African E-mobility Week
20–24 March 2023, Dar Es Salaam, Tanzania

Nairobi Metropolitan Area Transport Authority (NaMATA)

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PRESENTATION OUTLINE

1. NaMATA
2. E-Mobility Enabling Environment
3. Low Carbon, and Climate Resilient Development
4. Approach to Low Carbon, and Climate Resilient Development?
5. Is Public Transport Transition possible?
6. Projects Status
7. NaMATA’s BRT Battery Electric Bus Specifications 2022
8. Barriers/Challenges
9. Total Cost of Ownership
10. Key Guiding Principles for Effective E-bus Roll-out
11. Areas of Improvement
NaMATA was established to transform the quality of life through delivery of an integrated and sustainable Public transport system within the Nairobi Metropolitan Area.
Kenya has taken progressive legislative and policy steps towards creating an enabling environment for e-mobility.

- Climate Change Act of 2016
- Nairobi City County Council Act 2020.
- Kenya's Energy Act, 2019
- Kenya Finance Act 2019
- The Kenyan constitution of 2010 (Article 10 and Article 69)
Low Carbon, and Climate Resilient Development

The Integrated National Transport policy of 9 MRTS Corridors

INTP adopted by Parliament
Recommendations:
Development of MRTS and:
Establishment of Nairobi Metropolitan Area Transport Authority (NaMATA).

2009

2012

2014

Harmonization Study – further defined MRTS network and the selection of BRT and Commuter Rail

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One of the Strategic Objective aims to establish efficient, sustainable, world-class transport systems and logistics services that withstand projected impacts of climate change.

This looks at promoting sustainable infrastructure and one of the strategies to *Enhance Sustainable Mobility* is to establish Bus Rapid Transit in major urban areas especially Nairobi, Mombasa and Kisumu Cities.

Kenya seeks to abate her GHG emissions by 32% by 2030 relative to the BAU scenario of 143 MtCO2eq; and in line with her sustainable development agenda. One of the priority mitigation actions highlighted in the updated NDC to achieve this is through the implementation of the mass rapid transit system consisting of a Bus Rapid Transit (BRT) System with Light Rail for Greater Nairobi. This is the option with the largest mitigation potential with an abatement potential of approximately 2.3 MtCO2e a year by 2030.
Approach to Low Carbon, and Climate Resilient Development?

Introduction of electric fleet on our roads alone won't suffice. Matatus (PSV) and buses account for a huge 40 percent modal share of Nairobi's public transportation.

Over 70% of the population of the NMA use public transportation on a regular basis.

High cost of fossil fuels. Vehicles are old and contribute to congestion and air pollution.

Dual approach is better. Improve Public Transport to encourage more people to use the mass transit systems.
Is it possible to have Sustainable Public Transport?

- 1960s-Early 1980s
- 2004 Michuki Rules
- 2019, Gazettement of the MRTS corridors
- February 2017, NaMATA was established
- 2020, modernization of the NCRS
- 2020, Pilot BRT line 2
- 1990s
Steps taken

➢ **Line 2 Simba (28km)** – February 2022 tenders floated for International competitive Bid for leasing of 100 clean energy propulsion BRT buses for Phase I operations of about 20km.

- Bio-Diesel and Electric
- Operational before end of 2023

➢ **Line 3 (12.3km)** – Design completed, RAP on going. Recommended fleet size is 120 Electric buses

- To be operational by 2027

**Line 5 (10.4km)** – Detailed design ongoing. 60 buses. Construction completion/operation 2026
NaMATA’s BRT Battery Electric BUS SPECIFICATIONS 2022

• Low floor/low entry
• Maximum length (mm) 12,500
• Daily kilometer range: the electric bus system sustains a daily kilometer range of up to 360 km per bus.
• The gross vehicle weight should not exceed 19 000 kg (GVM)
• The initial installed capacity of the battery is at least 350 kW for a 12 bus and 550 kW for an 18m bus.
• Slow charging during the night
• Efficient energy consumption per kilometer for HVAC and other systems
BARRIERS/CHALLENGES

• High capital investment for fleet procurement, and charging infrastructure development.
• Poor understanding of e-mobility.
• Competition from established propulsion technologies
• Need for supportive Tax regime
Total cost of ownership – 12 year electric bus, BRT operations

• NaMATA has done a TCO for a 12 year BRT operation in Nairobi for BRT Line 2 pilot.

• It compared 3 propulsion technologies: Diesel, Electric, and Hybrid technologies.

• It took into account operating conditions in Kenya in developing the figures.

• This does not include the relative external costs of ownership eg such as pollution.

• Electric TCO per km, KES 334; Diesel KES 286. Hybrid is in between, at KES 307.

Source: NTU, 2022, BRT Line 2 Polity, Service and Business Plan
Public transport electrification

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<tr>
<th>Economic challenge 2-3x higher upfront investment in bus, chargers, and adaptation of depots</th>
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<td>Lower energy and maintenance costs depending on local characteristics</td>
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<td>Potential for competitive Total Cost of Ownership</td>
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<td>Paradigm shift: from vehicle to system procurement, including charging infrastructure</td>
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Key actors:  
- Public transport authority (PTA)  
- Public transport operator (PTO)  
- Bus manufacturer  
- Charging infrastructure supplier  
- Electricity utility
Increased awareness of climate change and its effects had led to search for alternative/cleaner technologies.

Increased generation from renewable sources has attracted attention

Excess power generated has made public transport a prime candidate for electrification

Introducing electric BRT buses would reduce reliance on fossil fuels by 20 million litres annually.

Electrification of public transport will help the country achieve targets in the National Climate Change Action Plan (NCCAP 2018-2022).
The TUMI E-Bus Mission aim is to support cities get into a position where they are ready to shift all new bus procurements to electric. Nairobi was identified based on the perceived readiness and private and public sector momentum in E-mobility and was selected as one of the 20 deep dive cities across the globe in the TUMI E-Bus Mission.
Key Guiding Principles For Effective E-bus Roll-out

System approach to e-mobility technology

E-bus provision calls for a system approach covering the following elements:

• Vehicle,
• Infrastructure to enable effective operations, and
• Service operation design ensuring service provision through e-buses matches the passenger demand/requirements.
Key Guiding Principles For Effective E-bus Roll-out

Before Fleet procurement, establish the required bus fleet strategy/plans

Prior to fleet purchase critical requirements is:

- Overarching bus plan covering the Nairobi Core area and neighboring counties.
- Business case and supporting financial analysis for fleet propulsion choice
- Supporting infrastructure, safety, and environment plan for both ultimate state and transitioning states
## Areas for Improvement

### Summary of key gaps and areas for improvement

| Enabling environment | • Encourage completion of the National e-mobility policy by State Department of Transport.  
| | • Development of Sustainable Urban Mobility Plans and associated bus strategy/ plan covering city wide and individual corridors. |
| Technical environment | • Finalise bus strategy/ plan to cover, amongst others, supporting infrastructure requirements, operational system needs, fleet requirement (maintenance, safety etc.) and environment/ social aspects. |
| Financial environment | • NaMATA’s financial analysis for TCO shows business case for electric buses still higher financially.  
| | • Two things necessary for transition: i). Bridge funding (eg concessionary international funding; grants; global challenge funds); ii). policy support requiring full economic costs justification (incl. costs of externalities). |
Nairobi Metropolitan Area Transport Authority (NaMATA)