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EMPOWERING E-MOBILITY IN THE GLOBAL SOUTH **The Case of Two Cities - Cuenca and Nairobi**



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ABBREVIATIONS

BAU	Business as Usual
BMZ	German Ministry for Economic Cooperation and Development
BRT	Bus Rapid Transit
BYD	Build Your Dreams
CBD	Central Business District
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GRA	Global Roadmap of Action towards Sustainable Mobility
KfW	German Development Bank
MRTS	Mass Rapid Transit System
NaMATA	The Nairobi Metropolitan Area Transport Authority
NDC	Nationally Determined Contribution
NMA	Nairobi Metropolitan Area
NMT	Non-Motorized Transport System
PMEP	Mobility and Public Spaces Plan
SuM4All	Sustainable Mobility for All
SUMP	Sustainable Urban Mobility Plan
TCO	Total Cost of Ownership
TUMI	Transformative Urban Mobility Initiative
UITP	International Association of Public Transport
UNFCC	United Nations Framework Convention on Climate Change

FOREWORD

Since its inception in 2017, the Sustainable Mobility for All (SuM4All) Partnership has been advocating for sustainable mobility in international forums, with transport decarbonization being one of the four goals for transport systems to achieve globally. The Partnership's 56 Member organizations were instrumental in framing the policy knowledge around decarbonization, universal access, efficiency, and safety that would support cities and countries on the path to achieving these goals. In recognition of the Partnership's achievements, the [United Nations Climate Change Conference \(UNFCCC\)](#) in 2021 acknowledged the Partnership as a champion of transport decarbonization in climate change action around the world.

The 27th United Nations Climate Change Conference (COP27) will take place in Egypt between November 6 and 18, 2022. COP27 is expected to advance action on several fronts—adaptation, the just transition toward decarbonization, and climate finance. Early in 2022, the Partnership engaged with country decision makers at a roundtable discussion to identify the most pressing demands for action on transport to bring forward at COP27. Appropriate e-mobility choices, international cooperation, investing in public transport, and the business of exporting used vehicles to the Global South, were the issues that took center stage. The Partnership mobilized itself into working groups to delve deep into these issues, develop a clear policy agenda for action at COP27, and influence policy debates on these matters.

We are pleased to release five important contributions to COP27 in the “GRA in Action Series.” They include: (i) E-mobility in Low-Income Countries in Africa: Finance, Governance, and Equity; (ii) Decision-Making Tool for E-Mobility Investments; (iii) Electromobility and Renewable Electricity: Developing Infrastructure for Synergies; (iv) Empowering E-mobility in the Global South: The Case of Two Cities—Cuenca and Nairobi; and (v) How to Unlock Public Transport for Climate and Sustainable Development: Six Areas for Action. The products are the outcome of a year of engagement with Member organizations, countries' decision makers, partners, and field experts.

The “GRA in Action Series” aims at generating a better understanding of transport decarbonization, collecting global experiences, and deep diving into the associated policy measures in the Global Roadmap of Action (GRA) to make them more pragmatic for countries' decision makers.

We thank the Transformative Urban Mobility Initiative (TUMI) and the International Association of Public Transport (UITP) for leading the preparation of piloting the policy recommendations contained in “Sustainable Electric Mobility – Building Blocks and Policy Recommendations” in the cities of Cuenca, Ecuador, and Nairobi, Kenya. This paper reflects on the challenges faced and lessons learned in the process of establishing roadmaps of action toward sustainable e-mobility.

Sustainable Mobility for All Steering Committee

(On behalf of our 56 Member organizations)

November 2022, Washington, D.C.

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Part I: TRANSPORT DECARBONIZATION IN CUENCA, ECUADOR

CUENCA, A CITY ON THE MOVE

Cuenca is a medium-sized city in Ecuador with a population of approximately 500,000 inhabitants. The city is third in size in the country and is known for its cultural and touristic wealth. Its mobility planning has developed around the private car. As a result, it is the city with the highest rate of vehicles per capita in the country.¹ Cuenca's vehicle fleet majorly runs on fossil fuels, representing 85 percent of the total greenhouse gas (GHG) emissions generated by the city.

However, Cuenca is making serious efforts to reverse its transport record in the region and promote sustainable urban planning. Some of the actions implemented are: (i) the Mobility and Public Spaces Plan (PMEP) as a guiding mobility policy; and (ii) improving public transport service through a tramway system. Furthermore, the city is in the planning stage of other projects, such as "Complete Streets", expansion of bikeways and bike sharing system, and implementation of e-buses.

The city's efforts have resulted in international organizations, such as development banks and cooperation agencies to consider Cuenca a perfect pilot city to implement mobility decarbonization projects.

This case study describes the process of building Cuenca's Electromobility Plan and its expected impacts.

PREVAILING STATE OF ELECTRIC MOBILITY IN CUENCA

The city of Cuenca is a pilot city under the Transformative Urban Mobility Initiative (TUMI). It has been developing its electric mobility plan since 2021, following an innovative methodology based on tailor-made training and empowering the local ecosystem to participate.

The city already gained successful experiences implementing various e-mobility solutions. Its tramway system is operating since 2020 as a backbone for mobility's decarbonization. On the other hand, the first network of fast chargers is being implemented through a partnership between the local energy provider and academia. The city has also initiated decarbonizing municipal fleets by introducing the first electric vehicles. In addition, Cuenca is on track to implement its first electric bus fleet through a loan from the German Development Bank (KfW).

BUILDING BLOCKS FOR SUSTAINABLE ELECTRIC MOBILITY IN CUENCA

Building on the Roadmap of Action toward Sustainable Mobility (GRA), the SuM4All initiative and its working group for electric mobility identified seven building blocks that enable successful implementation of public policies in the field of electric mobility.² They are grouped into three action fields: vision, policy, and implementation.

PHOTO 1.1. CUENCA'S TRAMWAY.



Source: Municipality of Cuenca, 2021

PHOTO 1.2. ELECTRIC VEHICLE IN CUENCA.



Source: Empresa de Movilidad EMOV EP, 2022

CUENCA'S ELECTROMOBILITY PLAN

Cuenca, with the support of TUMI, and through an innovative process and methodology, has developed its own Electromobility Plan. The city capitalized on its new capacities and acquired knowledge, and used the environment of collaboration, participation, and co-creation generated with the project stakeholders. Together with the private sector, academia, and civil society, it formed a city team committed to building the roadmap to decarbonize mobility in Cuenca. Since the start of the plan, actions have been developed within the seven building blocks of the three action fields.

Vision

Building Momentum

Before the plan was introduced, electromobility was a poorly understood topic in Cuenca and consequently, not considered in its planning processes. However, through the support of TUMI, the city team initiated a process of capacity building in the field of electromobility and its social, environmental, and economic benefits for Cuenca. This training process concurrently served to inspire and empower the city team to successfully tackle the next phases of the project.

The 360-degree training process addressed important vertical axes such as electric buses in public transport, fleets of taxi, municipal and private fleets, and charging infrastructure. It included crosscutting issues such as public policy in regulation and incentives, micro-mobility as in electric bikes and electric scooters, and shared electric mobility. As a result of this training and inspiration process, the team defined the vision for Cuenca 2030 in electric mobility.

This vision emerged from a co-creation exercise underpinned by the lessons learned from the conducted training workshops, all the discussion held in that phase and the contributions made by the working group.

Cuenca's Vision 2030 for Electric Mobility

"By 2030 the city of Cuenca is a vibrant and sustainable city that has achieved these characteristics through the adoption of electromobility, with citizens committed to fighting climate change, where electromobility efficiently meets the city's travel needs. Its citizens have access to a wide offer of electric transport, public transport, commercial transport and shared mobility services, which result in better ride-sharing alternatives to the combustion car, which has been possible thanks to the deployment of adequate infrastructure, the creation of regulation and public policies oriented to the promotion of electromobility. All this has been reinforced thanks to the efforts made by the public, private and academic sectors to inform and raise awareness among the population and businesses in Cuenca about the importance of decarbonising urban mobility."

~ Joint vision developed by the city team, 2022

Raising Awareness: Communicating and Informing to Boost Participation

A communication strategy that seeks to educate the population of Cuenca is underway to inform about the need to advance transition to electric mobility and to involve the whole of Cuenca's society in this mission. The strategy is being implemented in three stages.

Stage 1 - Advocacy: The city of Cuenca launches an educative-communicative campaign through digital and traditional media to raise awareness about the benefits of electromobility tailored to the target audience.

Stage 2 - Expectation and awareness: Communication continues to create and strengthen awareness around electromobility, and the work done by the team and the city plan. It also strengthens the perception of work done in a transparent way and for the benefit of the users.

Stage 3 - Conversion: The launch is carried out. At this stage, the residents already know the plan in depth and take actions to support it, recognizing its benefits.

PHOTO 1.3. WORKSHOP DEFINITION OF VISION AND MEASURES IN CUENCA



Source: CITIES FORUM, 2022

PUBLIC POLICY

Establishing the Right Policy Framework: Incentivizing the Transition to Electric Vehicles

The city team designed 42 measures that make up Cuenca's Electromobility Plan to lay out the necessary policy framework. Many of them are directly related to implementing incentives or to creating local regulatory frameworks, such as the design of an electromobility ordinance or the creation of the Cuenca Electromobility Observatory.

Integrating Electromobility Promotion Policy and Energy Policy for Mutual Benefits

The defined measures have integrated national policies on energy provision for e-mobility with local policies to boost the transition of fleets toward e-mobility improving financial conditions.

IMPLEMENTATION

Pilot Project: Implementing High Impact Demonstration Actions

Four mini pilot projects are being developed within the project that demonstrate benefits of electromobility and their real impact.

The first two pilots are focused on e-bus and taxi fleets. The city is actively working with private urban bus and taxi operators to debunk existing misconceptions about the technology and to define the feasibility of decarbonizing these fleets from a financial analysis of total cost ownership (TCO). This pilot will culminate with the launch of several electric taxis and buses, operational in 2023.

A third and fourth pilots are focused on micromobility, specifically on electric bicycles and last mile logistics using light electric vehicles. The objective of the third pilot is to understand the potential of the electric bicycle as an attractive means of replacing private vehicle travel. The pilot also seeks to define the

feasibility of incorporating e-bikes into Cuenca's public bicycle system (BICICUENCA). This pilot is articulated with academia, which support with existing analyses and studies and with collection of existing field data. The pilot includes the provision of electric bicycles to private vehicle users to identify the perceptions of this new means of transport in their daily commute and will develop proposals to strengthen BICICUENCA through the adoption of new measures.

PHOTO 1.4. TAXI OPERATOR TRAINING, CUENCA.



Source: CITIES FORUM, 2022

PHOTO 1.5. BUS OPERATOR TRAINING, CUENCA.



Source: CITIES FORUM, 2022

Providing Knowledge: Capacity Building and Experience Sharing

Learning from successful experiences is crucial, even more so if they can be found within the region. The city team visited Santiago de Chile, Bogotá, and Medellín in Colombia thrice for technical briefings. These cities have excelled in adopting electric mobility, especially in the implementation of zero emission buses. The learning outcomes have inspired and supported the process of Cuenca's Electromobility Plan.

PHOTO 1.6. LAST MILE LOGISTICS. BOGOTÁ



Source: Municipality of Cuenca, 2022

PHOTO 1.7. WORKSHOP METBUS. SANTIAGO.



Source: Municipality of Cuenca, 2022

Developing Tools for Transition: New Financing Mechanisms and Tailor-Made Business Models for Cuenca

Several measures in the Electromobility Plan as well as the pilot projects under development aim to advance the creation of strategies and financial mechanisms that will allow ambitious decarbonization projects to be deployed in Cuenca. These projects will also require implementing right incentive policies and close dialogue among all stakeholders, such as representatives of the urban bus operators in Cuenca and the taxi sector.

Timeline

The Electromobility Plan of Cuenca is expected to be finalized in the first quarter of 2023 in conjunction with the minipilots and the communication strategy's implementation.

Challenges Ahead

- ▶ Identifying financial mechanisms to improve the procurement conditions for electric fleets in taxis and buses based on TCO results.
- ▶ Defining the responsibilities of organizations to implement quick wins and short-term measures.
- ▶ Designing a package of measures in the plan that will be attractive for multilateral financing.
- ▶ Approval of the Electromobility Plan at the Cuenca Council.
- ▶ Maximizing promotion of electromobility to the population when implementing the communication strategy.
- ▶ Prioritizing sustainable micromobility focused measures to replace unsustainable modes of travel within the shift pillar of the Avoid-Shift-Improve Framework³.
- ▶ Identifying as many findings from the pilots as possible to refine the measures.

Lessons Learned

- ▶ The importance of working hand in hand with the city's stakeholders to define objectives and measures of the plan in the right way.
- ▶ Engaging citizens and finding early adopters are essential to magnify the message of the importance and empowerment of electromobility.
- ▶ The essential role of experiences from other cities provides learning and knowledge to inspire the city team.
- ▶ The role of fleet operators is fundamental in identifying measures that are grounded in the city's reality.

Replicability

The work carried out in Cuenca is attractive as a case with high potential of replicability to other intermediate cities in the region and beyond, given that 35 percent of the population of Latin America lives in intermediate cities.

What (And Who) is the City Team?

The city team comprises an interdisciplinary and interinstitutional team representing different organizations at both local and national levels: all areas of the municipality in charge of mobility (such as Cuenca's Mobility Directorate and Company), the Tramway, the electricity supplier, academia through four universities, representatives of the public transport and taxi sector, vehicle technology and electric micromobility suppliers, and at the national level, the Ministry of Energy, the Ministry of Environment and the Ministry of Transport.

Notes

1. Action Plan for the reduction of Carbon and Water Footprints for the canton of Cuenca, 2018.
2. Sustainable Electric Mobility: Building Blocks and Policy Recommendations: [GRA in Action Series: Sustainable E-Mobility](#)
3. Sustainable Urban Transport: Avoid-Shift-Improve (A-S-I). Available: [ASI TUMI SUTP iNUA No-9 April-2019.pdf \(transformative-mobility.org\)](#)

Suggested Readings

Sustainable Electric Mobility: Building Blocks and Policy Recommendations: [GRA in Action Series: Sustainable E-Mobility](#) (2021)

Electromobility in the global south: An Equitable Transition toward Road Passenger Transport Decarbonization: [E-Mobility in the Global South](#) (2021)

COVID Challenge Cuenca, Ecuador: [Transformative Urban Mobility Initiative \(TUMI\)](#)

Part II: AN E-BUS ROADMAP FOR NAIROBI, KENYA

Urbanization in Kenya is growing at an alarming rate and with traditional transport planning policies and strategies in place, transport is characterized by unbearable traffic congestion, high volume of traffic accidents, and increased vehicular emissions.

URBANIZATION TRENDS IN AFRICAN CITIES

African cities are growing rapidly at an alarming rate. According to a World Bank Report (Lall et al. 2017) urban population in African cities will double in 25 years from 472 million people in 2017 to an estimated one billion by 2042.

Kenya is not immune to this trend in the Global South. In East Africa, Kenya has the largest economy which has seen a 30 percent gross domestic product (GDP) per capita increase from 2016 to 2021 with an average GDP per capita in 2021 of US\$2006.8 (WBG 2021). Approximately 27 percent of Kenya's population—which was 52.6 million in 2019—lives in urban areas and this is projected to be 33 percent and 46 percent of the population by 2030 and 2050, respectively (WBG 2021).

Urbanization, transport, and carbon dioxide emissions are inherently linked. Transport is the life blood of thriving cities as it ensures effective movement of people and goods within a city. As city economies grow, the need to move people and goods increases, and with traditional and reactive city transportation policies that focus narrowly on improving private vehicle travel, these cities succumb to negative externalities such as traffic congestion and traffic accidents, which are the bane of urbanization. A strong correlation exists between transport carbon emissions and GDP per capita (Collett et al. 2020). As GDP increases, reliance to travel increases, and hence more is spent on transport with concomitant carbon emission implications.

Kenya is experiencing similar trends and fallouts of rampant growth. According to GIZ report on “Average vehicle growth is more than 200 000 vehicles per year since 2014 with the existing vehicle population standing at more than 2.5 million vehicles (GIZ 2019). Nairobi is ranked the worst city in Africa and fourth in the world on overall inefficiencies in its traffic system (Traffic Index 2018). Traffic congestion costs the economy 50 million Kenyan shillings (approx. 415,000 US\$ equivalent) in lost productivity every day and has contributed to respiratory diseases being the leading cause of morbidity at 39 percent of the total disease incidences in 2018. Transport sector accounts for about 13 percent of the country's total emissions from transport and is growing faster than any other sector in Kenya.

Since the 1960s, Kenya has experienced a distinct climatic warming trend with the annual mean increase having risen by approximately one degree Celsius at an

estimated average rate of 0.21 degrees Celsius per decade (World Bank 2021). This trend is projected to continue to rise further to 1.7 degrees Celsius by the 2050s and approximately 3.5 degrees Celsius by the end of the century (World Bank 2021).

KENYA'S LEGISLATIVE DYNAMICS

Kenya has a leading edge in progressive national and local legislation.

In Kenya's updated nationally determined contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in December 2020, an ambitious mitigating contribution was submitted of a reduction of 32 percent by 2030 relative to Kenya's business-as-usual (BAU) 2030 scenario of 143 million tons of carbon dioxide equivalent. In its NDC submission, low carbon and efficient transport systems have been identified as one of the priority mitigating activities (Kenya Ministry of Environment and Forestry 2020)

Kenya's *Climate Change Act of 2016* requires all sectors of government to "Promote low carbon technologies, improve efficiency and reduce emissions intensity by facilitating approaches and uptake of technologies that support a low carbon, and climate-resilient development." The Kenyan constitution (Article 10) and Climate Change Act of 2016 prescribe the formulation of a National Climate Change Action Plan, which among others, sets to "guide the county toward the achievement of low carbon climate resilient sustainable development." Accordingly, the Action Plan identified transport as one of its priority areas in its goal to further Kenya's "sustainable development by providing mechanisms and measures to achieve low carbon climate resilient development" (Govt. of Kenya 2016).

Nairobi's Climate Action Plan 2020–2050¹ target aims to achieve a 24 percent reduction below BAU emissions by 2025, 51 percent reduction by 2035, and will further strive to achieve carbon neutrality by 2050. The Action Plan² states that the development and improvement of mass transit options and mode switching is a key action through developing improved public transport, primarily aimed at addressing traffic congestion within

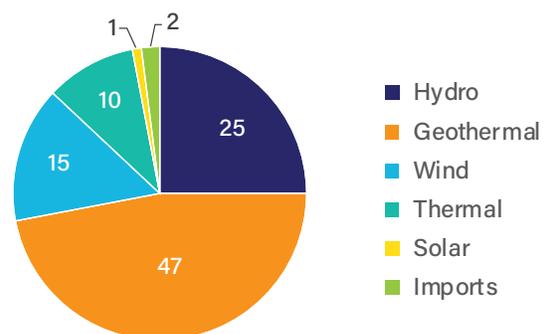
the city. The bus rapid transit (BRT) plan is one of the flagship projects and measures that includes (i) dedicated BRT lanes—two of the 5 BRT corridors are lined up to be electric; (ii) replacement of matatus or privately-owned local minibuses and ordinary bus services to feeder transport services; (iii) a bus notification system integrated with other transport system; and (iv) a revision of the bus lines and timelines. The Climate Action Plan also identifies the deployment and trials of electric buses as a key area of subaction.

Electrification and rail are also fundamental priorities in its Climate Action Plan. The plan states that its actions aim to address rehabilitation of the railway system to supplement the BRT project and to expand capacity of the four commuter rails that radiate from Nairobi central business district (CBD). The project also intends upgrades to existing stations, rolling stock, signaling systems and approximately 100 kilometers of new track as well as the construction of new stations.

High percentage of renewable energy relative to Kenya's total energy generation, and innovative current e-bus pilot projects, which sets a good foundation to catapult Kenya to lead the e-mobility agenda in Africa.

Kenya generates more than 2700 megawatts from installed generation capacity of which an impressive 80 percent or greater is renewable, against the demand at 1860 megawatts. The excess capacity could be used to power an electric transport fleet. The source of energy is split (figure 2.1).

FIGURE 2.1. KENYA'S SOURCES OF ENERGY. (PERCENTAGES)



Source: Kenya Ministry of Energy, 2019

BOX 2.1: TUMI E-BUS MISSION^a

The Mission is a quest to advance electric bus deployment across the Global South and serve as role model cases for successful and large-scale e-bus adoption in cities. Five hundred cities will be inspired until 2025, and these actions will lead to procurement of more than 100,000 e-buses, resulting in a reduction of more than 15 megatons of CO₂ emissions. The increased demand for e-buses worldwide will accelerate its technology maturation and mass roll-out of the technology.

Funded under the German Ministry for Economic Cooperation and Development (BMZ) and joining core groups^b, the TUMI (Transformative Urban Mobility Initiative) E-Bus Mission supports 20 deep-dive cities in their transition to electric bus deployment, including Nairobi, that receive support to develop and implement individual e-bus roadmaps.

Notes:

a. <https://www.transformative-mobility.org/campaigns/tumi-e-bus-mission>

b. The core group of organizations include C40 Cities, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), The International Council on Clean Transportation (ICCT), The Institute for Transportation and Development Policy (ITDP), ICLEI – Local Governments for Sustainability, The International Association of Public Transport (UITP) and World Resource Institute (WRI).

PHOTO 2.1. AN E-BUS IN NAIROBI



Source: UITP 2022

The private sector in Kenya is driving innovative contractual and financial mechanisms to advance e-mobility in Kenya. Roam and BasiGo are two electric bus manufacturing start-up companies in Nairobi and are running their pilot fleet of e-buses. Roam is a Swedish-Kenyan technology company that designs, develops, and deploys electric vehicles

that are tailored for the African context, leading the transition to electrification of the bus fleet. BasiGo has partnered with Build Your Dreams (BYD) – a listed company in China for its pilot e-bus implementation project in Nairobi, operated by the local matatu operator CityHoppa.

KENYA'S BARRIERS IN TRANSITION TO E-MOBILITY

However, Kenya needs to overcome some key barriers within the enabling, technical and financial environment to realize the holistic benefits of transitioning to e-mobility.

Impacts of e-mobility are best maximized through a dual approach that encourages: (i) sustainable mobility that enhances the shift to public and non-motorized transport modes, and (ii) public transport vehicle technology that minimizes carbon emissions. This dual approach aligns with the International Association of Public Transport (UITP) policy brief on “The Impact of Electric buses on Urban Life” where it emphasizes that “*Electric buses represent one important link in a mobility strategy chain, but their positive impact will be maximized if the transport network is efficient,*

accessible and of quality.” The outcome of this dual approach is a multiplier effect on air quality, urban mobility, and overall citizen health. (UITP 2019) (figure 2.2).

FIGURE 2.2. UITP GUIDING FRAMEWORK FOR E-BUS DEPLOYMENT.



Source: UITP 2022

Cities require a systematic approach to achieve this multiplier effect and to address their main barriers that most often hamper effective e-mobility rollout.

- ▶ **Enabling** environment that involves the institutional, strategic, policy, and integrated planning requirements that will aid the effective transition to e-busses.
- ▶ **Technical** capacity and operational requirements that relate to the public transport service offering particularly the vehicle fleet, infrastructure requirements, and operations.
- ▶ **Financial** requirements that cover the nature and scope of the financial requirement, potential sources of funding, public sector commitment, public-private risk allocation, and application readiness.

Analyses of these barriers in Kenya indicate progressive work within the policy, legislation, energy supply or availability, and innovative experimental financial instruments. However, urgent work is required to develop foundational sustainable urban transport plans and support bus plans to respond to technical and financial gaps identified during the peer review analysis.

THE NAIROBI METROPOLITAN AREA TRANSPORT AUTHORITY (NaMATA)

NaMATA was established by an Executive Order through Legal Notice No.18 of 17 February 2017 with the main mandate of overseeing the establishment of an integrated, efficient, effective, and sustainable public transport system within the Nairobi Metropolitan Area (NMA). The NMA comprises the counties of Kajiado, Kiambu, Machakos, Murang'a and Nairobi City.

NaMATA is involved in improving the public transport system in NMA through the introduction and implementation of mass rapid transit system (MRTS) comprising BRT, Commuter Rail System and Non-Motorized Transport System (NMT). In particular, the NMA shall:³

- ▶ Develop, formulate, and implement strategies, plans and policies for public transport.
- ▶ Coordinate to develop, manage and maintain MRTS with other government agencies and parties.
- ▶ Regulate and enter into agreements with MRTS operators and service providers.
- ▶ Integrate all modes of transport as well as transport and land use planning.
- ▶ Research and development to provide evidentially based MRTS network.
- ▶ Improve environmental sustainability of the transport system in the metropolitan area.

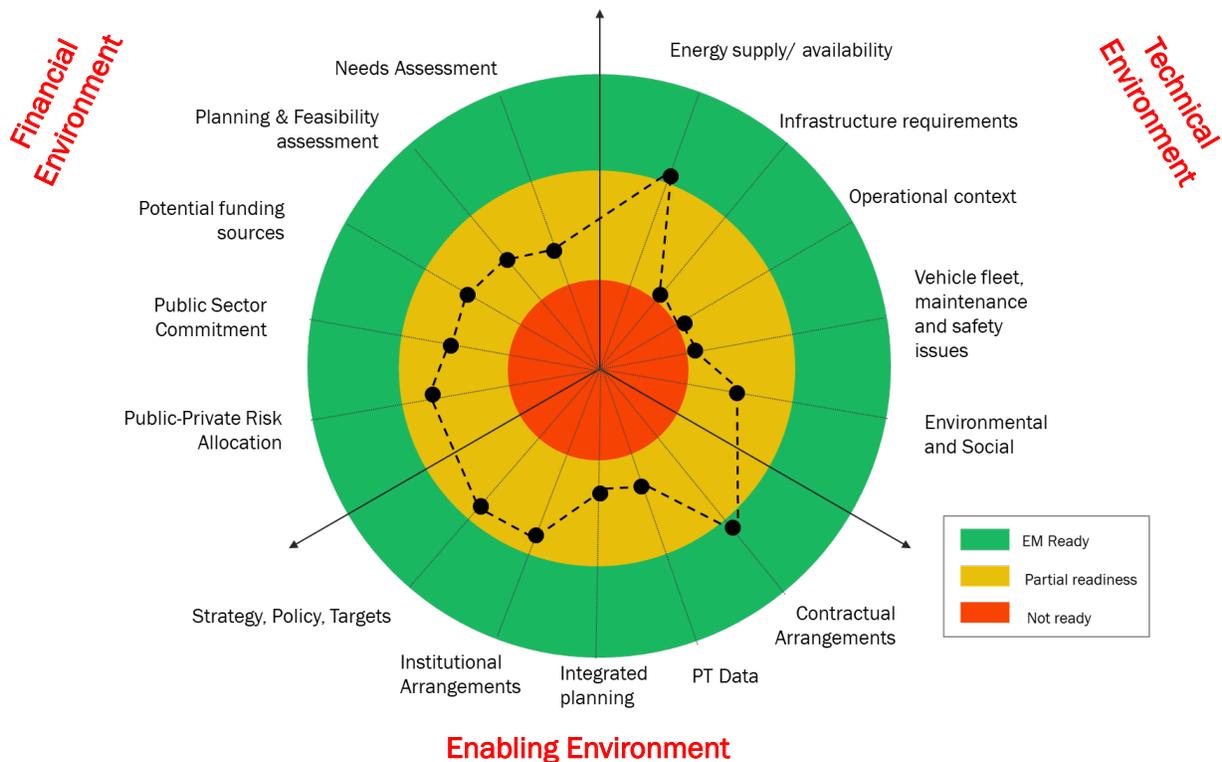
UITP led a mission to Nairobi in July 2022 within the framework of TUMI (box 2.1) This mission aimed

to assist the transport authority in developing a roadmap to implement e-buses by creating a long-term electric bus deployment strategy for the BRT project in progress and for all transport modes including the matatu fleet.

UITP led a peer review study over four days on Nairobi’s e-mobility strategy aiming to identify gaps and to ensure the roadmap for e-bus implementation answers Nairobi’s specific needs. Several meetings were organized and facilitated with NaMATA, national departments, local e-bus providers, and the operators through the Federation of the Public Transport Sector, which collectively showed strong cooperation in advancing electric bus mass roll-out in the region.

The summary of peer review analyses (figure 2.3) indicates Nairobi’s e-mobility readiness assessment against key elements within the enabling, technical and financial areas.

FIGURE 2.3. SUMMARY OF THE E-MOBILITY READINESS ASSESSMENT FOR NAIROBI.



Source: Authors own development

TABLE 2.1 HIGHLIGHTS KEY AREAS FOR IMPROVEMENT WITHIN THE ENABLING, TECHNICAL AND FINANCIAL ENVIRONMENTS.

SUMMARY OF KEY AREAS FOR IMPROVEMENT	
ENABLING	<ul style="list-style-type: none"> • Encourage completion of the national e-mobility policy. • Develop sustainable urban mobility plans and associated e-bus strategy or plan covering citywide and individual corridors for Nairobi. • Arrange for tactical and operational meetings across government sectors and tiers of government in e-bus roll-out.
TECHNICAL	<ul style="list-style-type: none"> • Address insufficient impact analysis and identify corresponding mitigating measures regarding infrastructure requirements, operational system needs, fleet requirements (maintenance, safety.), grid and battery life assessment, and environmental or social aspects.
FINANCIAL	<ul style="list-style-type: none"> • Assess business case as a component of the overall and corridor e-bus Strategy or Plan, which includes among others, a holistic lifecycle costing and proposals for an appropriate contracting or operating model that optimizes the financial risk accordingly.

PHOTO 2.2. SITE VISIT WITH THE NaMATA.



Source: UITP 2022

A systematic approach from institutional and governance arrangements would help overcome these barriers in: (i) establishing national policy and strategy; (ii) developing sustainable urban mobility plans as a contextual framework to prepare e-fleets; (iii) supporting infrastructure plans; and finally (iv) developing an implementation plan.

It is proposed that the e-bus roadmap for Nairobi comprise five key components:

1. An enabling and capacitated institutional arrangement and governance mechanism at the appropriate sphere of government to drive the e-bus delivery in Nairobi. The lead institution (NaMATA in this case) should be adequately resourced to drive the e-bus implementation.
2. An umbrella e-mobility strategy by the National State of Transport, which will strategically guide and align with Kenya's broader environmental and energy objectives. This national strategy should include national e-mobility vision, goals, objectives, and targets for all transport modes, an overarching business case for e-mobility, measures to unblock barriers at a national level, and supporting standards and specifications.
3. An overarching Sustainable Urban Mobility Plan (SUMP) for Nairobi that covers all transport modes based on the Avoid, Shift, and Improve (ASI) principles. This plan provides the integrated transport response that ultimately aims to increase the modal split in favor of public transport. This plan will also indicate how individual public transport corridors work in unison in design and operations where e-buses for example could be shared among routes to optimize the full integrated system.

PHOTO 2.3. A BRT STATION IN NAIROBI.



Source: UITP 2022.

4. A full BRT Network and Corridor service operational plan—service plans for different BRT corridors exist⁴—which is an input to the development of an e-bus and associated infrastructure plan. The plan should cover at a minimum:
 - For each route, passenger peak demand, bus capacity, cycle time and e-bus availability to determine fleet size and battery capacity. As a full network, fleet size can be optimized through fleet sharing among bus routes,
 - Lessons learned from existing or planned e-mobility pilot projects,
 - Fleet propulsion assessment, motivation and business case including Benefit and Total Cost Ownership assessment,
 - Quantification of Total Energy Demand requirements for full rollout and per corridor roll-out,

- Charging strategy and supporting Infrastructure requirements, and
 - Specifications and standards for fleet and supporting infrastructure.
5. A roll-out plan that identifies required number of e-buses and supporting infrastructure at key milestones of the project and establishes key mechanisms that will expedite the roll-out:
 - Roll-out strategy,
 - Financing and funding strategy,
 - Procurement strategy,
 - Maintenance and management strategy,
 - Battery renewal strategy, and
 - Vehicle recapitalization strategy.

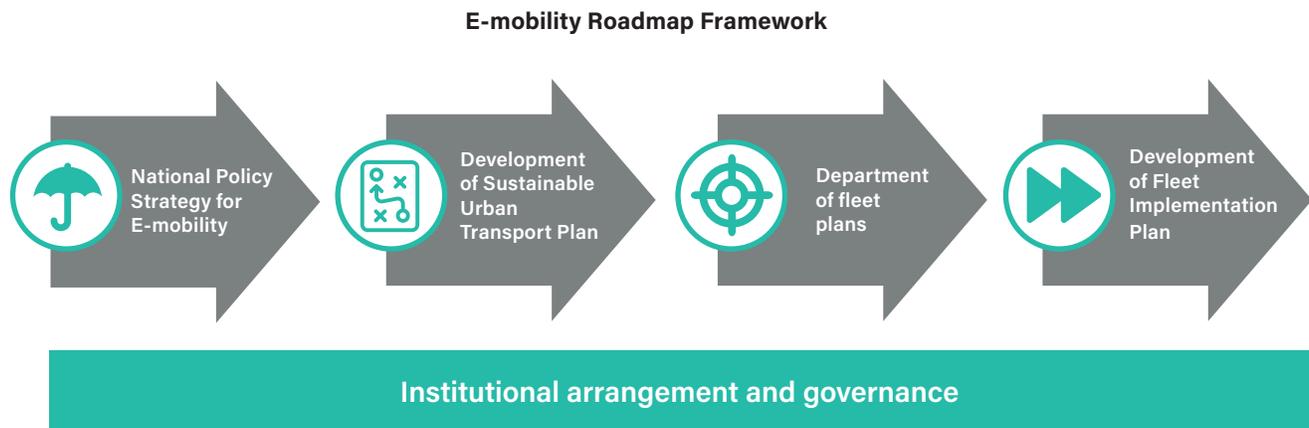
PHOTO 2.4. E-BUS IN OPERATION IN NAIROBI.



Source: UITP 2022.

In summary, figure 2.4 frames the e-mobility roadmap.

FIGURE 2.4. E-MOBILITY ROADMAP FRAMEWORK.



Notes

1. <https://cdn.nation.co.ke/downloads/Nairobi-City-Climate-Action-2021.pdf>
2. This section is taken from and further information can be found at: <https://nairobi.go.ke/download/nairobi-city-county-climate-action-plan-2020-2050/>
3. https://www.namata.go.ke/about_us
4. <https://africa.itdp.org/wp-content/uploads/2021/04/Service-plan-for-Nairobi-BRT-Line-2-191030.pdf> (line 2)
5. <https://africa.itdp.org/wp-content/uploads/2015/02/Nairobi-Ndovu-A104-BRT-Service-Plan.pdf> line 1 (line 1)

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