefficient vehicles off the roads. However, the program was closed after just 2 months (due to funding constraint). The program aimed to provide rebates of USD 3,500-4,500 per unit with an overall outlay of USD 2.85 billion to 700,000 vehicle owners.¹⁰
- **Plug-In Electric Drive Vehicle Credit:** It is an ongoing initiative managed by the Internal Revenue Service (IRS). It offers tax credits limits of up to USD 7,500 to owners of PEVs who bought the vehicles after 2009. The program was smartly designed to phase out whenever a car manufacturer sells 200,000 cars (here the credit phases out three and six months from the sales milestone)¹¹.
- **Clean Vehicle Rebate Project (CVRP):** This was launched in 2009 by the state of California to encourage consumers to buy new fuel-efficient vehicles i.e., electric vehicles, plug-in hybrids, and fuel cell vehicles.¹² Funding for this initiative is routed from different sources such as the Air Resources Board (ARB) of the state, vehicle registration fees, license plate fees, as well as allotments from the cap-and-trade auction's revenues. The rebates/concessions offered are triggered by the eligibility requirements such as income thresholds for applicants as well as on the availability of funding as the rebates (i.e., a maximum of USD 7,000 per applicant¹³) are allocated¹⁴.

Some parts of Asia on the other hand have benefited from direct subsidies as one of the government's toolkits to promote EV uptake. For instance, Japan, is a leading nation in deployment of fuel cell electric vehicles. The government offers a subsidy of USD 20,000 per vehicle as incentive to promote purchase of fuel cell EVs. This incentive proved pivotal for company like Toyota, which is the pioneer in fuel cell electric vehicles globally.¹⁵

Europe has also experienced increasing government led incentives to support EV companies and owners. For example, Norway exempts EVs from purchase or import taxes compared to the conventional charge of 25% on ICEs. EVs are also exempted from annual road tax, as well as EV owners are required to pay up to a maximum of 50% of the total amount of toll in the country.

⁹ Milken Institute [Link: <https://milkeninstitute.org/sites/default/files/reports-pdf/AccessToElectricVehiclesCA-LowRes26July.pdf>]

¹⁰ "The Car Allowance Rebate System: [Link: www.brookings.edu/wp-content/uploads/2016/06/cash_for_clunkers_evaluation_policy_brief_gayer.pdf]

¹¹ IRS [Link: www.irs.gov/businesses/plug-in-electric-vehiclecredit-irc-30-and-irc-30d]

¹² Air Resources Board, CVRP Report [Link: <https://ww2.arb.ca.gov/our-work/programs/low-carbon-transportation-investments-and-air-quality-improvement-program>]

¹³ California Department of Transportation, [Link: <http://dot.ca.gov/hq/MassTrans/dac.html>]

¹⁴ California Clean Vehicle Rebate Project, "Income Eligibility" [Link: <https://cleanvehiclerebate.org/eng/income-eligibility/>]

¹⁵ <https://insideevs.com/news/322225/japanese-government-to-offer-20000-subsidy-on-fuel-cell-vehicle-purchases/>

Government in countries of Africa have also initiated some initiatives but is not widely implemented and need to be promoted further. Example includes the Kenyan government, which under the Finance Act 2019 introduced a reduction of excise duty from 20% to 10% on EVs. However, other taxes that typically levied on any imported product remained the same such as Value Added Tax (16%), Import Declaration Fees (2%), Railway Development Levy (1.5%) and Import Duty (25%)¹⁶. Thus, Kenya Government though took an initial step to support EVs, still need to support the sector with some more relaxation and reforms that could result in reducing the cost of EVs further. The government of Rwanda has also provided incentives such as lower energy tariffs for charging stations, zero rating VAT for EVs, spare parts, batteries and charging station equipment as well as a lower corporate income tax at 15% and tax holidays for companies manufacturing and assembling EVs¹⁷.

Carbon Financing

The carbon credit system was established post the acceptance of the Kyoto Protocol. Participating countries were forced to limit their emissions to below 1990 levels (and specifically more than 5% reduction to 2012 levels). Carbon credits are thus measurable and verifiable emission reductions of greenhouse gases from certified climate action projects.

There are two main mechanisms for generation of carbon credits, namely¹⁸.

- **International Mechanisms (Compliance Markets)** where the main international mechanisms for generating carbon credits are the *Clean Development Mechanism (CDM) and the JI (Joint intervention)*.
- **Independent Carbon Credit Mechanisms (Voluntary Carbon Markets)** which allow organisations and individuals to voluntarily offset their emissions. Currently, the voluntary carbon credit market is dominated by four (4) main mechanisms: *Gold Standard, Verified Carbon Standard (VCS), American Carbon Registry (ACR) and Climate Action Reserve*.

With respect to carbon financing for EVs, South Pole has pioneered The Shift Asia platform, Asia's first digital carbon platform in Asia. The platform seeks to enhance cross-sector collaboration, catalyse investments as well as leverage on carbon financing as a mechanism to de-risk business models¹⁹.

In Africa, recently, Kenya announced plans to set up the Kenya Emissions Trading System that will allow companies and organizations to buy emission allowance to enable Kenya to meet its climate commitments. This can potentially create a revenue market for the EV companies to sell their credits. Notably in 2014, Kenya implemented her first ever carbon credits from sustainable farming under the Verified Carbon Standards (VCS).²⁰.

Despite the progress (from the examples above) there is a need to promote carbon financing particularly for EVs. Some of the issues that need to be addressed include.

- Awareness and information asymmetry around carbon finance across developing markets.

¹⁶ <https://www.kictanet.or.ke/the-potential-for-electric-vehicles-in-africa-a-kenyan-case-study/>

¹⁷ <https://www.newtimes.co.rw/news/rwanda-unveils-new-incentives-drive-electric-vehicle-uptake>

¹⁸ https://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ce-library/climate-change/mdg-carbon-facility-brochure/MDGCF_Brochure_English_07.pdf

¹⁹ <https://www.southpole.com/sustainability-solutions/shift-asia-platform>

²⁰ <https://www.worldbank.org/en/news/press-release/2014/01/21/kenyans-earn-first-ever-carbon-credits-from-sustainable-farming#:~:text=The%20Kenya%20Agricultural%20Carbon%20Project,%2C%20sustainable%20and%20climate%2Dfriendly.&text=The%20credits%20represent%20a%20reduction,5%2C164%20vehicles%20in%20a%20year.>

- Lack of processes, especially frequent and quality monitoring structures that are mandatory as part of the carbon finance package. Existing processes already pre-supposes a certain level of scale for the promoter/entrepreneur and creates a high-cost barrier for early stage EV players.
- Bureaucracy and time-consuming processes. In general, it may take as long as two years for the carbon receipts to be obtained. The certification process involves activities such as **(1)** public consultations and report writing, **(2)** preparation of project documentation (PDD, PoA-DD, Monitoring Reports, etc.), **(3)** Validation as well as verification by auditors (DOE- Designated Operational Entities), **(4)** Review by the certifying institution and sections for clarifications and corrections, among other steps.

Commercial Debt and Equity

Commercial debt and equity remain one of the oldest forms of capital support for businesses. Debt can be structured in various ways such as bond issues, convertible instruments, and debt crowdfunding whereas equity can be enabled from individual or institutional equity investors, equity crowdfunding, or public issues of shares at the capital markets.

While examples of commercial funding are not available to a great extent in Africa, other markets have significant support from private players. Europe for instance, is domicile to 541 EV companies and some of the EV players that have had well documented commercial financing rounds include Valeo, Carverter and Wallbox.

- **Valeo:** Valeo is a global automotive supplier that started its operation in 1923 in France (currently working in 33 countries). Since 2009, the company positioned itself as a hybrid, electric car, and autonomous vehicle solution provider. Low-cost debt instruments have been their principal sources of funding. As of December 2019, the company's average maturity of its debt was about 5 years.²¹ The major source of financing is the Euro-Medium-Term Note (EMTN) which is a flexible debt financing product traded outside the U.S.A. and Canada. They typically have maturities of less than 5 years. However, longer tenors are also possible with diversity in the currencies that can be offered.²² The table below shows the active bonds/EMTN that Valeo has leveraged.

Type	Final terms at	Maturity	Outstanding amount	Coupon
Convertible bond	June 2016	June 2021	USD 575m	0%
EMTN	Sept 2017	Sept 2022	EUR 600m	0.375%
EMTN	January 2018	January 2023	EUR 500m	0.625%
EMTN	January 2014	January 2024	EUR 700m	3.25%
EMTN	June 2018	June 2025	EUR 600m	1.50%
EMTN	March 2016	March 2026	EUR 600m	1.625%

Source: [EIB](#)

- **Carverter:** Carverter is an EV company based in the UK that was founded in 2018. The company has introduced a unique model where they have a platform that allows users to lease electric vehicles. Users can get into agreements where they pay for use of the EVs for a specified amount of time as opposed to buying the EV which is important to lower the acquisition costs. The company has managed to close EUR 2.30m in equity crowdfunding in January 2021.

²¹ Valeo [Link: <https://www.valeo.com/en/bond-investors/>]

²² Investopedia Link: [Here](#)

- **Wallbox:** Wallbox is an EV charging infrastructure company founded in 2015 in Spain. The company has operations in Europe, China, and the US where they provide unique smart charging solutions for EVs. Since its establishment, Wallbox has raised over EUR 56.0m from 6 investors. The publicly available transactions are highlighted below:

Lead Investor	Year of investment	Mechanism	Amount
Desafia	2018	Not Disclosed	Not Disclosed
Iderdrola	2019	Equity	EUR 11.0m
Seaya Venture	2020	Equity	EUR 12.0m
Cathy Innovations/WIND Venture	2021	Equity	EUR 33.0m

Source: Wall box financing journey, Source Crunchbase

- **Volta Trucks:** Volta Trucks founded in 2019 developed first fully electric 16-tonne delivery truck. The company has attracted financing in the form of equity at seed stage as well as debt financing (raised in January 2021) as shown below:

Lead Investor	Year of investment	Mechanism	Amount of financing
Luxor Capital Group	2021	Debt	USD 20.0m
Byggmastare AJ Ahlstrom	2019	Seed	EUR 4.50m

- **Ampersand:** Ampersand offers affordable options for the riders with both cash and lease to own model for the motorbikes. It also offers battery swap services with dedicated stations for the quick turnaround for riders. Ampersand has raised significant capital from institutional funder, Factor-E which invests in sub-Saharan Africa and Asia. The target market for its investments is typically seed-stage companies but it has also invested in some growth stage companies. The Ampersand transaction was Factor-E's first investment in the EV sector in Africa. They have also not invested in charging infrastructure to boost the adoption of EVs. Overall information of commercial capital raised by Ampersand are summarised below.

Financing Institution	Year of investment	Mechanism	Amount of financing
Ecosystem Integrity Fund (EIF)	2021	Equity	USD 3,500,000.00
Factor E Ventures	2019	Convertible Note	USD 100,000
Factor-E Ventures	2018	Seed	USD 500,000
Factor-E Ventures	2016	Convertible Note	USD 20,000
Not Disclosed	2016	Convertible Note	EUR 32,300
Start-up Boot Camp Smart Transportation and Energy Berlin	2014	Seed	EUR 7,500

Source: Crunchbase, Company website, Investors' websites, TechCabal etc.

- **Tugende:** Tugende is a Ugandan based company that offers an affordable lease-to-own model to enable motorcycle taxi drivers own bikes in 18 months or less. Tugende also ventured in the Kenyan market in 2020 and are in the process of expanding into Tanzania. The company has been able to scale from a combination of debt and equity financing from various international investors.

Moreover, Infraco recently made its first investment into the EV sector in East Africa. They invested EURO 1.0m into EkoRent the pioneer of NopeaRide, an electric taxi-hailing service operating in Nairobi.²³ It is anticipated that drivers will experience 30-50% savings as compared to ICE vehicle drivers. This is due to the

²³ Infraco Africa [Link: <https://infracoafrica.com/accelerating-access-to-electric-mobility/#:~:text=EkoRent%20Nopea%20is%20Infraco%20Africa's, reducing%20dependence%20on%20fossil%20fuels,%E2%80%9D>]

cost savings on diesel due to EVs. Another notable equity investment is from Persistent Energy Capital which invested in Ecoboda, (an e-motorcycle company) and Asobo (an electric motorboat solution provider), both being domiciled in Kenya

Lessons from Ampersand’s financing approaches

Given the report’s objective is to identify the appropriate financing mechanism for the E. African market, it would be important to draw lessons from Ampersand’s approach to financing. It provides indicative insights on a possible trajectory for other incoming sector players in Africa.

Continuous fundraising: The company has been in perpetual fundraising mode over the last few years. While this is costly both administratively and timewise, it also serves as an indicator that often an early-stage company particularly in a new sector need not raise its required capital from one or two investors. It is also because some investors may have limitation of the amount, they could invest at a given business stage. Also, even if an investor is willing to invest huge amount of capital with majority stake, the overall impact of capital need to be optimised by having a blend of different capital sources and investors as opposed to taking capital from one capital source. Additionally, multiple investors may bring different synergies, networks and skillsets that may support the growth of the company.

Flexibility to varying capital sizes and currencies: Ampersand’s fundraising data highlights a good spread in the amount of capital raised per transaction over the years. Also, the mix in the denominated currency of the respective transactions would effectively create a natural hedge by allowing for matching of costs and capital in some cases.

Absence of local debt capital: The fund raising also highlights that local debt capital from banks has not yet been available for the sector. The alternative to this is raising local capital through a fund manager who can lend in local currency by structuring cross currency swaps or other types of currency hedging mechanisms.

Donor Funding

The table below summarizes some of the officially known development financing partners that have been pro-active in the EV sector in E. Africa:

Offering	Description
Grant	<p>EEP Africa: EEP Africa provides a platform at which early-stage clean energy projects can apply and access funds. The platform works on a Call for Application basis. The most recent process (2020) was providing grants/repayable grants between EUR 200,000-500,000 with the minimum required co-financing of 30% of the total project budget. For instance, EEP Africa provided EUR 216,186.00 in grant funding to Stenrich Cycles (Solar-e-cycles) against a total project budget of EUR 422,289.00²⁴.</p> <p>SIEMENS Stiftung (Foundation): Provides grant capital on a project-to-project basis. For example, it supported multiple enterprises with grants for R+D including the WeTu social enterprise which tests innovative business models²⁵. Through the “E-Mobility</p>

²⁴ EEP Africa [Link: <https://eepafrica.org/Portfolio/stenrich-cycles/>]

²⁵ Siemens Stiftung Foundation [Link: <https://www.siemens-stiftung.org/en/foundation/development-cooperation/technology-for-developing-regions/e-mobility/>]

made in Africa for Africa” Pre-Seed Call the foundations supports EV companies in Sub Sahara Africa.

Shell Foundation: Provided grant capital to multiple enterprises including a USD 600,000 grant capital to Ampersand²⁶, an EV 2-wheeler player offering commercial motorbike riders with a battery swap option based on usage.

FONERWA: FONERWA (Rwanda Green Fund) is one of Ampersand’s grant investors (though the amount of funding is undisclosed). It also provides technical assistance in addition to financial support to projects supporting the green economy. It works on call for proposals cycle with multi-step approval and vetting process for selected applicants²⁷.

DFID renamed to Foreign, Commonwealth & Development Office (FCDO). DFID oversaw overseas aid and deployed grant capital into many off-grid energy players including electric mobility start-ups in Africa. It has provided grant capital to Ampersand and supported other initiatives in the East Africa region in partnership with Shell Foundation and others.

²⁶ Crunchbase [**Link:** https://www.crunchbase.com/organization/ampersand-2/company_financials]

²⁷ FONERWA [**Link:** <http://www.fonerwa.org/about>]

Proposed Financing Mechanism for the EV Sector in East Africa

To design a relevant financing facility, some of the prevalent financing instruments and mechanisms were assessed to identify the key features for the financing facility. Most of the financing mechanisms aim to overcome the existing challenges faced by the enterprises and financing institutions such as need for low-cost capital, longer tenures, and guarantees to mitigate the risk of the financiers, among others. A detailed market mapping was conducted to identify relevant alternate financing mechanisms for the EV and other parallel sectors. These may have already been established in either East Africa or any other countries. These structures were evaluated across three key dimensions of **(i) ease of implementation, (ii) appropriateness for the Africa EV landscape, and (iii) scalability.**

- **Ease of implementation** assesses whether the mechanism has been implemented earlier and if it has shown successful proof of concept; has the structure been used in East Africa and in the EV sector given the existing regulatory limits; and how many stakeholders and agencies are involved to operationalize the mechanism.
- **Appropriateness for the Africa EV landscape** is assessed by evaluating if the structure can meet the financing needs of EV enterprises in Africa. It also assesses if the mechanism considered future uncertainties (potential risks) in the EV sector in the region, its flexibility to adopt changes, and potential push back it might receive in the market.
- **Scalability** assesses how many financing institutions including DFIs are promoting the structure and whether the structure is applicable across stages, business models and products/solutions.

The table below highlights the possible financing solutions for EVs (drawing parallels from investment in EV sector or others). It is important to note that this assessment is contextual to East Africa and considers the current market scenarios. It is possible that in the coming years, the market dynamics will change given certain triggers such as government policy, competition, and global movement in vehicle manufacturing (which might favour some other model). For instance, incentives to banks may make enhanced credit offering a reality even though currently it is not a very favourable option. Again, the summary and assessment of financing structures explored as part of the evaluation are highlighted below:

An Assessment of Possible Financing Mechanisms

High [Score: 1.0]

Medium [Score: 2.0]

Low [Score: 3.0]

	Ease of implementation	Appropriateness for the African E-mobility landscape	Scalability
<p>Direct impact investments into e-mobility businesses</p> <p><i>Entrepreneurs apply for funding to impact investors. The investment would be to provide equity capital with commercial/ social returns expectations.</i></p>	<p>Investor(s) and entrepreneur need to align on valuation assumptions, impact and return expectations. Investors are generally not investing in the nascent sector in Africa currently with limited proof of concept. This could certainly improve as investors update their mandates to focus on EVs, more business models mature, more investors enhance sourcing strategies to focus on EVs as an asset class and more information is available to lower the asymmetry for both entrepreneurs and investors.</p> <p>A transaction may take up to 12 months to close.</p>	<p>Factor-E Ventures and InfraCo have provided early-stage equity to a few EV players but there is limited interest or examples of equity investments for EV sector currently.</p>	<p>Can provide the early-stage capital that can reduce the risk of the business. Other late-stage investors such as debt require this finance needed to complement this funding.</p>
<p>Enhanced Credit Facility</p> <p><i>Capital is provided at enhanced terms- lower rates, flexible repayment, etc.</i></p>	<p>Require a donor/grant provider to partner with a local bank and offer interest rate subvention to lower the cost of credit to the EV company. This assumes that it will lower other hurdles such as collateral and short loan tenor requirements. Negotiations with local banks may also take a lot of time.</p>	<p>Appropriate to lower the cost of credit. However, technical assistance to local banks may be needed in parallel to other risk mitigation mechanisms to propose. Transaction costs for financing institutions are not lowered in this structure.</p>	<p>Scalability may be limited once the interest rate subvention program ends and the sector has not yet scaled. Further, interest subvention in absence of a guarantee, may not be the solution to the risk of potential low LTV the banks might provide.</p>

	Alternatively, government lending to the private sector can be an option.		
Blended Debt Fund with Flexible Repayment Terms <i>Grant and non-grant (debt) funding is blended and provided as debt with flexible repayment options</i>	Depends on the availability of the blended fund. Fundraising for a blended fund takes a lot of time given that a fund manager has to raise multiple layers (tranches) of capital for the blended instrument to its desired achieve low-cost characteristics. It also requires a lot of financial and deal structuring expertise.	Helps lower the cost of capital to the entrepreneur. There is also an opportunity to pair up funding with technical assistance support for EV companies. For example, AFDB launched the Sustainable Energy Fund for Africa (SEFA) that seeks to offer financing and technical assistance to mini-grid projects ²⁸ . Hence a similar offering can be explored for the EV sector.	Blended finance products can be structured to apply to multiple markets. It lowers the cost burden for EV companies. Thus, allowing them to scale.
Green/e-mobility Bonds <i>Bonds are raised through a government backed NBFC and additional partial credit enhancement is provided by banks to improve the credit rating of the bond issue</i>	Depends on the policy focus of the government concerning EVs; where the government is prioritizing this sector, funding can move quickly due to the sovereign's credit rating.	However, most governments in East Africa are keen on raising bonds for other aspects of development such as road and railway infrastructure. Hence such competing needs may make EV financing through government-backed bonds quite slow from a priority perspective though this would the appropriate financing approach especially for charging infrastructure.	Scalability may be limited due to the low priority among some East African governments. Priority is often measured by budgetary allocations by governments, enabling policies and political goodwill associated with such pronouncements. Rwanda may be more open to such a proposition given that their recommended EV sales are higher compared to countries like Kenya. Despite this instrument being an area Africa is lagging other markets, the global green bond market grew from USD 3 billion to USD 163 billion between 2011 and 2018. Hence, there could be lessons governments can draw from as well as collaborations with the likes of the Climate Bonds Initiative ²⁹ .

²⁸ AFDB; <https://www.afdb.org/en/topics-and-sectors/initiatives-partnerships/sustainable-energy-fund-for-africa>

²⁹ <https://www.oecd.org/environment/cc/climate-futures/policy-highlights-financing-climate-futures.pdf>

<p>Social Impact bond</p> <p><i>Issued to achieve a specific impact (e.g. increase in the number of EVs sold). Collaboration with a government agency to pay for improved social outcomes</i></p>	<p>Will not be easy to implement as there are no examples of social impact bonds in the EV sector in Africa. Hence as a pioneer product, it will take a natural learning curve.</p>	<p>Social impact bonds are a nascent financing concept in Africa. A lot of awareness creation is needed for stakeholders e.g., governments, EV players, banks, potential implementers etc. Such awareness is needed around; how data collection and monitoring and evaluation is done as well as the implementation process. Moreover, social impact bonds have been explored in other sectors like healthcare and education but have not replaced the traditional financing solutions. This may indicate that social impact bonds cannot be implemented in isolation but parallel to other funding offerings.</p>	<p>Can be scalable if it is government-backed like EV tax credits, and rebates provided in other developed markets.</p>
<p>Guarantee and Asset-Backed Securitization</p> <p><i>Deals with securitizing future cash flows coming from consumer payments in exchange for electricity, valuing these assets as notes, and selling them to investors by listing on an exchange. The structure is backed by guarantees</i></p>	<p>The ease of implementation for asset-backed securitization depends on the standardisation of technologies, metrics, and availability of data. With the limited data on EVs being available in the market its ease of implementation is limited.</p>	<p>Asset securitization requires standardization of business models. For example, technologies need to mature and be well understood. Customer portfolios need to be large so that the receivables can be clustered into a special purpose vehicle (SPV) and sold to investors. The current EV market in East Africa is not mature enough? especially around the standardization of technologies. However, government guarantees can be developed to current on balance sheet financing and such guarantees can be transferred to SPV structures once the sector matures.</p>	<p>Guarantees and asset securitization is a scalable approach. This is a project finance aspect of ring-fencing the bankable assets and collaterals that can be pre-financed. This tends to realize a larger debt-to-equity ratio than typical on balance sheet financing.</p>
<p>Asset Lease Financing</p> <p><i>The owner of the asset (equipment manufacturer or the SPV created</i></p>	<p>In theory, asset lease financing is easy to implement. Transferable screening approaches from the ICE lease structures</p>	<p>Is appropriate for East African market as it complements the PAYG model to EV end users. If leasing is financed at low cost, the</p>	<p>Most OEMs are international companies hence their focus will be on the EV market in Europe, Asia, and the U.S.</p>

<p><i>for lease financing) provides the right to use the assets to another party against periodic payments. The financier can use this credit structure to get commercial funding</i></p>	<p>can be applied to EVs. However, there are currently no OEMs providing such opportunities to EV players. Hence EV player is providing end-user leases (PAYG) that have equity-like return characteristics given the lack of low-cost upfront lease financing from manufacturers.</p>	<p>EV company can earn a good spread on the cost of credit it on-lends its PAYG customers.</p>	<p>Hence Africa will not be a priority in the medium term.</p>
<p>A joint venture (co-financing mechanism)</p> <p><i>This can be where a large car manufacturer invests in the technology solution and a local partner works on the distribution and marketing. This has potential for multiple iterations where additional players can be involved as follows:</i></p> <ul style="list-style-type: none"> • <i>Car battery manufacturer provides the battery technology</i> • <i>Vehicle manufacturer provides the EVs</i> • <i>Local start-up/entrepreneur deals with distribution and marketing to end-users</i> • <i>Government utility or large oil conglomerate (seeking to be more sustainable) invests in charging infrastructure</i> • <i>Government and/or donor provides guarantees or RBFs to the local start-up to increase the accessibility of capital.</i> 	<p>It's not easy to implement given the multiple parties involved. Negotiating such contracts take a long time. However, it may be the most sustainable approach as it can spread risks across different partners over multi-year arrangements.</p>	<p>It's appropriate given that risks are spread amongst parties.</p>	<p>Maybe scalable if governments lead the way by creating an enabling environment or launching PPP models. At the moment, this may not be the policy priority.</p>

The insights from the framework above, helped us allocated ranking scores for each of the three guiding principles across the reviewed financing mechanisms. We then allocated points for each rank category starting from 100 (high score) where each subsequent rank was half of the points in the previous rank i.e., if the high score is 100, then medium score will be half of 100 i.e., 50 and low score would be half of the medium score i.e., 25. This allowed us to allocate an overall score for each financing mechanism. Ranking all the solutions, resulted in the blended finance option as the most suitable mechanism with the highest overall score as it ranked 2.0 in the ease of implementation category, 1.0 in appropriateness for the African E-mobility landscape and 2.0 for scalability (i.e., $50.00+100.00+50.00 = 200.00$)

	Ranking score			Overall Score
	Ease of Implementation	Appropriateness for the African E-mobility landscape	Scalability	
Direct Impact Investments	2.00	2.00	2.00	150.00
Enhanced Credit Facility	2.00	2.00	3.00	125.00
Blended Fund with Flexible Repayment Terms	2.00	1.00	2.00	200.00
Green/e-mobility Bonds	2.00	2.00	3.00	125.00
Social Impact Bond	3.00	3.00	3.00	75.00
Guarantee and Asset Backed Securitization	3.00	2.00	2.00	125.00
Asset Lease Financing	3.00	1.00	2.00	175.00
A joint venture (co-financing mechanism)	3.00	1.00	3.00	150.00
	Rank	Points per rank category		
High score	1.00	100.00		
Medium score	2.00	50.00		
Low score	3.00	25.00		

Source: Intelicap Calculations

Recommendations

As shown from the ranking metric in the previous section, different financing mechanisms vary in the degree of risk concerning ease of implementation, market appropriateness, and scale. This makes the selection of the optimum financing mechanism more contextual to qualitative aspects and not just quantitative considerations only. In determining the financing mechanism some other factors which have been considered include:

- **Ease of implementation v/s. scalability:** Some financing mechanisms may be easier to implement but harder to scale. For example, equity investments from impact investors such as Factor-E may work well at a single transaction level but not scalable over time as multiple rounds of equity raise may be needed to finance a company's growth plans. In each equity round, the entrepreneur may have their shareholding diluted by subsequent equity investors or existing investors providing additional funding. The investment does not consider funding which is often in USD against projects whose receivables are in local currency. Alternatively, having a blended fund may be relatively difficult to implement as the fundraising by the fund manager may take time (with the only exception being that if the fund is already existing such as sovereign funds, and DFI funds). However, at the same time, such a blended financing mechanism may be an easier path to scale. Hence finding the right balance concerning ease of implementation v/s scalability becomes difficult.
- **Market considerations:** Given the status of the EV sector in Africa, there are certain financing mechanisms though appropriate for the sector, may not fit currently in terms of timing. For instance, having an asset-backed securitization fund often requires evidence of track record in terms of credit history. They also require maturity of both the technology and business models since debt investors would be only relying on a collateral. Lastly, underwriters for risk mitigation mechanisms such as partial or full risk guarantees need to be available in addition to forex hedging in the case where funding is in a different currency from the business or project receivables. Further, EV technologies and business models are yet to be proven to provide confidence to potential off-balance-sheet debt investors. Also, with the few businesses in the East Africa EV sector now, there may not be a ready market to sell one company's defaulted collateral to another.
- **Market positioning:** Market positioning is impacted by the limited local vehicle manufacturing which limits any EV innovations. For the ICE sector, Africa is one of the largest markets for import of used vehicles and it will continue as it provides a secondary revenue stream to international OEMs which help them migrate to EVs in their own countries, i.e., Europe, China and America. Bloomberg research considered markets like the U.S., Europe, China, India, Japan, S. Korea and Australia as the growth markets for EVs in the next 25 years.³⁰ This, investors are also not considering Africa to a large extent for investment in the EV sector. Market positioning is also influenced by government policies. Initiatives such as tax credits and rebates often have a signalling effect on the market and may serve to catalyse innovations. Developed countries have set ambitious targets and more progressive policies, which discount any small initiatives by governments in developing countries such as Kenya (Kenya reduced EV import duty charges). Moreover, the support of governments in financing also open market for additional private financing. For instance, green bond issues for EVs by Government may strengthen confidence among investors. However, this may not be the priority for most transportation ministries in Africa as road and railway construction have the immediate need and consequently, infrastructure bonds would feature high in the priority.

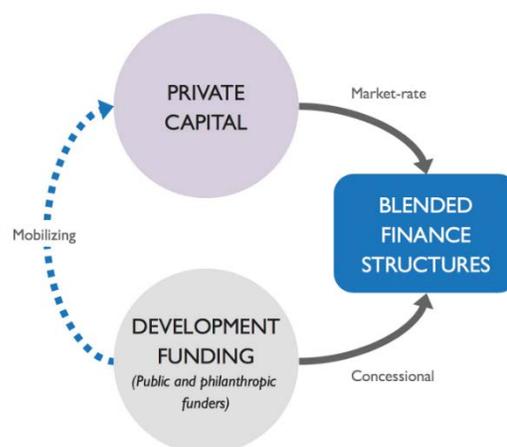
Considering the above factors and ranking metrics, blended finance could be one of the most appropriate financing solutions for the EV sector in Africa. Blended finance offers a balance between the ease of implementation as well as the potential for scale. It will also enable low-cost capital to support scale for the nascent EV market. Furthermore, it enables both public and private capital to participate with a one-stop

³⁰ Bloomberg; <https://bnf.turtl.co/story/evo-2020/page/7>

solution that facilitates different types of capital with varying risk appetites to complement each other. In the next section, we suggested process to design a blended financing mechanism that might be beneficial for the EV sector in Africa. However, this does not mean that other modes of financing are not necessary as the ranking results highlighted previously shows that others (such as direct investments, asset lease financing and enhanced credit facilities) are equally as important.

How to design a blended finance structure?

Blended finance is the mix of catalytic capital from public or philanthropic sources to private sector investment to enable capital for sustainable development. This section looks at how such a blended instrument can be operationalised for the EV sector in E. Africa. Our approach followed a stepwise structured sequence from first principles including jurisdiction considerations of the fund, structure of the fund, expected controls as well as possible institutional investors that might befit such a fund.



Step 1: Identify the jurisdiction for the blended finance fund

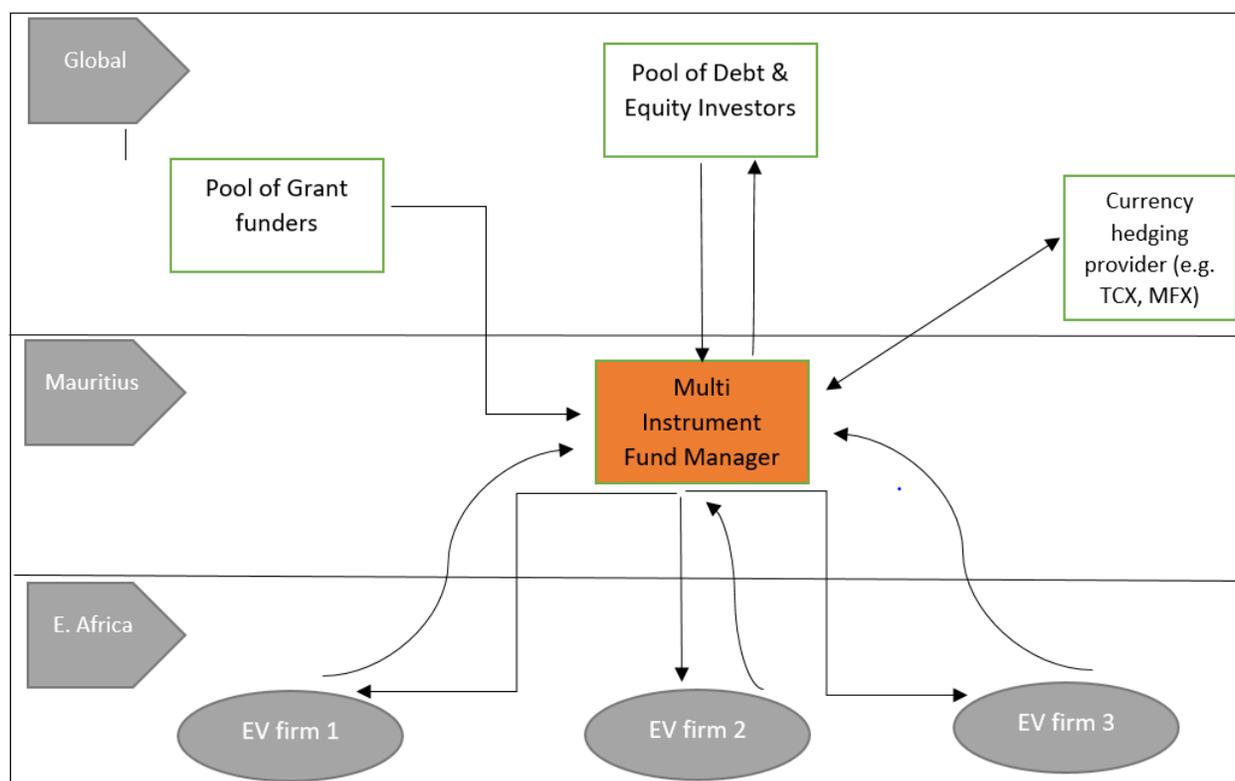
To minimize the overall cost of operation for the fund, careful consideration of the jurisdiction for hosting the fund increase the attractiveness of the proposition to potential investors. The underlying assumption being the benefits of the lower cost of operations which will be passed to the EV companies that would apply for funding. Some of the macro aspects that affect the cost of operations include:

- Taxation levels i.e., corporate tax rates and capital gains tax rates
- Legal set-up and other compliance costs
- Whether or not there are restrictions on capital flows or exchange controls
- Political stability and strength of the legal framework

From the above factors, taxation is the most recurring element as it would be applicable over the lifetime of the fund. Hence the selection of the jurisdiction would be heavily weighted towards this factor. ⁱ

Step 2: Design the fund

After identifying the potential jurisdiction for the fund, and understanding the macroeconomic aspects of the host country, the next step would be designing of the fund. It involves targeting investors, considering the portfolio allocations, types of capital needed as well as the criteria for deployment and operationalizing the fund. The snapshot below highlights structure to the financing mechanism including the location as well as the flow of funds across each stakeholder. The downstream arrows represent the movement of capital from the investors to the fund manager and from the fund manager to the EV companies. While the upstream arrows denote repayment obligations by the EV companies to the fund manager and from the fund manager to the investors (upon fund closure).



In terms of the implementation of the above structure, it would be important to structure the financing considering the different business models, stages of the business, among others. For instance, an EV company doing pilots will be classified as an early-stage enterprise where the consideration should be more component of grant funding from the pool of funds. This financing would enable the company to test the technology prototype and refine its business model before qualifying for the next stage of funding.

Once a company has understood the market and is ready to scale, it would be classified as a matured stage company thus qualifying for stage-2 financing. This financing could be a blend of milestone-based financing (form of results-based financing) combined with probably debt or equity depending on the intended use of funds. One of the ways to structure it could be that the proceeds from the grant (result-based financing) upon achieving the intended results can be netted off from the loan repayment requirements thus reducing the debt obligation for the borrower.

The table below highlights the stepwise criterion of how stage 1 and stage 2 financing works.

Stage of financing	Criteria and description
Stage 1	<p>Instrument: Blended finance with higher proportion of grant capital</p> <p>Timeline/tenor: 6-15 months</p> <p>Criteria for funding</p> <ul style="list-style-type: none"> • Registered as a for-profit company or social enterprise. • Strong and competent management team. • Proof of concept established with demonstration of technology. • Formal application, due diligence, and investment committee approval.

	<p>Use of funds</p> <ul style="list-style-type: none"> • Technology refinement i.e., software and/or hardware development including field testing. • Business model refinement i.e., testing different revenue models and price offerings. • Regulatory compliance i.e., Obtaining licences, necessary certifications, community engagement protocols and other approvals. <p>Post financing requirements</p> <ul style="list-style-type: none"> • Quarterly reporting by the EV company to the fund manager on pre-agreed KPIs such as: <ul style="list-style-type: none"> • refined pricing/business model, • documented results, • refined software and hardware outputs that are independently verified, • regulatory compliance such as licensing and operational set up etc. 																		
Stage 2	<table border="1"> <tr> <td colspan="2" data-bbox="451 758 1443 800">Blended finance with key instrument as Equity</td> </tr> <tr> <td data-bbox="451 800 669 842">Timeline/tenor</td> <td data-bbox="669 800 1443 842">Long-term (more than 7-8 years)</td> </tr> <tr> <td data-bbox="451 842 669 1157">Criteria for funding</td> <td data-bbox="669 842 1443 1157"> <ul style="list-style-type: none"> • The target firm is registered as a for-profit company or social enterprise. • Strong and competent management team. • Formal application, due diligence, and investment committee approval. • Demonstrated business model and strategic plan. • The company has revenue for at least 12 months. • Willingness to provide preferential equity non-controlling stake. </td> </tr> <tr> <td data-bbox="451 1157 669 1262">Use of funds</td> <td data-bbox="669 1157 1443 1262"> <ul style="list-style-type: none"> • Setting up of manufacturing or assembly base/operations. • Installation of charging infrastructure. </td> </tr> <tr> <td data-bbox="451 1262 669 1367">Post financing requirements</td> <td data-bbox="669 1262 1443 1367"> <ul style="list-style-type: none"> • Fund manager nominee sits at the investee's board • Reporting of financial and operational performance (at least every 6 months) i.e., financials, sales reports etc. </td> </tr> <tr> <td colspan="2" data-bbox="451 1367 1443 1409">Blended finance with key instrument as Debt</td> </tr> <tr> <td data-bbox="451 1409 669 1514">Timeline/tenor</td> <td data-bbox="669 1409 1443 1514">Medium-to-long-term (2-7 years) with possible principal moratorium initially (depending on the client's cash-flow features).</td> </tr> <tr> <td data-bbox="451 1514 669 1787">Criteria for funding</td> <td data-bbox="669 1514 1443 1787"> <ul style="list-style-type: none"> • Registered as a for-profit company or social enterprise. • Strong and competent management team. • Formal application, due diligence, and investment committee approval. • Demonstrated business model and strategic plan. • The company has revenue for at least 12 months. • Stable cash flows of the enterprises </td> </tr> <tr> <td data-bbox="451 1787 669 1873">Use of funds</td> <td data-bbox="669 1787 1443 1873"> <ul style="list-style-type: none"> • General working capital needs e.g., inventory procurement, pre-financing portfolio base expansion. </td> </tr> </table>	Blended finance with key instrument as Equity		Timeline/tenor	Long-term (more than 7-8 years)	Criteria for funding	<ul style="list-style-type: none"> • The target firm is registered as a for-profit company or social enterprise. • Strong and competent management team. • Formal application, due diligence, and investment committee approval. • Demonstrated business model and strategic plan. • The company has revenue for at least 12 months. • Willingness to provide preferential equity non-controlling stake. 	Use of funds	<ul style="list-style-type: none"> • Setting up of manufacturing or assembly base/operations. • Installation of charging infrastructure. 	Post financing requirements	<ul style="list-style-type: none"> • Fund manager nominee sits at the investee's board • Reporting of financial and operational performance (at least every 6 months) i.e., financials, sales reports etc. 	Blended finance with key instrument as Debt		Timeline/tenor	Medium-to-long-term (2-7 years) with possible principal moratorium initially (depending on the client's cash-flow features).	Criteria for funding	<ul style="list-style-type: none"> • Registered as a for-profit company or social enterprise. • Strong and competent management team. • Formal application, due diligence, and investment committee approval. • Demonstrated business model and strategic plan. • The company has revenue for at least 12 months. • Stable cash flows of the enterprises 	Use of funds	<ul style="list-style-type: none"> • General working capital needs e.g., inventory procurement, pre-financing portfolio base expansion.
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	<ul style="list-style-type: none"> Charging infrastructure or battery technologies (possibly the assets will need to be secured as collateral).
Post financing requirements	<ul style="list-style-type: none"> Quarterly reporting on loan covenants Interest and principal payments
Results-Based Financing (RBF) with repayable grant	
Timeline/tenor	2 years (for RBF) with a 1-year repayment once the conversion to a repayable grant is triggered.
Criteria for funding	<p>The financing is provided in parallel to the debt and/or equity provision explained previously.</p> <p>The criteria that accrue to debt or equity will apply depending on the corresponding commercial tranche. This is in addition to pre-agreed milestones that the RBF financing will be measured against. These could include:</p> <ul style="list-style-type: none"> number of EVs deployed. amount of CO2 emissions replaced. Jobs created (directly and indirectly). Gender-related milestones achieved.
Use of funds	<p>Matching fund for working capital has the effect of lowering the effective cost of capital to the investee.</p> <p>The RBF can convert to an interest-free loan, the proceeds can be used as an additional income buffer to the fund that is only accessible to the debt and equity investors upon exit. The grant providers/donors would not be reimbursed as they had provided the funding as part of the de-risking process for the fund's investors.</p>
Post financing requirements	<ul style="list-style-type: none"> Reporting and verification of milestones (every 6 months) Issuance of a milestone compliance certificate where milestones are met. Issuance of a default notice or letter of conversion informing the investee that the RBF trigger clause has been affected due to not meeting milestones.

Control Measures for the Fund

The success of the above structure is highly dependent on effective controls that will ensure that the fund's intended objectives are realised. The considerations highlighted below are some of the key internal control measures that the blended fund needs to deploy to be successful. This list is not exhaustive since the additional lessons will be derived once the fund is operational.

- Selection of Fund Manager:** The ideal fund manager understands the EV sector, rural segment, innovative business models and can manage multiple instrument structures i.e., debt/equity/grant. This can be a single entity fund manager or a consortium where the fund management roles are distributed. For instance, one manager oversees the grant disbursements while the other oversees the commercial capital for the fund.
- Portfolio allocation:** There are 4 major ways the fund can spread its risk to enhance its likelihood of bankability. In some of the areas, indicative metrics could be provided while in other general rule of thumb guidelines can be made applicable given the limited base case data sets. Moreover, the optimum

portfolio allocation would need to be modelled to provide different return estimates depending on various assumption scenarios. The 4 areas are as follows:

- **Allocation by stage of investee:** The recommendation includes 80:20 rule of thumb where 80% of the allocated funding is earmarked for stage 2 business models while 20% is earmarked for stage 1 business models. In reality, this may not be possible at the onset of the fund as, in all likelihood, most businesses currently are in the stage 1 category. Hence having a step-down approach where the fund achieves its objective within a reasonable time frame would be appropriate. The overall assumption being that having a larger concentration of the portfolio in stage 2 companies lowers the risk of default and thereby enhances bankability.
- **Allocation by asset class:** The fund could be distributed across different asset classes to effectively lower the cost of capital. For example, 10% can be allocated for upfront grants, 20% for results-based financing (RBF), 25% for equity investments, while 45% for debt investments. These are worst-case allocation that ensures that the effective cost of capital remains at single digits for the fund and to the downstream investees.

For instance, in the previous sub-section, when assessing the 2-wheeler EV segment in Kenya, the above percentages were used to arrive at an equity allocation of USD 113,497,387 and a debt allocation of USD 204,295,297 (workings are shown previously). Hence the total commercial pull (i.e., excluding upfront grant and RBFs) is USD 317,792,685 over a period. Considering, the proportion of debt to the total commercial capital, this will be 64.29% while equity to total commercial capital is 35.71%.

Assuming an equity return expectation of 15% and a cost of debt at 6%, using the weighted average cost of capital formula/approach an effective cost of capital of 8.6% for the fund could be achieved (considering taxation at 15% for Mauritius corporation tax).

Assuming a spread of 140 basis points or a margin of 1.40% over and above the fund's cost of capital, the investees could be charged a cost of capital of 10% for the debt. Note that the calculation above does not factor, the grant elements and any possible conversion assumptions of RBFs into repayable grants. Hence the cost of capital would effectively be much lower than projected above worst-case assumption.

This shows that achieving single-digit investment rates for EV companies is possible with blended capital. In summary, the formula for calculating the weighted average cost of capital above is shown below:

The Formula for WACC

$$WACC = \left(\frac{E}{V} \times Re \right) + \left(\frac{D}{V} \times Rd \times (1 - Tc) \right)$$

where:

E = Market value of the firm's equity

D = Market value of the firm's debt

V = *E* + *D*

Re = Cost of equity

Rd = Cost of debt

Tc = Corporate tax rate

- **Allocation by technologies:** This is ensuring that the financing is deployed across all the EV segments i.e., two-wheeler, three-wheeler, four-wheeler etc. in the proportion of demand. This will ensure that there is diversity for the fund but availability of finance for the EV technology thus reducing potential payment risks.
- **Allocation by markets:** There are many EV enterprises in East Africa including Kenya, Uganda, Rwanda, Tanzania, among others. Evaluation and financing across region diversify financing

deployment and acts as a risk mitigation factor to any macro risks (especially political risks). The long-term proposition could ensure expansion of this fund to other jurisdictions thus effectively making it a Pan-African blended instrument like funds managed by DFIs like AFDB.

- **Cost controls:** Maintaining the overall cost of operations for the fund as low as possible is an important feature for the fund manager. Some of the ways for cost management include:
 - **Digitizing processes:** Funding applications can be digitized; screening and processing of applications can be digitized as well to lower the cost of human resource which ultimately gets calculated into the cost of capital for investees. Some other ways could be having a pool of advisors who assess applications and are remunerated based on time allocated rather than being on payroll.
 - **Sourcing of low-cost investment capital:** The process of obtaining funding needs to be considered by the fund manager. Accessing low-cost capital from DFIs, foundations, charities, pension funds and governments is critical for achieving cost efficiencies.
 - **Deployment:** Faster deployment of capital will ensure that the funds remain in circulation and the funds earn higher management fees, returns as well as meet any hurdle requirements set by the fund investors. Faster deployment can also allow for redeployment of capital within the fund life in case an investee’s investment matures mid-way through the fund lifecycle.

The table below shows the 5-year projected revenue mapped for various EV segments in Kenya. This is based on the combination of past growth rate data drawn from vehicle imports against a government target of 5% of EV sales to total vehicle imports by 2025. Considering the 2-wheeler EV segment only, the projected cumulated revenues will be USD 648,556,500. Assuming a 30% gross margin, the projected cumulative cost of sales will be USD 453,989,550.

	2021	2022	2023	2024	2025
2-wheeler EVs	\$1,231,500	\$6,738,000	\$36,864,000	\$201,687,000	\$402,036,000
3-wheeler EVs	\$495,000	\$1,962,500	\$7,777,500	\$16,367,500	\$28,560,000
4-wheeler small EVs	\$3,996,000	\$24,216,000	\$146,772,000	\$889,584,000	\$2,191,428,000
4-wheeler Bus EVs	\$2,664,000	\$16,144,000	\$97,848,000	\$593,056,000	\$1,460,952,000

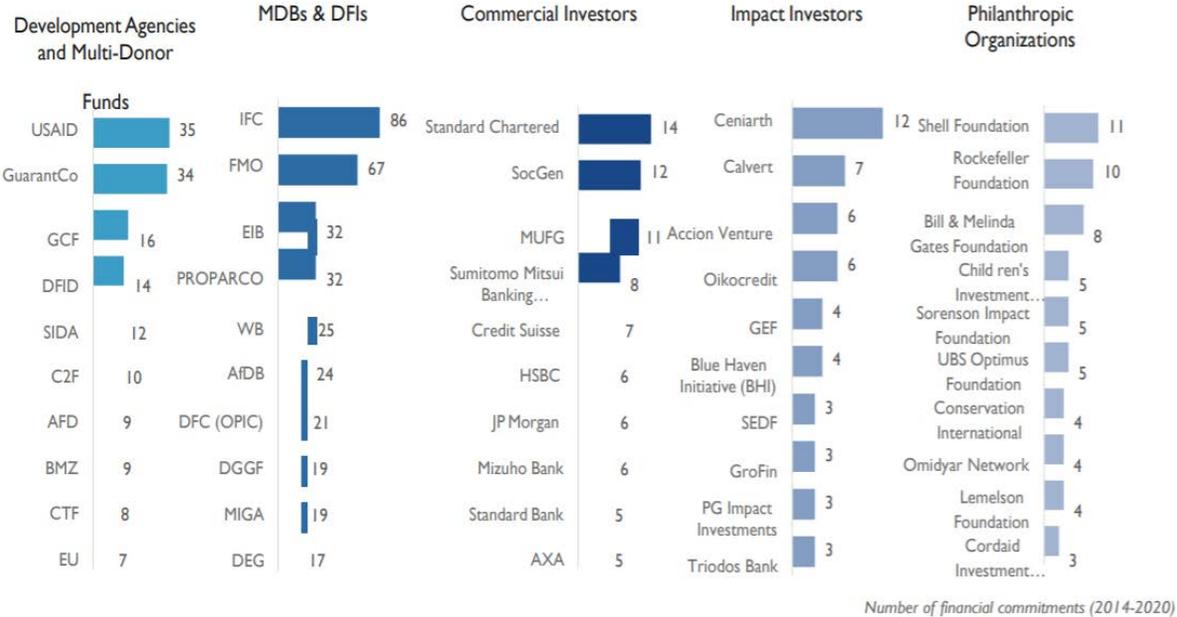
The table below shows a possible capital split and the funding partners that could fill up the funding gap to realize an effective blended structure. The suggestion would be a reasonable capital split that would be beneficial for the different capital needs of the EV business.

Capital type	Capital allocation using a case of 2-wheeler	Potential Investor Entities
Upfront Grant (i.e., 10%)	USD 45,398,955	<ul style="list-style-type: none"> • FCDO • Siemens Stiftung (Foundation) • Shell Foundation

Results based financing (i.e., 20%)	USD 90,797,910	<ul style="list-style-type: none"> • EEP Africa • Shell Foundation
Equity (i.e., 25%)	USD 113,497,387	<ul style="list-style-type: none"> • Factor-E • Infraco • DFC
Commercial debt with matching concessional funding (i.e., 45%)	USD 204,295,297	<ul style="list-style-type: none"> • Repayable grant/interest-free debt: <ul style="list-style-type: none"> ○ EEP Africa ○ DFC • Commercial debt: <ul style="list-style-type: none"> ○ Symbiotics ○ Yunus Social Fund ○ PG Impact ○ Oiko Credit ○ Crowdfunding platforms
Total	USD 453,989,550	At Blended Instrument pricing

The figure below indicates some of the blended finance providers:

Figure 2: Blended finance providers



Conclusions

As discussed in this report, the market potential of EV in East Africa will be realised at the intersection of business model innovation, an enabling regulatory environment and flexible capital structures that are adaptive to the EV infrastructure, cash flow cycles, and growth requirements. Considering the sector is still young, there is limited market data on commercial exits to project the prospective returns investors could expect. At this stage, both commercial and concessional finance providers need to work together to create a blended financing facility. As mentioned, this would often mean structuring multi-year partnership agreements between EV entrepreneurs, donors as well as debt and equity investors to enhance the flow of opportunities for each partner. The methodology used in arriving at the blended finance structure shows that achieving a low cost of capital is possible with the appropriate financing structure and investment vehicle. This will ensure that entrepreneurs can deploy EVs in communities without necessarily passing the high cost of capital to the consumers. We would like to further evaluate this idea with the selected investors to bridge the knowledge gap and take buy-in from the stakeholders when implementing such a financing structure is considered.

ⁱ For reference, Mauritius could be the country of choice for the fund due to the following reasons:

- **Taxation benefits:** Mauritius has the lowest corporate tax rates at 15% compared to countries like Kenya where rate is 30%.ⁱ There is no capital gains tax and no withholding tax on dividends and interest in Mauritius. The country has 44 tax treaties globally. Another seven treaties are awaiting ratification out of which five are in Africa namely, Ghana, Gabon, Kenya, Morocco, and Nigeria. The fund in Mauritius must be able to deploy across Africa at low costs given that scalability of the solution was a key consideration.ⁱ
- **Positioning:** Mauritius exemplifies quality legislation and a strong regulatory framework, political stability, effective infrastructure, and time zone (GMT+4) that enables trading on all global markets in a single day. It also has a wide array of international banks, professional firms and qualified human capital that make it an ideal jurisdiction for such a fundⁱ.
- **Risk Mitigation:** Mauritius has signed 23 Investment Promotion and Protection Agreements (IPPAs) with countries in Africa. It is also a member of the World Bank's Multilateral Investment Guarantee Agency (MIGA)ⁱ. It provides an additional level of comfort to investors.

ABOUT US

SIEMENS STIFTUNG: As a not-for-profit foundation, Siemens promotes sustainable social development across multiple sectors and ecosystems. Our geographical focus includes regions in Africa and Latin America as well as Germany and other European countries. [Website: [Here](#)]

Project team: Marah Köberle & Elisabeth Biber

INTELLECAP: Intellecap is the advisory arm of Aavishkar Group that seeks to build ecosystems to create and nurture a sustainable & equitable society. To date, we have completed over 700+ engagements (including clean tech & e-mobility projects), impacted 40+ countries globally and facilitated over US\$ 400 million in capital deployment. [Website: [Here](#)]

Project team: Karnika Yadav, Ankit Gupta, Daniel Kitwa & Sarah Makena