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SOLUTIONSplus

D3.3 Business Opportunities and Partnerships

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Dissemination and uptake

The be used by all SOLUTIONSPlus project team members

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Short summary

The document summarises the current status of the partnership development process between local businesses and solution providers (including start-ups) in the partner cities and European industry partners. Local businesses were supported to share knowledge and information, and to develop complementing solutions to the mainstream options already developed by the EU industry partners and catalogued. In order to enhance the cooperation beyond the consortium, a network is being created with SMEs active in e-mobility in Europe and the partner regions. Through the online platform and toolbox and several online events and exchanges the potential demand for e-mobility options is being shared.

Evidence of accomplishment

Report

Pasig, Philippines

Background

The SOL+ demonstration in Pasig, Philippines focuses on delivering the following main components: the design and development of high-quality, cost-competitive, locally appropriate e-quadricycles; demonstration of integration of innovative charging solutions; demonstration of suitable use cases considering the "shared" EVs – a first of its kind in the Philippines.

Tojo Motors, Inc. has been engaged through the SOL+ local innovators call to assist in the fruition of the demonstration activities in Pasig. They are involved in the development of the design, prototyping and construction of the pre-production e-quad units to be used in the demo. They are also involved in the provision of appropriate charging solutions, and in the provision of the e-vehicle sharing platform. ToJo Motors (established in 2013) is involved in developing modern technologies, operating after-sales facilities and service centres, and sales of key components for green transportation. It specializes in the development and production of electric vehicles for three and four-wheel types, including accessories and related parts. In addition to its regular servicing support, it maintains onsite service centres for vehicle fleet clients to ensure smooth operation of and facilitate parts supply for their units. Tojo Motors also offers innovative financing options to its customers, such as to acquire the vehicles exclusive of the battery and avail of a battery leasing program. Under the scheme, the leasing fee rental fee of the battery, inclusive of repair, charging, and maintenance. This applies to battery swapping or battery charging options as well.

Developments and Potential – Business Opportunities and Partnerships

Vehicles – E-quads

The e-quads in Pasig are to be powered by Valeo's[1] "e-Access" motor. One Valeo e-Access motor was initiatilly sent in advance to Pasig for preliminary testing in existing EV models. The eAccess (13kW powertrain) solution has been chosen for all the applications thanks to its high flexibility, facility of integration and a wide range of performances which allow to address various types of applications. Subsequently, 25 units of the said motors had been sent for integration in the e-quad prototype and pre-production (demo) units, as well as in the FLEV (flexible electric van) units being developed through a project sponsored by the Philippine Department of Science and Technology and implemented by the **De La Salle University**. The (2) pre-production units of the said FLEVs are to be tested as part of the SOL+ demonstration system (i.e. shared e-vehicles) in Pasig City.

The results of the preliminary testing of the eAccess motor have spurred discussions between **Tojo and Valeo** towards further collaborations, and potentially using the said motor in the other vehicles in the Tojo line-up (e.g. e-taxi, e-jeeps, e-trikes, other light electric vehicles).

The **Philippine Postal Corporation** has also expressed interest in including their existing EVs (e-3wheelers and e-bikes) EVs into the shared EV demonstration. Moreover, they had expressed interest in seeking assistance in crafting longer term strategies towards greening their fleets and delivery services. Similarly, significant market opportunities for the utilization of e-quads by private companies is also being explored (e.g. consultations conducted with **Ninja Van, IKEA**, **Global Cargo**).

Tojo Motors has expressed that technical expert assistance relating to the following topics would be highly beneficial for improving their products: vehicle panel designs; utilization of adhesives; vehicle weight reduction

[1] SOLUTIONSplus consortium member.

strategies; advanced battery cooling technologies and integration of more advanced batteries such as lithium titanate oxide).

Batteries and Charging

The charging points to be implemented in the SOL+ demo will focus primarily on government-owned properties, but scaling-up ideas are also pointing towards enabling the integration of charging infrastructure across the city, as facilitated by local regulations/incentives that would encourage locators to adopt, and for suppliers to provide such equipment and infrastructure. The team is currently exploring partnerships with several providers of charging solutions in the country (**e-Sakay; Unioil**, among others).

The SOL+ team is also exploring synergies, and potential collaboration for providing charging solutions with the IKI-supported E-2&3wheeler project of **UNEP**,[2] which is looking into partnering with a local SME (**Charm**)for putting up charging equipment (particularly for PHLPost Pasig). **Zaragosa Logistics Centre** (ZLC)[3] is also set to assist in the determination of suitable charging locations / infrastructure in Pasig.

The SOL+ project is also bringing in the technology and expertise on high quality second-life EV batteries through the SOL+ Innovators Hub. **Betteries**, a Berlin-based company has recently been selected as a participant to the first SOL+ Innovators call and will be sending several (8 planned) units of their Bettery packs to Pasig, for integration into the e-quads and e-FLEVs as sources of auxiliary power (i.e. for air conditioning and potentially for cooling of loads). Longer-term industrial cooperation between Betteries and Tojo (and its affiliate company working on batteries) is also envisioned and will be explored.

Shared EV System

Several opportunities are being explored in relation to the "shared EV system" that will ultimately be put up in the Pasig demo. The consultations with the different stakeholders pointed towards a huge opportunity towards the focusing the demonstration towards **B2B applications** involving small and medium sized enterprises (**SMEs in Pasig** were surveyed and consulted) for urban freight applications (e.g. materials delivery/ aiding provision of services that entail transport of equipment, own employee transport).

Aside from this, the shared EVs will also be utilized by the Pasig City Government for their own transportation needs (e.g. employee, and equipment – particularly medical equipment – transport; **General Services Office, City Health Office,** among other divisions).[4] It is being explored whether the shared scheme shall also be appropriate to tie up with an employment generation program, particularly for drivers which had been displaced during the COVID pandemic. The system is also envisioned to be something that is scale-able and can be set up in **other cities** in the country. It will also be explored whether it would be feasible to aim for the sharing system to include other EVs (e.g. owned by other companies/ businesses/ citizens) into such a system. The engagement of companies such as **Pluservice**[5] in terms of providing assistance in the scaling up/commercialisation of the system would be worthwhile to pursue.

[2] Ibid.
[3] Ibid.
[4] Pasig Government – the City Transportation Development and Management Office – is a SOL+ consortium member.
[5] SOLUTIONSplus consortium member.

Hanoi, Vietnam

Background

The SOL+ demonstration in Hanoi, Vietnam focuses on integrating first/last-mile solutions to bolster public transport in the City. In particular, the demonstration will put up a shared e-scooter/e-bike sharing system that would connect a major transport hub to a commercial area in Hanoi.

QiQ Vietnam, a company that was established n 2018 with the aim of supporting green, sustainable and shared transport systems in the country, has been tapped to support the implementation of the demonstration activities in Hanoi through the SOL+ local innovators call. QiQ has had direct experience in successfully demonstrating sharing systems in Hanoi (e.g. Ecopark on the outskirts of Hanoi), as well as in Hoi An (first bike sharing system in Vietnam). QiQ has been tapped to develop the V-share app (and associated backend elements), as will as bring in European standards-compliant e-bikes (10 units), and advanced vehicle communication units (VCUs) which will be integrated into the e-scooters.

Developments and Potential – Business Opportunities and Partnerships

E-vehicles

Aside from the e-bike units that will be provided by QiQ, the University of Transport Technology (UTT) which leads the implementation of the Hanoi demonstration activities, will be integrating 50 units of e-scooters to be purchased from Vinfast and 10 e-bikes from QIQ for the shared solution to last-mile connectivity. The demand for electric two-wheelers in Vietnam has been growing significantly in recent years. This presents a potential for the local production and assembly business led by domestic and foreign invested manufacturers including Vinfast, Honda, Piago. These manufacturers have actively invested in production facilities, technology, and human resources to improve their production system and product quality, leading to higher availability of locally produced or assembled electric vehicles and electric vehicle components. Up to now, a series of discussion and dialogs have been conducted between UTT, the Vietnam Association of Motorbike Manufacturers and authorities for developing e-scooters and promoting emobility solutions in Vietnam.

Batteries and Charging

The SOL+ project is also bringing in the technology and expertise on high quality second-life EV batteries to Hanoi through the SOL+ Innovators Hub. Betteries, a Berlin-based company has recently been selected as a participant to the first SOL+ Innovators call and will be sending 6 units of their “Bettery” packs to Hanoi, together with other relevant components (i.e. inverter, casing), These packs are intended to serve as back-up power in the main stations under the demo, and potentially serve as a mobile source of power, for situating “temporary” stations/catchment areas which can be used to market the system in areas aside from the main stations. There is significant potential to be explored in the second-life battery market in Vietnam.

The potential integration of renewable energy (i.e. solar panels) into such can also be explored, wherein collaborations with local panel providers can be sought.

Several discussions on bus charging solutions have also been started between ABB and Vinfast. Vinfast has just launched and integrate their first 150 e-buses into the public transport system of Hanoi City in December 2021.

Shared System

(*have there been interest from other entities /organisations/local authorities for based on the on-the-ground discussions? Please include them here)*

As Hanoi City is encouraging the shared mobility solutions to support for the public transport, the shared system of the demonstration under this pilot is importantly interested by Hanoi Department of Transport and authorities. The University of Transport Technology is also exploring the potential for initiating a start-up which can later on be involved in the management/operations of the shared system, after the conclusion of the demonstration. Promoting Opportunities for providing assistance by experienced EU entities in the initiation/development phases of such a start-up can be explored under the EU Innovators Call, and participation in the Start-up Hub. Smart applications for shared mobility can also be explored for future collaboration between local start-ups and EU partners.

Kathmandu, Nepal

Background

The SOL+ demonstration in Kathmandu, Nepal focuses on following main components: the conversion of old diesel bus to E-bus, redesign of e-3 wheelers and e-shuttle van. Shree-Eco visionary (SEV) and Clean Energy International (CEI) have been engaged through the SOL+ local innovators call to design, prototyping of e-3 wheelers (new design by SEV and retrofitting of existing e-3 wheelers by CEI) in Kathmandu. SEV is also developing e-shuttle van. Sajha Yatayat leads the retrofitting diesel bus to e-bus.

SEV, established in Nepal in 2008, has a long history of manufacturing electric vehicles (three wheelers and four wheelers) in Kathmandu, as well as developing charging/battery management system. It has been responsible for the production and maintenance of electric three-wheeler named 'Safa Tempo', currently run as a public transport. Likewise, CEI has produced and sold several types of electric two and three wheelers in two cities in Nepal, Kathmandu and Birgunj, such as e-rickshaw, e-mini pick-up, e-school van, e-street food van. Sajha Yatayat, public transport operator and SOL+ local partner in Kathmandu, has been running diesel buses and currently adding e-buses in the fleet (procurement at the final stage). The conversion of diesel bus to e-bus is a first of its kind in Kathmandu, even in Nepal – which has a high scale-up potential.

Developments and Potential – Business Opportunities and Partnerships

Vehicles – E-3 wheelers and e-shuttle van

The e-3-wheelers and e-shuttle van in Kathmandu are to be powered by **Valeo**'s "e-Access" motor. After the technical needs analysis, Valeo motor (13kW) suits the e-3 wheelers (passenger, cargo and waste collection services) and e-shuttle van prototype to be developed in Kathmandu by SEV. This powertrain seems quite advanced providing wide range of high-quality performances and efficiency. As such type of motors have not yet been integrated in the local manufacturing of e-3 wheelers or e-shuttle van, it would be a game-changer for local industry. One unit of e-Access motor was sent to Kathmandu. Various conversations between SEV and Valeo took place to design optimal Vehice Control Unit for the prototypes. Remaining 6 units will be sent to Kathmandu along with designed VCU. The e-3 wheelers have a huge demand in Kathmandu or in all parts of Nepal, SEV believes that the success of the prototype would increase the production of such vehicles in local market with Valeo motors.

SEV and CEI have expressed that technical expert assistance relating to the following topics would be highly beneficial for improving their products: design review (improvement aspects), and products engineering and validations (e.g. vehicle weight reduction strategies). **PEM motion**, a German based company, has been recently selected for the services. PEM motion would also offer SEV and CEI to loop into the industry network of PEM motion.

Vehicles – Retrofitting diesel bus to e-bus

The initial total cost calculation of retrofitting a selected old diesel bus to e-bus in Nepal, carried out by Sajha Yatayat, shows that the vehicle ownership cost and vehicle operational cost of the retrofitted bus is approximately 32% and 33% lower than importing new electric bus respectively. The resource saving aspects in the vehicle retrofitting is an additional point. Sajha Yatayat also sees the market potential in the bus retrofitting to support the huge number of bus fleet renewal to e-buses. Sajha Yatayat has expressed the technical expert assistance on the overall technical review of the vehicle design, as well as suggestion and supply of the equipment. Several international companies, such as German based – **Orten**, Swedish/ Kenya based – **Opibus** and Netherland/ India based – **EMOSS**, have been contacted and potential co-operation opportunities are being discussed.

Batteries

For the new design of e-3 wheelers to be developed by SEV, the SOL+ project is bringing in the technology and expertise on high quality second-life EV batteries through the SOL+ Innovators Hub. **Betteries,** a Berlin-based company has recently been selected as a participant to the first SOL+ Innovators call and will be sending several (4 planned) units of their Battery packs to Kathmandu. The second life EV batteries is of high interest in Kathmandu, as the city currently has less facility on battery management or recycling facility. An industrial cooperation between Betteries and SEV is also envisioned and will be explored.

(max 1.5 pages)
#introduction – SME
#developments and state – collaboration
#potential developments forward

Montevideo, Uruguay

Background

The local manufacturing component for the city of Montevideo consists of the detection of local capacities for the design, prototyping and local manufacture of light electric vehicles, as well as the support from SolutionsPlus to create products and business models according to the needs local.

For this purpose, it was requested the collaboration with the program MOVÉS - "Towards an efficient and sustainable urban mobility system in Uruguay" (URU / 17 / G32), a project funded by the Global Environment Facility (GEF) established in 2017 with the goal of promoting a sustainable low-carbon efficient and inclusive mobility system. In 2020, MOVÉS and SOLUTIONSplus started a phase of collaboration for the promotion of the local design and assembly of Light Electric Freight Vehicles (LEFVs), i.e., e-cargo bikes, e-tricycles and e-quadricycles. In this context, in November 2020 MOVÉS launched an open call focused at start-ups interested in entering the business of LEFVs manufacturing. Six start-ups legally established in Uruguay applied to the call, complying with all the requirements that included a technical proposal for each type of vehicle proposed, indicating the origin of the components, as well as the production chains involved in each vehicle. Since then the MOVÉS Project, in cooperation with the SOLUTIONSplus team, has been supporting these start-ups in the vehicle design process and evaluating their real production capacities and potential for manufacturing.

During this process, MOVÉS and SOLUTIONSplus were able to support and guide the start-ups into the development of prototype designs that fulfill the minimum technical characteristics established in the Call, the safety parameters, the compliance with local safety and regulatory requirements, the versatility of the proposed vehicles as well as the use case/s according to the Uruguayan context. The process allowed the MOVÉS Project and SOLUTIONSplus to better understand if the selected start-ups had real production capacities. As a matter of that fact, from the 6 selected start-ups, 2 of them were not able to continue the process until the end due to the lack of financial and/or technical capacities.

The second phase of this component started with the collaboration with the Julio Ricaldoni Foundation (FJR) in order to conduct the prototyping and manufacturing of vehicles. Is in this context, as the support process carried out by MOVÉS helps ensure that the start-ups that will be supported for the prototyping, testing and manufacturing phases have sound vehicle designs and the production capacities needed, thus reducing the risk in the next stages. Three startups continue with the process of prototyping and manufacturing: CargoBike, GreenStar and Wheele. In total, eleven vehicles, from e-cargo bikes to electric tricycles and quadricycles are being manufactured under this program.

Introduction to the Start-ups

Wheele

Wheele is a company created in 2016, with the purpose of marketing light electric vehicles, assisting in sales, workshops, and spare parts. The products marketed by the brand are electric bicycles of different types and for personal and commercial use, electric motorcycles, scooters, electric cargo tricycles. Within the purpose of the company is the development of sustainable vehicles underpinning its activity with the introduction of environmentally friendly construction techniques.

Wheele is a brand of sustainable electric mobility products for recreational, personal and work use, which was founded in 2013. It specializes in electric bicycles, electric motorcycles, electric scooters, electric skateboards and electric tricycles. WHEELE is a brand in constant national and international expansion, and in Uruguay it is represented by Cataloa S.A. The range of products offered by WHEELE is very wide and varied, ranging not only from sustainable mobility products (active and electric) but also accessories for mobility.

The tricycles are made with imported parts and national assembly recycled from cigarette butts. For example, the cargo box is made in Uruguay with 100% recycled material. At a second stage, a local plan of adaptations to the box (also made with 100% recycled material) will be developed to accommodate different types of uses. It is technically feasible to manufacture the drawer or container from recycled materials. Pressing is the right technique to create the plates that make up the walls of the drawers: cigarette butts, being a small waste of low volume and weight, could not be used in their entirety to make the plates. However, Teko (a company that supplies the recycled materials for the box) has developed an innovative technique that consists in the manufacture of plates with characteristics similar to wood, from the degradation of the cigarette butts through the use of an inoculated fungus on a bio-based substrate made from rice husk. This process makes the manufacture of large plates viable. For this preparation, a week of work is required for the fungus to develop, and then 6 hours of workshop, between pressing and manufacturing. It is estimated that the production of a box will require around 30,000 cigarette butts. Since each butt in contact with the environment can contaminate up to 50 liters of water, and release up to 7,000 toxic substances, the procedure preserves 1,500,000 litres of water.

Additionally, Wheele has a training department for users in which tasks such as: how to remove the rear wheel of the bicycle, how to charge or remove the battery from the bicycle, how to interact with the instrument panel of the electric bicycle, how to charge the battery and other related tasks are taught. Finally, the company has several sales offices in the city of Montevideo and also has several points of sale in other cities of Uruguay.

GreenStar

GreenStar is a company created to develop the manufacture and commercialization of electric vehicles, both for recreation and for urban logistics. Its objective is to produce environmentally-friendly vehicles, starting from a base that adds value to its products and also generates qualified national labor.

The startup was created in 2019 focused on the manufacture and commercialization of electric vehicles, both for recreation and urban logistics. Their objective is to produce environmentally-friendly vehicles, starting from a base that adds value to its products and also generates qualified national labor.

GreenStar aims to develop different utility e-tricycles and e-quadricycles with a design based on two front wheels and one or two rear wheels, depending on the model. To reduce the environmental footprint of transport, GreenStar will convert their highly successful internal combustion engine tricycle in an electric vehicle. Moreover, GreenStar could test second-life lithium-ion batteries in a prototype, in order to move forward to sustainable e-vehicles. Additionally, GreenStar is already able

to go ahead with the next stage and receive VALEO motors to be mounted in their prototypes (2 models of iBSG and 2 models of e-Access Serial electric powertrains).

CargoBike

CargoBike is a start-up dedicated to the production of e-cargo bikes with a focus on sustainable and efficient transportation, friendly to the environment, and easy to use for users. CargoBike's commitment is the production of these vehicles with business schemes that are affordable for potential users in order to achieve relevant levels of introduction in the market of sustainable vehicles for urban logistics.

CargoBike is a startup oriented to the design, prototyping and production of e-cargo bikes. The CargoBike team focuses on the development of local suppliers to outsource the key stages of the design and engineering, as well as the further prototyping and manufacturing processes.

Currently, CargoBike carries out the design process of bicycles and boxes with its own resources. After that, part of the prototyping and production process is expected to be outsourced to local companies (Frame welding, Painting, and Box manufacturing) to be later assembled.

Developments and status of collaboration

Valeo Powertrains

Valeo proposes the provision of products and systems that contribute to the reduction of CO2emissions and to the development of intuitive driving. for the case of Montevideo, Valeo will provide 4 powertrains for the startup GreenStar. The process began with a preliminary evaluation of the preliminary vehicle designs, in which simulations were carried out which demonstrated that Valeo's engines were suitable for the proposed vehicles.

Later it was observed that the engine had to be supplied with some peripheral and auxiliary elements, such as the central control (CCU), the accelerator pedal, the dashboard with a display, among other elements established by Valeo. It is intended that the powertrain be supplied in a "kit" format that contains all the necessary and sufficient elements for the operation of the vehicle.

Given the above, the Valeo team in conjunction with local manufacturers have held technical meetings, in which supply limits have been determined and information has been exchanged. An agreement will be signed shortly between the parties to exchange more information and advance with the assembly of the kit by Valeo.

Recently, as of the approval of the final design of the vehicles, the information for the performance simulation has been updated, so Valeo has all the necessary and sufficient supplies for the assembly and shipment of the corresponding kit. These are 2 iBSG engines and 2 e-Access Serial engines.

PEM Motion - Vehicle design and engineering

Pem-motion is a company which provides consultancy services, development and strategic support. They support startups from the first idea to market entry. PEM Motion stands for a strong Combination of technical expertise and Project experience. They define themselves as smart, clever and always thinking one step further – from the development to industrialization. Instead of long development cycles, PEM Motion focuses on agile processes and the Return on Engineering (RoE). They helps to turn the Startup vision into reality with a minimum of investment costs and in half the time.

In the context of one of the SolutionsPlus Innovators Call, Pem-motion will provide technical support in the stages of vehicle prototyping and manufacturing for the local startups in the Latin America cities. In particular, some technical issues that are pending to be solved will be asked to the PEM-motion staff, in order to get a technical.

Developments and Potential – Business Opportunities and Partnerships

E-cargo-bike drivetrains suppliers

A drivetrain needs detection process was carried out for e-cargo bikes and assisted pedal bicycles, finding some European companies whose products could be adjusted to vehicles manufactured in Latin America.

Local vehicle manufacturers were consulted and a first filtering of European suppliers was conducted, discarding some of them due to incompatibility or discontinuity of products. SolutionsPlus is currently negotiating with one of the drivetrain providers (TQ group), evaluating the application to one of the SolutionsPlus innovators calls for the supply of technology and services.

Second-Life Batteries research project

The Faculty of Engineering of the public university of Uruguay (UDELAR) is carrying out a project on second-life batteries. The project is conducted by researchers of the faculty and counts with the support of the National Agency for Innovation and Research of Uruguay (ANII), based on an articulation between companies and academia.

The project proposes the development of a prototype for the second life of electric vehicle batteries. It is proposed to design and build a prototype from a used electric vehicle battery, which will be integrated into a smaller electric vehicle, or could also be used in a stationary energy storage system. The proposal is structured as follows: 1st.) recycling of an electric vehicle battery that has been disabled due to failure or degradation, 2nd.) design and assembly of a low-voltage battery pack from recycled cells whose state is suitable for second life, 3rd) testing of the new battery pack in the battery testing laboratory of the Institute of Electrical Engineering (IIE) of the Faculty of Engineering of UDELAR, recently assembled by the Working Group on Electric Vehicles (GTVE) and 4 °) testing of the new battery pack in a light electric vehicle.

Step 1) will be carried out in the IIE by a trained workgroup. Step 2) will be developed by the GTVE, first implementing a research stage on the matter and then moving on to the electrical engineering project and the assembly of the new pack. Step 3) will be implemented in the Chroma model 17020

test equipment recently acquired and installed by the GTVE. The test equipment, which is regenerative, supports the cycling of batteries under any type of charge / discharge curve. Step 4) will be carried out by the SME GreenStar, which will test the prototype on one of the electric tricycles that it is currently developing.

TGRide

TGRide is an Uruguayan startup that offers a complete hardware and online platform for manufacturers of bicycles and other light electric vehicles, providing a service that gives them the possibility of reaching their maximum potential both at the production level and in terms of the relationship with their users. TGR manages and analyzes all the data linked to the electric vehicles collected and, based on statistical analysis, provides a real-time diagnosis of each of them.

The information collected through our technology allows the brand to improve not only customer service but also industry processes, improving the products. By anticipating problems or failures, TGR gives the possibility of correcting them before they become a major inconvenience. Thus, they collaborate to strengthen the relationship of the brand with its customers and its community.

TGR combines digital, hardware, and software-based technologies that are integrated into the TGR APP, a mobile application connected to the electric bicycle via Bluetooth. The application is useful for both the end-user and the brand. On one hand, it allows the brand to obtain real-time relevant data of its operation. On the other hand, it allows the user to access all the information needed about their bicycle whenever they want or need through their smartphone, allowing the manufacturer to remove the screens from the handlebars so that they are both neater and more comfortable. For both sides, a new exclusive communication channel is created that can work back and forth, promoting a positive feeling towards the brand.

It is expected to incorporate these devices into the vehicles produced under the SolutionsPlus project in order to gather relevant information, focused on the measurement of several variables and the conformation of key performance indicators of the vehicles.

Effiza - Charging infrastructure developments.

Locally, the startup Effiza is able to develop electric vehicle chargers, adaptors and charging management systems in order to charge electric buses with a charger with a CCS standard or other standard. Effiza is a startup that works with projects related to energy efficiency and electric mobility, focused the areas of solar power, public lighting, and electric-mobility projects.

Regarding the e-mobility projects, the startup is dedicated to provide technical assistance to users or owners of electric vehicles, adapting charging solutions for different vehicles that have different kinds of connectors with different standards (Type 2, Mennekes, GB/T and so on). At the same time, Effiza is currently working on a project related to the construction of slow chargers, semi-fast chargers and fast chargers, with the aim to develop a Charger Management System that will indicate to the user the charger's availability, special reserves of chargers, among other centralized services. This development seeks to incorporate its own design. Every charger developed by Effiza will comply with the protocol OCPP for communication between the equipment and the energy provider.

Effiza is able to provide different types of solutions in charging centers or charging points in order to match different charging standards and manage the charging points. Additionally, Effiza is currently working on the development of charging facilities for several types of electric vehicles such as electric bikes, electric tri/quadricycles and light electric vehicles, which include additional services and mod cons such as water and public armchair, among others.

Quito, Ecuador

Background

The main component of the SolutionsPlus demonstration project in Quito aims to contribute to the consolidation of a Low Emission Zone in the Historic Centre of Quito for which the project will provide 24 LEVs of 4 different kinds, both for last-mile logistic and passenger connectivity.

For the manufacturing of 10 e-quadricycles, SIDERTECH was selected in the first local innovators' call. In 2012, SIDERTECH started producing metal components for motorcycles. Today, the company is using its expertise to develop an electric four-wheel vehicle that, thanks to its flexible design, can be deployed for multiple uses. With a high torque to climb Quito's steep streets (up to 20%) and long-lasting batteries, Sidertech's vehicles can be used for cargo, food truck, deliveries, maintenance, trash collection, industrial logistic, private security, and much more. Developed to improve quality of life in cities, SIDERTECH's four-wheelers have a reduced width that would allow them to ride even in bike-lanes.

PLURAL is an Ecuadorian firm with more than 10 years of experience in applied social research, social development projects, social intervention and public policy construction, from a human rights, gender, sustainability and innovation, inclusion and social participation perspective. Together with Bixi Cargo and Tacuri Bicycle, PLURAL has created "E-Cargo bike", a strategic alliance that aims at making cycle transport logistic a generalized, friendly and accessible solution. The group was selected in the first local innovator's call for the manufacturing of 10 e- bikes for the SolutionsPlus project.

Developments and status of collaboration

So far, SIDERTECH has developed an e-quadricycle prototype, for cargo applications. The company is exploring models for passenger transport. In total they will assemble 10 units based on the different prototypes. The prototype of Sidertech's electric four-wheeler is ready and has gone through the first on field tests. After discussions, it was determined the prototype could be powered by VALEO's Access Serial powertrain. The first unit of this powertrain model arrived already and adaptation to the prototype has been attempted but electric controller needs to be replaced for one of VALEO.

PLURAL, on the other hand, has developed 10 e- bikes in four different models, three of which are cargo bikes, and one is for passenger transport. With help of the SolutionsPlus regional team matching opportunities for European components have been scouted, but nothing has been formalized yet.

PENMOTION – some discussions have been conducted for the support in the vehicles' design and engineering, in the context of the EU innovators call.

Potential – Business Opportunities and Partnerships

Powertrains

With help of the SolutionsPlus regional team matching opportunities for European powertrains have been scouted, but nothing has been formalized yet.

E-Vehicles

The SOL+ team discussed with **UNEP** potential synergies with their **GEF Global E-Mobility** pilot in Quito, and it was identified that given the timeline of each project they could carry on the progress SolutionsPlus achieved by its termination deadline. Moreover, the best opportunities revolve around the business model the GEF pilot proposed to advance in the transition towards LEVs. They propose a shift from renting to a leasing scheme that facilitates the acquisition of units at lower cost.

In order to test the logistic plan with the e-vehicles developed by the project several opportunities have been analysed. UNEP suggested to work with the UN's **Global Pact** local office. They have an already established table of discussion on ODS with private companies in which a key group of firms have made some progress or express interest in advancing towards e-logistics.

Additionally, **UNEP** has proposed a potential donation which has been discussed with the Municipality and specific vehicle models have been identified. Further administrative and legal details have been identified to sort out to enable the donation.

Logistics

Collaboration with academia for data collection and modelling

Zaragoza Logistic Center (ZLC) is working actively within the project and will develop the logistic plan for the Historic Center of Quito. For that purpose, the project identified a couple of alliances with two local universities. On one hand, **CATENA – the logistic research institute belonging to the San Francisco University** – provided the methodology of the MIT Global Scale network for the data collection process that already took place in 2021 in order the input data for the Logistic Plan. On the other hand, the project approached the **National Polytechnical University** in order to work with a Research Project they have that can learn the methodology used by ZLC to develop the logistic plan so they can gain the know how to update the plan in the future. Complementarily, it was discussed that further collaboration can take place with **MODEMAT- Mathematical modelling centre-** since they have been working on optimization models for public transport routes.

Collaboration with local businesses and initiatives

Another opportunity relies on **courier companies** that would be interested in testing the LEVs in the Historic Centre, and may contribute to the project by expanding their operations from final goods to inputs and supplies.

Also, another existing project in the Historic Centre was identified, **"De Vuelta al Centro"** whose main goal is to work closely with commercial establishments to help them with post COVID economic recovery. This project is the pilot initiative of a **World Bank** project on Urban Regeneration of the Historic Centre with Development oriented to Transport approach. In that context, is has been

discussed that shifting to e-logistics for their supply chain can be outlined as part of the incentive packages the project would to offer merchants in the zone and therefore a specific group of potential users would be engaged in the testing of the vehicles.

Charging

The second component of the SolutionsPlus demonstration project in Quito is to provide charging infrastructure. In that context, potential partnership with **ABB** remains a possibility, subject to the Municipality's definition of the operating model for the integrated public transport system after conversion to e-buses.

Likewise, the regional team of SolutionsPlus has had meetings with the Electric Enterprise of Quito (EEQ) and with the Public Enterprise for Public Works, which manages all public parking lots, in order to discuss potential locations for charging points.

Lastly, an approach to battery swapping systems providers was also made, but further discussion is needed based on how the operating model of the pilot is defined.