GREEN PROTOCOL

GP

Empowering Nigeria's Roads:

Policy Perspectives for the Adoption of Electric Two- and Three-Wheeler Vehicles

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Introduction

Internal combustion engine technology predominantly shapes the prevailing global automotive landscape. Nonetheless, the rapid emergence of electric vehicles, particularly electric two- and three-wheelers, is noteworthy. In China alone, the current deployment of over 250 million electric two-wheelers underscores the transformative shift in transportation dynamics.

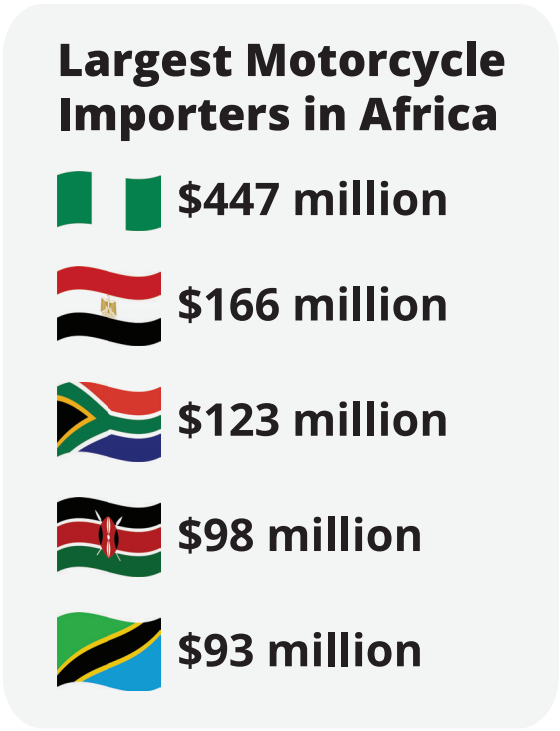
The surge in global sales of small-format electric vehicles, such as electric two- and three-wheelers, is notable, with a growth rate of approximately 14% annually.[1] This growth is attributed to the increasing cost-competitiveness of electric vehicles compared to internal combustion engine (ICE) vehicles. Exploring the intersection of electric vehicles and energy access challenges in Nigeria, studies have shown that if electric vehicles can provide superior mobility services, they could stimulate decentralized electricity sales and reduce the overall electricity expenditure required by utilities to meet financial obligations.[2]

1 Patrick Hertzke et al., "Global Emergence of Electrified Small-Format Mobility," McKinsey & Company (blog), October 2020 –

2 www.mckinsey.com/industries/automotive-and-assembly/our-insights/ global-emergence-of-electrified-small-format-mobility

Nigeria, as the largest importer of motorcycles in Africa, recorded imports totaling $447 million in 2015, constituting 2.4% of global imports.[3] Other significant importers in Africa include Egypt ($166 million), South Africa ($123 million), Kenya ($98 million), and Tanzania ($93 million).[4] The primary motorcycle exporters to Africa encompass China, India, Thailand, Vietnam, and Japan. Despite this substantial motorcycle trade, electric motorcycle imports into Africa remained marginal, totaling only $20.7 million in 2015, representing a mere 1.2% of total motorcycle imports.[5]

As the automotive industry expands its frontiers into Africa, a region characterized by relatively low levels of motorization but burgeoning economic and population growth, crucial inquiries arise. Firstly, what is the anticipated pace of electric vehicle adoption, especially in the realm of two- and three-wheelers? Secondly, where will their production centers be? Will they continue to be imported, as is the current norm with conventional two-wheelers, or are there prospects for domestic manufacturing? Third, what can be done to rapidly increase the adoption of electric two- and three-wheelers in Nigeria? This paper delves into these inquiries and advocates for proactive policies in Nigeria to facilitate the leapfrogging to electric technology for two- and three-wheelers. Such measures promise not only environmental advantages but also potential avenues for industrialization.



3 Michael Dioha et al., "Exploring the role of electric vehicles in Africa's energy transition: A Nigerian case study", February 2022 - https://pubmed.ncbi.nlm.nih.gov/35243266/

4 Electric Mobility in Africa: A Unique Opportunity To Leapfrog To Clean Air And Low Carbon Mobility, January 2023 - https://www.cseindia.org/electric-mobility-in-africa-a-unique-opportunity-to-leapfrog-to-clean-air-and-low-carbon-mobility-11682

5 Ibid

Background and International Context

According to a report by P&S Market Research, the global market for electric two- and three-wheelers is projected to reach $19 billion by 2025, experiencing a modest annual growth rate of 6.9% from 2017 to 2025.[6] This comparatively gradual growth, particularly when contrasted with electric cars, is attributed to the substantial existing market base in China, which stands as the world's largest electric vehicle (EV) market. China, dominating global production and sales of electric two-wheelers, already accounts for approximately 25% of the global market share for two- and three-wheelers.[7] Consequently, newer markets like India are anticipated to witness significantly higher growth rates, surpassing electric car sales. Noteworthy manufacturers in India, such as Hero and TVS, are swiftly introducing new models, with Hero Electric aiming to increase annual sales from around 30,000 scooters in 2017-18 to an ambitious 600,000 by 2023.[8] The company now offers lithium-ion battery-powered scooters with varying speed capabilities.

A key driver behind the escalating competitiveness of EVs is the rapid depreciation in the cost of lithium-ion batteries. Between 2010 and 2016, the price of these batteries plummeted by more than 70%, and Bloomberg (2018) predicts a further 73% decrease between 2016 and 2030.[9]

6 Ibid

7 P&S Intelligence - Electric Vehicle Market Size and Share Analysis by Technology, January 2023 - https://www.psmarketresearch.com/market-analysis/electric-scooter-and-motorcycle-market

8 Electric Mobility in Africa: A Unique Opportunity To Leapfrog To Clean Air And Low Carbon Mobility, January 2023 - https://www.cseindia.org/electric-mobility-in-africa-a-unique-opportunity-to-leapfrog-to-clean-air-and-low-carbon-mobility-11682

9 P&S Intelligence - Electric Vehicle Market Size and Share Analysis by Technology, January 2023 - https://www.psmarketresearch.com/market-analysis/electric-scooter-and-motorcycle-market

There exists a substantial disparity in the adoption rates of two- and three-wheelers across the developing world. While motorcycles are pervasive in most of Asia and widely used in West Africa and, to a slightly lesser extent, in East Africa, their prevalence is more limited in Southern Africa. The discrepancies are even more pronounced with the adoption of electric two- and three-wheeler technology. Despite the colossal numbers in China, countries such as India, Vietnam, and Indonesia have experienced a relatively slower adoption rate. In Africa, the use of electric two- and three-wheelers is nascent but evolving. In India, there were over 20 manufacturers of electric two-wheelers in 2014, and informal manufacturers assemble electric three-wheelers utilizing batteries and components imported from China.[10]

In the global landscape of Electric Vehicle (EV) adoption, China and India have emerged as pioneers, each implementing distinct yet impactful strategies to foster the transition to electric two- and three-wheelers. As Nigeria seeks to navigate this transformative shift, examining and adapting successful policy strategies becomes imperative. In the next section, this report delves into the experiences of China and India, exploring policy dimensions such as regulatory frameworks, demand generation, tax incentives, and the encouragement of local manufacturing to derive strategic insights applicable to Nigeria.

10 Tracking India's Industrial Evolution with Electric Mobility – WRI India, 2022 - https://www.wricitiesindia.org/sites/default/files/EV_4D_Paper_FINAL.pdf

Strategic Policy Options for Increased Uptake of Electric Two and Three-Wheelers in Nigeria

Drawing on the experiences of China, India, and other African countries, the analyses below provide a roadmap for Nigeria to strategically navigate the path toward electric two-wheeler adoption. By tailoring policies to address the unique socio-economic context of Nigeria, the country can harness the full potential of electric mobility, driving sustainable growth and contributing to the global shift towards cleaner transportation.

01

China's Pioneering Policy Framework

China, the world's largest EV market, has strategically implemented policies across distinct phases to bolster the adoption of electric two- and three-wheelers. Initiating research projects in the 1990s, China progressively escalated its efforts, culminating in Phase V (2016 onwards). The key strategies include full or partial bans on gasoline motorcycles in major cities, subsidies, and public procurement policies. The impending phase-out of subsidies in favor of electric vehicle quotas underscores China's commitment to sustainable mobility. Industry standards are rigorously enforced, consolidating electric vehicle and battery production. The reclassification of certain electric two- and three-wheelers, such as bicycles, exempting them from licensing and registration further promoted their use.

02

2. Balancing Ambition and Realism in India

As the second-largest motorcycle market globally, India's journey towards electric two- and three-wheeler adoption has been characterized by various shifts in government policy. The ambitious goal of a complete transition to electric technology by 2030 is reflected in initiatives like the National Electric Mobility Mission Plan 2020 and the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme. While budgetary allocations have fallen short of targets, demand incentives under FAME, including subsidies for qualifying models, demonstrate a commitment to drive consumer adoption. India's experience, though marked by challenges, offers valuable insights into Nigeria's evolving policy landscape.

03

3. Tax Incentives: Nudging Toward Electric Mobility

Both China and India have leveraged tax incentives to boost E2W adoption. In China, lower import duties and excise taxes, coupled with industry-specific funds, have promoted investments. In India, programs like the Air Ambience Fund in Delhi provide a supportive fiscal environment. The reduction of import duty for electric vehicles and value-added tax exemptions in India also provide examples of ways the government can foster a conducive economic atmosphere for EV uptake.

Recognizing the unique challenges faced by African nations, several countries, including Rwanda, Kenya, Egypt, Morocco, Zambia, Mauritius, and Cape Verde, have also initiated incentive programs. Rwanda, for instance, introduced tax breaks and exemptions to accelerate e-vehicle adoption, demonstrating a holistic approach that includes reducing ownership and maintenance costs and providing preferential corporate income tax rates.

04

4. Local Manufacturing as a Catalyst for Sustainable Growth

Encouraging local manufacturing emerges as a strategic imperative to combat the dumping of outdated ICE vehicles. In the countries assessed, it is clear that for local manufacturing to thrive, the countries had designed detailed plans (with SMART targets), implemented tax reforms, provided production incentives, stimulated domestic demand, and promoted local content in the EV industry. The next section provides a deep dive into how Nigeria can support technology transfer and local manufacturing for electric two- and three-wheelers.

The Potential for Technology Transfer on Electric Two- and Three-Wheelers in Nigeria

The energy transition has ushered in a transformative era for developing countries, providing an unprecedented opportunity to establish their manufacturing base for EVs. This paradigm shift not only fosters local economic growth but also retains value chains, generates employment, and makes the transition to electric technology more affordable. The relative simplicity of electric motor technology, battery packs, and related assembly, particularly in smaller vehicle segments, has paved the way for startups to drive growth independently of traditional original equipment manufacturers (OEMs).

Several African countries, including Nigeria, South Africa, Uganda, Ethiopia, Morocco, Rwanda, Ghana, Tunisia, Sudan, Zambia, Zimbabwe, Togo, Namibia, Botswana, and Cape Verde, are embracing this opportunity by developing EV policies as part of their industrial development strategies. Initiatives are underway to set up assembly facilities, with Nigeria actively promoting local assembly of cars, vans, and small vehicles such as three-wheelers and two-wheelers. Notably, the National Automotive Design and Development Council (NADDC) and the Stallion Group have successfully launched the first-ever electric car assembled in Nigeria, marking a significant step towards domestic EV manufacturing in Nigeria.

As Nigeria positions itself to become a player in the electric mobility space, there's a compelling case for collaboration with other Global South nations, especially those leading the EV revolution, such as China and India. These nations, with their advanced electric technology and established manufacturing capabilities, can serve as valuable knowledge and expertise sources for Nigeria.

China, a global powerhouse in EV manufacturing, has proactively promoted electric two-wheelers to bolster its position as a hub for emerging automotive technologies. The Chinese experience provides a roadmap for Nigeria to leapfrog traditional production challenges. Lower-scale technology requirements in the electric vehicle space, especially in two-wheelers, open up possibilities for Nigeria to enter the market more effectively. China's success in supporting a multitude of small-scale parts makers and suppliers demonstrates that lower technology barriers can be viable options in EV manufacturing in Nigeria. The lower barriers to entry in the electric two- and three-wheeler sector, coupled with a large regional market in West Africa, make it an attractive option for domestic production. Nigeria, with its significant motorcycle market and proximity to other markets, could replicate China's strategy of supporting numerous small-scale assemblers and parts makers to foster a thriving domestic electric two-wheeler industry.

India, another major player in the EV landscape, presents valuable insights for Nigeria's foray into electric mobility. With around 200–250 firms involved in manufacturing two- and three-wheelers, India exemplifies the potential for diverse participation in the electric vehicle sector. Nigeria can draw inspiration from India's approach, tailoring its strategy to accommodate a multitude of participants, fostering innovation, and promoting healthy competition. The economies of scale in battery production and certain components, as seen in India, highlight the need for focused attention in specific areas. Nigeria could strategically invest in developing expertise and capabilities in these critical components to ensure sustainability and competitiveness in the electric mobility market.

Despite the potential for domestic manufacturing, Nigeria faces challenges typical of many African nations aspiring to establish an automotive industry. Limited manufacturing capabilities, poor infrastructure, and high invisible costs pose significant hurdles. However, the relatively simpler technology in the electric two- and three-wheeler space, compared to traditional ICE vehicles, offers a unique advantage. The lack of 'brown' assets in ICE technology in the motorcycle market further positions Nigeria favorably. The motorcycle market allows for a more straightforward implementation of protectionist measures to support domestic manufacturing compared to the car market, which is dominated by used imports. This political ease in implementing supportive measures enhances the feasibility of establishing a robust electric mobility industry in Nigeria.

> *Nigeria, with its significant motorcycle market and proximity to other markets, could replicate China's strategy of supporting numerous small-scale assemblers and parts makers to foster a thriving domestic electric two-wheeler industry.*

Nigeria stands at the threshold of a transformative opportunity to establish domestic manufacturing capabilities for electric two- and three-wheelers. Learning from the experiences of China and India and fostering collaboration with other Global South nations, Nigeria can leapfrog traditional challenges and create a vibrant and competitive electric mobility industry. By strategically investing in key components, promoting innovation, and addressing infrastructural gaps, Nigeria can unlock the immense potential for technology transfer and become a key player in the global electric mobility landscape.

Key Insights from Research and Consultation

Through insightful interviews with 20 stakeholders spanning the private and public sectors actively engaged in driving Electric Vehicle (EV) adoption in Nigeria, a nuanced understanding of the barriers hindering the widespread acceptance of 2- to 3-wheeler EVs has emerged. To pave the way for comprehensive EV adoption in Nigeria, strategic interventions are imperative. The identified barriers underscore the urgency of addressing multifaceted challenges.

Primarily, bolstering power generation, transmission, and distribution capabilities emerged as the paramount requirement to scale demand for electricity from EVs. Beyond this, enhancing the affordability of EVs stands as a critical imperative, requiring a paradigm shift where EVs become not only economically competitive upfront but also in terms of day-to-day operational expenses when compared to their traditional fossil fuel-powered counterparts.

The establishment of a sustainable and efficient charging infrastructure necessitates the integration of gas-powered and solar EV charging stations into the national energy mix. However, the inherent hurdles posed by insufficient local electricity supply and infrastructure present formidable challenges to the long-term sustainability of the EV industry in Nigeria.

Inquisitively, we solicited the perspectives of our respondents on the perceived risks and challenges hindering the penetration of 2-3-wheeler EVs in Nigeria. In tandem, we sought their expertise in formulating viable mitigation measures.

This exhaustive exploration has yielded comprehensive insights, distilled into four overarching categories, encapsulating the key findings and potential avenues for addressing the intricate challenges impeding the progress of the 2- to 3-wheeler EV market in Nigeria, as provided below.

Risk: Inadequate local electricity supply and infrastructure. *(Severity: High)*

Mitigation: Adopt a phased approach for introducing charging models at different locations. This includes home charging setups, office charging stations, and public charging infrastructure. Tailor the development of charging infrastructure based on a thorough understanding of current and potential demand. This strategic approach ensures that infrastructure is sized, scaled, and shaped to meet the diverse needs of EV users.

Risk: Lack of experience and technical expertise in the EV sector. *(Severity: High)*

Mitigation: Establishing partnerships and technical alliances with renowned international players is crucial. By collaborating with established entities in the electric vehicle industry, Nigeria can augment its local skill sets. This collaborative effort facilitates the transfer of technology and knowledge, contributing to the development, production, and control of technological principles related to Electric Vehicle Supply Equipment Suppliers (EVSE-S) and Charge Point Operator (CPO) operations, as well as E-mobility Service Provision.

Risk: Slow development of the EV charging business due to policy uncertainty. *(Severity: Medium)*

Mitigation: Actively driving policy changes and providing consistent support within the electric vehicle sector is essential. This involves the development of a robust and stable policy framework. Long-term national objectives and targets, supported by sound market forecasts, instill investor confidence. Specific policy approaches can include incentives for zero- and low-emission vehicles, economic instruments to bridge cost gaps, and support for the phased deployment of charging infrastructure. Increasing the number of charging stations over time and exploring technological advancements like battery swap methods can also help mitigate the risk associated with limited range and policy uncertainty.

Risk: Higher price of EVs impacting market penetration, demand, and profitability. *(Severity: Low)*

Mitigation: Implementing economic policies and incentives is crucial to narrowing the cost gap between EVs and conventional vehicles. This includes supporting early charging infrastructure deployment and considering measures such as parking waivers or reduced toll fees to enhance the value proposition of EVs. To determine optimal strategies for market penetration, demand, and profitability, detailed economic and financial models need to be developed. These models inform investment decisions and guide project commercialization efforts. Securing sufficient funding and financial capabilities requires identifying local and international intervention funds and grants while positioning Nigeria to access them effectively.

Policy Roadmap to Accelerate the Uptake of Electric Two- and Three-Wheelers

1. Tailored Industrial Policy for Local Manufacturing: Craft a focused industrial policy at both national and subnational levels, drawing inspiration from successful models like India's strategy. Mandate supply-side directives for Nigerian manufacturers of two- and three-wheeler EVs and create purchase mandates for fleet operators. Subnational governments should incentivize local manufacturing through measures such as tax breaks, subsidized resources, and streamlined procedures, focusing particularly on the unique dynamics of the two- and three-wheeler segments.

a. Responsible Government Agency: National Automotive Design and Development Council (NADDC)

b. Proposed Timelines: Develop the policy framework within the next year, with implementation starting in the subsequent 2 years.

2. Harness Nigerian Mineral Reserves for Battery Production: Strategically tap into Nigeria's abundant mineral reserves, especially for lithium-ion battery components relevant to two- and three-wheeler EVs. Focus on localizing value-added processes like smelting and cell assembly to boost job creation and maximize returns within Nigeria. Break the trend of value-added processes occurring outside the continent, underscoring the importance of in-house processing for economic empowerment within the specific context of two- and three-wheeler EVs.

a. Responsible Government Agency: Ministry of Mines and Steel Development

b. Proposed Timelines: Initiate mineral reserve exploration and develop processing facilities within the next 2 years, with full-scale local processing in the following 3 years.

3. Plan for Battery Recycling in Nigeria: Proactively plan for the recycling of spent batteries from two- and three-wheeler EVs within Nigeria to ensure safe disposal and mineral recovery. Establish recycling mechanisms early on to accommodate the impending increase in the adoption of two- and three-wheeler EVs. Address the lack of formal infrastructure for scrapping old batteries within Nigeria by developing sustainable solutions tailored to the characteristics of the two- and three-wheeler segments.

a. Responsible Government Agency: National Environmental Standards and Regulations Enforcement Agency (NESREA)

b. Proposed Timelines: Establish battery recycling mechanisms within the next 2 years, ensuring full operational efficiency in the subsequent 3 years.

4. Develop Charging Network Models for Two- and Three-Wheelers: Foster coordination among Nigerian utilities, fleet operators, and government agencies for the development of diverse business models for charging networks specifically catering to two- and three-wheeler EVs. Assess and upgrade the electricity distribution system within Nigeria with a focused approach to substation levels relevant to the unique charging requirements of two- and three-wheeler EVs.

a. Responsible Government Agency: Nigerian Electricity Regulatory Commission (NERC)

b. Proposed Timelines: Coordinate charging network models within the next year, with substantial development and implementation in the following 2 years.

5. Fuel Economy Regulations for Two- and Three-Wheelers: Craft fuel economy regulations tailored for importing markets like Nigeria, specifically addressing the characteristics of two- and three-wheeler EVs. Introduce measures such as tax reductions to promote the adoption of electric two- and three-wheelers, considering the unique usage patterns and market dynamics within Nigeria.

a. Responsible Government Agency: Federal Ministry of Environment

b. Proposed Timelines: Draft and implement fuel economy regulations for two- and three-wheeler EVs within the next 2 years.

6. Financing Strategies for Two- and Three-Wheeler EV Targets: Estimate cumulative costs to meet 2030 targets for two- and three-wheeler EV adoption within the Nigerian context. Address financing barriers related to high costs, limited options, and perceived risks associated with two- and three-wheeler EVs. Develop a detailed financing strategy in collaboration with Nigerian financing institutions, multilateral banks, and international finance, focusing on the unique economic landscape of the two- and three-wheeler segments.

a. Responsible Government Agency: Central Bank of Nigeria (CBN)

b. Proposed Timelines: Develop financing strategies within the next year, with active implementation and continuous assessment over the subsequent 3 years.

7. Design a Subsidy and Incentive Strategy for Local Manufacturers: Develop a subsidy and incentive strategy to improve the competitiveness of locally manufactured two- and three-wheeler EVs compared to ICE vehicles. Focus on reducing the total cost of ownership within the Nigerian market. Enhance the availability of electric two- and three-wheelers, especially for commercial and ride-sharing fleets, fostering increased adoption in the local market.

a. Responsible Government Agency: Federal Ministry of Industry, Trade and Investment

b. Proposed Timelines: Design subsidy and incentive strategies within the next year, with active application starting in the subsequent 2 years.

8. Leverage Nigerian Fuel Economy Regulations for the Segment: Utilize fuel economy regulations specifically for two- and three-wheeler EVs to improve their efficiency and reduce emissions. Establish benchmarks and incentives to encourage Nigerian manufacturers to contribute to the overall reduction of emissions by adopting electric two- and three-wheelers, aligning with local regulatory frameworks.

a. Responsible Government Agency: National Automotive Council (NAC)

b. Proposed Timelines: Leverage fuel economy regulations within the next year, ensuring alignment with existing regulations and industry standards.

9. Detailed Plan for Charging Infrastructure for Two and Three-Wheelers: Develop a comprehensive plan for charging infrastructure tailored to the specific needs of two- and three-wheeler EVs within Nigeria. Address technology-specific challenges related to the impact on the power grid and cater to diverse Nigerian consumer needs for charging in the context of two- and three-wheeler EVs.

a. Responsible Government Agency: Rural Ele*ctrification Agency (REA)*

*b. Proposed Timelines: Develop a comprehensive charging infrastructure plan within the next year, with phased implementation over the subsequent 3 year*s.

10. Involve the Nigerian Private Sector in the Two- and Three-Wheeler Segments: Engage the private sector within Nigeria, especially Nigerian manufacturers focusing on two- and three-wheeler EVs. Encourage the adoption of business models that provide customized charging services and deploy EVs specifically designed for two- and three-wheeler services. Facilitate investments in battery swapping, particularly for the price-sensitive two- and three-wheeler segments within the Nigerian market.

a. Responsible Government Agency: Nigerian In*vestment Promotion Commission (NIPC)*

b. Proposed Timelines: Facilitate private sector involvement within the next year, fostering partnerships and investments over the subsequent 2 years.

Conclusion

It has become increasingly evident that electric propulsion is poised to take the lead in transforming the landscape of two- and three-wheelers, potentially becoming the dominant force within the next decade or two. This paradigm shift presents substantial opportunities to steer Nigeria's market dynamics toward embracing electric technology on its roads. While operational aspects play a crucial role, the significant global variations in the adoption of electric two- and three-wheelers are primarily shaped by policy disparities. Notably, China benefits from extensive supportive policies, whereas India, until recently, exhibited a slower pace in endorsing electric two- and three-wheelers.

Nigeria currently lacks comprehensive policies supporting electric mobility. Faced with fiscal constraints, the pivotal question arises for Nigeria: whether to heavily invest in new automotive infrastructure and incentivize emerging technologies or follow market trends as a latecomer in the sector. Opting for electrical technologies over ICEs aligns with Nigeria's climate and industrialization ambitions. While urban areas are anticipated to be the primary markets, the substantial reduction in battery and solar PV costs opens up promising prospects in rural and remote regions lacking access to the electricity grid. The synergy of electric two-wheelers with other appliances presents a transformative potential to broaden the scope of renewable energy applications in these underserved Nigerian locations.