UNEP Electric Motorcycle Pilot Project for Kenya and Uganda

Data Analysis and Policy Recommendations Kenya

Project Background

- The transport sector is responsible for more than one quarter of energy related Greenhouse Gas (GHG) emissions worldwide
- Motorcycles are the fastest growing transport mode in many countries and have major climate and air quality impacts.
- In Kenya, 2&3 wheeler vehicle segments are the largest share of the vehicle fleet registered with a share of 48%.
- The Paris Declaration on Electro-Mobility and Climate Change and Call to Action sets a global deployment target for electric 2- and 3-wheelers in 2030 exceeding 400 million units (UNFCCC, 2015b).
- China, Norway and the Netherlands witnessed an impressive growth of EV sales over the past five years
- Battery electric two and three wheeler sales have risen significantly in China with India, and ASEAN nations quickly adopting the technology.

Project Background

- United Nations Environment Programme (UNEP) is implementing the Sustainable Low Emissions Transport project
- The project aims to promote a global transition to no and low emissions mobility for improved air quality and climate change mitigation.
- This project is supporting demonstration pilots of electric 2&3 wheelers as well as developing policies in Ethiopia, Kenya, Uganda, Philippines, Thailand & Viet Nam to foster the transition to electric mobility.

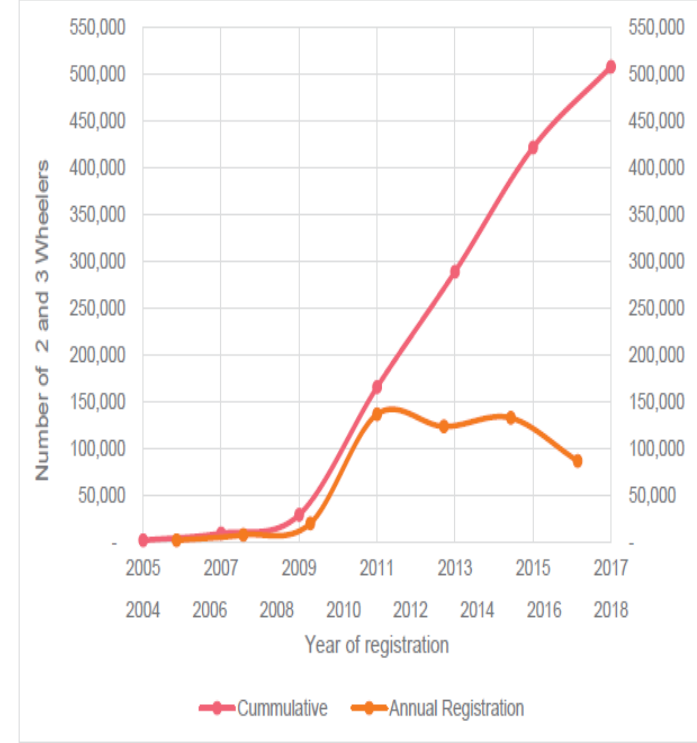


Figure 1-1: Annual and Cumulative Two and Three Wheelers Registration

Expected deliverables/Activities

- Arrange for delivery of electric motorcycles from SSSC Limited to pilot partners in Kenya and Uganda.
- Technical training sessions
- Assembly and disassembly of electric motorcycles
- Safety protocols for riding and handling electric motorcycles
- Launch of electric motorcycles pilots in Kenya and Uganda working together with the pilot partners.
- Data collection and analysis

Introducing the project/Project set up

- Duration: April 2021 -Feb 2022
- Focus: proof of concept for e 2 wheelers and awareness creation
- Supported by: Project funded by the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Shenzhen Shenling Car Company Limited (SSCC) – Manufacturers of Tail G e-motorcycles
- Developing electric mobility baseline led by *EPRA*
- The demonstration projects are implemented through logistical support from *Sustainable Transport Africa*

Implementing partners:

- **United Nations Environmental Programme (UNEP)**
- **Shenzhen Shenling Car Company Limited (SSCC)**
- **Kenya Power and Lighting Company (KPLC)**
- **Kisumu County Government (KCG)**
- **Kenya Forestry Service**
- **Powerhive**
- **<u>Pilot partner – Uganda (CAIA)</u>**
  - International University of East Africa
  - Ntuha
  - SafeBoda
  - Bodawerk
  - Baylor Uganda

Technical specs - the pilot bike

- TAILG Model：TDQG91Z
- Lithium Battery 72V50Ah
- Signal Voltage – 12V
- Claimed range – 100km
- Claimed Max Speed – 75 km/h
- Brakes – discs front and rear
- Charger – 72V 3A
- Charging time – 3 to 8 hrs
- Loading capacity – 2 persons
- Some units had hub mounted motors while others had center mounted motors
- Price – USD 1,550 FOB Shenzen

Counterpart ICE bike

- Yamaha DT 125

Engine - 123cc 2 stroke single cylinder
Fuel tank – 10 litres
Power – 11KW
Top speed – 110 km/h
Weight - 107 kg *with oil and a full fuel tank
Price (KES) – 588,370
Fuel consumption – 30km per l
Range – 300km

- Bajaj BM150

Engine – 145cc 4 stroke single cylinder air cooled
Fuel tank – 11 litres
Power – 8.8KW
Top speed – 94 km/h
Weight - 123 kg *with oil and a full fuel tank
Price (KES) – 144,490
Fuel consumption – 49km per l
Range – 539km

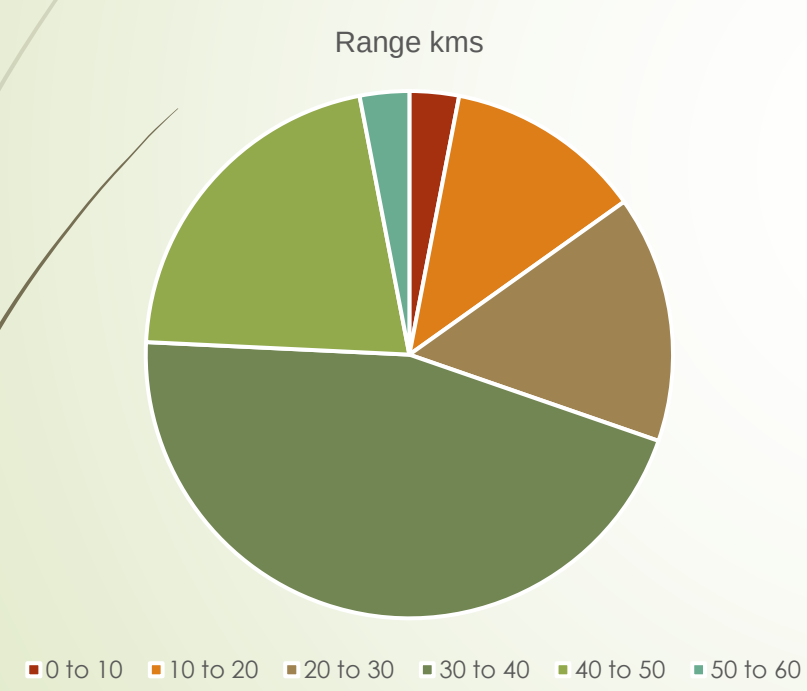
Data collection

Implementing Partner	**Kisumu County** (A subnational county government)
Use Case	**Units used by city inspectorate to carry out routine monitoring and by community worke**
Time Period	**May 2021 – Mar 2022**
Electric Bikes received	**15**
Data received from	**12 units**
Total Mileage covered	**52,953Km** **3,412Km (individual bike – 1/11/21 – Seme)**
Longest recorded Trip	**45 Km**
Maximum weight carried (including rider)	**177Kg**
Maximum Speed recorded	**68Km/hr**

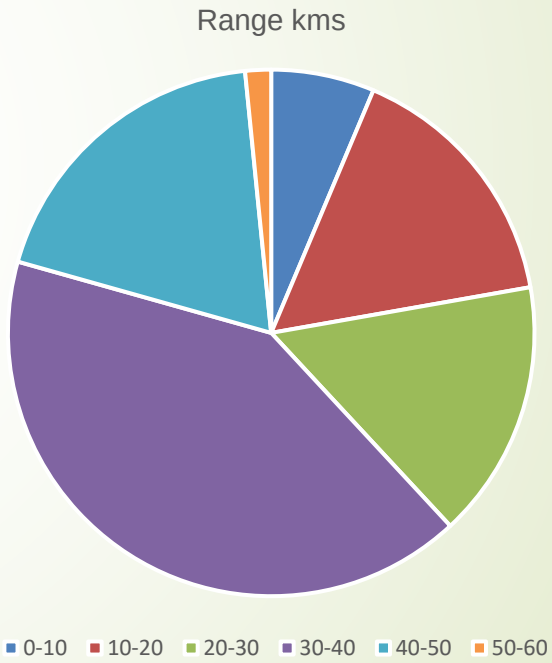
Implementing Partner	**Kenya Power** (a national power utility company)
Use Case	**Units used by meter readers distributed mai in Kiambu , Nakuru, Kajiado and Nairobi counties.**
Time Period	**June -Oct 2021**
Electric Bikes received	**13**
Data received from	**12 units**
Total Mileage covered	**31,413Km** **5,561Km (individual bike – 21/3/22 – Githung**
Longest Trip	**70 Km (Whatsapp message 21/6/21)**
Maximum weight carried	**118Kg**
Maximum Speed recorded	**78Km/hr (Whatsapp message 21/6/21)**

Range

KCG



KPLC



Challenges / Benefits

KFS

Major challenges:

- Long charging time
- Electrical system faults

Major benefits

- Silence of patrolling
- Fuel cost savings

KCG

Major challenges:

- Long charging time
- Limited maximum speed

Major benefits

- Fuel cost savings

KPLC

Major challenges:

- Long charging time
- Limited travel range for this use case

Major benefits

- Fuel cost savings
- Suitable business case company

Results

- Kisumu - Approx total distance covered - 52,952kms.
- KPLC - Approx total distance covered - 31,413 kms.
- Karura - Approx total distance covered - 790 kms.
- Total distance – 85,155 kms
- Energy Used – 4,087 KWh
- Emissions abated – 6,629 kgs of CO2
- It is a viable technology

Costs comparison

- **Yamaha DT125** - 1,000kms @30km/l – Total spend – **KES 4,290.**
- **Baja BM150** - 1,000kms @49km/l –Total spend – **KES 2,653.**
- **Electric motorcycle** – **KES 1,200** to travel 1,000km
- Saving against Yamaha of KES 4,290 – 1,200 = **KES 3,090** per 1,000 kms
- **Kisumu Pilot Savings** - Approx total distance of 52,952kms. Saving thus far is - KES **163,621**
- **KPLC Pilot Savings –** Approx total distance of 31,413 kms. Saving thus far is - KES **97,066**
- **Net fuel cost savings (inc Karura) -** KES **263,128 (USD 2,288)**

Gaps identified

- Clearance of bikes
- Checks on state of health of batteries
- Technical faults
- Safety
- Range
- Speed

Recommendations

- Range extension by providing a charging solution
- Battery management
- Swappable batteries and a network of swapping infrastructure to increase range.
- Fast chargers
- Further reduction of energy costs for better competitiveness
- Capacity building – maintenance training, rider training, local assembly (SKD/CKD), Manufacturing.
- Tracking for data collection and data analysis tools – software and programs that collect and analyse data.
- Robust motorcycles
- **Maintenance** - Source available parts locally
- Safety
- More public relations and awareness

General Policy Guidelines

- **Pilot Projects and Stakeholder Forums -** to test the right financing, provide local experience and build the necessary capacities
- National governmental ministries and agencies as well as think tanks and NGOs could play a big role in promotion of e-mobility.
- International support can help countries act early
- Need to categorise different types of electric two wheelers - electric motorcycles, slower electric scooters and electric bicycles.
- Potential reduction in the use of scarce foreign exchange for fuel importation for the transport sector
- Promotion of Solar Power Energy and other renewable forms
- Policy reforms to support low-cost imports of electric motorcycles.
- Waivers on acquisition tax, excise tax, parking fees and tolls, as well as waivers on access restrictions.

General Policy Guidelines

- Leverage additional capital for lending to EV financing programs
- Developing standards for electrical motorcycles – electronic, electrical and battery failure occurred in our pilot.
- Spare parts need to be easily accessible or interchangeable with those of common ICE motorcycles
- Interoperability of batteries – the market has 72V, 60V, 48V and 42V
- National and local governments must support the deployment of charging infrastructure including battery swapping.
- Electricity market that is open to producers and resellers and responsive to the opportunities and needs of EV charging
- Legislation and infrastructure for e-waste management
- Encourage re-use of the batteries in second life applications
- Vehicle scrapping schemes

General Policy Guidelines

- Local assembly and / or manufacture of electric motorcycles
- Develop indigenous electric motorcycles
- Significant levels of local content in assembly or manufacture
- Training and retraining schemes developed to help workers adjust to new roles and industries (e.g. Colleges, TVET)
- **Safety –** Mechanical, Electrical, shock prevention
- **Environmental Robustness** – tropical rain, flood fording, shocks, vibrations, drop test
- **High voltage** warnings in the inner parts of the motorcycle.
- **Battery tests** – shorting, overcharging, over-discharging, high charge current
- **Operator age requirement** – driver licence at 16 or 18 years?

THANK YOU