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solutions plus



SOLUTIONSplus transformative Living Labs

Imprint

About

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Title

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

Contributing partners

SOLUTIONSplus Consortium Partners

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Project Partners



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Project Information

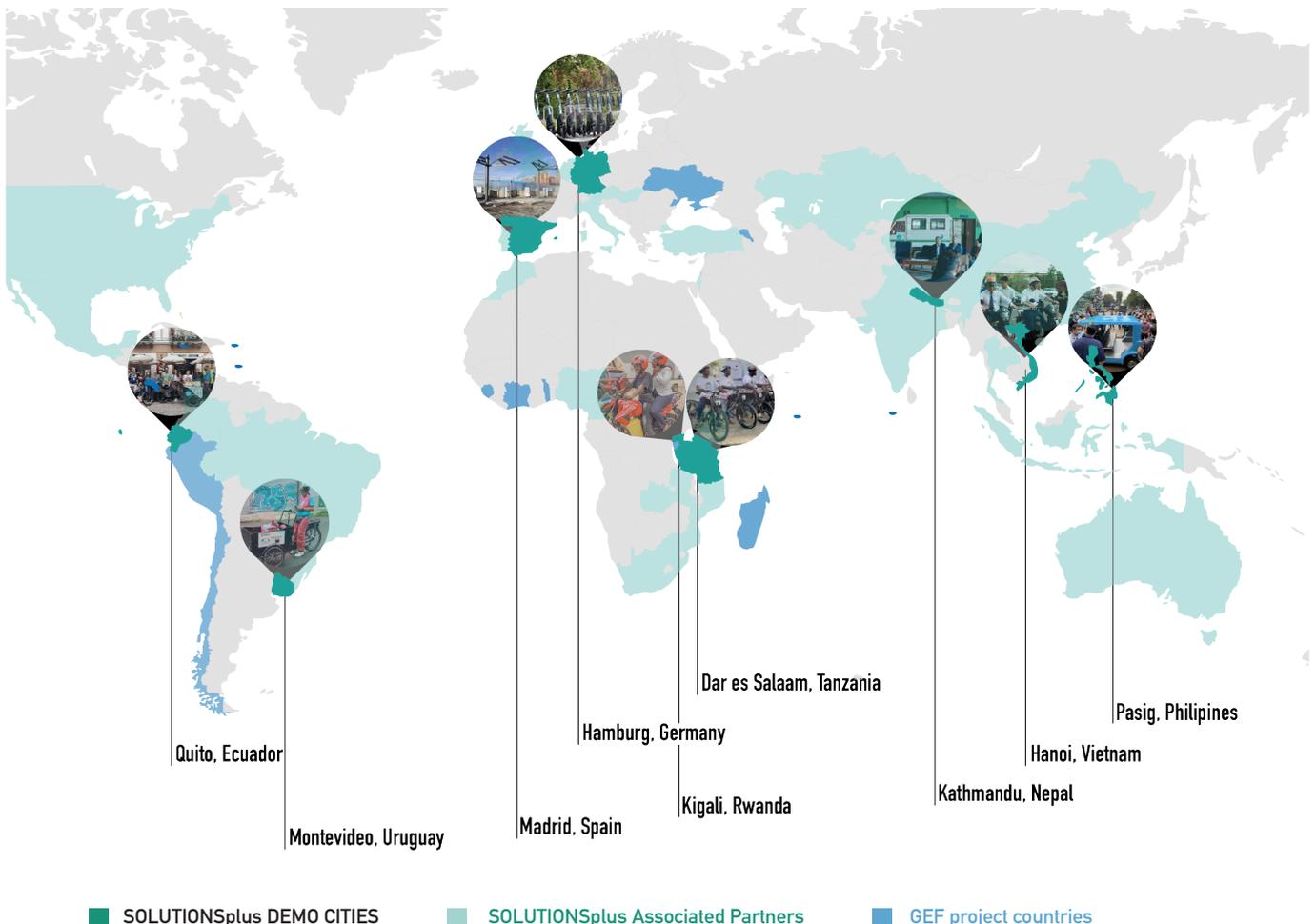
SOLUTIONSplus (INCO Flagship Project) Integrating Urban Electric Mobility Solutions in the Context of the Paris Agreement, the Sustainable Development Goals and the New Urban Agenda

SOLUTIONSplus is an **international flagship project** to support the global transition to sustainable mobility. In the context of the EU-funded SOLUTIONSplus project **47 partners and over 100 associated partners** work together on transformative change towards sustainable urban mobility through innovative and integrated electric mobility solutions. The team of local authorities, knowledge and finance partners, industry, networks, and international organizations will help boosting the availability of public and shared electric vehicles, foster the efficiency of operations and support the integration of different types of e-mobility in urban areas that meet the needs users and local conditions in Europe, Asia, Africa, and Latin America. **The project started implementing e-mobility solutions for the first and last mile (electric two and three-wheelers), electric buses and minibuses, innovative charging solutions and multimodal journey planners in ten partner cities and has initiated replication actions across the partner regions in Europe, Asia, Africa, and Latin America.**

The consortium develops, tests, and replicates innovative, intermodal e-mobility solutions to address the increased demand for personal and freight transport and the related challenges. The focus for the e-mobility

innovations is on shaping energy use, providing access for all, creating business opportunities, and developing concepts that can make a direct contribution to a low-carbon development. The emphasis on shared and public transport fleets of the project also helps to address, urban congestion, access to jobs and services, and influence land use. A core element of the SOLUTIONSplus concepts is an integrated and balanced approach that addresses social, economic, and environmental issues. Local value generation and job opportunities in the partner countries is a key focus for the SOLUTIONSplus vehicle platforms and business models.

The project has launched the co-development of **demonstration actions** to test different types of innovative and integrated e-mobility solutions, complemented by a comprehensive toolbox, capacity development and replication activities. Demonstration actions have been launched in **Hanoi (Vietnam), Pasig (Philippines), Lalitpur/Kathmandu (Nepal), Nanjing (China), Kigali (Rwanda), Dar es Salaam (Tanzania), Quito (Ecuador), Montevideo (Uruguay), Madrid (Spain) and Hamburg (Germany)**. The replication in twenty additional cities are closely coordinated with the sister project funded by the **Global Environment Facility**.



Short Summary on the Implementation process in the SOLUTIONSPlus Demonstration Cities:

Hamburg



1. **4 physical e-scooter parking zones** have been implemented.
2. T-Systems initiated and coordinated the **electrification of the taxi fleet** together with the city of Hamburg.
3. The living lab Hamburg was accompanied by the integration of a Low Carbon Mobility Monitoring (LCMM) tool to **measure the fuel or electricity consumption and emissions of taxis**.

Madrid



1. Completion of the infrastructure works for the installation of the **ABB charging solution Carabanchel bus depot**.
2. **Development of software solutions** towards support of multiple pantographs by an advanced multi-outlet bus charging solution
3. **Testing** a mobile inverted pantograph provided by ABB.
4. Managing the **new mobility** hub with charging solutions for diverse services at Fuente de la Mora P&R facility.

Pasig



1. Shared use of **smart, multi-purpose**, locally-designed and produced e-quadricycles **for passenger and cargo** to support the City's day-to-day operations.
2. Local manufacturer - Tojo Motors Corp. **completed development of the prototype** of the flexible electric vehicle.
3. With the help of **De La Salle University**, an integrated platform that features a booking app, a fleet management interface, and a systems and components monitoring is currently being developed.
4. The shared system will also feature innovative **Flexible Electric Vans (FLEV)**, that has been developed through funding from the Philippine Department of Science and Technology (DOST).

Hanoi



1. Procurement and arrangements for last mile connectivity for **fifty units of e-mopeds** (Vinfast Ludo).
2. A first trial from QiQ was conducted and **IoT was installed for V-Share**.
3. The **pilot project for last-mile connectivity was launched** in Hanoi to offer a connection between a BRT Station (Van Khe) and the AEON Mall in Ha Dong using electric two-wheelers. The shared e-mobility system consists of **electric 2-wheelers** (50 e-mopeds and 10 QiQ e-bikes).

Kathmandu



1. Sajha Yatayat has selected a supplier for the supply & delivery of a conversion kit for **the conversion of a converting a diesel bus to an electric bus**
2. Prototypes for remodelling of e-3 wheelers (Safa Tempo) for passenger and cargo use cases by local company – Clean Energy International (CEI), **are ready and are on the test run.**
3. **Prototypes** for a new design of e-3 wheelers with a multi-use concept and e-shuttle vans are complete.
4. SOLUTIONSplus launched the **electric 3-wheelers** in Kathmandu 11/2022 as the first phase.

Quito



1. Two components: 1) the **multimodal e-mobility hub** in the Historic Center of Quito and 2) the **Mobility as a Service (MaaS)** app.
2. Multimodal e-mobility hub in the Historic Center of Quito with **10 e-cargo bikes**, locally manufactured, deployed at the area to transport supplies, goods, light parcels and recycled materials with two months of operations (11/2022 to 1/2023)
3. **Four operating schemes and seven participants** including a local fruit and vegetable vendor, restaurants, a bike messenger association, two courier companies and two waste picker's associations.
4. **Testing a Mobility as a Service Application (MaaS App)** for Public Transport.

Montevideo



1. SOLUTIONSplus and the **Julio Ricaldoni Foundation (FJR)** hosted an event to **launch the LEV prototypes locally produced.**
2. The SOLUTIONSplus delegation joined the Municipality (IM) and the Public Utility Company (UTE) teams in the Ciudadela Terminal for a **site visit** that was followed by a working session.
3. The procurement process will be **launched soon** and the e-taxi chargers needed have been secured via the 2nd EU Innovators Call.
4. The **urban logistics component** was carried out with the support of the **MOVÉS Project** of the Ministry of Industry and Energy and the Julio Ricaldoni Foundation (FJR). For the pilot, two e-cargo bikes, one of each manufacturer, were introduced in the operations of PedidosYA, the Latin American subsidiary of Delivery Hero, for a period of two weeks.

Kigali



1. Two main components: 1) **Electric bicycles** 2) **Gender-inclusive e-motos**
2. The bikeshare system was launched in September 2021 with **80 conventional bicycles**, to be completed by **50 e-bikes** in mid-2023.
3. In July 2022, **80 bike racks** were deployed at strategic locations.
4. In November 2022, **24 electric motorcycles** were handed over to the women trained and having successfully passed the driving exam.

Dar es Salaam



1. Two main components: 1) **Electric tuk-tuks** for passenger services 2) **Pedal-assist electric bicycles** for urban deliveries and medical supplies
2. Unprecedented data was collected in 2021 and 2022 to electrify feeder tuk-tuks to the Bus Rapid Transit (BRT) network. **Electric tuk-tuk prototypes** locally developed (new and retrofitted) will be launched in the first quarter of 2023.
3. In November 2022, **16 pedal-assist electric bicycles** co-designed with a German company were locally assembled and handed over to the cooperative.

Hamburg, Germany

Dominik Radzuweit, Hamburger Hochbahn:

“SOLUTIONS plus provided the opportunity to expand e-scooter sharing to the outskirts of the city and to explore how privately operated solutions can complement collective public transport. Now the number of e-scooters in the demonstration areas exceeds the initially planned number, and more providers are following.”

<p>Inform</p>	<p>The Hamburg demonstration action provided tools and different types of knowledge products for the SOLUTIONSplus online tool-box, addressing the knowledge gaps identified in the course of the project. Moreover, a site visit to an e-bus depot in Hamburg was arranged in the context of the 2022 SOLUTIONSplus General Assembly.</p> <p>Examples of open-access knowledge products created and published include presentations on public transport and MaaS in Hamburg, the e-scooter project, and the integration of shared e-mobility into the transport system.</p>
<p>Inspire</p>	<p>Capacity-building activities comprised a comprehensive online workshop on the 5th & 6th of May 2022 to exchange experiences on shared e-mobility. The course was jointly organised by SOLUTIONSplus and MOBI-MIX. The event gathered European frontrunners in the field of shared micro-mobility, including 13 cities and local authorities and several public transport and micro-mobility operators.</p> <p>Regarding the electrification of Hamburg’s taxi fleet, T-Systems and Polis organized the City Dialogue to promote and replicate the activities in other German cities, including Bremen, Hannover and Leipzig.</p>
<p>Initiate</p>	<p>Following a tender process, HOCHBAHN subcontracted TIER mobility as solution provider in the two demonstration areas (Lokstedt and Langenhorn). This process initiated an extension of operation areas beyond the city centre.</p> <p>The Zukunftstaxi project will continue until the end of 2023. The project is accompanied by a bi-weekly meeting with taxi owners and fleet operators. T-Systems will foster the replication in other cities and regions to ensure the long-term sustainability.</p>



<p>Implement</p>	<p>The first e-scooters were launched in June 2021. HOCHBAHN provided dedicated parking zones at Metro stations in the demonstration areas. In the meantime, more than 300 e-scooters are located in the demonstration area, which exceeds the initially planned number of 200 vehicles, and TIER mobility explained to uphold their service in the demonstration areas beyond the project's lifetime. Moreover, other e-scooter providers followed and extended their service areas to the demonstration sites. T-Systems initiated and coordinated the electrification of the taxi fleet together with the city of Hamburg. The demonstration project shows the potential to reuse the existing telecommunication infrastructure and the electricity distribution network of a telecom operator for the electrification of car fleets. ComfortCharge installed the charging infrastructure at the premises of Deutsche Telekom. T-Systems brought together all stakeholders, including car manufactures, taxi operators, taxi fleet management software companies, advertising companies and the German taxi association.</p>
<p>Impact</p>	<p>After fifteen months of operations (June 2021 to end August 2022), ca. 160,000 journeys in the demonstration areas were recorded. Vehicle data and a user survey revealed seasonal ups and downs, with February being the month with fewest trips, and August being the month with the highest number of trips. Highest demand was during the morning and late afternoon, which indicates that e-scooters have been used mostly for commuting rather than for leisure activities. Start and end points of trips were concentrated in parking zones around metro stations. The user survey confirmed that the e-scooters have been used as part of intermodal travel chains, as first and last mile connection to public transport stations.</p> <p>The e-taxi charging activities in Hamburg are accompanied by the integration of a Low Carbon Mobility Monitoring (LCMM) tool to measure the fuel or electricity consumption and emissions of taxis. During the first 18 months of the Zukunftstaxi project it was shown that savings of 10-15 % fuel consumption or electricity is possible with eco-driving.</p> <p>According to Karen van der Linde and Dominik Radzuweit from the Hamburger Hochbahn AG “the demo project will help to test under which conditions last mile mobility solutions like e-scooters can work out in the outskirts and thereby also enable the city to gain more experiences with this kind of vehicle and drive technology.” In this way, it will be possible to increase the number of residents who have access to these mobility services, achieve the best possible mobility mix in the city, and help Hamburg achieve its climate protection goals.</p>



An example of an E-scooter Parking Zone Established in Hamburg

Preliminary Results

T-Systems initiated and coordinated the electrification of the taxi fleet together with the city of Hamburg.

ComfortCharge installed the charging infrastructure

The first e-scooters were launched in June 2021

Site visit to an e-bus depot in Hamburg

More than 300 e-scooters are located in the demonstration area

SOLUTIONSplus online toolbox

SOLUTIONSPPLUS UPDATE

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Madrid, Spain

<p>Inform</p>	<p>Tools and different types of knowledge products on charging infrastructure, batteries and e-buses were incorporated in the SOLUTIONSplus online toolbox and shared with the city, addressing the knowledge gaps identified in the course of the project. Members of the Madrid team participated in exchange sessions and training activities. First results from the demonstration action were presented at conferences and events, including the TRA in Lisbon.</p> <p>The open-access knowledge products created as part of the Madrid demonstration and published in the SOLUTIONSPlus toolbox include presentations on the local bike-sharing system BiciMad and Madrid’s micromobility regulation, a fact sheet on the vehicles and operation of the e-bike sharing system in Madrid, and an introduction to SAE (Sistema de Ayuda a la Explotación), the control system for the operation of EMT Madrid.</p>
<p>Inspire</p>	<p>A total of four modules were conducted in the Regional Training Programs of 2021 and 2022, addressing the gaps identified in the Technical Needs Assessment carried out in 2020. i.e., 1) low-carbon urban logistics, 2) LEV regulations, 3) charging infrastructure, and 4) e-buses. Moreover, members of the Madrid city team participated in the site visit to an e-bus depot in Hamburg in the context of the 2022 General Assembly.</p> <p>As part of the SOLUTIONSPlus peer-to-peer training project, the Madrid Urban Living Lab partners had the opportunity to share their knowledge, experiences and feedback with interested stakeholders from Asia, Africa and Latin America. The lessons shared focused on micromobility and regulations, as well as the implementation and operation of e-bike sharing systems.</p>



Mono post structures for the inverted pantographs



E-Bus in Madrid

<p>Initiate</p>	<p>The main components of the demonstration action are centred around e-bus charging in the Carabanchel bus depot. More recently, a new mobility hub with charging solutions for diverse services (carsharing, BiciPark...) at Fuente de la Mora P&R facility was opened as a second component.</p>
<p>Implement</p>	<p>The main activities carried out in the Carabanchel bus depot comprise the completion of the infrastructure works for the installation of the ABB charging solution in the bus depot, the development of software solutions for supporting multiple pantographs by an advanced multi-outlet bus charging solution, and the testing of a mobile inverted pantograph provided by ABB. For the depot "Carabanchel" in Madrid with 50 charging stations a Smart Charging concept has been elaborated. The precondition was that the charging scheme must not influence the operation of the bus fleet. The Madrid team also managed the new mobility hub.</p>
<p>Impact</p>	<p>The expected impact of charging e-Busses with the inverted pantograph technology is to facilitate the charging process. It requires no personnel (in contrast to the plugging process) and offers further advantages regarding safety & security, which enable the usage of a higher voltage and thus higher charging power. In total, this technology enables a faster introduction of an electric bus fleet (target for the city of Madrid: multiply the number of electric vehicles by ten in the next 8 years) due to a facilitated and faster charging process.</p> <p>The following changes in the charging scheme were suggested:</p> <ul style="list-style-type: none"> • The charging starts at midnight, whereas before charging started at 23:30 and also the peak load occurred before midnight • The charging ends at 04:00 in the morning, with a constant total charging power for the whole duration. Before, the charging power reached a peak before midnight and was decreasing step by step until 02:45 in the morning <p>With these changes and the constant total charging power managed by the smart charging software, the peak load can be reduced significantly from 3000 kW (3 MW) to 1500 kW (1.5 MW). Further, the biggest part of the energy is consumed outside of the peak hours.</p> <p>Due to this smart charging strategy, which can be applied for up to 50 charging points, saving of 50.000 €/Year could be achieved without changing the current power tariff.</p>

Preliminary Results

 <p>Peer-to-Peer Training with stakeholders from Africa, Asia and Latin America</p>	 <p>Various presentations specific to Madrid</p>
 <p>Demonstration action are centred around e-bus charging in the Carabanchel bus depot</p>	 <p>Site visit to an e-bus depot in Hamburg</p>
 <p>Charging e-buses with the inverted pantograph technology is to facilitate the charging process.</p>	 <p>SOLUTIONSplus online toolbox</p>

Pasig, Philippines

Pasig City Mayor Vico Sotto, 5th December 2022 :

“Pasig demo is a clear indication of the local government moving in the right direction, away from using fossil fuels. Pasig city government is pushing for alternative mobility. We have planned to ramp up the number of our electric vehicles until our local government’s whole fleet is utilizing e-vehicles.”

<p>Inform</p>	<p>Knowledge products related to demo activities and e-mobility in general, such as light electric vehicles, urban logistics, charging infrastructure, and vehicle integration, were incorporated into the SOLUTIONSplus online toolbox and shared with the city. This has supported Pasig city in understanding the technicality as well as policy and planning aspects of the e-mobility system.</p>
<p>Inspire</p>	<p>Pasig stakeholders joined the Asia regional and Pasig-specific training on e-mobility in 2021 and 2022. In May 2021, SOLUTIONSplus organised an online training on ‘How e-mobility and integrated urban mobility planning can contribute to the SDGs in Asian cities’. The Asia Regional training (online), which followed in October 2021, provided a combination of introductory knowledge about the electric mobility sector and the prerequisites for planning the electric mobility ecosystem, as well as specialized topics on electric vehicle management, selecting and setting up charging infrastructure, and cross-cutting topics. In the same month, Pasig-specific training (online) discussed those topics addressing the local context.</p> <p>In December 2022, Pasig City organized a 3-day training focusing on the rôle of Philippine cities on EV adoption and planning for charging infrastructure. The event also facilitated knowledge exchange between the Pasig City Government and six other Philippine city governments who showcased their respective e-mobility initiatives and experience. Various city representatives from the transport, planning, environment, and council offices joined the discussion on how to address capacity and policy gaps to foster the uptake of e-mobility in their cities.</p>
<p>Initiate</p>	<p>On the 5th of December 2022, the e-quadricycle or e-quad was officially launched as part of the pilot demonstration of the SOLUTIONSplus Project in Pasig City. The event was attended by members of the Pasig City Government, team members of the SOLUTIONSplus Project (Clean Air Asia, Wuppertal Institute and Urban Electric Mobility Initiative [UEMI]), as well as representatives from ToJo Motors. City Mayor Hon. Vico Sotto gave the keynote speech and was accompanied by Vice-Mayor Dodot Jaworski, Congressman Roman Romulo, and members of the City Council during the inspection of the e-quad prototype at the venue.</p> <p>The e-quads and FLEVs are envisioned to provide valuable insights into using of such multi-purpose, smart, locally designed and assembled EVs in lieu of the current internal combustion engine vehicles in the City Government’s fleet. Moreover, the presence of such a cohesive pilot intends to inspire others as to what might be possible with the entry of such systems. This comes as an effort to deliver sustainable urban mobility solutions to the City, especially as local government units in the Philippines are required to increase the share of electric vehicles in their fleet with the passage of the Electric Vehicle Industry Development Act (EVIDA) in 2022.</p>

Preliminary Results



Academic collaboration with De La Salle University on the development of the prototype of Flexible electric van (FLEV) and booking app



Powertrain integration and testing of 48-V motors from Valeo



15 E- quadricycle, 1 prototype launched - a smart vehicle for passenger and cargo use case



The booking app was tested by Pasig City’s different office representatives



E-quadricycle for 4 passengers bear a maximum load of 450 kilograms



Enhance the Philippine Urban Mobility Programme (PUMP) with better e-mobility integration



230 people trained in Pasig-specific e-mobility training

<h2>Implement</h2>	<p>In Pasig City, the pilot demonstration involves the shared use of e-quadracycle for passenger and cargo use to support the City's day-to-day operations.</p> <p>E-quadracycle and FLEV prototype development: Local manufacturer - Tojo Motors completed development of the prototype of the flexible electric vehicle. Due to changes in the specifications of some vehicle parts from suppliers (e.g. China standardized the battery capacities so the originally proposed specification has been phased-out), the specifications for both e-quadracycle and FLEV had to be changed accordingly. They are currently in production phase using these newly updated supply parts. Combining the nimbleness of smaller vehicles and the carrying capacity of larger vehicles, the e-quad can accommodate four passengers and bear a maximum load of 450 kilograms. Another vehicle that will be used for the pilot demonstration is the flexible electric van or the FLEV. The FLEV is being developed by ToJo Motors and the De La Salle University through a funding mechanism of the Department of Science and Technology, and features a chassis that can be used for multiple purposes. Both vehicles are modular in nature and can be configured in a variety of ways to suit the vehicle requirements of their end-users, which will primarily be the different offices of the Pasig City Government. Tojo motors received advisory support on FLEV Chassis structural Assessment from PEM motion (German start-up, selected from EU Innovators call).</p> <p>Booking app: With the help of De La Salle University, a booking app is currently being developed, which will be used by Pasig City offices to reserve and schedule a vehicle of their choice for use in the conduct of their respective operations. The booking app was tested for use by Pasig City's different office representatives. As a proxy to the SOLUTIONSplus e-quadracycles and FLEV that have yet to be produced, the app trial run was used on Pasig City's current vehicle fleet, which include their existing e-tricycles. The feedback from the app trial run was used to modify some features of the app and customize it according to the operational needs of Pasig City government. The booking app is ready for use once the e-quadracycles and FLEV are on the ground for the vehicle demo test.</p>
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E-Quad Showcase Event in Pasig City (December 2022)



E-Quad Showcase Event in Pasig City (December 2022)

<h2>Impact</h2>	<p>The impact assessment of the demonstration activity in Pasig is currently underway to assist in scaling up the project. In the Philippines, the National Urban Mobility Programme, locally called the Philippine Urban Mobility Programme, or PUMP, concept document has been developed to operationalize the National Transport Policy. SOLUTIONSplus will develop a paper to enhance the said document further looking into unlocking urban mobility opportunities through electrification and taking into account the lessons learned from the pilot demonstration. A policy paper focusing on catalyzing city-level actions on e-mobility and sustaining pilots will also be formulated to form pathways for e-mobility uptake.</p>
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Hanoi, Vietnam

Prof. Dr. Vu Ngoc Khiem, Associate Professor at University of Transport Technology, 28th Nov 2022:

“With the desire to develop a green and sustainable city in the future by reducing harmful emissions from the transport sector, the University of Transport Technology hopes that the pilot (on shared e-2 wheelers) will promote and drive positive changes to urban transport through new solutions for electric mobility, thereby contributing to the achievement of global climate and sustainable development goals.”

<p>Inform</p>	<p>Hanoi stakeholders benefited from the knowledge products related to demo activities and e-mobility in general, such as shared mobility system, charging infrastructure, and vehicle integration services, that were incorporated in the SOLUTIONS-plus online toolbox.</p>
<p>Inspire</p>	<p>Hanoi stakeholders joined the Asia regional and Hanoi-specific training on e-mobility in 2021 and 2022. In May 2021, online training on ‘How e-mobility and integrated urban mobility planning can contribute to the SDGs in Asian cities’ was organised. The Asia Regional training that followed in October 2021 provided a combination of introductory knowledge about the electric mobility sector and the prerequisites for planning the electric mobility ecosystem, as well as specialized topics on electric vehicle management, selecting and setting up charging infrastructure, and cross-cutting topics. In the same month, Hanoi-specific training (online) discussed those topics addressing the local context.</p> <p>In November 2022, a 2-day national training on e-mobility was organised in Hanoi jointly with UNDP. Various national and international experts discussed local and international experiences on integrating e-mobility into planning, technical details on electric vehicles and charging infrastructure. Representatives from local government, academia and private sectors actively participated in the training.</p>
<p>Initiate</p>	<p>To operationalise a shared e-2 wheeler system in Hanoi, a local start-up, QiQ Elevate Mobility, was awarded with a seed funding. QiQ is also developing the V-Share app for booking and returning vehicles, as well as monitoring battery status. A Vehicle Communication Unit connects the vehicle into a networking system. A charging unit from Betteries (German start-up selected from EU-Innovators call) using second life batteries will also be installed at a docking station. The local partner, University of Transport Technology (UTT), is also in close collaboration with UNEP for implementing a similar shared e-2-wheeler system in Hanoi and for expanding the services.</p>



Photos from the Events Held in Hanoi in November 2022

<p>Implement</p>	<p>Hanoi demo on shared e-mobility systems for last mile connectivity will be piloted in two major locations, at a BRT station and AEON shopping mall within a distance of 2 kms. The shared e-mobility system consists of electric 2-wheelers (50 e-mopeds and 10 QiQ e-bikes).</p> <p>The main activities carried out in Hanoi during the reporting period are:</p> <p>E-mopeds procurement and arrangements for last mile connectivity: Fifty units of e-mopeds (Vinfast Ludo) are procured to provide last mile services and charging system from Vinfast will be installed. In order to apply for permission to operate a shared e-mobility system, UTT carried out several meetings with local authorities. An approval from Hanoi People’s Committee has been obtained. Vehicle registration is complete and the license plate of each e-moped are installed. A dedicated E-2 wheelers parking hub is selected and the construction is complete. To ensure drivers safety, helmets are provided in each e-mopeds and insurance documents (vehicle owner’s liability insurance and accident insurance for passengers) are prepared. A trial operation of the e-moped took place prior to demo launch.</p> <p>App and IoT: A first trial for V-Share from QiQ was conducted and IoT was installed, a fully functioning app is under development by QiQ.</p> <p>Shared e-moped showcase event in Hanoi : On the 28th of November 2022, the pilot project for last-mile connectivity was launched in Hanoi to offer a connection between a BRT Station (Van Khe) and the AEON Mall in Ha Dong using electric two-wheelers. The pilot demonstration, which initially covers 2 km, is to be supported by a newly built app, V-Share, and the ambition is to gradually replace the shuttle service currently provided by diesel-run vans with an electric 2-wheeler-sharing or bike-sharing program.</p> <p>The service is available for the use of the public for free for six months. Three types of two-wheelers are made available for the project: e-mopeds from Vietnamese manufacturer VinFast (Ludo); e-mopeds from Chinese manufacturer TailG, and; e-bikes from Vietnamese start-up QiQ.</p> <p>A charging unit from Betteries (German start-up selected from EU-Innovators call) using second life batteries will be installed at Aeon mall. Betteries will provide a better pack (2.3kWh, 2kW) with an inverter and casing.</p>
<p>Impact</p>	<p>SOLUTIONSplus organized a workshop on 28th November 2022 to carry out the impact assessment of the shared e-2 wheelers demonstration actions in Hanoi. Ten key local stakeholders joined the workshop and discussed the priority indicators. Along with this, a scale-up concept note is being developed to improve ridership and to expand the services to another route. A policy paper on e-bike sharing system in Hanoi, currently being drafted, considers barriers, opportunities and policy recommendations for the successful planning process</p>

Preliminary Results

 Knowledge and training hub established to share learnings from living lab activities

 50 units of e-mopeds to provide last mile services and charging system from Vinfast

 Cargo e-motorbikes launched in collaboration with UNEP

 Charging units at the docking stations from Vinfast and 1 unit from Betteries using 2nd life batteries

 App and IoT for the booking and returning e-mopeds

 210 people trained in Hanoi-specific e-mobility training

Kathmandu, Nepal

Bhushan Tuladhar, Sajha Yatayat Board member, May 2022:

“Public transportation going to electric is important (for Nepal). As international projects like SOLUTIONSplus bring together public transport operators and experts from different regions, share experiences on e-mobility, and help each other out, we have a better opportunity for expanding and improving the public transport services in Nepal and in Sajha Yatayat.”

<p>Inform</p>	<p>Knowledge products related to demo activities and e-mobility in general, such as e-buses, vehicle retrofitting, light electric vehicles, urban logistics, charging infrastructure, and vehicle integration, were incorporated into the SOLUTIONSplus online toolbox and shared with the city. These have supported Kathmandu in understanding e-mobility technicality as well as policy and planning aspects.</p>
<p>Inspire</p>	<p>Kathmandu stakeholders benefited from the Asia regional and Kathmandu-specific trainings on e-mobility, held in 2021 and 2022. In May 2021, an online training on “How e-mobility and integrated urban mobility planning can contribute to the SDGs in Asian cities” was organised. In October 2021, the Asia Regional training provided a combination of introductory knowledge about the e-mobility sector and the prerequisites for planning the e-mobility ecosystem, as well as specialized topics on electric vehicle management, selecting and setting up charging infrastructure, and other cross-cutting topics. As a follow up, these topics were covered in a subsequent Kathmandu-specific training (online) specifically to address local context and challenges. To build technical, financial and managerial capacity, an exchange between Sajha Yatayat and Valeo was facilitated in September 2022. This was followed by a face-to-face workshop in November 2022 on business models and financing for the electrification of public transport in Nepal, which was also joined by government authorities, private sectors and development agencies. Sajha Yatayat then organised e-3 wheelers driver training and e-bus technical training in Kathmandu in November and December 2022.</p>



Photos from the November 2022 Events in Kathmandu

Preliminary Results

- Academic collaboration with DTU and King's College in Kathmandu on pre-feasibility of vehicle integration services
- Prototypes for a new re-modelled e-3 wheelers (Passenger and cargo use case)
- One e-shuttle van and 6 e-3 wheelers with the multi-purpose concept (Passenger, cargo and waste collector) one mini e-truck (conversion to electric)
- Test a second-life battery from Batteries in e-shuttle van
- 200 people trained in Kathmandu-specific e-mobility training
- Co-development of bus conversion from Diesel to e-bus
- Stakeholder consultation on impact assessment of demonstrations

<p>Initiate</p>	<p>To establish an ecosystem of electric mobility to enhance public transport in Kathmandu, two local start-ups were engaged and received seed funding: Clean Energy International (CEI), which supported the development of prototypes for the remodeling of Safa tempos (e-3 wheelers) for passenger and cargo services, and Shree Eco visionary (SEV), for prototypes for a new design of e-3 wheelers with a multi-use concept (passenger, cargo, and waste) and e-shuttle van. A local partner and public transport operator, Sajha Yatayat, is converting a diesel bus to an e-bus – the first of its kind in Nepal. PEM motion, a German start-up selected from the EU Innovators call, also provided advisory support on the structure and design of a cargo vehicle for CEI and an e-shuttle van for SEV. Kathmandu will also test a second-life battery from Betteries (a German start-up selected from the EU-Innovators call) in an e-shuttle van.</p> <p>In an academic collaboration, the Kathmandu demonstration case was also a part of Denmark Technical University (DTU)'s B.Sc. course in June 2021 and February 2022, where students presented concepts on 'Promotion of e-mobility in the public urban transport of Kathmandu, Nepal'. The students from DTU and King's College from Kathmandu prepared two studies on the prefeasibility of vehicle integration services in June 2022. DTU M.Sc. students will also work on the Kathmandu demonstration evaluation in 2023.</p>
<p>Implement</p>	<p>The SOLUTIONSplus project launched the electric 3-wheelers in Kathmandu in November 2022 as the first phase of its demo launch program. Specifically, a remodelled Safa tempo for passenger use and a new e-cargo tempo were launched, manufactured by local companies CEI and SEV, respectively. In December 2022, the prototype of e-3 wheeler (cargo use case) was also readied. All of these prototype vehicles are in the stage of test run, and data collection on the users' and drivers' perception and technical performance is underway as an ex-ante assessment.</p> <p>Sajha Yatayat has selected a local supplier via the public procurement process to supply and deliver a conversion kit for converting a diesel bus to an electric bus. The prototype is planned to be ready by mid 2023.</p>
<p>Impact</p>	<p>To assess the impact of each prototype developed in Kathmandu, a detailed assessment is being conducted. SOLUTIONSplus gathered 14 key stakeholders in November 2022 to advance the impact assessment of selected e-mobility demonstration actions in Kathmandu. This activity will eventually inform and support the scaling up of the EV demonstrations in the city.</p> <p>Nepal's Department of Transport Management is drafting a policy on vehicle conversion and Nepal Electricity Authority is developing infrastructure for a public charging system. To complement these activities, SOLUTIONSplus is developing policy papers on Vehicle conversion and Charging Infrastructure.</p> <p>SOLUTIONSplus will also draft a paper on National Urban Mobility Plan to support developing integrated sustainable mobility planning.</p>



Workshop on Impact Assessment of Kathmandu EV demonstrations



Remodelled Safa tempo – e- cargo prototype

Quito, Ecuador

Mónica Sandoval, Vicechair of the Mobility Commission of the City Council, Municipality of Quito, 18 August 2022:

“SOLUTIONSplus brings together all the elements: the economic recovery, the preservation of the cultural heritage and the possibility of working with local innovators and their great ideas to achieve zero emissions logistics in the HCQ.”

Inform	Tools and different types of knowledge products on low-carbon urban logistics, cycle logistics, light electric vehicles (LEV), charging infrastructure, batteries and e-buses were incorporated in the SOLUTIONSplus online toolbox and shared with the city, addressing the knowledge gaps identified in the course of the project.
Inspire	A total of four modules were conducted in the Regional Training Programs of 2021 and 2022, addressing the gaps identified in the Technical Needs Assessment carried out in 2020. i.e., 1) low-carbon urban logistics, 2) LEV regulations, 3) charging infrastructure, and 4) e-buses. Quito not only benefited from the content presented, but was able to share initiatives that public and private actors are pushing forward in the city (e.g.: Zero Emissions Zone and locally manufactured e-bus). Between July 18th and August 3rd, 2022, a SOLUTIONSplus delegation (WI, FIER and UEMI) joined the local team and held a series of meetings and workshops , where topics such as e-buses, charging infrastructure, MaaS, LEV and urban logistics were discussed with members of national and local entities, as well as with private stakeholders. Additionally, Quito benefited from its participation in other SOLUTIONSplus CB instances, such as virtual and on-site P2P exchanges , site visits, expert advisory boards and international conferences related to e-bike sharing systems, low-carbon urban logistics, last-mile connectivity, e-buses, e-BRT and trolleybuses.
Initiate	In Quito, the start-ups ECargoBikeUIO (10 e-cargo bikes), Sidertech (10 e-quadracycles) and Grupo Miral (4 e-vans) received seed funding for the local design and assembly of different types of LEV, mainly for logistics, but also for passenger transport. Sidertech will receive 10 Valeo drivetrains in a kit to be easily integrated in the e-quadracycles. In addition, PEM Motion , one of the companies selected in the 1st Innovators Call supported ECargoBikeUIO and Sidertech in vehicle design and battery sizing. Further support on vehicle design for Sidertech and Miviltech is expected under the 2nd EU Innovators Call . Finally, SOLUTIONSplus supported the city with the elaboration of a pre-feasibility study for the electrification of 1 BRT corridor.
Implement	<p>Component 1: Multimodal e-mobility hub in the Historic Center of Quito (HCQ)</p> <p>On August 18th, 2022., the LEV prototypes, locally manufactured with the seed funding provided by SOLUTIONSplus, were launched with the local authorities of Quito in the National Polytechnic School (EPN). The activity allowed potential users to test the vehicles and provide suggestions to the design to suit their needs for the design. The manufacturing process of 10 e-cargo bikes was finalised building on the suggestions provided in the launch by the 20 companies that expressed their interest in testing the different types of SOLUTIONSplus vehicles in their operations. Moreover, the local team counted on the support of two local universities, the National Polytechnic School (EPN) and the San Francisco University (USFQ), for the vehicle technical evaluation and the pilot design, as well as the inputs provided by the ZLC. In this context, the first pilot phase of the multimodal e-mobility hub in the HCQ started on November 7th, 2022 and ended on January 6th, 2023. During this period, the pilot worked with 4 operating schemes and 7 users, i.e., 2 food distributors, 1 restaurant, 2 couriers and 2 recycling associations, which were selected on the basis of the ex-ante data collection process carried out in 2021 and the subsequent planning and preparation phase. A private parking lot was rented as a collaborative cross-docking platform, that was used by 3 of the users. In order to extract sound data from the pilot, several tools, such as GPS tracking, surveys and interviews were applied. In the 2 months of the pilot, the e-cargo bikes travelled a total of 1,071 km, carried 16 tons of cargo, made 229 deliveries, collected recyclables from 134 points and achieved an estimated reduction in emissions of 491.74 kg CO₂e. The significant efficiency gains experienced in all operating schemes reveal a high scale-up and replication potential. The phases 2 and 3 of this pilot component, i.e., the 10 e-quadracycles and the 4 e-vans, are planned to start in mid-2023.</p> <p>Component 2: Mobility as a Service (MaaS) app</p> <p>The MaaS app was developed during 2020 and 2021 by Pluservice in permanent exchange with the Mobility Secretariat, the Municipal PTO and the Subway operator in order to ensure that the app is aligned to the local needs of the PT system. In October 2022, with the approval of the Municipal PTO, the pilot design and implementation started. A group of 37 students of the National Polytechnic School (EPN) used the app to plan their journeys, top up their e-wallets, and buy and validate PT tickets between November 21st and December 16th (4 weeks) in the University Station of the BRT System. A total of 216 tickets were issued and 164 tickets validated via app (75% of the issued tickets) for a value of USD 57.40. 88% of the students stated that they will use the App 3 times/week to everyday if the application was publicly available. Moreover, 80% of students agreed that the application should include other PT options and sustainable modes.</p>



Scheme 1: Food provision



Scheme 2: Restaurant with own cross-docking



Scheme 3: Courier



Scheme 4: Collection of recycled materials

Results of the first pilot phase of Component 1



10 e-cargo bikes



154 recycled materials collection points



16 Tons



491.74 kg CO2e



2 months (7 nov- 6 jan)



229 trips



956 packages



1,071 km

Impact

The SOLUTIONSplus team supported the Municipality of Quito in the **review and adjustment** of the Draft Ordinance of Micro-mobility, in which SOLUTIONSplus recommended broadening the scope to include not only personal micro-vehicles, but the full spectrum of LEV. The Municipality adopted the changes, and the draft is about to go to first debate in the City Council. Moreover, the team has been in permanent contact with funding and international cooperation agencies working in the country, such as the World Bank, the Inter-American Development Bank, AfD, GIZ, etc., in order to identify **potential synergies and funding** for the scale-up of the project. In this context, the **GEF7 e-mobility project in Ecuador** (USD 1.3M) will build on the knowledge and experience generated by SOLUTIONSplus and the **ACCESS project** (€2.4M) funded by IKI will add a digital layer to the components implemented under SOLUTIONSplus to consolidate their scale-up and replication.

Montevideo, Uruguay

Belén Matuone, Logistics Manager, PedidosYA Uruguay, 25 January 2023:

“SOLUTIONSplus e-cargo bikes have an important potential in the new business lines that PedidosYA is developing, due to their larger carrying capacity and their contribution to sustainability in comparison to the ICE motorcycles that currently represent 80% of our total fleet.”

<p>Inform</p>	<p>Tools and different types of knowledge products on low-carbon urban logistics, cycle logistics, light electric vehicles (LEV), charging infrastructure, batteries and e-buses were incorporated in the SOLUTIONSplus online toolbox and shared with the city, addressing the knowledge gaps identified in the course of the project.</p>
<p>Inspire</p>	<p>A total of four modules were conducted in the Regional Training Programs of 2021 and 2022, addressing the gaps identified in the Technical Needs Assessment carried out in 2020. i.e., 1) low-carbon urban logistics, 2) LEV regulations, 3) charging infrastructure, and 4) e-buses. Montevideo not only benefited from the content presented, but was able to share initiatives that public and private actors are pushing forward in the city (e.g.: the charging infrastructure network and business models for e-mobility).</p> <p>Between July 2nd and 8th, 2022, a SOLUTIONSplus delegation (WI, FIER and UEMI) joined the local team and held a series of meetings and workshops, where topics such as e-buses, charging infrastructure and multimodal charging were discussed with members of national and local entities, as well as with private stakeholders.</p> <p>Additionally, Montevideo benefited from its participation in other SOLUTIONSplus CB instances, such as virtual and on-site P2P exchanges, site visits, expert advisory boards and international conferences related to e-bike sharing systems, low-carbon urban logistics, last-mile connectivity and e-buses.</p>
<p>Initiate</p>	<p>In Montevideo, the start-ups CargoBikeUY (5 e-cargo bikes), Wheele (3 e-cargo bikes) and GreenStar (2 e-tricycles and 2 e-quadracycles) received seed funding for the local design and assembly of different types of LEV, mainly for logistics. GreenStar will receive 2 Valeo drivetrains in a kit to be easily integrated in the e-quadracycles. In addition, PEM Motion, one of the companies selected in the 1st EU Innovators Call supported CargoBikeUY and GreenStar in the vehicle design. The 8 e-cargo bikes and 2 e-tricycles are finalised, pending only the 2 e-quadracycles. The second EU Innovators Call will focus on supporting the consolidation of Montevideo’s charging ecosystem and the retrofitting of utility vehicles. Finally, SOLUTIONSplus supported the city with the elaboration of a pre-feasibility study for the electrification of 1 bus line connected to the Ciudadela Terminal.</p>



<p>Implement</p>	<p>Component 1: Multimodal charging hub in Ciudadela Terminal On July 6th, 2022, SOLUTIONSplus and the Julio Ricaldoni Foundation (FJR), one of the local partners of the project, hosted an event to present the progress towards implementation of the two components of SOLUTIONSplus in Uruguay and to launch the LEV prototypes locally produced by 3 Uruguayan companies. The presentation was followed by a workshop with the national and local authorities to discuss the actions needed to scale-up the previously implemented initiatives related to e-mobility. On July 7th, 2022, the SOLUTIONSplus delegation that was on the ground (FIER, WI, UEMI) joined the Municipality (IM) and the Public Utility Company (UTE) teams in the Ciudadela Terminal for a site visit that was followed by a working session in the IM to discuss the details and next steps of the implementation. At present, the procurement process for the works that need to be conducted in the Terminal will be launched soon and the e-taxi chargers needed have been secured via the 2nd EU Innovators Call. Additionally, the local team is in conversations with UTE and Effiza, a local charging company, for the implementation and operation of the e-bus chargers and LEV charging options.</p> <p>Component 2: Urban logistics The urban logistics component was carried out with the support of the MOVÉS Project of the Ministry of Industry and Energy (MIEM) and the Julio Ricaldoni Foundation (FJR), two local initiatives pushing forward low-carbon mobility in Uruguay. For the pilot, two e-cargo bikes, one of each manufacturer, were introduced in the operations of PedidosYA, the Latin American subsidiary of Delivery Hero, for a period of two weeks (December 14th to 23rd, 2022). In these 2 weeks, 156 trips were made, 90 packages delivered with a total weight of 135 kg, and 187 km travelled. As a result, 86 kg CO2e were avoided.</p>
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PedidosYA riders in the CargoBike.UY (left) and Wheele e-cargo bikes



PedidosYA riders in the CargoBike.UY (left) and Wheele e-cargo bikes

<p>Impact</p>	<p>The SOLUTIONSplus project in Uruguay is focusing its efforts on building a strong collaboration between local and European companies with the aim of consolidating the charging ecosystem needed for the scale-up of e-mobility in the country. Another important aspect in which the project has been in discussions with the local stakeholders is in the set-up of a national capacity building program on e-mobility for all education levels, which is in line with the Technical and Vocational Education and Training (TVET) Fund in Latin America that will focus on the energy transition in Uruguay. These aspects are reflected in the City Roadmap for Montevideo and will be presented in the scale-up concept.</p>
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Kigali, Rwanda

Emmanuel Asaba Katarbarwa, City Engineer, City of Kigali, 11 August 2021:

“There are significant parts where the SOLUTIONS plus project can support us: by getting a number of electric vehicles, by raising awareness on them, but also, very importantly, by helping scale up the solutions.”

Inform	Tools and guides on shared systems and their application in various cities were incorporated in the SOLUTIONSplus online toolbox , alongside knowledge products on specific charging strategies for electric motorcycles in East-Africa.
Inspire	Capacity-building activities targeted the immediate training need expressed in Kigali on EV Charging Infrastructure in 2021, before moving to the topic of EV battery technologies and end-of-life management in 2022 . A large peer-to-peer training with more than 8 cities in 2022 enabled exchange on electric bikeshare systems.
Initiate	Two start-ups are supported in Kigali: Guraride (electric bikeshare) and Ampersand (electric motorcycle-taxis) . Seed funding was awarded to both companies; technical support and cooperation from EU companies was provided on battery sizing, battery design, drivetrain, operation and maintenance of shared fleets.
Implement	The bikeshare system was launched in September 2021, firstly with 80 conventional bicycles deployed at strategic locations connected to the bus network, to be completed with 50 electric bicycles in mid-2023 . 80 bike racks were deployed at strategic locations in July 2022. The second component in Kigali of electric motorcycle taxis has a strong gender-inclusive component. Following an assessment of success factors for gender-inclusive projects, recruitment and ad-hoc driving training, 24 electric motorcycles were handed over to the women in November 2022. Technical support on the electrification of buses is provided, and an E-Bus Master Plan is being designed. A MaaS application is being developed through discussions with the City of Kigali and the regulatory authority RURA. A design studio provides concepts for the re-design of public transport and integration of shared micro-mobility.



Bike Rack Deployment in Kigali



Testing of E-Motorcycles in Kigali

Impact	The City of Kigali initiated the E-mobility Technical Coordination Committee , providing a well-recognised platform for information sharing and alignment between public and private organisations. SOLUTIONSplus provides policy support in the form of a City EV charging strategy and recommendations for fiscal conditions for pedal-assist electric bicycles. Lastly, SOLUTIONSplus supports scaling-up projects, for instance, with recommendations to mainstream the gender-inclusive approach.
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Preliminary Results

- 35 women trained
- 24 e-moto-taxi handed over
- Gender-inclusive research
- 1 E-Mobility Technical Committee
- 1 bikeshare system with 2 corridors
- 80 conventional bicycles
- 50 electric bicycles
- 80 bike racks

Dar es Salaam, Tanzania

Fanuel Kalugendo, Director of Transportation Development, DART, 8 February 2022:

“We expect to use SOLUTIONSplus as a learning curve, to test the actual vehicles but also to know about policies and guidelines, to have evidence-based decision making for the future.”

Inform	Policy guidelines for electric two- and three-wheelers and paratransit in various locations across the world were added to the SOLUTIONSplus online toolbox.
Inspire	Dar es Salaam stakeholders benefited from regional training on EV Charging Infrastructure (2021), EV battery technologies and end-of-life management (2022), and on-site training on public transport electrification (2023) . Exchange with Indian cities, more advanced on electric three-wheelers, took place in July 2022.
Initiate	Two local start-ups are supported in Kigali: Auto Truck (new and retrofitted electric three-wheelers) and SESCOM (retrofitted electric three-wheelers), via seed funding and technical support on battery sizing and vehicle retrofitting. An EU-based organisation, EURIST, was selected to provide electric bicycles and morphed into a new company for the deployment in East-Africa, the African Ebike Trading GmbH.



Implement	Introducing electric three-wheelers required the development of prototypes, local partnerships, and data collection. Auto Truck manufactures vehicles incorporating locally available materials in close partnership with the Dar es Salaam Institute of Technology; Auto Truck and SESCOM also explore vehicle conversion. Vehicles will be launched in the first quarter of 2023 . To identify appropriate specifications of vehicles, charging, and operational and business strategies, SOLUTIONSplus collected substantial and unprecedented data in 2021 and 2022 (GPS tracking, survey of drivers and users, frequency occupancy). A Design Studio looked at the integration of electric three-wheelers with the BRT system. In addition, SOLUTIONSplus introduced 16 pedal-assist electric bicycles , co-designed with a German company and locally assembled, to be used for urban deliveries and the transport of medical supplies, launched in November 2022. SOLUTIONSplus will assess the feasibility to scaling up the use of electric bicycles for urban deliveries.
Impact	SOLUTIONSplus is taking a leading role in assessing the regulatory, fiscal, and market environment for the introduction of electric three-wheelers, as well as assessing the barriers to the uptake of electric mobility. SOLUTIONSplus will issue a policy paper on electric mobility policies in Tanzania and a National Urban Mobility Policies and Investment Program. Lastly, SOLUTIONSplus tightly supports organisations intending to scale-up the electric three-wheeler pilot by sharing data and recommendations.

Preliminary Results

-  1 large Feasibility Assessment
-  16 pedal-assist electric bicycles deployed
-  2 new tuk-tuks prototypes
-  Urban deliveries & medical supplies
-  4 retrofitted tuk-tuks
-  30 persons trained on assembly
-  One EV Center at a Research Institute



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