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Feasibility Study for Electric Vehicle Charging Infrastructure Deployment in Kenya

In cooperation with

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Energy for the nation.

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Project Background

The global shift toward e-Mobility is accelerating as countries seek to reduce transport-related Greenhouse Gas (GHG) emissions and dependence on fossil fuels. Electric vehicles (EVs) are central to this transition, but their large-scale adoption depends on the availability of reliable and accessible charging infrastructure. In emerging markets such as Kenya, expanding Electric Vehicle Charging Infrastructure (EVCI) is essential to address range anxiety, enable diverse EV use cases and support long-term decarbonization of the transport sector.

GIZ's "Promotion of Electric Mobility in Kenya" project was commissioned by the German Ministry for Economic Cooperation and Development (BMZ) and co-financed by the European Union. The feasibility study on Electric Vehicle Charging Infrastructure (EVCI) deployment in Kenya, with support from GIZ & in collaboration with the Kenya Electricity Generating Company PLC (KenGen), is a critical step toward translating national policy ambitions into actionable investment pathways to support Kenya's transition to clean and sustainable transport.

The study aims to systematically assess the technical, financial, economic, environmental, and social feasibility of EVCI deployment across public and private use cases in Kenya. Evaluation of market potential, infrastructure requirements, economic viability, regulatory readiness and stakeholder interest to provide an evidence-based foundation for informed decision-making. The outcomes of this assessment are expected to guide KenGen and other stakeholders in identifying optimal investment models, de-risking EVCI deployment, and accelerating EV adoption. Ultimately, the project is intended to contribute to reduced emissions, enhanced energy security, and the development of a resilient, future-ready e-mobility ecosystem in Kenya.

Disclaimer

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The report on the “Feasibility of Electric Vehicle Charging Infrastructure (EVCI) Deployment in Kenya” has been prepared with the collective support and contributions of the key institutions and stakeholders whose commitment to advancing sustainable mobility in Kenya has been instrumental to the successful completion of this study.

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We also acknowledge the valuable contribution of our local partner, Knights Energy, whose on-ground support, contextual understanding, and coordination assistance were vital across data collection, stakeholder consultations and validation processes. Their continuous engagement ensured that the study remained grounded in local market realities and implementation considerations.

Finally, we thank all government agencies, private sector stakeholders, industry participants and experts who shared their time, insights, and perspectives during consultations and workshops. Their contributions have enriched the analysis and strengthened the practical relevance of the study. While this report reflects a collective effort, the interpretations and conclusions presented herein remain those of the study team.

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List of Acronyms and Abbreviations

2W	Two-wheelers
3W	Three-wheeler
4W	Four-wheeler
AC	Alternate Current
API	Application Programming Interface
BAU	Business-as-Usual
BETA	Bottom-Up Economic Transformation Plan
BSS	Battery Swapping Station
CAPEX	Capital Expenditure
CCS	Combined Charging System
CHAdeMO	Charge de Move
CI	Commercial and Industrial Consumer
CKD	Completely Knockdown Unit
CO2	Carbon Dioxide
CPO	Charge Point Operator
DBFOT	Design, Build, Finance, Operate, Transfer
DBO	Design-Build-Operate
DC	Direct Current
DCFC	Direct Current Fast Charging
DFI	Development Finance Institution
DISCOM	Distribution Company
e-2W	Electric Two-wheeler
e-3W	Electric Three-Wheeler
e-4W	Electric Four-Wheeler
e-Bus	Electric Bus
EIA	Environmental Impact Assessment
e-Mobility	Electric Mobility
EPRA	Energy and Petroleum Regulatory Authority
ESIA	Environment and Social Impact Assessment
EU	European Union
EV	Electric Vehicle
EVCI	Electric Vehicle Charging Infrastructure
EVCS	Electric Vehicle Charging Station
EVSE	Electric vehicle supply equipment
e-Waste	Electronic Waste
FBU	Fully Built Unit
FEMA	Federal Emergency Management Agency
ft	Feet
FY	Financial Year

GB/T	Guobiao/Tuijian
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GW	Gigawatts
GWh	Gigawatts hours
HAM	Hybrid Annuity Model
ICE	Internal Combustion Engine
IDF	Import Declaration Fees
IEC	International Electrotechnical Commission
IoT	Internet of Thing
IRR	Internal rate of return
ISO	International Organisation for Standardisation
JV	Joint venture
KEBS	Kenya Bureau of Standards
KenGen	Kenya Electricity Generating Company PLC
KES	Kenyan Shilling
km	Kilometre
KPLC	Kenya Power and Lighting Company
KURA	Kenya Urban Roads Authority
kV	kilo Volt
kVA	kilovolt-Amperes
kW	Kilowatt
kWh	kilowatts hour
LCPDP	Least Cost Power Development Plan
LCV	Light Commercial Vehicle
LDO	Lease-Develop-Operate
LULUCF	Land Use, Land-Use Change and Forestry
MoEP	Ministry of Energy and Petroleum
M-Pesa	Mobile Pesa
MRT	Ministry of Roads and Transport
MtCO2e	Metric Tons of Carbon Dioxide Equivalent
MW	Megawatt
NDC	Nationally Determined Contribution

NEMA	National Environment Management Authority
NPV	Net Present Value
NTSA	National Transport and Safety Authority
O&M	Operation and Maintenance
OCPP	Open Charge Point Protocol
OEM	Original Equipment Manufacturer
OMC	Oil Marketing Company
OPEX	Operational Expenditure
PCS	Public Charging Station
PPP	Public-Private Partnership
RDL	Railway Development Levy
RDSS	Revamped Distribution Sector Scheme
RE	Renewable Energy
ROI	Return on Investment
SDGs	Sustainable Development Goals
SETA	Sustainable Energy Technical Assistance
ToU	Time-of-Use
US	United States
USD	United States Dollar
V2G	Vehicle-to-Grid
V2H	Vehicle-to-Home
VAT	Value Added Tax

Executive Summary

Kenya is at a pivotal moment in its transition to sustainable, low-carbon mobility, with electric mobility (e-Mobility) emerging as a key lever for achieving climate, energy security and socio-economic goals. Under its Nationally Determined Contribution (NDC), Kenya has committed to reducing GHG emissions by 32% by 2030. The transport sector, responsible for about 13% of national emissions and over 70% of petroleum consumption, presents a critical opportunity for intervention. In urban areas like Nairobi, road transport accounts for nearly 40% of PM2.5 pollution.

Kenya's electricity system, with over 85% of generation from renewable sources, provides a strong foundation for transport electrification. Installed capacity continues to expand, and off-peak surplus indicates the grid can accommodate EV charging with strategic management. The EV market remains nascent in Kenya, dominated by electric two-wheelers (e-2W), which account for roughly 90% of registrations. Uptake in other segments is constrained by high upfront costs, limited charging infrastructure, fragmented standards, skills gaps and evolving regulations.

This feasibility study evaluates Kenya's readiness to scale EVCI and identifies the technical, spatial, financial and institutional pathways needed to support long-term EV adoption. EV stock is projected to grow from about 22,000 vehicles in 2025 to over 6 million by 2050, with penetration potentially exceeding 80% under high-adoption scenarios. Corresponding electricity demand could reach more than 33,000 GWh annually by 2050, contributing up to 32% of the national peak load, showcasing the importance of phased deployment, smart charging and demand-side management.

The study highlights the need for a diversified charging ecosystem encompassing home, public, captive and highway charging. Spatial planning and GIS-based site selection are essential for prioritising high-demand corridors while ensuring equitable access in peri-urban and underserved areas. Technical requirements include harmonised standards, interoperability, cybersecurity and compliance with international protocols.

Economic and financial analysis confirms that EVCI deployment is viable under current tariffs, particularly with supportive public policies and access to land and grid infrastructure. While CAPEX is the main cost driver, project viability depends on utilisation rates, energy tariffs and financing terms, with strong potential for private sector participation through concessional and blended finance. The study also assesses multiple business models and underscores the importance of coordinated Public-Private Partnerships (PPP) to manage risks such as grid constraints, technology obsolescence, safety, cybersecurity and regulatory fragmentation through standardised guidelines, streamlined permitting and centralised monitoring.

Beyond climate mitigation, e-Mobility delivers substantial socio-economic benefits, including improved air quality linked to an estimated 19,000 premature deaths annually and the potential to create over 325,000 jobs by 2028, with inclusive design essential to a just transition. Thus, the study concludes that Kenya is well positioned to develop a scalable, resilient and financially sustainable EVCI ecosystem by leveraging its renewable energy advantage, strengthening institutional coordination and mobilising public and private investment, enabling the country to emerge as a regional leader in e-Mobility aligned with Vision 2030 and the Sustainable Development Goals (SDGs).

1. Introduction

Kenya is undergoing a significant transition in its transport and energy sectors as it responds to global climate commitments, national development priorities and technological change. Under its NDC, Kenya has committed to reducing greenhouse gas emissions by 32% by 2030. The transport sector, accounting for approximately 13% of national emissions and over 70% of petroleum imports, represents a priority area for decarbonisation due to its emissions intensity, exposure to fuel price volatility and impact on the trade balance. In this context, e-Mobility has emerged as a strategic pathway to enhance energy security, reduce emissions and support sustainable growth.

Globally, the transition to EVs is accelerating, driven by supportive policies, technological advances and declining battery costs. Kenya is well positioned to leverage this shift given its renewable-dominated electricity mix, with over 85–90% of generation from geothermal, hydro, wind and solar. This clean energy base supports low-emission transport electrification and aligns with national power sector planning under the Least Cost Power Development Plan (LCPDP), which emphasises capacity expansion, grid reliability and distributed energy integration.

The Government of Kenya has strengthened its commitment to e-Mobility through fiscal incentives, policy development and regulatory action. Tax and duty exemptions for EVs and charging equipment under the Finance Act 2023, subsidised e-Mobility tariffs, and the draft National e-Mobility Policy (2024) signal efforts to lower adoption barriers and establish a coherent framework. Regulatory agencies, including Energy and Petroleum Regulatory Authority (EPRA), Kenya Bureau of Standards (KEBS) and National Environment Management Authority (NEMA), are advancing standards to support safe, interoperable and environmentally responsible EVCI.

Despite this progress, Kenya's EV market remains at an early stage, dominated by electric two-wheelers, which account for nearly 90% of registrations. Adoption in higher-impact segments such as four-wheelers, buses and commercial fleets remains limited by high upfront costs, fragmented charging solutions and the limited availability of public charging stations, largely concentrated in Nairobi. Infrastructure gaps, uneven grid capacity and reliability concerns continue to constrain expansion beyond major urban centres.

EVCI is therefore a critical enabler for scaling e-Mobility. Strategic planning is required to align charging deployment with projected EV growth, mobility patterns and geographic contexts, while addressing technical standards, accessibility, environmental safeguards, cybersecurity and interoperability.

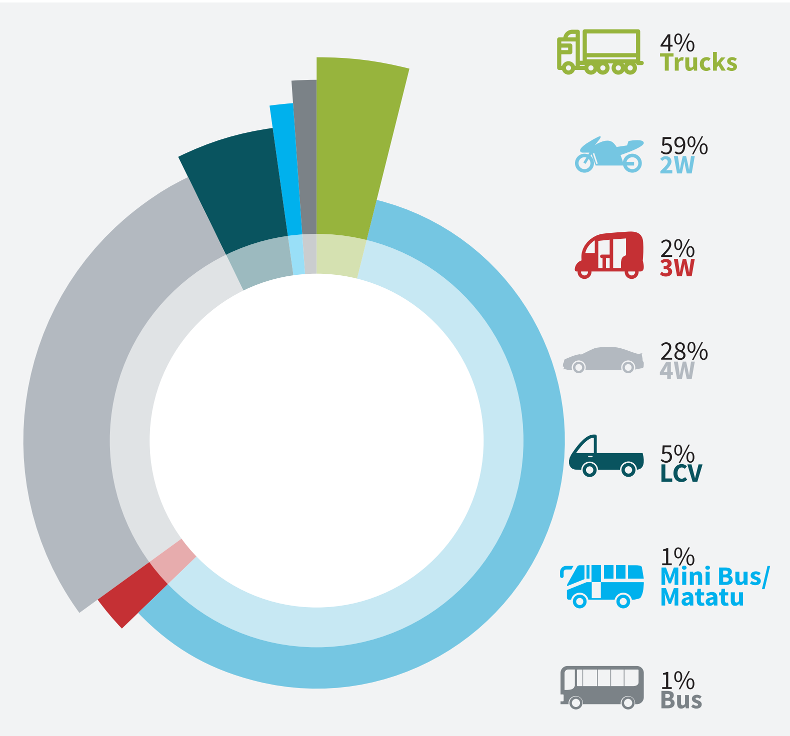
This feasibility study provides a practical roadmap for EVCI deployment in Kenya by assessing EV adoption pathways, grid impacts, priority charging locations and investment requirements, and by identifying suitable technologies, business models and PPP approaches. The study aims to support coordinated action by policymakers, utilities and investors to develop a scalable, financially viable and inclusive charging ecosystem that accelerates Kenya's transition to e-Mobility and delivers long-term climate and socio-economic benefits.

2. Energy & E-Mobility Landscape in Kenya

Kenya's energy sector is undergoing a transformative evolution, characterised by rapid RE adoption, growing electrification rates, and ambitious plans to meet escalating demand driven by urbanisation, industrialisation, and population growth. A granular understanding of the current energy mix, grid capacity, demand trends, and future projections is critical to aligning infrastructure development, including EV charging networks, with national priorities for sustainability and economic resilience.

Kenya has significantly expanded its installed capacity from 2019-20 to 2023-24, increasing from 2,741 MW to 3,243 MW, an increase of 18.3%. Kenya's energy mix is dominated by renewable sources, particularly geothermal and hydroelectric power, which contributes 29% and 26% of the overall installed capacity, with significant contributions of 13.43% from wind energy and 6.6% from solar energy. The rise in installed capacity also increased the overall generation from 11,462 GWh to 13,68, GWh from 2019-20 to 2023-24.

Figure 1: Vehicle Share in the Total Stock till 2023



Source: NTSA, Kenya National Bureau of Statistics

According to the Kenya Power and Lighting Company (KPLC), peak demand reached a new high of 2,439 MW in December 2025 and is projected to increase to 8,152 MW by 2043, as per the LCPDP 2024-2043. This shows that electricity usage rises with an increase in peak demand by 7% annually over the period under reference demand scenario. Also, according to the report under the vision scenario,[1] the projected peak demand will be 13,495 MW by the year 2043.

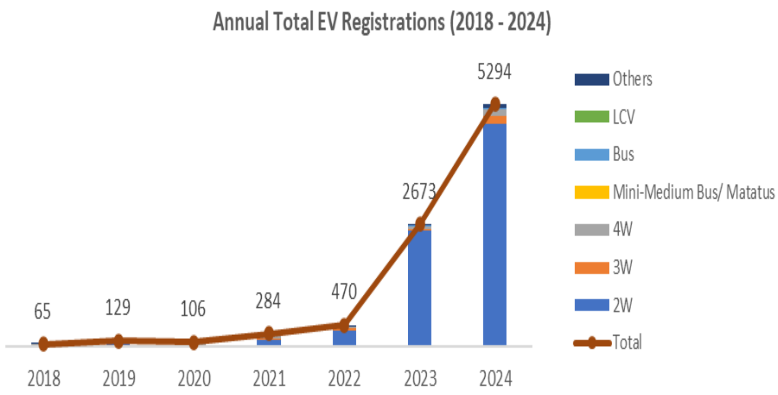
1 **Reference Scenario** is the base case scenario with projection based on historical data trends and envisaged growth in the different demand drivers based on expected national economic development and selected committed flagship projects. Vision Scenario is based on accelerated development patterns highly driven by Vision 2030 growth projections and implementation of flagship projects. (LCPDP 2024-2043)

Kenya's economy relies heavily on road transport, which facilitates 80% of passenger and freight movement[2] and contributes 8.3% to gross domestic product (GDP)[3]. However, the sector is also the largest energy consumer and emitter, utilizing 72% of petroleum products and accounting for 62% of energy-related carbon dioxide (CO2) emissions[4],[5]. Between 2009 and 2019, transport emissions surged by 59.4%, with projections indicating a rise to 17% of national GHG emissions by 2030[6], directly conflicting with Kenya's pledge to cut emissions by 32% by 2030 under its NDC.[7],[8]

The total vehicle stocks in Kenya are approximately 4 million, and the vehicle share is shown in Figure 1.

Kenya's EV market has surged exponentially since 2018, reflecting a pivotal shift toward sustainable mobility. Annual EV registrations (excluding e-bicycles) skyrocketed from 56 units in 2018 to 4,862 units in 2024, with 2W having 90% of total EVs registered in the year 2024, as shown in Figure 2.

Figure 2: EV Registration, 2018-2024



Source: NTSA, Kenya National Bureau of Statistics

2 Passenger and Freight movement through Road Transport
3 Transport sector contribution to Kenya's GDP
4 GHG Emissions through the Transport Sector
5 Petroleum Sale for the Road Transport Sector
6 GHG Emission Trends in Road Transport
7 GHG emission projection in the transport sector by 2030
8 Kenya GHG emission Target

e-Mobility Barriers

The widespread adoption of e-Mobility in Kenya faces significant barriers that must be addressed to enable a successful transition to e-Mobility. These barriers are broadly categorised into policy, economic and infrastructure as shown in Table 1.

Table 1: Key Barriers to EV Adoption

Policy	• Insufficient Financial Incentives • Fragmented Policy Framework • EVCI Guidelines
Economic	• High Ownership Costs • Import and Excise Duties
Infrastructure	• Limited Charging Infrastructure • Grid Limitations • Parking

Source: pManifold Analysis

3. Electric Vehicle Charging Infrastructure Landscape

Kenya's EVCI ecosystem remains nascent, with ~82 PCSs concentrated largely in urban hubs. Nairobi dominates deployment, hosting 80% of operational stations in commercial zones, malls, and corporate parks.

Table 2: CPOs wise number of chargers installed and their type

Existing EVCI (2025) and its Type			
CPOs	**Number of Chargers**	**AC**	**DC**
Knights Energy	41	21	20
EVChaja	10	09	01
EcoTrify	08	08	-
Kenya Power	07	06	01
KenGen	03	03	-
ChargeNet	01	01	-
SupaChaja	05	05	-
UTU	07	07	-
Total	**82**	**60**	**22**

Source: Stakeholder Consultations

In Kenya, the KS International Electrotechnical Commission (IEC) 61851 standard governs EV supply equipment for charging electric road vehicles, which covers the rated supply voltages up to 1,000 V Alternating Current (AC) or 1,500 V Direct Current (DC).[9] Based on the international IEC 61851 standard for EV conductive charging systems,[10] it ensures compatibility with global charging requirements. Table 3 shows the current CPO as per vehicle segments in Kenya.

9 Kenya Standard for the EV conductive charging System
10 International Standard for EV conductive charging system

Table 3: CPOs in Kenya

Vehicle Segments	EVCI Operators
2W	Ampersand, ARC Ride, eWaka, Fika Mobility, Go-Electric Ltd, Kiri EV, Mazi Mobility, Powerhive, Roam, Spiro, STIMA Mobility
4W	EVChaja, Equator Mobility, Go-Electric Ltd, Knights Energy, Power Governors Ltd, Roam, Supa Chaja, TotalEnergies, KPLC, KenGen
Buses	BasiGo, City Hopper

Source: pMainfold Analysis

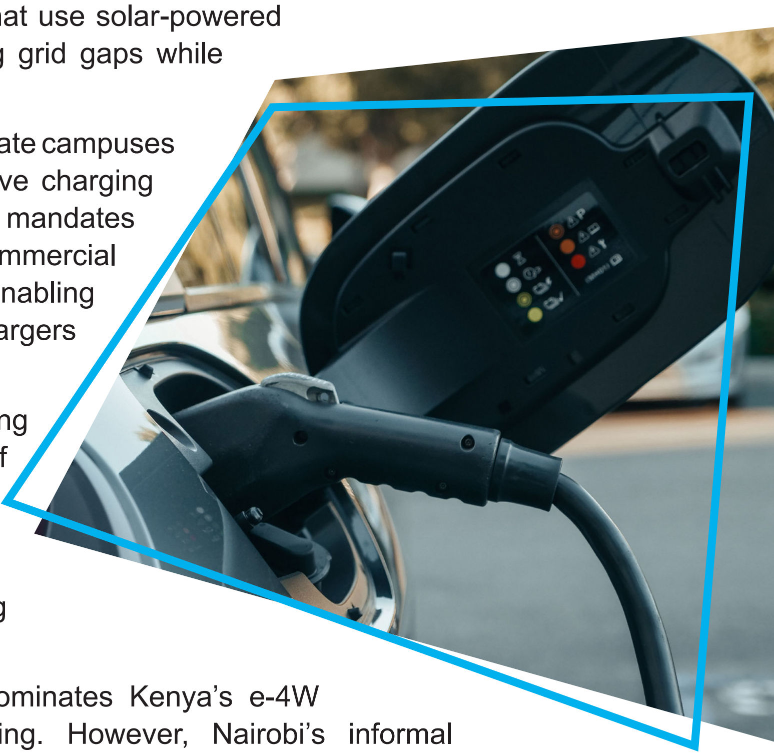
Note: This list is non-exhaustive

4. EVCI Deployment Trends, User Behaviour, and Operations

EV charging patterns in Kenya reveal distinct utilisation characteristics across various vehicle segments.

Charging Infrastructure Typologies and Deployment Trends

- **Public Charging Networks:** Public charging infrastructure in Kenya remains concentrated in urban centres like Nairobi and Mombasa, where Kenya Power and other private players like Total Energies, Knights Energy and others, offer primarily 50 kW DC fast chargers and 22 kW AC units and are planning to expand along high-traffic corridors. Currently, at PCSs, major OEMs are ABB, Circontrol, Fronius, Setec Power, etc with the combination of Type 2, CCS, CHAdeMO. However, rural areas rely on decentralised models that use solar-powered charging stations, thereby addressing grid gaps while prioritising affordability.



- **Dedicated/Captive Charging:** Corporate campuses and logistics hubs are adopting captive charging to optimise fleet operations. The policy mandates that 5% of parking spaces in commercial buildings be charging spaces, enabling workplaces to install 7–22 kW AC chargers for employee EVs.
- **Battery Swapping:** Battery swapping is gaining traction for e-2Ws (~90% of Kenya's EV fleet), eliminating range anxiety and upfront costs. Startups like Ampersand deploy optimised swap cabinets in Nairobi, enabling faster adoption of e-2W in the country.
- **Home Charging:** Home charging dominates Kenya's e-4W segment, enabling overnight charging. However, Nairobi's informal settlements face risks from unregulated 3 kW setups, prompting Kenya Power to mandate KEBS certified equipment under the guidelines.

Considering the vehicle segment priorities based on their requirement vary:

- e-2Ws: Prioritise Battery Swapping Stations (BSS) for speed and affordability, with riders averaging 2-3 swaps daily
- e-Buses/LCVs: Depend on dedicated depot charging for scheduled operations, like BasiGo's CCS2 chargers, achieving full charges in 2 hours
- Private e-4Ws: Use home charging and occasional public stations for long trips, though range anxiety persists due to limited highway infrastructure
- Rural Users: Rely on solar hybrid stations (e.g., Roam's off-grid hubs) due to unreliable grid connectivity

LCVs exhibit an even higher nocturnal charging preference, with most of the fleet accessing charging facilities during night hours. 2W charging patterns demonstrate greater temporal distribution, encompassing both daytime and nighttime utilisation periods, reflecting the operational characteristics of this vehicle segment.

5. Policy and Regulatory Landscape for e-Mobility

This section reviews the existing policies, guidelines, legislation, and standards for the adoption and operation of EVs and EVCI. Table 4 outlines the policies–NDCs and Bottom-Up Economic Transformation Plan (BETA) 2022-2027, focusing on the transport sector.

Table 4: Policy Framework – NDC & BETA Plan

Policies	Description
Nationally Determined Contributions[11]	Kenya's 2020 NDC targets include a commitment to reduce overall GHG emissions by 32% relative to the business-as-usual (BAU) scenario of 143 MtCO2e, including Land Use, Land-Use Change and Forestry (LULUCF) by 2030. This target is an increase from the initial NDC of 2015, which set a goal of a 30% reduction. Kenya requires over USD 62 billion for mitigation and adaptation actions across all sectors up to 2030, with 29% allocated to mitigation and 71% to adaptation:[12] **NDC for Transport sector:** Kenya has outlined the transport sector-related NDC under two main categories, which are:[13] **Mitigation:** ▪ Implement low-carbon and efficient transportation systems as part of Kenya's updated NDC **Adaptation:** ▪ Upscale road construction to harvest water and reduce flooding systematically ▪ Enhance institutional capacities for climate-proofing vulnerable road infrastructure ▪ Promote the use of appropriate designs and building materials for climate resilience ▪ Enhance the resilience of at least 4,500 km of roads against climate risks

11 Kenya's overall updated NDC targets
12 Domestic and Internation contribution for NDC targets
13 Transport sector-related NDC targets, Kenya

Policies	Description
Bottom-Up Economic Transformation Plan (BETA) 2022-2027	The Kenyan government's BETA 2022-2027 is a comprehensive economic strategy designed to drive economic growth, reduce poverty, and enhance living standards and aims to achieve these goals through a value chain approach. Additionally, the agenda includes several initiatives to promote e-Mobility as part of its broader economic and environmental goals. **EVCI** ▪ The government plans to construct 1000 Electric Vehicle Charging Stations (EVCS), out of which 700 will be in urban areas and 300 along highways[14] **Local Assembly and Manufacturing:** ▪ BETA aims to promote local assembly and manufacturing of EVs and 2Ws, aligning with Kenya's industrialisation goals[15]

Source: pManifold Analysis

National Electric Mobility Policy

In August 2023, through Gazette Notice 10132 of 2023, the Cabinet Secretary of the MRT appointed the Taskforce on the Development of National e-Mobility Policy,[16] Strategy and Regulations. The purpose of the task force was to develop a national e-Mobility policy for a conducive e-Mobility environment in Kenya, to accelerate the transition to e-Mobility. Released on February 3, 2026, the National e-Mobility policy recommends a boost in the infrastructural capacity to support the widespread adoption of EVs. Table 5 shows the policy's key objectives and action points.

Table 5: Objectives and Actions of the National e-Mobility Policy in Kenya

Policy Objective	Actions
To develop an integrated and comprehensive policy, legal and regulatory framework to promote the adoption of e-mobility	▪ Establish an e-Mobility Institutional Framework to facilitate the widespread adoption of EVs and establish transition targets ▪ Establish and review the legal and regulatory framework to promote the adoption of e-mobility
To promote the local manufacture and assembly of EVs	▪ Ensure establishment of local manufacture and assembly of EVs ▪ Establish a local upstream ecosystem for EV auto components
To develop and enhance e-mobility infrastructural capacity to accelerate the adoption of EVs	▪ Establish supportive measures for EV charging infrastructure ▪ Ensure a reliable electricity supply to support e-mobility
To improve fiscal and non-fiscal measures to accelerate the adoption of EVs	▪ Provide fiscal and non-fiscal incentives to promote infrastructure development ▪ Provide fiscal and non-fiscal incentives to EV consumers to accelerate adoption

14 BETA 2022-2027 targets for EVCI, Kenya
15 BETA 2022-2027 Local Assembly and Manufacturing target, Kenya
16 National Electric Mobility Policy

Policy Objective	Actions
To scale up socioeconomic measures to promote the adoption of EVs	▪ Enhance gender equality and social inclusion in the e-mobility ecosystem ▪ Enhance financial inclusion in the e-mobility ecosystem
Development of alternative sources of funds to reduce over-reliance on fuel levy for road maintenance, rehabilitation and development	Develop sustainable alternative financing sources to reduce over reliance on the fuel levy for road maintenance, rehabilitation and development in light of the increasing adoption of e-Mobility.

Source: Ministry of Roads and Transport

EV Charging and Battery Swapping Infrastructure Guidelines, EPRA – 2023

In 2023, EPRA developed comprehensive guidelines[17] to facilitate the development, regulation, and standardisation of EVCI. These guidelines aim to create a safe, accessible, and efficient EV charging network supporting Kenya's transition to sustainable mobility. The framework outlines key regulatory, technical, and operational requirements for PCS, Private Charging Infrastructure and BSSs while ensuring compliance with safety, cybersecurity and consumer protection standards.

Key objectives of the EPRA EV Charging Infrastructure Guidelines include:

- **Licensing & Compliance:** Ensuring that CPOs obtain the necessary approvals before installation and operation
- **Infrastructure & Safety Standards:** Inclusion of dedicated power supply, fire protection, and accessibility measures at charging stations
- **Strategic Deployment:** Location requirements, such as charging stations within every 3 km × 3 km grid in cities and every 25 km along highways to ensure wide coverage
- **Technical Standardisation:** Establishing charging specifications, equipment certification and metering accuracy to ensure reliability
- **Data Sharing & Smart Integration:** Requiring real-time data availability, Internet of Things (IoT) -based battery monitoring, and open Application Programming Interface (API) access for improved system efficiency
- **Fair Pricing & Consumer Rights:** Implementing transparent pricing, secure payment methods and cybersecurity measures

Tax Structure and Incentives

The taxation of vehicles in Kenya differs significantly between Internal Combustion Engine (ICE) vehicles and EVs. Financial Act 2019[18] have reduced excise duties for EVs to 10% to further promote e-Mobility, while the Finance Act 2023[19] introduces a series of fiscal measures designed to discourage the use of ICE vehicles. The following are the current provisions for e-Mobility, as shown in Table 6.

17 Electric Vehicle Charging and Battery Swapping Infrastructure Guidelines 2023, EPRA
18 Kenya Financial Act 2019
19 Kenya Financial Act 2023

Table 6: Taxation on ICE Vehicles, EVs and EVCI in Kenya

Category	ICE Vehicle	EV Vehicle	EV Charging Infrastructure
Import Duty (of customs value)	25%	2W: 25% 3W: 25% 4W: 35% Bus: 0% (CKD) / 35% (FBU)	0% of customs value
Value Added Tax (VAT)	14%	2W: Zero Rated 3W: 16% 4W: 16% Bus: Zero Rated	16%
Excise Duty	Less than 1500cc: 20% 1500cc to 3000cc: 25% Over 3000cc: 35%	2W: 0% 3W: 10% 4W: 10% (CKD) / 20% (FUB) Bus: 10%	10% of (Custom value + Import duty)[22]
Railway Development Levy (RDL)	2% of the customs value	2% of the customs value	1.5% of the customs value
Import declaration fees (IDF)	3.5% of the customs value	3.5% of the customs value	2.5% of the customs value

Source: pManifold Analysis

Policy Frameworks Gaps and Recommendations

Despite Kenya's progress in developing an enabling environment for e-Mobility, several policy and regulatory gaps continue to hinder the large-scale deployment of EVCI. Table 7 outlines the key policy gaps identified in Kenya's e-Mobility landscape, along with their potential impacts on infrastructure deployment, investment flows and overall sector growth.

Table 7: Identified Gaps in Policy Framework & Potential Impact

Gap Category	Observed Gap	Potential Impact
Fragmented Legal & Institutional Framework	▪ Multiple agencies (EPRA, KEBS, NEMA) with overlapping mandates ▪ Lack of a central coordinating body or unified e-Mobility policy ▪ Lack of public awareness on the e-Mobility sector ▪ Draft e-Mobility Policy adoption still pending	▪ Conflicting requirements, slower approvals, gaps in enforcement ▪ Inconsistent policy signals to investors and operators ▪ Risks of duplication or contradiction in regulations ▪ Lack of public awareness will create misconceptions amongst people

20 Taxes on ICE vehicles in Kenya
21 National e-Mobility Policy & Implementation Strategy 2024, Ministry of Road and Transport, Kenya
22 Excise duty for EVs in Kenya

Gap Category	Observed Gap	Potential Impact
Tax & Incentive Structure	▪ Inconsistent tariff and duty exemptions for EVs/EVCI equipment ▪ Finance Act (2023) offers some exemptions for EVs, but is limited and unclear for charging equipment ▪ Limited financial or fiscal incentives for advanced charging solutions	▪ Higher upfront costs hinder private investment and scale-up ▪ Unclear or partial coverage discourages adoption of advanced technologies (e.g., battery-swapping, DC fast charging) ▪ Missed opportunities to leverage renewable surplus or reduce import bills
Technical Standards & Certification	▪ KEBS standards incomplete for emerging technologies (Vehicle-to-Grid (V2G), battery-buffered DC, wireless charging) ▪ Approval pathways unclear or lengthy for new EVCI hardware	▪ Potential import of substandard equipment jeopardising safety and performance ▪ Slower adoption of cutting-edge charging methods ▪ Delays in market rollout of new technologies, limiting e-Mobility growth
Environmental & Social Considerations	▪ No specific **Environmental & Social Impact Assessment** (ESIA) guidelines for EVCI ▪ Life-cycle management (battery disposal, e-waste) is not clearly addressed ▪ Inclusivity for women, persons with disabilities, and local communities is insufficiently integrated	▪ Heightened environmental risks if large EVCI projects lack oversight ▪ Missed opportunities to ensure safe disposal or recycling ▪ Potential community resistance or inequitable access if local stakeholders are not consulted
Limited Provisions for Advanced Charging & Renewables	▪ Bi-directional charging (V2G, Vehicle-to-Home (V2H)) not explicitly covered in regulations ▪ Lack of EV charging infrastructure ▪ Absence of aggregator licensing or policy to enable reverse power flow ▪ No standardised green-certification mechanism for “clean” EV charging.	▪ Inability to harness EVs as distributed energy resources (peak shaving, frequency regulation) ▪ Credibility gap for operators who want to claim “green” charging but lack a recognised certification system ▪ Create range anxiety ▪ Underutilised off-peak RE

Gap Category	Observed Gap	Potential Impact
▪ Grid Connection & Planning	▪ Unclear mechanisms for sharing grid upgrade costs between utilities and private EVCI developers ▪ Limited ToU tariffs with capping, plus potentially high demand charges for large EVCI sites ▪ Distribution expansion often lags behind EVCI deployment	▪ Possible grid bottlenecks, curbing new charging stations or resulting in localised blackouts ▪ High operating costs for EVCI operators ▪ Slower adoption of medium/heavy EV fleets, especially for freight or bus depots

Source: pManifold Analysis

To accelerate Kenya's e-Mobility transition, targeted policy interventions are essential to address existing regulatory, financial, technical, and infrastructure gaps. Table 8 outlines the recommendations that focus on streamlining governance, enhancing incentives, strengthening technical standards, integrating sustainability, and improving grid planning.

Table 8: Policy Recommendation & its Outcome

Gap Addressed	Recommendation	Key Outcome
Fragmented Legal & Institutional Framework	▪ **Finalise & Operationalise Draft e-Mobility Policy:** Unify mandates across EPRA, KEBS, NEMA, and county governments ▪ **Create an e-Mobility Coordination Council** to streamline licensing, standard-setting, dedicated staffing for the e-Mobility sector and enforcement ▪ **Consolidate Guidelines into a Single EVCI Bill** for clarity and consistent enforcement	▪ Clear roles/responsibilities among agencies ▪ Reduced policy conflicts and overlaps ▪ Increased investor confidence through stable and predictable regulations
Tax & Incentive Structure	▪ **Streamline Tax Exemptions** for EVCI-specific hardware (e.g., chargers, inverters, battery-swapping tech) ▪ **Offer Reduced Duties** or short-term tax holidays for advanced charging solutions (V2G, battery-buffered DC) ▪ **Establish a National EVCI Incentive Fund** (capital expenditure (CAPEX) subsidies, low-interest loans) ▪ Expand **ToU Tariffs** without capping	▪ Lower capital & operational costs for EVCI developers ▪ Encourages early adoption of advanced charging technologies ▪ Facilitates off-peak charging, harnessing surplus renewables and smoothing grid load.

Technical Standards & Certification	▪ Develop/Adopt KEBS Standards for V2G, DC fast chargers, battery-swapping protocols ▪ Fast-Track Certification Pathway for pilot EVCI technologies to expedite market entry ▪ Periodic Review of standards to keep pace with rapid EV tech evolution.	▪ Ensures safety and performance of EVCI equipment ▪ Encourages local and international stakeholders to bring in new charging models ▪ Minimises risk of subpar or incompatible equipment in the Kenyan market.
Environmental & Social Considerations	▪ **EVCI-Specific ESIA Guidelines** from NEMA with clear thresholds (e.g., power capacity, site size) ▪ **Promote Inclusive Deployment** and Public Awareness Campaigns (universal design features in chargers, community engagement) ▪ **Lifecycle Management:** Mandate end-of-life battery disposal/ recycling protocols	▪ Reduces negative environmental impacts and fosters community buy-in ▪ Encourages equity, accessibility, and safe disposal practices ▪ Helps build public trust in EVCI projects
Advanced Charging & Renewables	▪ **Regulatory Support for V2G & Smart Charging:** Enable reverse power flow and aggregator licensing ▪ **Green Certification** for EVCI operators to validate renewable sourcing (e.g., RE certificates) ▪ **Solar-Plus-Storage Incentives** for large hubs	▪ Leverages EVs as distributed energy storage for grid services ▪ Validates "clean" claims for operators, boosting consumer confidence ▪ Increases share of local renewable power in EV charging
Grid Connection & Planning	▪ **Formalise Joint Planning** between KPLC, county governments, and EVCI developers to align distribution upgrades with future EV load ▪ **Cost-sharing models** for grid reinforcement (utility + private co-funding) ▪ Expand **ToU Tariffs** and reevaluate **demand charges** for high-capacity sites	▪ Accelerates grid upgrades where needed ▪ Reduces the cost burden on either utilities or private operators alone ▪ Makes large-scale EVCI (buses, freight depots) financially viable

Source: pManifold Analysis

e-Mobility Tariff Structure

Kenya's electricity tariff structure is critical in shaping the energy consumption landscape and influencing the adoption of e-Mobility solutions. These electricity tariffs are set by EPRA and implemented by KPLC. This section details the current tariff structures for domestic and commercial consumers and analyses their implications for e-Mobility.

The Tariff structure in Kenya is designed to cater to a diverse range of consumers from low-income households to large industrial users. The electricity tariffs effective from 1st July 2025 reflect slight adjustments across various consumer categories, including domestic, commercial and industrial consumers (CI). Reductions in both peak and off-peak tariffs can be observed across most of the consumer categories, whereas no change in the e-Mobility tariff was observed, maintaining the existing tariff rates to support EV adoption, as shown in Table 9.

Table 9: e-Mobility Tariff Structure in Kenya[23]

Consumer Type	Rated Supply – Voltage (V)	Unit Consumption	Tariff Rate (Ksh) (Effective from 1st July 2024)	Tariff Rate (Ksh) (Effective from 1st July 2025)
e-Mobility	240 V or 415 V	< 15,000 units	16.00/kWh (Peak hours)	16.00/kWh (Peak hours)
			8.00/kWh (Off-peak hours)	8.00/kWh (Off-peak hours)
Note: The off-peak is: 10 PM to 6 AM (weekdays), Saturday/Public Holiday–all day except 8 AM to 2 PM and Sunday–all day.				

Source: Authority of the Republic of Kenya

23 Electricity Tariff Structure in Kenya

6. Environmental and Social Impact Assessment

The deployment of EVCI has environmental and social implications that must be addressed to ensure sustainability. Expanding EVCI increases electricity demand, raising issues around grid capacity and energy security. Although Kenya's power mix is largely renewable, managing peak demand and battery storage remains a key challenge.

Key Environmental Concerns & NEMA's Role

- **Land Use & Urban Planning:** EVCI construction must comply with the Physical and Land Use Planning Act (2019)[24] and EIA Regulations (2003)[25], to prevent deforestation and green space disruption. Developers must implement mitigation measures such as afforestation or integrating green infrastructure.
- **Battery Recycling & Waste Management:** Lithium-ion battery disposal is regulated under Waste Management Regulations (2006)[26]. NEMA enforces EPR to promote recycling and repurposing.
- **Pollution Control & Compliance:** Air Quality Regulations (2014)[27] and Water Quality Regulations (2006) ensure that charging stations minimise emissions and prevent chemical leaks. NEMA mandates environmental audits and pollution mitigation strategies.
- **Sustainable Material Use & Circular Economy:** Green Economy Strategy (GESIP 2016-2030)[28], promotes recyclable materials in EVCI and second-life applications for EV batteries. Impact on Ecosystems & Biodiversity
- **Habitat Disruption & Green Space Encroachment:** Charging hubs along highways (e.g., Nairobi-Mombasa Road) risk disrupting urban forests and ecological corridors. Green infrastructure (permeable pavements, tree canopies) can mitigate biodiversity loss.
- **Impact on Sensitive Ecosystems:** Wetlands (e.g., Dunga Wetland, Lake Naivasha Ramsar Site) are vulnerable to EVCI-related land use changes.
- **Soil & Water Contamination Risks:** Transformer leaks and underground cabling can degrade soil and water quality. Kenya's Water Quality Regulations (2006) enforce similar safeguards.

24 Physical and Land Use Planning Act, 2019.
25 Environmental (Impact Assessment and Audit) Regulations, 2003.
26 Environmental Management and Co-ordination (Waste Management) Regulations, 2006.
27 Environmental Management and Co-ordination (Air Quality) Regulations, 2013
28 Green Economy Strategy and Implementation Plan-Kenya 2016-2030

Strategies for Sustainable EVCI Expansion

- **Mandatory EIAs:** NEMA should enforce EIAs before approving EVCI projects in sensitive areas.
- **Green Infrastructure:** Promote solar canopies, permeable pavements, and green roofs in charging hubs.
- **Zoning & Land Use Planning:** Work with county governments and KURA to prevent EVCI encroachment on protected areas.
- **Sustainable Construction:** Requires low-impact development techniques to reduce habitat disruption.

The social impacts of EVCI deployment must be considered to ensure equity, accessibility, and community acceptance. Various stakeholders, including local governments, civil society organisations, and vulnerable communities, must be involved in decision-making.

- **Community Perspectives on EVCI Deployment:** Public awareness of EVCI remains limited in Kenya due to low understanding of EV benefits. South Africa has addressed this through nationwide awareness campaigns; a model Kenya could adopt through local sensitisation programs.
- **Accessibility and Inclusivity for Women, Differently-Abled Individuals, and Marginalised Groups:** Equitable access to EVCI is vital, as women and marginalised communities in Kenya face mobility challenges. The UK requires wheelchair-accessible and well-lit charging stations; an approach Kenya could adopt to avoid worsening inequalities.
- **Engagement with Civil Society Organisations, NGOs and Local Communities to Address Concerns:** Effective stakeholder engagement is crucial for EVCI deployment. Kenya's SETA program supports community dialogue on fair energy distribution, while countries like India have advanced EV infrastructure through partnerships with local NGOs to address tariffs, land use and safety.

ESIA is a critical statutory process in Kenya designed to evaluate the environmental and social implications of development projects before implementation. For EVCI, which falls under energy projects with medium risk as per the Second Schedule of the Environmental Management and Coordination Act (EMCA, 1999), an EIA license from NEMA is mandatory before construction. Key aspects of ESIA are:

- **Screening & Scoping:** Determines the necessity of a full EIA based on the project's scale and identifies key environmental aspects to be examined
- **Baseline Studies & Impact Assessment:** Analyses existing conditions and evaluates potential impacts on land, biodiversity, air and water quality, energy systems, and communities
- **Mitigation Planning:** Develops strategies to minimise negative effects and enhance positive outcomes
- **Public Participation:** Ensures stakeholder consultations and community input throughout the process
- **EIA Report Submission:** The proponent, via licensed environmental experts, submits the report to NEMA along with the prescribed fee (0.1% of project cost or a minimum of KES 10,000)

- **Review & Licensing:** EPRA and other lead agencies review the report, followed by the Technical Advisory Committee evaluation. If approved, NEMA issues a conditional EIA license within 21–30 days
- **Monitoring & Compliance:** NEMA conducts audits and reviews periodic environmental performance reports. Non-compliance may lead to suspension, revocation, or cancellation of the license
- **Key Environmental Considerations for EVCI**
  - **Grid Load and Energy Demand:** EVCI can impose peak load stress on Kenya's grid. Integration of smart charging and battery storage solutions is crucial for grid stability
  - **Land Use and Habitat Protection:** Site selection must adhere to the Physical and Land Use Planning Act (2019), avoiding disruption of ecologically sensitive zones
  - **Battery Waste Management:** Lithium-ion batteries pose end-of-life disposal risks. EPR regulations under NEMA and the 2006 Waste Management Regulations must be strictly followed
  - **Sustainable Materials:** Circular economy principles and second-life battery applications should be adopted in alignment with Kenya's Green Economy Strategy (GESIP 2016–2030)
- Key Social Considerations for EVCI
  - **Community Awareness:** Public education campaigns are necessary to counter low EV awareness and facilitate community support
  - **Equity and Inclusion:** Infrastructure should be universally accessible, ensuring equitable service for marginalised populations
  - **Just Transition:** Workforce transitions from fossil fuel sectors require reskilling and support programs to promote social equity and economic inclusion

Accessibility and Inclusivity

An inclusive EVCI network ensures that charging facilities are accessible to all users, particularly women, elderly individuals, persons with disabilities, and marginalised communities. Without inclusive design, large segments of the population may be excluded from participating in the EV transition. Some of the key design features for inclusive EVCI are mentioned below:

- **Vehicle Space & Movement:** Allow full door openings and manoeuvrability for users with mobility aids
- **Charger Reachability:** Charging interfaces should be accessible from both seated and standing positions, with no obstructions

- **Lighting & Shelter:** Install adequate lighting and weather protection to enhance user safety and comfort
- **Surface Quality:** Ensure flat, smooth ground conditions to support wheelchairs and walking aids
- **Proximity to Amenities:** Situate charging points near accessible toilets and retail facilities
- **Use clear signage and provide real-time updates** on charger availability and functionality
- **Display details on space dimensions**, potential obstructions, and nearby accessibility features
- **Offer diverse payment options**, including contactless cards and other alternatives, not limited to mobile apps

7. EV & EVCI Forecast and its Implications

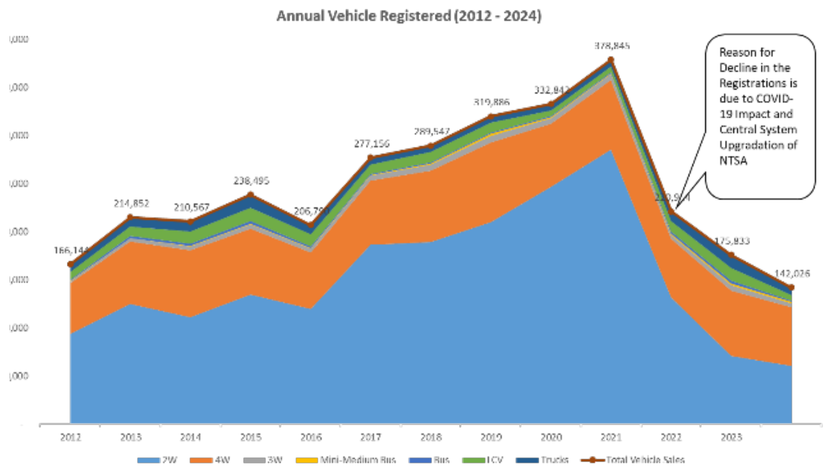
Kenya's e-Mobility transition presents both opportunities and challenges for its electricity grid. This section presents a comprehensive analysis of the EVCI landscape in Kenya, focusing on the projected evolution of EV adoption and its implications on the grid from 2025 to 2050. Simulations and modelling are performed using Integrated Energy and Transport e-Mobility Model (IETEM©), an integrated modelling and simulation tool developed by pManifold, to assess the implications of rising EV adoption across various segments such as 2Ws, 3Ws, 4Ws, mini-medium buses (Matatus), buses, LCVs and Trucks under three adoption scenarios, namely Low, Medium and High. Each scenario captures different trajectories of market readiness, policy intervention and infrastructure development.

Kenya's vehicle market is broadly segmented into different types of vehicles, and is classified into different categories:

- **Motorcycles (2W):** This category represents 2Ws, commonly used for personal transport, considered as 10% of total 2Ws and commercial activities ("boda-bodas") are considered as 90% of total 2Ws.
- **Three Wheelers (3W):** This includes auto-rickshaws and other 3W vehicles, primarily used for passenger transport in urban and semi-urban areas
- **Saloon Cars, Station Wagons (4W):** This category encompasses standard passenger vehicles for personal use, considered as 95% of total 4Ws and commercial activities are considered as 5% of total 4Ws.
- **Mini Buses/Matatu (Mini-Medium Bus):** This segment refers to the ubiquitous "matatus," which are privately owned minibuses that serve as a primary mode of public transport in Kenyan cities
- **Buses and Coaches (Bus):** This includes larger buses used for long-distance travel and urban mass transit
- **Panel Vans, Pick-ups, Lorries (LCV):** This category covers LCVs used for transporting goods and services
- **Trucks, Trailers (Trucks):** This includes heavy-duty vehicles used for long-haul freight transport

The vehicle registration trends in Kenya from 2012 to 2024, as shown in Figure 3, highlights key shifts in mobility patterns, economic influences, and the potential for e-Mobility transition.

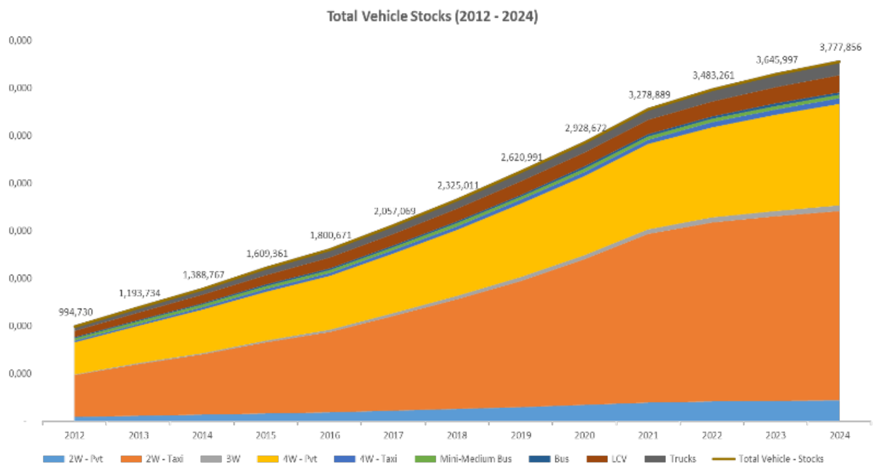
Figure 3: Total Vehicles Registered in Kenya (2012 – 2024)



Source: Kenya National Bureau of Statistics

The growth in Kenya's existing vehicle stock from 2012 to 2024, as shown in Figure 4, highlights the continuous expansion of the country's transport sector, with an increase from 994,730 vehicles in 2012 to approximately 3.7 million vehicles in 2024.

Figure 4: Existing Vehicle Stocks in Kenya (2012 – 2024)

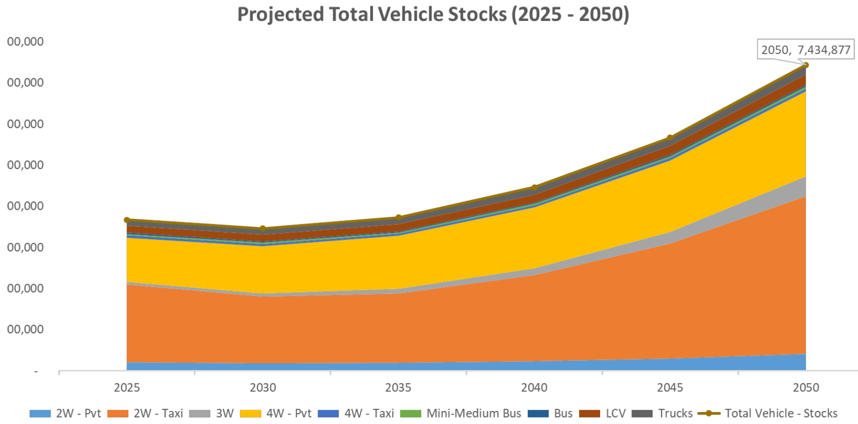


Source: Kenya National Bureau of Statistics

Total Vehicle Projections

IETEM© projections for Kenya's total vehicle stock from 2025 to 2050, as shown in Figure 5, illustrate a continuous increase in vehicle ownership and mobility demand till 2050.

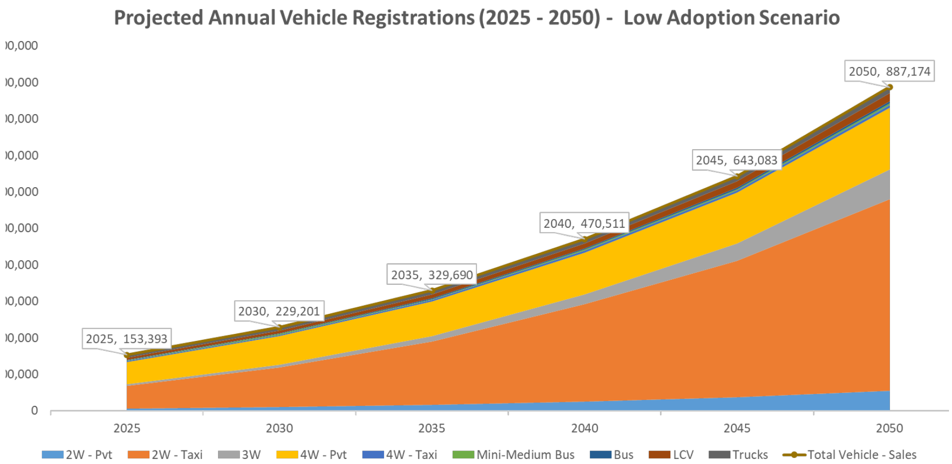
Figure 5: Projected Total Vehicle Stocks (2025 – 2050)



Source: pManifold Analysis

The projected annual vehicle registrations in Kenya from 2025 to 2050 as shown in Figure 6, demonstrates a robust upward trajectory, with total annual registrations escalating from approx. 153,000 units in 2025 to 887,000 units by 2050.

Figure 6: Projected Annual Vehicle Registrations (2025 -2050)

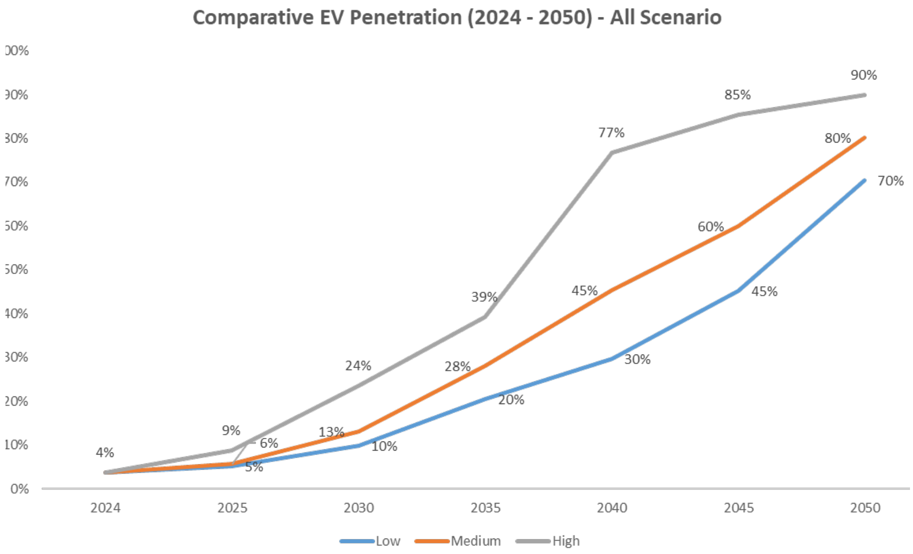


Source: pManifold Analysis

Projection of Electric Vehicles

The projected EV penetration in total vehicle sales across low, medium and high adoption scenarios from 2024 to 2050 is shown in Figure 7: EV penetration from 2025 to 2050 for all Adoption Scenarios Figure 7. This demonstrates that the varying levels of commitment and investment can significantly influence the pace and scale of EV adoption in Kenya's transport sector.

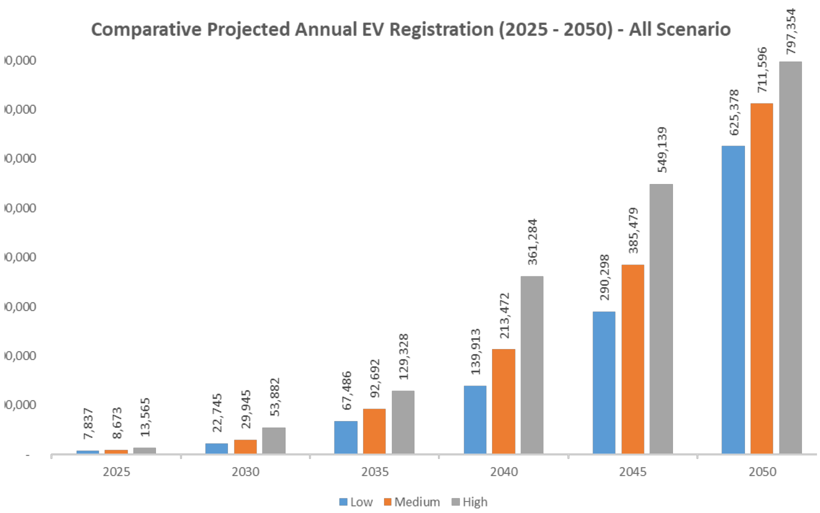
Figure 7: EV penetration from 2025 to 2050 for all Adoption Scenarios



Source: pManifold Analysis

The projected annual EV registrations in Kenya from 2025 to 2050 under the low, medium, and High adoption scenarios are shown in Figure 8.

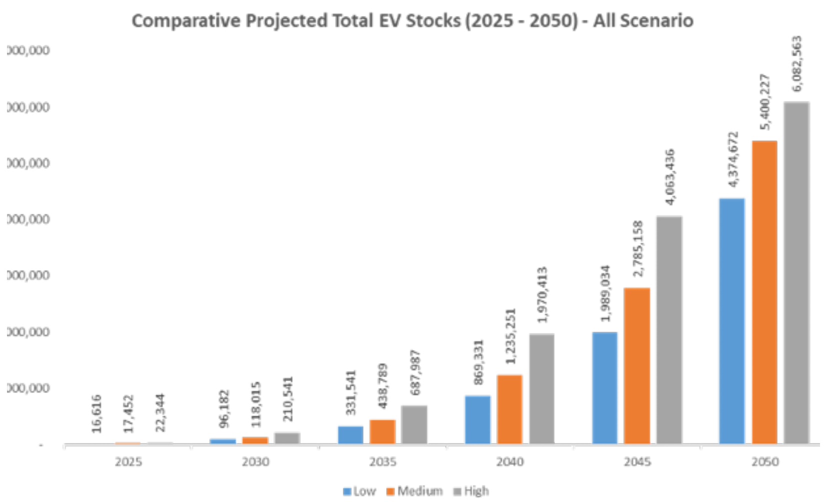
Figure 8: Projected Annual EV Registration (2025-2050) – All Scenario



Source: pManifold Analysis

This steady inflow of new EVs each year contributes to the cumulative growth in total EV stock shown in Figure 9.

Figure 9: Projected Total EV Stocks (2025–2050) – All Scenario

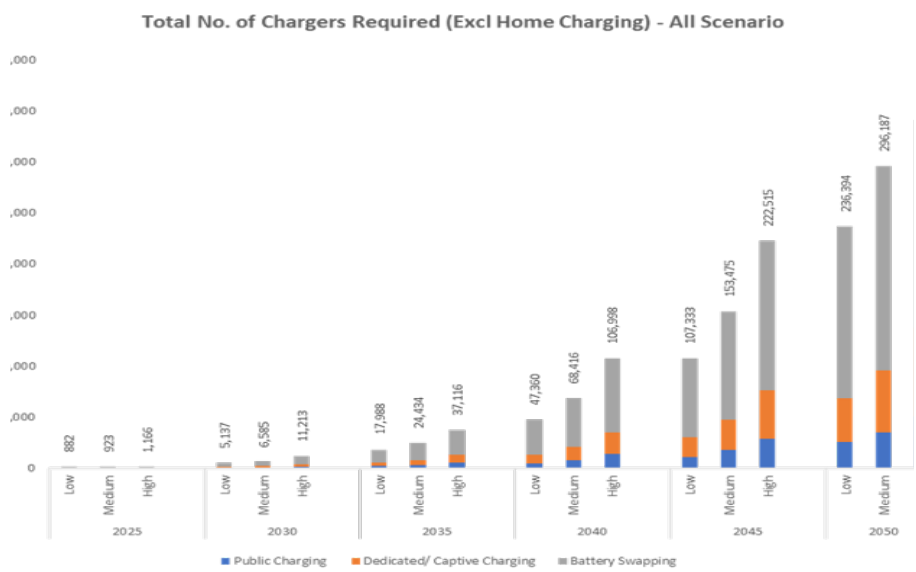


Source: pManifold Analysis

Projection of Electric Vehicle Charging Infrastructure

The projection under the low adoption scenario highlights a steady and sustained increase in EV presence across the country, primarily driven by e-2W taxis, e-2W private and e-3W. The Figure 10 shows the projected total number of EV chargers required (excluding Home Charging) in Kenya from 2025 to 2050 under low, medium and high adoption scenarios

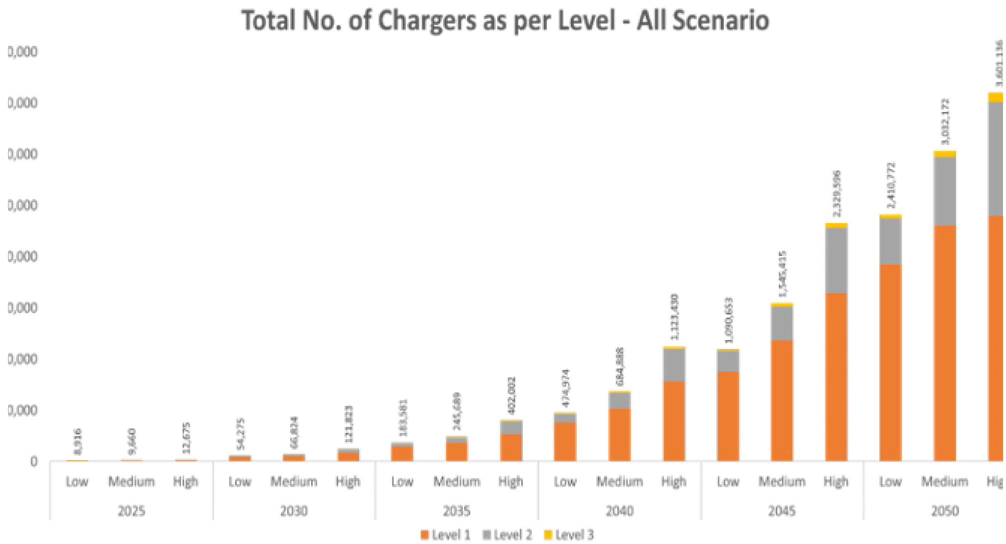
Figure 10: Total No. of Chargers Required- All Scenario



Source: pManifold Analysis

Complementing the above trend of the projected number of chargers required, Figure 11 further breaks down these projections by charger level.

Figure 11: Total No. of Chargers as per Level–All Scenario



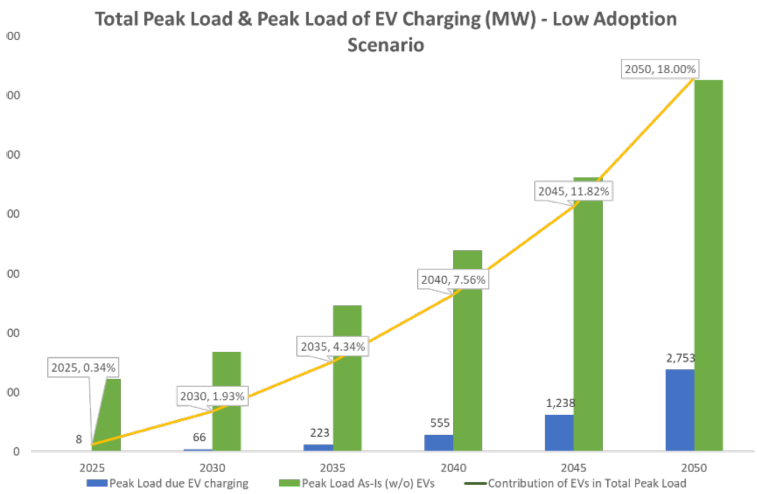
Source: pManifold Analysis

Projected Peak Loads

Low EV Adoption Scenario

The projected total peak load and EV charging peak load grow steadily from 2025 to 2050, as shown in the Figure 12.

Figure 12: Total Peak Load & Peak Load due to EV Charging (MW)–Low Scenario

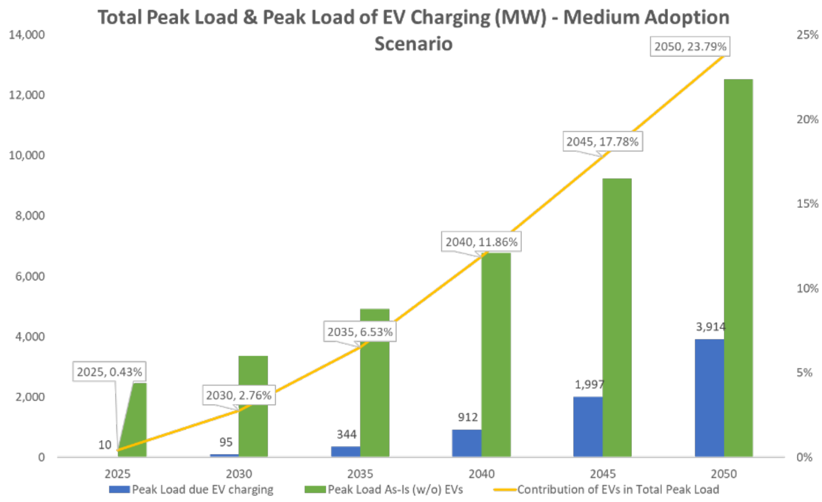


Source: pManifold Analysis

Medium EV Adoption Scenario

The projected total peak electricity load and the corresponding peak load attributable to EV charging under a medium adoption scenario is shown in Figure 13.

Figure 13: Total Peak Load and Peak Load of EV charging (MW)–Medium Scenario

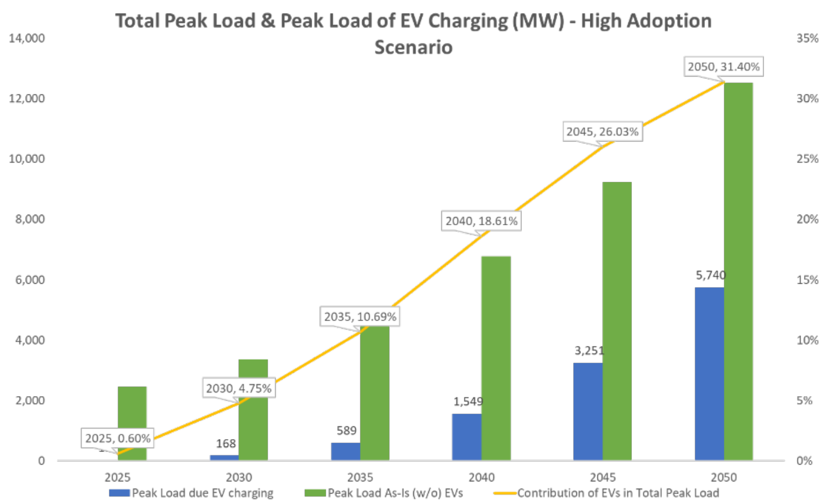


Source: pManifold Analysis

High EV Adoption Scenario

The projected total peak electricity load and the corresponding peak load attributable to EV charging under a high adoption scenario is shown in Figure 14.

Figure 14: Total Peak Load & Peak Load due to EV Charging (MW) – High Scenario



Source: pManifold Analysis

Overall EV, EVCI Projections & Impact on Grid

This covers the anticipated impact of increased EV adoption on Kenya's electricity grid between 2025 and 2050 for low, medium and high adoption scenarios, based on key metrics such as EV registrations, vehicle stock levels, peak load implications and electricity consumption patterns. The broad-level summary of all the scenarios is given in Table 10.

Table 10: Projections of EVs, Peak Load & Electricity Consumption

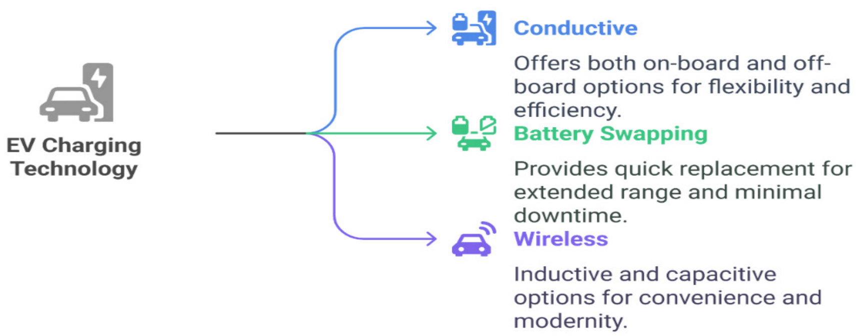
EVs and its Impact on Grid	2025			2030			2040			2050		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
EVs Annual Registrations (Nos)	7,837	8,673	13,565	22,745	29,945	53,882	139,913	213,472	361,284	625,378	711,596	797,354
EVs Penetration in Total Sales (%)	5%	6%	8.8%	9.9%	13%	23.5%	29.7%	45%	76.8%	70.5%	80%	89.9%
EVs Stocks (Nos)	16,616	17,452	22,344	96,182	118,015	210,541	869,331	1,235,251	1,970,413	4,374,672	5,400,227	6,082,563
EVs Penetration in Total Stocks (%)	0.5%	0.5%	0.6%	2.8%	3.4%	6.1%	19.5%	27.7%	44.2%	58.84%	72.63%	81.8%
Peak Load Due to EV Charging (MW)	8	10	15	66	95	168	555	912	1,549	2,753	3,914	5,740
Contribution of EVs in Total Peak Load (%)	0.34%	0.43%	0.60%	1.93%	2.76%	4.75%	7.56%	11.86%	18.61%	18.0%	23.79%	31.99%
Peak Load Due to EV Charging (MW) in Time Slot 4 (TS4) – 06:00 PM to 12:00 AM	5.83	7.24	10.11	46.33	68.21	116.04	390.58	645.8	1077.12	1918.14	2756.2	4079.1
Electricity Consumption Due to EV Charging (GWh)	57.6	63.7	80	400.6	603.2	890	3,701.4	5,790	8,623	17,765.4	24,687	33,922
Contribution of EVs in Total Electricity Consumption (%)	0.24%	0.26%	0.3%	1.17%	1.75%	2.6%	5.21%	7.86%	11.1%	11.59%	15.22%	19.5%

Source: pManifold Analysis

8. EVCI Technology Analysis and Selection

As Kenya transitions to e-mobility, this section outlines EV technologies, charging solutions, and segment-specific infrastructure needs. Infrastructure requirements vary by vehicle type, including e-2Ws, e-3Ws, buses and freight trucks, each with distinct power and siting needs. Charging technologies are generally classified into three main types, shown in Figure 15.

Figure 15: Classification of EV Charging Technologies



Source: pManifold Analysis

Global adoption of EVCI standards varies by region but broadly aligns with international frameworks such as IEC 61851, International Organisation for Standardisation (ISO) 15118, and IEC 62196. Table 11 summarises key standards and connector types by country.

Table 11: Summary of Different Standards Adopted Globally

Country/Region	Standards Adopted	Connector Types	Key Features
United States (US)[29]	SAE J1772, ISO 15118	Level 1 & 2: J1772; DC Fast Charging (DCFC): CCS, CHAdeMO, Tesla	SAE J1772 for AC charging; CCS and CHAdeMO for DC fast charging; Tesla uses proprietary connectors.
European Union (EU)	IEC 61851, ISO 15118, IEC 62196	AC: Type 2; DC: CCS Combo 2	Type 2 connector (IEC 62196-2) for AC charging; CCS Combo 2 for DC fast charging; standardized across EU for interoperability.
United Kingdom (UK)[30]	IEC 61851, ISO 15118, PAS 1899, EV (Smart Charge Points) Regulations 2021, Public Charge Point Regulations 2023	AC: Type 2; DC: CCS Combo 2, CHAdeMO	Type 2 and CCS Combo 2 connectors widely used; PAS 1899 sets accessibility standards; smart charging regulations mandate features like off-peak charging; Public Charge Point Regulations 2023 enhance transparency and reliability.
India[31]	IS 17017, IS-17017-Part-23, IS-17017-Part-24	AC: Type 2; DC: CCS2, CHAdeMO	IS 17017 series aligning with international standards; Type 2 for AC charging; CCS2 and CHAdeMO for DC fast charging.
China	GB 39752-2024	AC & DC: GB/T	GB/T standard outlines safety principles for EV conductive charging systems, covering aspects like markings, warnings, communication protocols, charging interfaces, and protections for both AC and DC systems.
South Africa (SA)	IEC 61851, ISO 15118	AC: Type 2; DC: CCS Combo 2	Type 2 connector for AC charging; CCS Combo 2 for DC fast charging; aligns with European standards for interoperability.
Norway	IEC 61851, ISO 15118, Open Charge Point Protocol (OCPP)	AC: Type 2; DC: CCS Combo 2, CHAdeMO	Type 2 connector for AC charging; CCS Combo 2 and CHAdeMO for DC fast charging; OCPP used for network communication.
Japan	CHAdeMO, IEC 61851	AC: Type 1; DC: CHAdeMO	Type 1 connector for AC charging; CHAdeMO for DC fast charging; CHAdeMO was developed in Japan and is widely used.

29 Charger Types and Speeds | US Department of Transportation
30 Accessible EV charging standards: PAS1899–Energy Saving Trust
31 BIS Standard

Country/Region	Standards Adopted	Connector Types	Key Features
Kenya	KS IEC 61851, ISO 15118	AC: Type 2; DC: CCS Combo 2	Type 2 connector for AC charging; CCS Combo 2 and others for DC fast charging based on imports of vehicles in the country, align with international standards to ensure compatibility and safety.

Source: pManifold Analysis

Kenya's EV charging ecosystem benefits from a strong digital payments landscape, led by widespread M-Pesa adoption. Most CPOs support multiple payment options, including mobile money, apps, and cards, with regulations requiring clear, transparent pricing at public chargers and inclusive, accessible payment interfaces. The pricing structure must include all applicable components, such as:

- Price per kilowatt-hour (kWh)
- Price per minute
- Price per charging session

9. Location Selection Tool for EVCI in Kenya

Selection of optimal locations for EVCS is a strategic process that requires balancing accessibility, visibility, cost-effectiveness and the ability to meet current and future demand. The key considerations include urban form and demographics to identify high-demand and underserved areas; competitor presence to avoid redundancy; dwell time at locations such as commercial centres; and proximity to transport corridors, parking hubs and major activity nodes. Technical and financial factors such as grid capacity, land use, zoning, property costs and construction feasibility are equally critical, alongside user travel patterns and charging behaviour to ensure a user-centric network design, accommodate future growth and accelerate the adoption of electric vehicles.

A comprehensive analysis of leading geospatial and mapping platforms xMap, CARTO, ArcGIS and SuperMap, was conducted to identify the most suitable tool for strategic EVCI planning. The assessment evaluated capabilities, including geospatial analytics, demographic overlays, route optimisation, real-time data integration and EV-specific APIs, aligning these features with planning needs such as demand forecasting, accessibility, network optimisation, and site suitability to identify the most effective tools for strategic EVCI planning. Table 12 provides a comparison between all the identified tools that support data-driven decision-making for EV infrastructure rollout. Where:

- "✓" means the feature is available and supported by the tool
- "⚠" means the feature is partially supported or available via integration, plugin, or external API
- "×" means the feature is not supported or not applicable to the tool's core functionality

Table 12: Comparison of Different Tools with their Features

Features	xMap Tool	CARTO Tool	ArcGIS Tool	SuperMap Tool
Real-time Traffic Data	×	✓	✓	✓
POI Data	✓	⚠	✓	✓
Geospatial Analysis	⚠	⚠	✓	✓
Heatmaps (e.g., demand, usage)	✓	✓	✓	✓
Demographic/Land Use Overlays	✓	✓	✓	✓
Route Optimisation	×	⚠	✓	✓
3D Data Visualisation	✓	✓	✓	✓
Terrain Analysis	×	×	✓	⚠
Mobile & Web Integration	×	✓	✓	✓

Features	xMap Tool	CARTO Tool	ArcGIS Tool	SuperMap Tool
Open Data Integration	⚠	⚠	✓	✓
High-resolution Satellite Imagery	✓	✓	✓	✓
Sensor/IoT Data Integration	⚠	⚠	✓	✓
AI/ML Integration (e.g., predictions)	×	×	✓	⚠
Historical/Temporal Analysis	×	×	✓	✓
Cloud Deployment / SaaS	✓	✓	✓	✓
Multi-user Collaboration	⚠	✓	✓	✓
Custom Dashboard Creation	⚠	✓	✓	✓
API/SDK Availability	⚠	✓	✓	✓

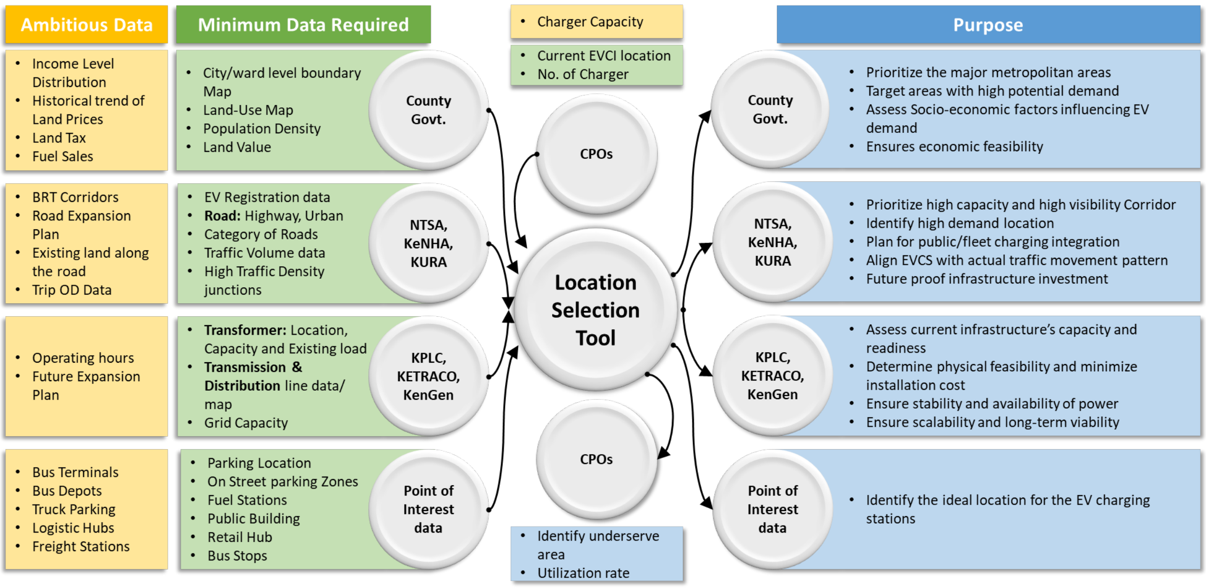
Source: pManifold Analysis

Recommendations for Adoption

ArcGIS by Esri stands out as the best overall choice for EVCS planning due to its comprehensive suite of GIS tools that support end-to-end infrastructure analysis, from site selection to deployment monitoring. It enables advanced spatial and suitability analysis by integrating layers such as population density, road networks, land use, and utility access, while also offering support for EV-specific data like vehicle density and charging demand. Its powerful 3D and terrain visualisation, real-time and historical data integration and network analysis tools allow stakeholders to make highly informed decisions. ArcGIS also supports scalable enterprise deployment, secure data management and interactive dashboards for stakeholder engagement. While the cost and complexity of the platform may pose challenges for smaller organisations, but much more feasible for the county or country level analysis, its comprehensive geospatial capabilities, seamless smart city integration and advanced tools for public infrastructure planning position it as the most robust and future-ready solution for large-scale EV infrastructure deployment.

Figure 16 presents a Location Selection Tool designed to optimize EVCI placement by integrating minimum data like EV registration data, road classifications, traffic volumes, transformer capacity and parking locations along with the ambitious data such as income levels, land prices, road expansion plans, and operating hours to ensure that station deployment meets diverse objectives including prioritizing high-demand areas, aligning with real traffic patterns, minimising installation costs and enhancing socio-economic and economic feasibility.

Figure 16: Minimum and Ambitious Data Required from the Respective Stakeholders

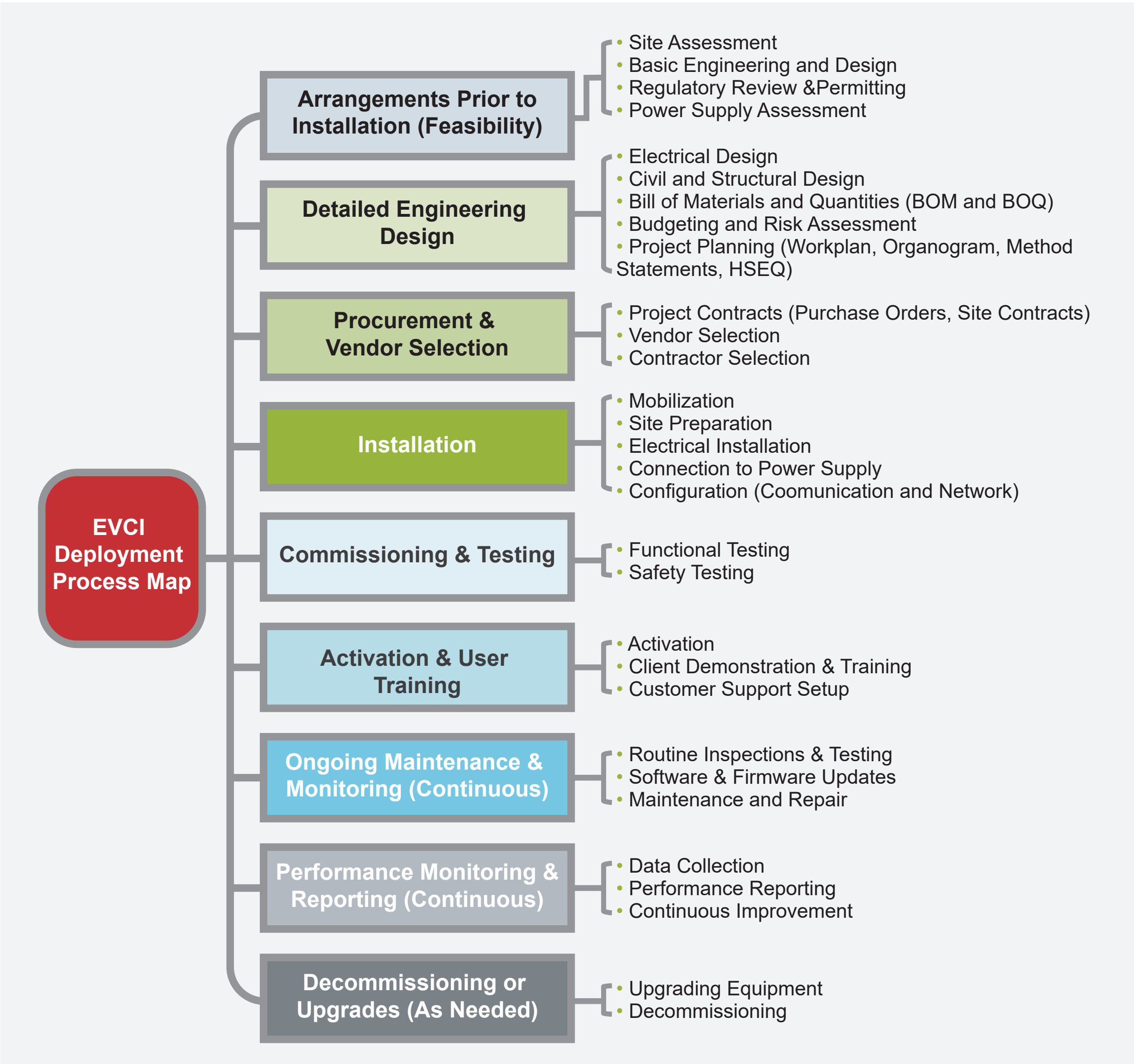


Source: pManifold Analysis

10. EVCI Deployment Process Map

The EVCI Deployment Process Map, as shown in Figure 17 offers a structured, end-to-end framework for planning, installing, and operating EVCI.

Figure 17: EVCI Deployment Process Map



Source: pManifold Analysis

11. Economic and Financial Analysis

The assessment of EV charging infrastructure is structured around key parameter groups to ensure a comprehensive evaluation of costs, revenues and performance. **CAPEX parameters** capture upfront investment requirements, while **OPEX parameters** account for ongoing operational and maintenance costs. On the income side, **revenue parameters** estimate earnings from charging services, and **financial parameters** evaluate overall project viability through metrics such as returns, cash flows, and payback periods. **Sensitivity parameters** test how variations in key assumptions, such as utilisation rates or pricing, affect financial outcomes, highlighting potential risks and uncertainties. **Operational parameters** reflect real-world performance factors that influence daily functionality and utilisation. Together, these elements provide a structured, data-driven framework for evaluating and optimising EVCS investments. The parameters considered for financial assessment are summarised in the Figure 18

Figure 18: Parameters for Financial assessment

CAPEX Parameters

Charger CAPEX
- 7.2 kW: USD 550
- 11 kW: USD 700
- 22 kW: USD 1,700
- 40 kW: USD 6,800
- 60 kW: USD 10,000
- 120 kW: USD 25,000
- 250 kW: USD 42,500

Installation and Commissioning Cost
- 10% of the total charger cost and grid infrastructure cost

Grid Upgradation Cost
- >500 kVA: USD 100/kVA
- <500 kVA: USD 50/kVA

OPEX Parameters

Land Rent/Lease
- USD 130 per Parking Space per Month

Manpower Cost
- USD 43.75 per Charger

Annual CPMS Licensing Fees
- USD 4,000 for "n" No. of Chargers

Annual CPMS Charge Point Fees
- USD 100 per Charger for 0 to 100 Chargers
- USD 80 per Charger for 100 to 200 Chargers
- USD 60 per Charger for above 200 Chargers

Electricity Cost
- **Peak Hours:** USD 0.17 per kWh
- **Off-Peak Hours:** USD 0.10 per kWh

Internet Cost
- USD 3.8 per PCS

Annual Maintenance Cost
- 2% to 5% of Charger's Capital Cost

Personnel Cost
- USD 43 per Charger per Month

Insurance
- 1% of total Project Cost

Corporate Tax
- 30%

Revenue

Charging Tariff
- USD 0.40 per kWh

Sensitivity Parameters

Utilization Rate
- Current: 5%
- After 10 years:
  - Base Scenario: 15%
  - Ambitious Scenario: 30%

Electricity Escalation Rate
- 1% annual

AMC Escalation Rate
- 3.8% annual

Financial parameters

Commercial Loan Tenure
- 7 Years

Blended Finance Loan Tenure
- 10 Years

Interest Rate:
- Commercial Finance: 15% per annum
- Blended Finance: 10.75% per annum

Debt to Equity Ratio
- Equity: 30%; Debt: 70%

Operational parameters

Operational Days
- Month: 30; Year: 360

Peak & Off-Peak Charging Demand
- **Peak Hours:** 30%
- **Off-Peak Hours:** 70%

Charger Efficiency
- 95%

Source: pManifold Analysis

The financial model© for EVCS assesses the feasibility of deploying chargers across various locations in Kenya. Based on stakeholder consultations and projections for 2030, 2035, 2040, and 2050, the study identifies opportunities to strategically install chargers at different locations which incorporate varying charger types, capacities and number of chargers to match charging demand patterns, grid availability and land suitability. Figure 19 shows the typical charger deployment by location to serve as the basis to estimate CAPEX, OPEX and long-term financial viability for each deployment scenario. This approach ensures that investment planning aligns with Kenya's e-Mobility growth targets while addressing location-specific demand patterns and infrastructure needs.

Figure 19: Typical Deployment Scenarios for EVCI

	Fuel Service Station	Commercial Hub	Public Fleet Operator (Para Transit)	Bus Fleet Operator	Captive Fleet Operator (Taxi)	Small Hub / Rural EVCI	Large Hub	Battery Swap Station
	DC Chargers							Fast Chargers
Charger rating	120 kW	120 kW	120 kW	250 kW	120 kW	120 kW	120 kW	3 kW
No. of Guns	2	2	2	2	2	2	2	-
No. of Chargers	4	2	10	10	2	5	5	9
	AC Chargers							Slow Chargers
Charger rating	-	22 kW	-	-	7 kW	-	22 kW	0.8 kW
No. of Guns	-	1	-	-	1	-	1	-
No. of Chargers	-	10	-	-	10	-	5	15

Source: Stakeholder Consultations

The study actively evaluated the economic and financial feasibility of deploying EVCI in Kenya by developing a data-driven financial model tailored to real-world scenarios. The financial assessment covered seven deployment scenarios. Each scenario detailed the capital layout, projected energy output, recurring costs and expected revenues along with the payback period, NPVs and IRRs for the project duration of ten years, as shown in Table 27

Table 13: EVCS Configuration and Projected Costs, Revenue, Payback Period, NPV and IRR

			Urban Level Stations					Highway PCS	
Parameter			Fuel Service Station	Commercial hub	Public Fleet Operation (Para Transit)	Bus fleet Operator	Captive Fleet Operator (taxi)	Small Hubs	Large Hubs
Charging Station Configuration									
DC Chargers									
Rating			120 kW	120 kW	120 kW	250 kW	120 kW	120 kW	120 kW
No. of Guns			2	2	2	2	2	2	2
No. of Chargers			4	2	10	10	2	5	5
AC Charger									
Rating			-	22 kW	-	-	7	-	22 kW
No. of Guns			-	1	-	-	1	-	1
No. of Chargers			-	10	-	-	10	-	5
Total Connected Load			590 kVA	570 kVA	1,470 kVA	3,060 kVA	380 kVA	740 kVA	870 kVA
Financial Study									
Overall CAPEX (USD)			201,135	156,860	502,205	924,715	118,278	251,735	278,933
Equity (USD)			60,340	47,058	150,661	227,415	35,483	75,520	83,680
Debt (USD)			140,795	109,802	351,544	647,300	82,795	176,215	195,253
Charging Demand (kWh)	1st Year	5% Utilisation	207,360	198,720	518,400	1,080,000	133,920	259,200	306,720
	10th Year	15% Utilisation	,080	596,160	1,555,200	3,240,000	401,760	777,600	920,160
		30% Utilisation	1,244,160	1,192,320	3,110,400	6,480,000	803,520	1,555,200	1,840,320
Electricity Consumption (kWh)	1st Year	5% Utilisation	218,274	209,179	545,684	1,136,842	140,968	272,842	322,863
	10th Year	15% Utilisation	654,821	627,537	1,637,053	3,410,526	422,905	818,526	968,589

Parameter			Urban Level Stations: Fuel Service Station	Urban Level Stations: Commercial hub	Urban Level Stations: Public Fleet Operation (Para Transit)	Urban Level Stations: Bus fleet Operator	Urban Level Stations: Captive Fleet Operator (taxi)	Highway PCS: Small Hubs	Highway PCS: Large Hubs
		30% Utilisation	1,309,642	1,255,074	3,274,105	6,821,053	845,811	1,637,053	1,937,179
OPEX (USD)	1st Year	5% Utilisation	49,749	69,753	124,288	204,140	60,826	62,184	84,585
	10th Year	15% Utilisation	114,778	141,240	286,830	522,145	114,386	143,465	185,347
		30% Utilisation	197,091	220,123	492,613	350,860	167,547	246,357	307,102
Revenue (USD)	1st Year	5% Utilisation	72,576	69,552	181,440	378,000	46,872	90,720	107,352
	10th Year	15% Utilisation	256,411	242,464	640,970	1,324,304	164,542	320,542	377,585
		30% Utilisation	494,537	470,668	1,236,285	2,564,543	318,332	618,200	729,813
Payback (Years)	Commercial Finance	15% Utilisation	4.9	6.66	4.98	3.98	10+	4.99	5.38
		30% Utilisation	3.89	4.38	3.81	3.23	5.76	3.82	3.98
	Blended Finance	15% Utilisation	4.9	6.61	4.96	3.98	10+	4.98	5.36
		30% Utilisation	3.82	4.38	3.82	3.23	5.74	3.82	3.99
Project IRR (%)	Commercial Finance	15% Utilisation	20.2	12.6	20.3	27.5	-0.9	20.2	18.2
		30% Utilisation	33.5	30.0	33.5	40.3	20.2	33.4	32.5
	Blended Finance	15% Utilisation	20.5	12.9	20.5	27.7	-0.5	20.4	18.4
		30% Utilisation	33.6	30.1	33.6	40.4	20.4	33.5	32.7

Source: pManifold Analysis

The study established that with strategic planning, stakeholder collaboration and tailored financial structure, Kenya can build a commercially viable and resilient EV charging ecosystem that supports its e-Mobility and climate ambitions.

12. Risk Analysis

Kenya's rapid EVCI expansion, driven by national climate goals, county initiatives, and private sector investment, is creating high demand for EVCS across urban areas. However, this growth brings property and liability risks, particularly from EVSE and BSS using lithium-ion batteries, which pose fire and safety hazards if damaged, aged, or misused.

Risk identification involves systematically recognising potential threats and challenges that could affect the successful implementation, operation, and long-term sustainability of EVCI. This process helps decision-makers pre-emptively address vulnerabilities, particularly in evolving markets like Kenya, where technological adoption, regulatory maturity, and public awareness are still developing.

Early identification of risks enables proactive planning, targeted mitigation strategies, and informed investment decisions. It also facilitates stakeholder confidence, especially when systems involve high-voltage equipment, battery, and grid-dependent assets in both urban and rural contexts. These risks are spread across various aspects, which include but are not limited to:

- Technical and Technology Risks
- Location and Site Risks
- Commercial and Market Risks
- Policy and Regulatory Risks
- Operational and Maintenance Risks
- Safety, Environmental, and Social Risks

The risks are identified for the above categories along with their mitigation strategies, which are covered in the detailed version.

13. EVCI Business Models

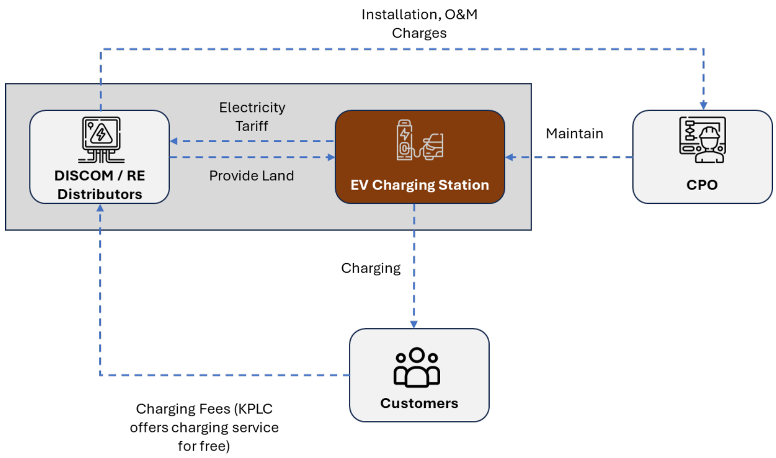
The EVCI deployment strategy presents an integrated deployment proposal and strategy for EVCI in Kenya, combining viable business models to support scalable and sustainable infrastructure rollout. The deployment strategy concludes with a phased action plan and institutional roles to ensure coordinated, resilient, and inclusive EVCI development aligned with Kenya's e-Mobility and climate goals.

Existing EVCI Business Models in Kenya

This section explores the range of business models suitable for deploying EVCI in Kenya, reflecting both current market practices and innovative approaches tailored to local needs.

- Utility-Led Model (KPLC-Centric)

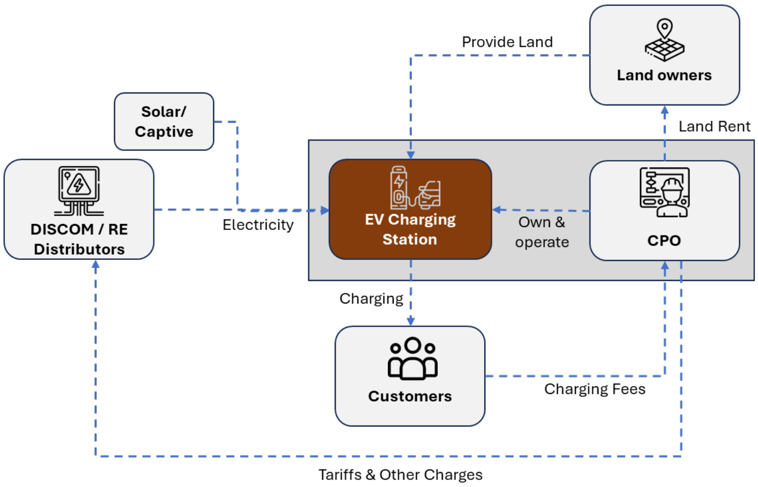
Figure 20: Utility-led Business Model



Source: Stakeholder Consultations

- Private Charge Point Operator (CPO) Model

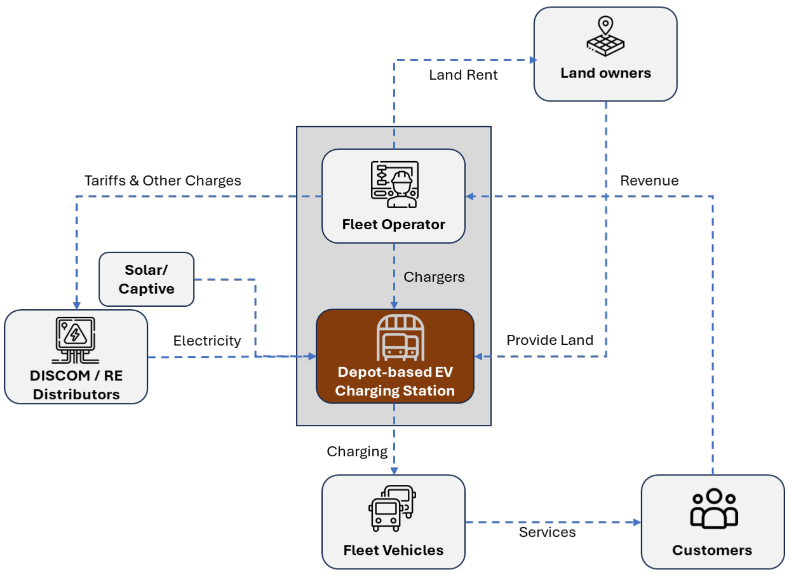
Figure 21: Private CPO Business Model



Source: pManifold Analysis

- Fleet-Integrated or Depot Charging Model

Figure 22: Fleet-Integrated Business Model



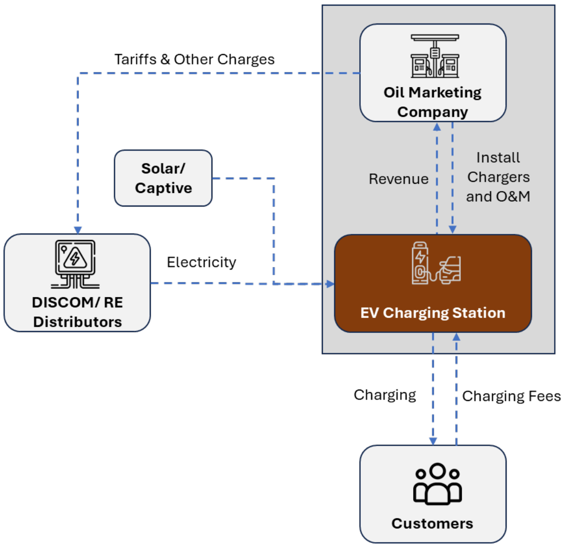
Source: pManifold Analysis

- Oil Marketing Company (OMC) Models

OMCs in Kenya are leveraging their existing fuel retail network to enter the EV charging space. Two sub-models are emerging:

- Self-Owned and Operated: The OMC installs and operates EV chargers independently, managing branding, customer interaction, and pricing as shown in Figure 23.

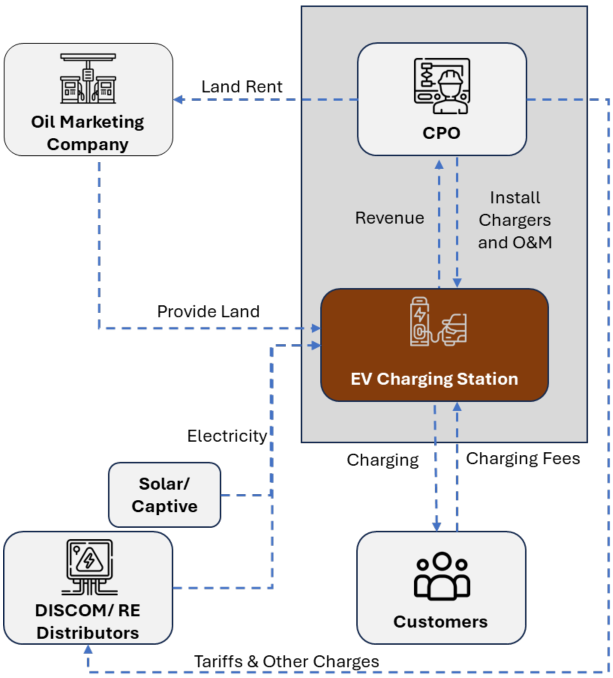
Figure 23: OMC – Self Owned Business Model



Source: pManifold Analysis

- Partnership with CPOs: The OMC provides land and utilities, while the CPO brings in EVSE, software, and operational expertise, as shown in Figure 24. Revenues are shared based on pre-agreed terms.

Figure 24: OMC – Partnership with CPO Business Model

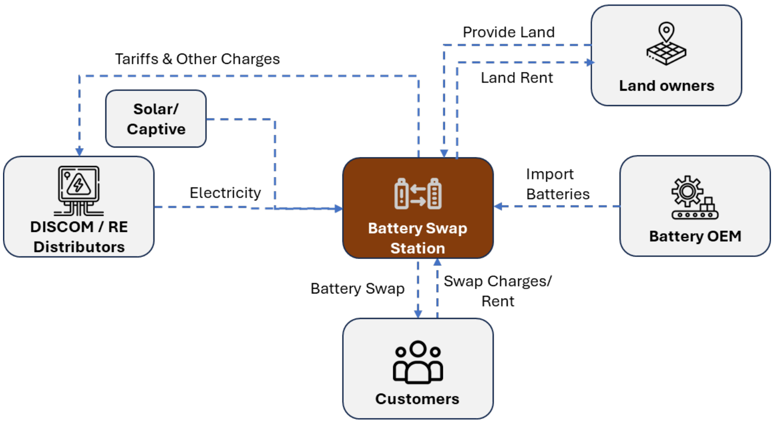


Source: pManifold Analysis

- Battery Swapping or BaaS Model

Battery swapping is emerging as a viable solution, mainly for e-2W, particularly targeting boda-boda riders and last-mile delivery agents. In this model as shown in Figure 25, the battery is decoupled from vehicle ownership, reducing the upfront EV purchase cost. Swap stations are installed at petrol stations, retail shops, or dedicated hubs.

Figure 25: Battery Swap Model



Source: pManifold Analysis

Challenges in Existing EVCI Business Models in Kenya

Despite the emergence of various business models, ranging from utility-led deployments and private CPOs to fleet-based charging hubs and battery swapping, the development of Kenya's EVCI continues to face some structural hurdles. Each model, while tailored to specific market segments, encounters unique challenges across economic viability, technology integration, regulatory clarity, and operational feasibility. Table 14 outlines a comprehensive comparison of the key barriers associated with each business model currently deployed in the Kenyan market.

Table 14: Challenges in Existing EVCI Business Models in Kenya

Business Model	Economic Challenges	Technological Challenges	Policy & Regulatory Challenges	Market / Operational Challenges
Utility-Led Model (KPLC)	Limited capital availability due to competing grid priorities Lack of cost recovery	Limited deployment of smart meters and demand forecasting Grid strain from clustered EV load on weak feeders	Lack of regulatory framework	Lack of planning integration & coordination with transport & urban authorities
Private CPO Model	High upfront CAPEX Difficulty accessing long-term, affordable finance Revenue uncertainty	Need to deploy multi-standard chargers (Type 2, CCS2, CHAdeMO, GB/T) Limited smart energy/load management integration	Lengthy permitting from counties; unclear zoning laws	Difficulty accessing prime land due to speculation or high rents Shortage of skilled technicians Low station utilisation in low-density EV zones

Business Model	Economic Challenges	Technological Challenges	Policy & Regulatory Challenges	Market / Operational Challenges
Fleet-Integrated / Depot Model	High cost of acquiring EV fleets and charging infrastructure Lack of bankable project models	High simultaneous charging load causes transformer overloading Lack of managed charging & BESS to manage load or avoid peak tariffs	No fiscal incentives for private depot infrastructure Absence of grid upgrade support mechanisms	Downtime due to a lack of trained drivers, parts, and service Limited expansion beyond fleet boundaries
OMC Model	Uncertain ROI due to slow EV uptake vs. land cost Electricity pricing may be less competitive vs. fuel margins	Need for grid upgrades to support fast charging	Overlap of safety, fuel, and EV codes; lack of unified EV fuel station guidelines No regulatory clarity on co-located energy use (fuel + EV)	Need for staff retraining Congestion risk at high-traffic stations during peak hours
Battery Swap / BaaS Model	High capital tied in battery inventory Low utilisation leads to slow ROI Battery leasing business model still evolving	No battery/ connector standardisation among manufacturers Safety concerns: overheating, short circuits, fire risks in high-density battery storage Battery degradation tracking challenges	Absence of policies on battery ownership, safety, storage, second-life use, and recycling No financial incentive to manufacture or assemble locally	Risk of battery theft or vandalism Uncertainty on residual battery value Dependency on a reliable supply chain for battery availability

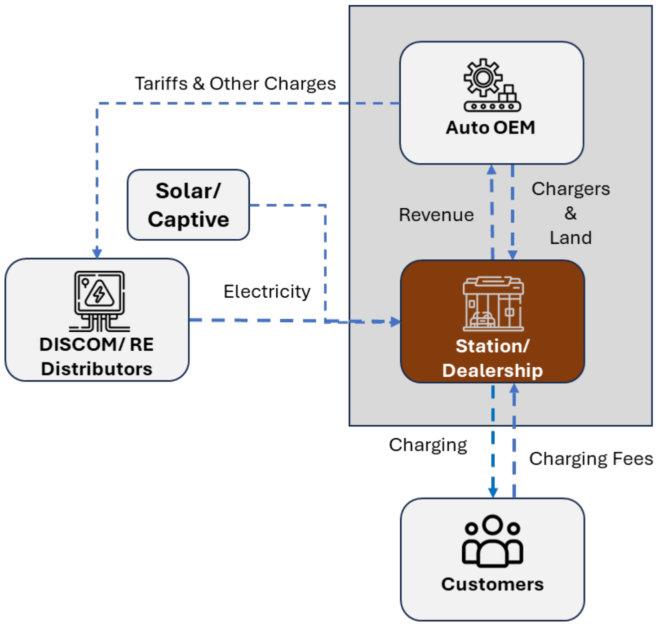
Source: pManifold Analysis

Proposed Business Models for EVCI Deployment in Kenya

To accelerate Kenya's transition toward e-Mobility, it is essential to diversify and refine business models for deploying EVCI. The following business models outline these proposed pathways in detail, highlighting their relevance and potential role in closing Kenya's infrastructure gaps.

Auto OEM-Led Business Model

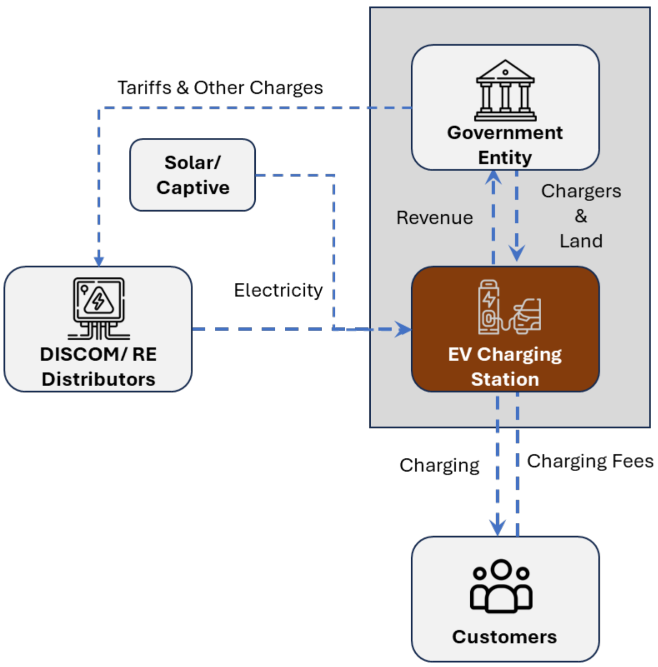
Figure 26: Auto OEM Business Model



Source: pManiford Analysis

- **Government-Led EVCI Model**

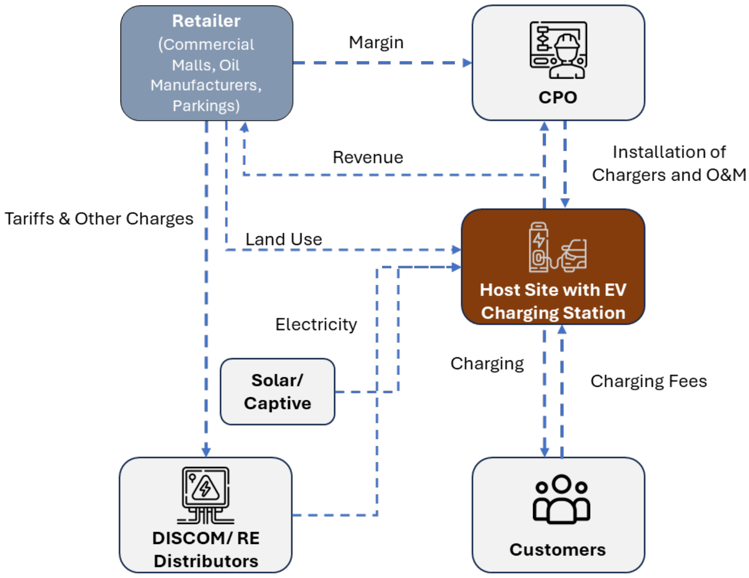
Figure 27: Government Led Business Model



Source: pManifold Analysis

- **Retail Host Model**

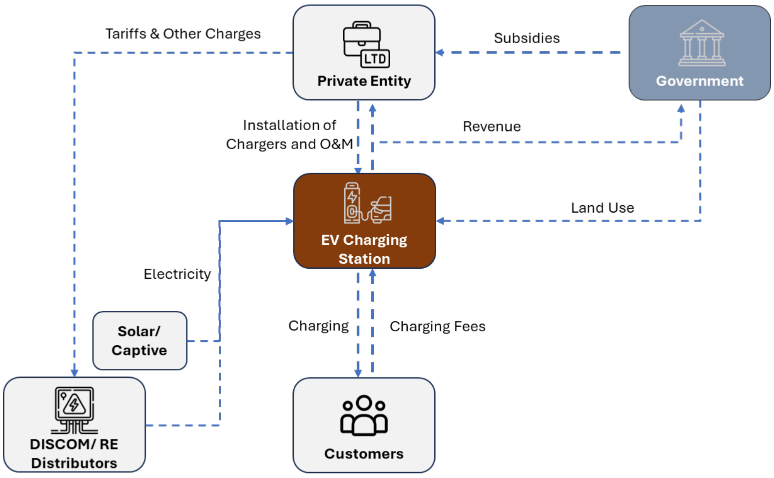
Figure 28: Retail Host Business Model



Source: pManifold Analysis

- **Public-Private Partnership (PPP) Model**

Figure 29: PPP Business Model



Source: pManifold Analysis

Table 15 provides a comparative summary of proposed EVCI business models, assessing their applicability to different vehicle segments and deployment locations.

Table 15: Summary of Proposed Business Models and Relevance in Kenya

Business Model	Vehicle Segments	Key Locations	Relevance to Kenya
Auto OEM-Led Model	Passenger EVs, Premium EVs	Dealerships, urban centres, and highways	Emerging relevance; could grow through the auto OEMs' expansion. Helps build brand loyalty and complements private sales.
Government-Led Model	All vehicle segments	Public offices, parks, rural areas, county facilities	Highly relevant; supports equity and public access. County-level land and policy tools can be leveraged.
Retail Host Model	Passenger EVs	Malls, petrol stations, mixed-use complexes	Strong fit for urban Kenya. Can accelerate awareness and usage in middle-class zones. Retailers benefit from increased dwell time.
PPP	All segments	National highways, urban, rural, and bus stops	Very relevant. Enables scale, risk-sharing, and network consistency.

Source: pManifold Analysis

Recommended EVCI Business Model

Among the various business models analysed, the PPP model emerges as the most practical, scalable, and impactful approach for accelerating the deployment of EVCI in Kenya. This model offers a strategic mix of public sector involvement, such as land access, regulatory support, and long-term policy stability, with private sector expertise in infrastructure development, innovation, and customer service delivery. The PPP model directly addresses the barriers by distributing financial and operational risks between stakeholders. This model also aligns with Kenya's decentralised governance structure, where county governments control land use and transport planning, while national agencies such as the MoEP and EPRA regulate tariffs and grid access. A well-structured PPP can integrate both levels to support seamless EVCI development. Key Benefits of the PPP Model for Kenya are:

- Access to public land at minimal cost to reduce upfront investment burdens
- Targeted fiscal incentives (e.g., duty exemptions, concessional loans) to enhance private sector participation
- Shared responsibility in achieving climate and transport policy targets
- Scalability across counties, highways, and city clusters using a standardised model adaptable to local contexts

The PPP model not only enables efficient infrastructure deployment but also ensures long-term viability by tying EVCI expansion to broader development goals, such as job creation, rural connectivity, and clean energy integration. It is recommended that Kenya's national e-Mobility strategy adopt the PPP model as the central implementation pathway for public charging infrastructure.

Implementation of the PPP Business Model

EVCI in Kenya is a capital-intensive sector that intersects with urban planning, utility access, and environmental policy. A PPP model[32] offers a strategic path to bridge infrastructure gaps by combining public oversight with private sector capital, innovation, and operational efficiency.

32 World Bank EVCI PPP Model

Key Objectives:

- Accelerate EVCI Rollout: Build a national, accessible, and reliable charging network
- Minimise Public Expenditure: Attract private sector funding and share risks efficiently
- Foster Innovation & Service Quality: Promote competition, technical innovation, and high standards
- Promote Equitable Access: Ensure urban and highway coverage, including underserved areas
- Enable RE Integration: Support smart charging, grid-responsive operations, and energy transition

Kenya's deployment strategy recognises five core PPP models, each with distinct advantages. The key parameter of each model is outlined in Table 16. Each model plays a complementary role in ensuring Kenya's EVCI is financially viable, technically robust, and equitably distributed.

Table 16: PPP Models for EVCI Deployment

Model	Description	Use Cases	Govt. Role	Private Role
Design-Build-Operate (DBO)	Private sector designs, installs, and operates the stations; government funds CAPEX	City transit hubs, municipal car parks	CAPEX	Technical & O&M
Concession Agreement–Design, Build, Finance, Operate, and Transfer (DBFOT)	Private partner designs, finances, builds, operates, and transfers the infrastructure	Intercity highways, commercial corridors	Land, Permits & Regulatory	CAPEX, Build, O&M
Lease-Develop-Operate (LDO)	Public leases land to a private operator for development and operations	Parking lots, malls, bus terminals	Land & Oversight	CAPEX, Build, O&M
Hybrid Annuity Model (HAM)	The government pays part of the CAPEX; the private sector recovers balance through annuity and incentives	Low-demand urban and rural areas	Partial CAPEX	Build, O&M
Joint Venture (JV)	Shared ownership and governance between public authorities and private firms	County-level and DISCOM-led rollouts	Risk shared based on equity	

Source: pManifold Analysis

14. EVCI Deployment Strategy

The success of Kenya's EVCI rollout hinges on a multidimensional strategy. The development of a robust and scalable EVCI ecosystem in Kenya will depend on progress across a set of interconnected thematic areas. These include policy frameworks, institutional governance, charging deployment, technical standards, grid integration, financing, land planning, skills and awareness, and data systems. Each area represents a critical enabler, addressing current gaps while unlocking Kenya's e-Mobility potential. Table 17 outlines the key development areas of EVCI deployment and its significance in the country.

Table 17: Key Development Areas of EVCI Deployment in Kenya

Development Area	Significance
National Policy & Regulatory Framework	Kenya has taken early steps (e.g., draft EV policy), but a consolidated national strategy is needed for coherent EVCI scale-up
Institutional Governance & Coordination	Streamlining mandates across MoEP, KPLC, EPRA, counties and other key stakeholders to avoid delays and overlaps
Charging Infrastructure Rollout	Urban hubs like Nairobi and Mombasa face space and traffic pressures, and inter-city corridors need fast chargers
Grid Integration & Power Planning	Kenya's grid is green (90% RE) but suffers from local grid constraints. Distribution readiness and smart load management are critical
Technical Standards & Interoperability	KEBS, EPRA has set base standards, enforcing connector, protocol, and safety uniformity is key to a stable market
Business Models & Financing	Public & private participation is essential; clarity on PPPs, fiscal tools, and risk-sharing mechanisms must be developed
Land Use & Permitting	Complex land rights, lengthy approvals, and fragmented urban planning impede rollout speed
Awareness, Skills & Workforce	Low EV literacy and a lack of trained technicians hinder demand and safe charger installation
Monitoring, Evaluation & Data Systems	No centralised EVCI database exists; policy cannot evolve without real-time feedback and utilisation data

Source: pManifold Analysis

Thus, each area is critical to building a reliable, inclusive, and scalable charging ecosystem. These areas represent the full ecosystem needed to support widespread and equitable EV adoption. The enabling strategies under each area are designed for phased implementation, categorised into short-term (2025–2027), medium-term (2027–2032), and long-term (2032–2040) duration to reflect readiness levels, evolving technology, and market maturity. A comprehensive and time-bound approach ensures that Kenya not only builds the physical infrastructure for EVs but also establishes the regulatory, financial, and institutional foundations to sustain and scale it efficiently. The following sections present the targeted strategies under each development area to guide the phase rollout plan of EVCI in the country.

15. Recommendations

Kenya's transition to e-Mobility has reached a pivotal stage where timely, coordinated, and large-scale deployment of EVCI will determine the pace, inclusivity and long-term sustainability of the entire EV ecosystem. As EV adoption accelerates in response to rising fuel costs, supportive policy signals and increasing demand for clean and efficient transport solutions, charging infrastructure must expand in parallel to prevent supply demand mismatches, grid stress and unequal access across regions and user groups. The analyses undertaken across policy, grid integration, technical standards, financial viability and institutional readiness demonstrate that isolated or incremental interventions will be insufficient; instead, Kenya requires a comprehensive and integrated approach that aligns regulatory frameworks, infrastructure planning, financing mechanisms, technology choices and stakeholder coordination under a unified national strategy. Establishing such a structured and system-based foundation will enable the country to deploy a reliable, interoperable, and future-ready charging network that supports widespread EV adoption while safeguarding grid stability, economic viability, and climate objectives.

The comprehensive technical, financial, regulatory and institutional analyses, it is recommended that the Government of Kenya adopt an integrated and phased approach to the deployment of EVCI to ensure that infrastructure readiness advances in parallel with the anticipated growth in EV adoption. A coordinated national strategy anchored in policy certainty, standardised technical specifications, grid preparedness, sustainable financing mechanisms and institutional alignment will enable streamlined and coherent development, promote equitable access across regions and user groups and strengthen long-term system reliability and economic viability.

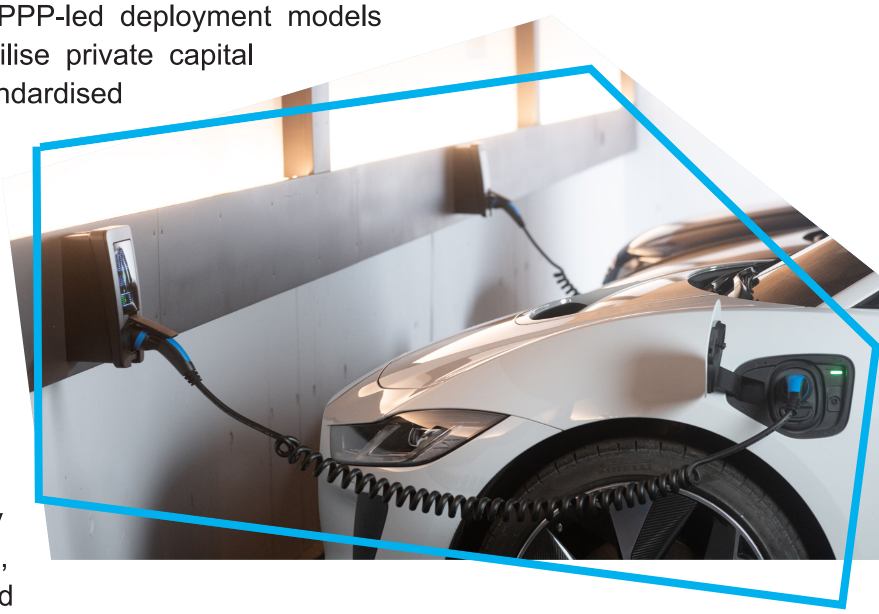
The Government of Kenya has come up with the National e-Mobility Policy. The policy framework and working group clearly define the roles, responsibilities, timelines and performance indicators and harmonise permitting, safety and licensing requirements across relevant regulatory institutions, including the EPRA, the KEBS and the NEMA. At the same time, county governments should be empowered through targeted technical assistance and fiscal support to enable decentralised and context-responsive charger deployment.

Infrastructure rollout should follow a structured, data-driven and spatially optimised approach. At least one DC fast-charging station should be installed every 50 km to support long-distance travel along intercity corridors, complemented by dense public charging networks in urban centres, transport hubs, logistics clusters and public fleet depots. GIS-based planning tools should guide site selection, incorporating traffic volumes, grid capacity, land availability and service gaps to ensure equitable access and efficient utilisation. With Kenya's significant penetration of e-2Ws and paratransit vehicles, dedicated BSS and fleet-based charging hubs should be prioritised to minimise downtime and improve operational economics for commercial operators. All deployments should comply with environmental and social safeguards, including full ESIA procedures, flood-resilient design, accessibility standards for persons with disabilities and inclusive payment systems such as mobile money and contactless options.

Power system readiness must be addressed proactively to ensure reliable and cost-effective integration of EV demand. Under high EV adoption scenarios, charging loads are projected to add more than 5,700 MW of peak demand and over 33,000 GWh annually by 2050, necessitating coordinated investments in generation, transmission and distribution infrastructure. Utilities, including the KPLC, should incorporate EV demand scenarios into expansion planning, pre-allocate transformer capacity along priority corridors and implement expedited connection procedures. ToU tariffs, smart charging systems and demand-side management measures should shift charging to off-peak periods to mitigate grid stress. In areas with constrained networks, hybrid systems integrating solar PV generation and BESS should be deployed to enhance resilience and reduce reliance on grid reinforcement. Pilot initiatives for V2G, V2H and V2L applications should be introduced to enable EVs to function as distributed energy resources and contribute to grid stability.

National technical and communication standards should be adopted and enforced to ensure interoperability, consumer confidence and long-term scalability. Standardisation of Type 2 connectors for AC charging and CCS 2 for DC fast charging is recommended as the primary configuration, with continued support for legacy connectors such as CHAdeMO and Type 1 and phased consideration of GB/T standards where market demand justifies. A national cybersecurity framework aligned with ISO/IEC 27001 should be implemented, supported by periodic audits and real-time threat monitoring. Furthermore, a centralised and interoperable data platform should aggregate real-time information on charger status, utilisation, pricing and uptime, enabling evidence-based planning, performance monitoring, and enhanced transparency.

Financing structures should prioritise PPP-led deployment models supported by blended finance to mobilise private capital while mitigating early-stage risks. Standardised concession agreements, transparent risk-sharing mechanisms and long-term contract tenures will enhance project bankability and attract both domestic and international investors. As network utilisation increases and financial viability strengthens, public subsidies should be gradually phased out in favour of market-based tariffs and sustainable private sector financing. Complementary models, including utility-led charging, retail host arrangements, OEM-led networks, BaaS and CaaS should be enabled to diversify delivery mechanisms.



Simultaneously, local value creation and human capital development should be embedded within the deployment strategy. Incentives for domestic manufacturing and assembly of chargers, batteries and related components, supported by industrial clusters and technology transfer arrangements, can reduce import dependence and generate employment. Partnerships between industry, academia and international technology providers should strengthen research and innovation capacity. Structured training programs integrated within technical and vocational institutions should build a skilled workforce of technicians, installers and operators to ensure safe and sustainable operations.

Finally, sustained public engagement and adaptive governance will be essential to foster consumer uptake and maintain system performance. A national EVCI information portal and mobile application should provide real-time data on station locations, tariffs and availability. Public awareness campaigns, demonstration projects and progressive electrification of public sector fleets should lead by example and accelerate market confidence. A comprehensive monitoring and risk management framework, including a live risk register, periodic reviews and public performance reporting, should enable continuous improvement and resilience against operational, financial and cybersecurity risks.

Therefore, it is recommended that implementation proceed through a phased roadmap. Short-term (0–2 years) focused on policy finalisation, institutional establishment and pilot corridor deployment, medium-term (2–5 years) on scaling infrastructure across highways, secondary cities and fleet hubs through PPP and blended finance models and long-term (5+ years) on nationwide coverage, network optimisation, and advanced smart-grid integration. By adopting this structured and coordinated approach and leveraging Kenya's 85% RE mix, the country can establish a reliable, interoperable and financially sustainable charging ecosystem that reduces emissions, strengthens energy security, stimulates investment and positions Kenya as a regional leader in e-Mobility.

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