

This is not an ADB material. The views expressed in this document are the views of the author/s and/or their organizations and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy and/or completeness of the material's contents, and accepts no responsibility for any direct or indirect consequence of their use or reliance, whether wholly or partially. Please feel free to contact the authors directly should you have queries.



Supporting E-mobility Startups

Kathleen Dematera Contreras

Urban Living Lab Center

Urban Electric Mobility Initiative (UEMI)

17 November 2023

Better Air Quality (BAQ) Conference

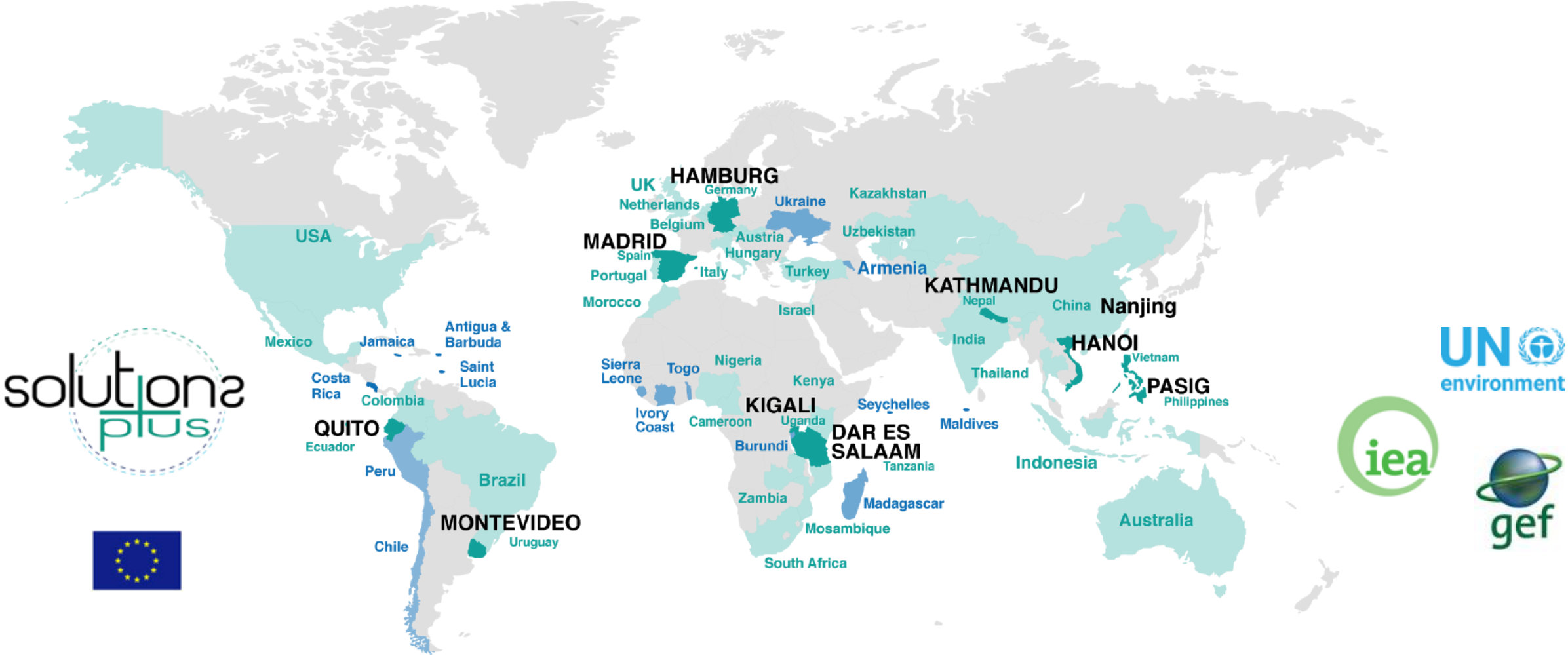
Asian Development Bank

Manila, Philippines

Integrated Urban Electric Mobility Solutions in the Context of the Paris Agreement, the Sustainable Development Goals and the New Urban Agenda

InCo flagship project on "Urban mobility and sustainable electrification in large urban areas in developing and emerging economies"

Joint Global e-Mobility Platform



InCo flagship project on “Urban mobility and sustainable electrification in large urban areas in developing and emerging economies”



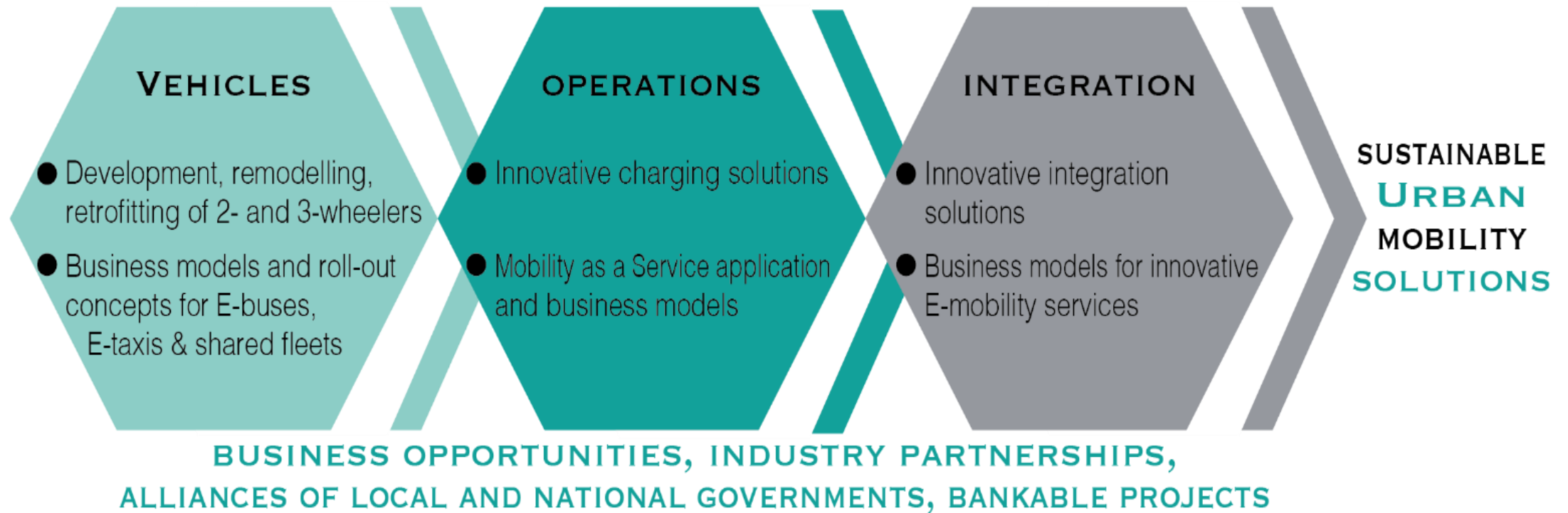
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 875041

- Funded under the Horizon 2020 call GV-05-2019
- Duration: 1 January 2020 - 31 December 2023
- Total budget: €20,233,098.75 (EU Contribution:€17,970,258.75)
- Consortium of 46 partners, 116 associated and support partners
- 10 Living Labs: Kathmandu, Manila/Pasig, Hanoi, Montevideo, Quito, Kigali, Dar es Salam, Hamburg, Madrid and Nanjing (self-funded)

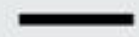


Overall objective of SOLUTIONSplus

Accelerate transformational change towards sustainable urban mobility through innovative and integrated electric mobility solutions.



URBAN LIVING LAB CENTER



Capacity building for the
transformation of urban
mobility, energy, and
resource sectors



UN HABITAT
Collaborating Center





Living Lab

PASIG Philippines

**Shared e-mobility for cargo
and passenger services**

- Electric Quadricycle
- Flexible Electric Van (FLEV)
 - Booking App
 - Charging solution

Shared e-mobility for cargo and passenger services

Progress

E-Quadricycle and FLEV prototype development

- Prototype of e-quad and FLEV completed by Tojo motors (local start-up); currently in the production phase
- Integrated EU technology (Valeo eAccess 48V drive)
- Lightweight (Body: FRP composite; E-quad: 300 kg payload, FLEV: 700 kg)
- Fitted with an informatics system

Booking app

- Tested in Sep 2022 - the app trial run on Pasig City's existing e-tricycles.

Charging solutions

- Assessment of charging facilities' location



E-Quadricycle

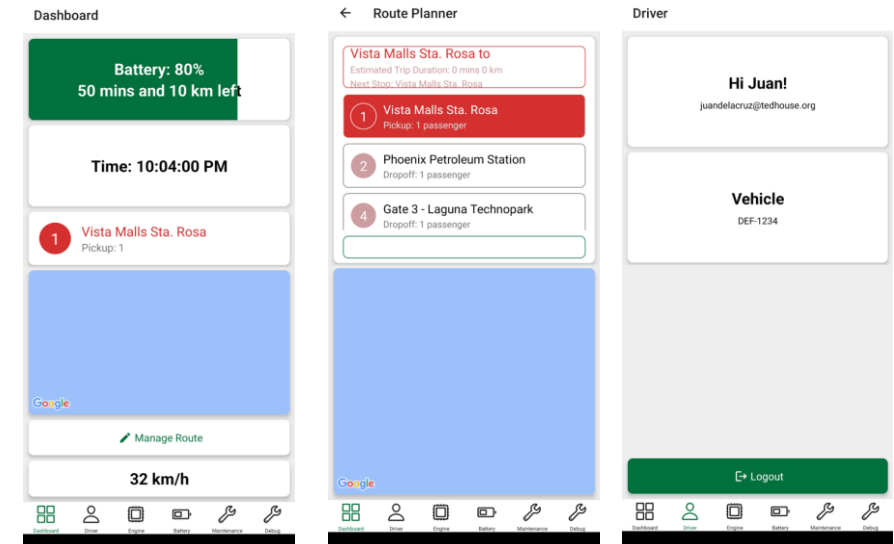
FLEV

Challenges & adaptation

- Redesigns (i.e. upgraded battery capacity, upsized chassis size) had to be made due to changes in technical specifications of parts as well as limited availability
- Adjustment with Valeo drive – due to available chargers (FLEV), Climate

Innovation & opportunities

- Cost-competitive, locally appropriate, and multi-purpose
- Collaboration with UNEP-implemented BMU-IKI project: Charging pods and solar charging network
- Exploring expanding charging solutions in city through private-public partnership with city government and local charging providers



Booking app: Driver app

E-quadricycle prototype launch

Progress

- Pilot launch on 5th December 2022 at the quadrangle of the Pasig City – public event
- The event was joined by Pasig city government officials (Mayor, Congressman and members of city council), citizens, PHL post, SOLUTIONSplus project partners, the manufacturers, UNDP PHL
- Widely disseminated – featured in local newspaper
- **Pilot under test operation**
 - Data collection on the vehicle performance and improvement needed is on-going



E-quadricycle demo Launch in December 2022

Policies

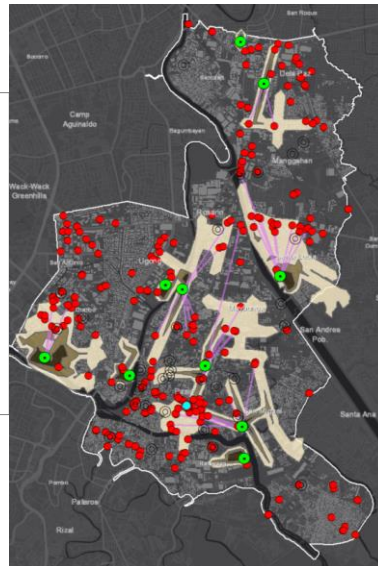
- Policy paper to enhance the PUMP- looking into unlocking urban mobility opportunities through electrification and taking into account the lessons learned from the pilot demonstration
- Policy paper on city leadership on e-mobility

Institutional coordination

- De La Salle University and DOST
- Co-ordination with Pasig E-mobility Steering Committee – for Charging solutions and EV uptake

Integration & planning

- Urban logistics fleet operations system
- Passenger fleet management system
- TU Berlin Design Studio for charging solution



EU Start-up support

- PEM motion (German start-up) provided advice to Tojo Motors on FLEV Chassis structural Assessment
- 2nd life battery from Betteries (German start-up) in e-quad

Capacity building

- Asia regional Training on e-mobility - Oct - Nov 2021
- Pasig Specific training - 2021 (online) and 2022 (onsite)
- Technical training on e-quads operation (on-site)
- P2P exchanges on e-bike sharing (online)



Pasig e-mobility training in Dec 2022

There are opportunities for multi-purpose vehicles



- For example, non-road use--in ports, airports, cargo ports, industrial complex, and road maintenance, and more.

Understanding and addressing local needs



The EVs were instrumental in the delivery of relief goods to the victims of Typhoon Ulysses, in November 2020, on the distribution of financial assistance to families that are eligible under the Social Amelioration Program during the community quarantines, and in the delivery of Christmas food packs to all Pasiguenos.



In the Philippines, UNEP worked with Clean Air Asia, the Philippine Postal Corporation, the City of Pasig and electric vehicle manufacturer TAILG to show the potential of electric two- and three-wheelers to deliver urban freight. Upon the onset of the pandemic, these vehicles were used to deliver vital relief goods during lockdowns.

Sources:
<https://cleanairasia.org/our-news/pasig-city-beefs-programs-sustainable-transportation-amidst-pandemic>
<https://www.unep.org/news-and-stories/story/paving-way-electric-mobility-south-east-asia>



Living Lab

HANOI Vietnam

**Shared Electric 2-
wheelers for last-mile
connectivity**

- E-mopeds, E-bikes
- V-Share App

Hanoi: Piloting electric mopeds for sharing system

system

Information & progress

- **E-mopeds procurement and arrangements**
 - 50 units of e-mopeds (Vinfast Ludo) are procured
 - Vehicle registration is complete
 - Dedicated parking lots are selected
 - Ensure drivers safety: helmets, insurance
- **App and IoT**
 - V-Share App by QIQ to book and show vehicle positioning
 - A first trial of V-Share was conducted and IoT was installed



Vinfast e-mopeds



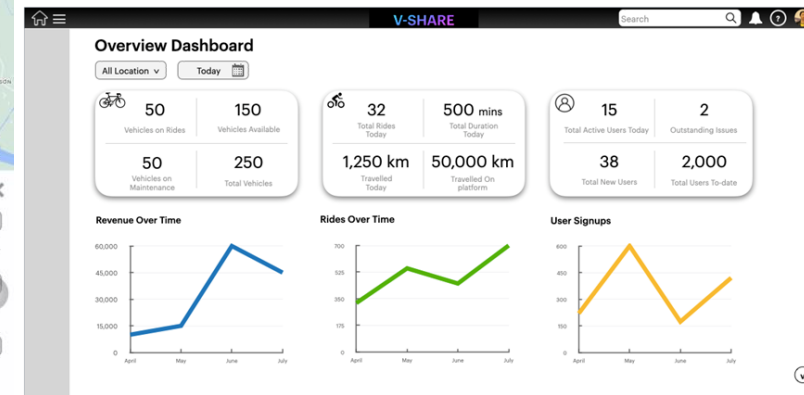
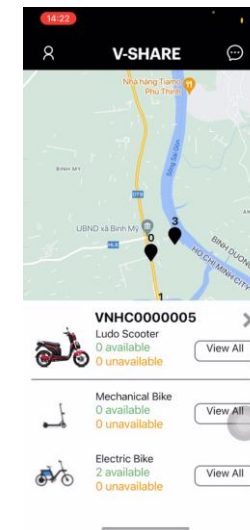
QiQ e-bikes

Challenges & adaptation

- An app is under development – Alternative solution is used – stand-alone GPS and Google forms to unlock the system and operation personnel to support it
- Awareness and legal knowledge needed for demo users.
- UTT to sign an operation contract with a transport company to run the demo on-site

Innovation & opportunities

- Extend the services to new metro lines – 15K passengers/day – that lack last-mile services – use parking lots for docking station
- Collaboration with UNEP-implemented BMU-IKI project - 25 e-mopeds (TAILG) for shared system



V-share app displays

Demo launch – Shared e-moped in Hanoi

Progress

- Pilot launch on 28th November 2022 at parking lot of Aeon mall
- Service is available for free for six months
- Event was joined by official representatives from National government (National Assembly, National Traffic Committee, Ministry of Natural Resources and Environment, the Ministry of Science and Technology, the Ministry of Transport), Local government (Hanoi Department of Transport, Hanoi Public Transport Management Center), SOLUTIONSplus project partners, the manufacturers, UNDP Vietnam, GIZ Vietnam and users
- Widely disseminated – featured in local newspaper
- **Pilot under test operation**
 - Registration of average 5-10 new registered users per day in weekdays and number increases in weekend
 - Data collection on the service quality and improvement needed is on-going



Demo Launch of Shared e-mopeds



Public booking e-mopeds

Policies

- Scale-up concept on EV sharing under development
- Policy Advice Paper on E-bike-sharing system in Hanoi

Capacity building

- Asia regional Training on e-mobility 2021
- Hanoi Specific training 2021 (online) and 2022 (onsite)
- P2P exchanges on e-bike sharing (online)

EU Start-up support

- Charging unit from Betteries (German startup) – using 2nd life battery

Institutional coordination

- Co-ordination with Hanoi People's Committee, MOT and Hanoi DOT

Impact assessment

- Workshop on 28th November 2022 to carry out the impact assessment of the shared e-2 wheelers demonstration actions in Hanoi



National Training on E-mobility in Hanoi city in Nov 2022



Workshop on Impact Assessment of Hanoi EV demonstration in Nov 2022



Living Lab

Kigali Rwanda

Electric moto-taxis

Electric bike share

Kigali: Piloting electric moto-taxis

Information & progress

- The moto-taxi pilot supports local innovator, Ampersand
- Gender-inclusive component: goal is to pilot and scaleup gender-inclusive e-mobility efforts.
- In early 2022, 35 female drivers were recruited and received ad-hoc training. More than half passed driving exam.
- In November 2022, 24 e-moto-taxis from Ampersand handed over to the women having passed the exam in the presence of government officials and of the City of Kigali.
- In addition to the gender-inclusive component, technical support for the drivetrain (Valeo), battery sizing, design and industrialisation strategy (IDIADA, PEM Motion)
- Connection to financiers

Innovation & opportunities

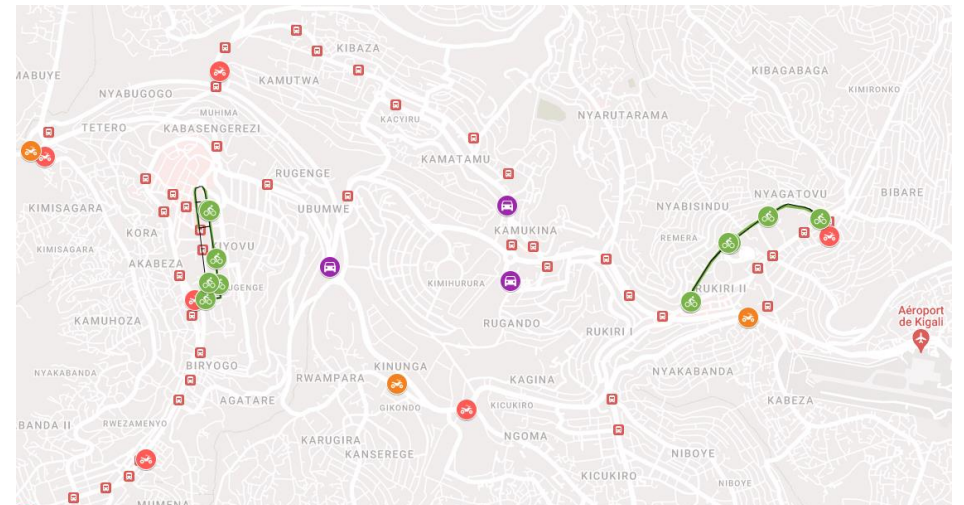
- From 60 to 800+ motorcycles during SOLUTIONSplus time
- Rwanda: scale-up via a NAMA Facility proposal
- Regional market (Kenya, Tanzania); partnership with Total Energies; large market



Kigali: Piloting electric bike-share

Information & progress

- Guraride's bike-share system launched in September 2021: 80 conventional bicycles, deployed on 2 pilot corridors (eastern neighbourhood near a major bus terminal, and in the central business district).
- 50 electric bicycles to be introduced in 2023
- Technical support on the operation of shared systems (redistribution, data, battery charging options)
- Capacity-building on bike-sharing systems (including electric bicycles) include peer-to-peer training on e-bike share systems in February 2022.
- In addition to the bikeshare system, cycling and intermodality is supported through 80 bike racks at strategic locations deployed in July 2022.



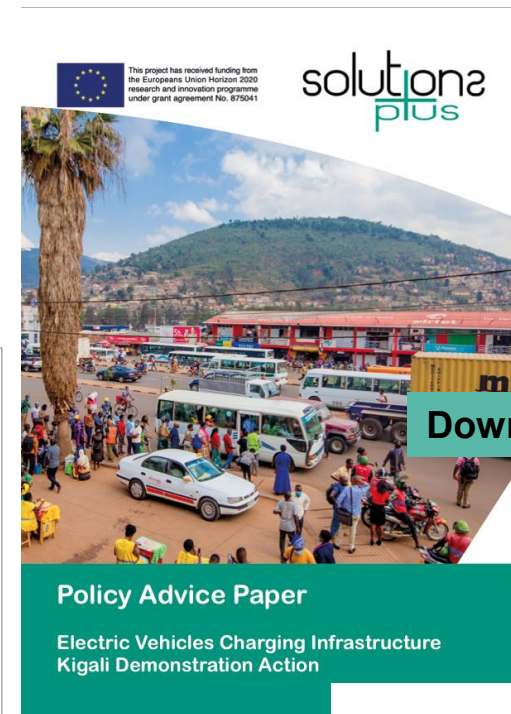
Kigali: Piloting electric bike-share

Elements to aid the pilot e-bike-share

- Policy advice paper on EV Charging Infrastructure with **recommendations on charging for e-bicycles** was presented in January 2022.
- Policy advice paper on fiscal conditions for e-bikes, stressing importance of applying **e-mobility tax reductions in Rwanda to pedal-assist e-bicycles**
- **Coordination between stakeholders:** Supporting City of Kigali in creating an E-Mobility Technical Committee gathering 4x per year => exchanges between public and private stakeholders on policy, incentives, needs, etc.
- Kigali bikeshare financial assessment study is drafted - identification of the coverage area assessment, demand analysis, station mapping, system sizing, system specifications, and system phasing for the Kigali bikeshare

Innovation & opportunities

- Scaling up to build a consistent network; study to identify financial and business model options



Policy Advice Paper

Electric Vehicles Charging Infrastructure
Kigali Demonstration Action



Policy Advice Paper

Electric bicycles in Rwanda:
Fiscal and regulatory framework

Publication

Kigali's experience enabled to identifying 5 key principles for gender-inclusive electric mobility projects: Planning, Training, Retaining, Evaluating and Disseminating, elaborated in the document.

Recommendations are given for scaling up projects in Kigali and replicating similar projects in East Africa.

This report aims to share learnings to:

- Support Kigali-based projects aiming to increase women's role in electric mobility operations as taxi or delivery services.
- Initiate a dialogue and peer exchange among companies based in East Africa with a gender-inclusive focus, particularly for the companies selected in the SOLUTIONSplus replication calls in Kenya, Uganda, Sierra Leone, and Togo.



Key achievements in pilot actions shown for furthering efforts



INFORM

- Toolbox on shared systems, electric 2-wheelers, paratransit, e-mobility policies



INSPIRE

- Topics in Africa regional training: EV Charging Infrastructure (2021), EV battery technologies and end-of-life management (2022), on-site training on public transport electrification (2023)
- Asia regional Training on planning e-mobility 2021 (online), City Specific training 2021 (online) and 2022 (onsite)
- Peer-to-peer exchange on vehicles (bike share systems, three-wheeler electrification)



INITIATE

- Local companies financially and technically supported
- Technical assistance on design, retrofit, component supply, strategy, operations
- Academic collaboration to support living labs



IMPLEMENT

- Vehicles adapted to local conditions, e.g. e-motos battery swapping, frugal vehicles as e-bikes
- Gender-inclusive dimension

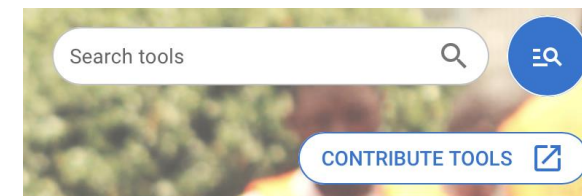


IMPACT

- Impact assessment to support scale-up of demos
- Identify scale-up prospects
- E-mobility plans and policy
- Regionally replicating the gender-inclusive recommendations

E-mobility Toolbox to support development, implementation and monitoring of innovative e-mobility solutions

- For more resources: <https://emobility.tools>
- The e-Mobility Toolbox is an online information portal to support development, implementation and monitoring of innovative electric mobility solutions.
- The structure of the toolbox reflects the priority areas identified through extensive collaboration of stakeholders from government, private sector, academia, finance and civil society working on e-mobility around the globe.



- The e-Mobility Toolbox is a joint product of the EU Horizon 2020-supported SOLUTIONSplus project led by the Urban Electric Mobility Initiative and the Global Electric Mobility Programme to Support Countries with the Shift to Electric Mobility led by the United Nations Environment Programme.
- The development of the toolbox is supported by the European Union and the Global Environment Facility (GEF).

E-mobility Toolbox

- For more resources: <https://emobility.tools>

VEHICLES

E-3 WHEELERS E-CARS E-BIKES E-BUSES E-MOTOCYCLES E-SCOOTERS E-TRUCKS

INTEGRATION

MOBILITY-AS-A-SERVICE (MAAS) SHARED MOBILITY SYSTEMS URBAN MOBILITY PLANS

OPERATION

BATTERIES CHARGING MAINTENANCE

DEMONSTRATIONS

AFRICA ASIA EUROPE LATIN AMERICA AND THE CARRIBEAN

POLICY

ENERGY SYSTEMS ENVIRONMENT PLANNING VEHICLES

BUSINESS AND FINANCE

BUSINESS MODELS FINANCING SCHEMES PROCUREMENT GUIDELINES

SUSTAINABILITY

AIR POLLUTION CLIMATE CHANGE ECONOMIC SUSTAINABILITY GENDER SAFETY

SUSTAINABILITY

AIR POLLUTION CLIMATE CHANGE ECONOMIC SUSTAINABILITY GENDER SAFETY

Lessons learned: Understanding users' mobility needs / stakeholder engagement

- Understanding local context (baseline, trends, stocktaking of EV deployments, users, etc.)
 - *Where are we now? Where are we headed?*
 - *Who are the potential users? What mobility needs to they have?*
- Pilot demonstration
 - *What is suitable?*
 - *What have we learned from experience?*
 - *How do we address those?*
 - *How do we design the systems better?*
- Addressing gaps in policies to ensure integration o EVs
 - *Which areas are under the city government's mandates? Which are national government's?*



Stakeholder meeting in Pasig City Hall, July 2019

Lessons learned: Present a holistic program to city stakeholders

| Evaluation framework | Emission inventory, baseline; health mapping | Pilot demo | Business models | Capacity development | E-mobility roadmap | Policy support & institutionalization | City replication roadmap & scaleup |
|---|--|---|--|--|--|---|---|
| <ul style="list-style-type: none"> • To measure success of pilots in fulfilling their objectives; • To identify impacts of various e-mobility solutions | <ul style="list-style-type: none"> • Emission inventory of air pollution sources • Mapping of air pollution-related health outcomes • Air quality data and monitoring | <ul style="list-style-type: none"> • Vehicle - Electric 2/3-wheelers; Electric quadricycle; Flexible electric vans • Operation: Public charging solutions • Integration: Integrated and shared urban solutions (passenger and logistics) | <ul style="list-style-type: none"> • Business plan dev't to sustain activities on commercial basis after project. • Address prerequisites in policy, regulatory and market environments for the success of a measure or business model | <ul style="list-style-type: none"> • Capacity-building on electric mobility • Capacity building on mobile source emission inventory • Identify gaps b/w present capacity & future desired skills; envisioning desired state | <ul style="list-style-type: none"> • City's vision for e-mobility • Targets and timeline • Need for e-mobility in the city – results of EI, health mapping, e-mobility landscape in the city, & baseline assessment | <ul style="list-style-type: none"> • Policy support • Policy proposals for local and national governments; financing institutions | <ul style="list-style-type: none"> • Facilitate scaleup and replication of innovative technologies and business model tested |

Action points



1. Define vision!

2. Monitor, evaluate, adjust; Improve data to inform policy and planning: Where are you now, where are you headed, what are suitable solutions?

3. Build expertise, facilitate skill development and peer learning

4. Proactive dissemination and stakeholder engagement

5. Scaleup and/or replicate pilot opportunities where suitable! Foster the take-up of e-mobility innovations





SOLUTIONSplus



Scan me

Follow us



<https://www.solutionsplus.eu>



Urban Electric Mobility Initiative (UEMI)



Scan me

Follow us



<https://www.uemi.net>



Urban Living Lab Center (ULLC)



Scan me

Follow us



<https://www.living-lab.center>

Kathleen Dematera Contreras
kathleen.dematera@uemi.net