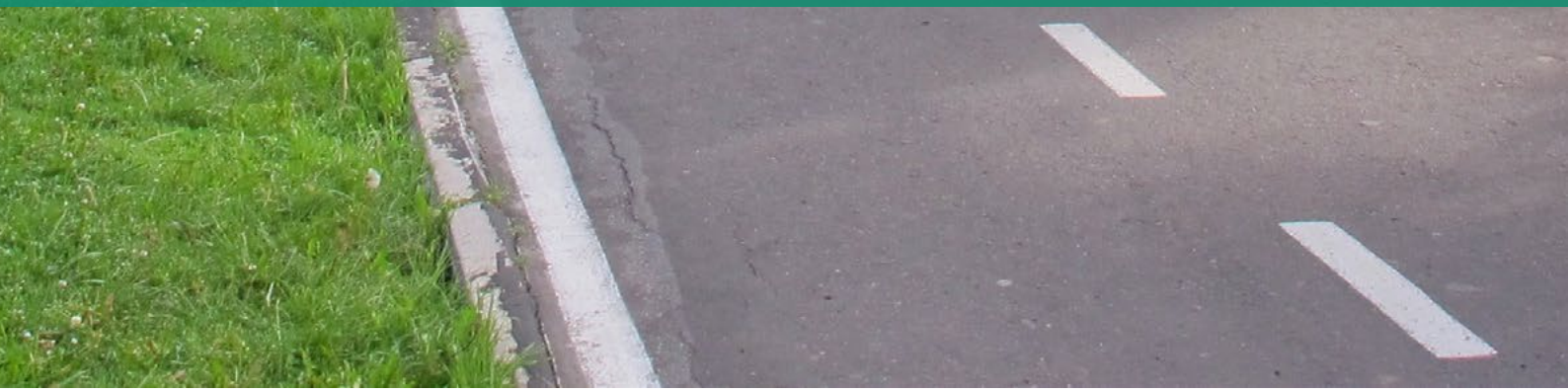
QUITO/ECUADOR

SOLUTIONSPLUS I SCALE-UP CONCEPT NOTE



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PROJECT PARTNERS

ABOUT

This paper has been prepared for the project SOLUTIONSplus to accelerate the shift towards low-carbon urban mobility in urban logistics in Ecuador through institutionalization, policy development and digitalization in order to reduce greenhouse gas emissions and air pollution in the transport sector of Quito and Ecuador.

TITLE

Solutionsplus Scale-Up Concept Note: Quito, Ecuador

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LAYOUT

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All the pictures are provided by the SOL+ partners

June, 2024

Scale-Up Concept Note

Project Title: Accelerating the shift towards low-carbon urban logistics in Ecuador through institutionalization, policy development and digitalization

City/Country: Quito/Ecuador

1. Background

1.1. National and local low-carbon mobility policies

The Ecuadorian Government has adopted a series of plans, policies and laws to create the enabling environment to advance towards transport decarbonization countrywide. These include the Nationally Determined Contributions (NDCs), in which the country commits to reducing its GHG emissions by 9% unconditionally, and 21% if additional international resources are made available until 2025 in comparison to 2010. In order to mitigate the emissions of the transport sector, the country will focus on the promotion of efficient and sustainable transport sector such as the first tram line in Cuenca, the first subway line in Quito, and the cable car in Guayaquil (MAATE, 2022).

The Ecuadorian Energy Efficiency Law (LOEE) issued in March 2019 was created in order to guarantee energy sovereignty using environmentally clean technologies and non-polluting and low-impact alternative energies. To this end, Article 14, which refers to energy efficiency in the transport sector stipulates that, that from 2025 on all new public and commercial transport vehicles will have to be zero emissions (Ley Orgánica de Eficiencia Energética, 2019). Nevertheless, given the minimum progress observed between 2019 and 2023, the Energy Competitiveness Law, a reform to the Energy Efficiency Law approved in January 2024, postpones the start of the fleet renewal process to 2030 (Ley Orgánica de Competitividad Energética, 2024). Despite the extension, national experts still doubt the feasibility of 2030 due to the lack of incentives for e-mobility that exist in the country.

In the same context, the 2021 Reform to the *Law on Road Transport, Transit and Road Safety (LOTTTSV)* declares the public interest of e-mobility and exults Municipalities and National Ministries to create the necessary incentives to promote it within their corresponding mandates. In addition, this Reform establishes that electric vehicles should be exempt from the measures to restrict vehicle circulation; that EVs will have free use of paid public parking spaces within the jurisdiction of the municipalities; and that public entities and commercial establishments that offer parking spaces to the public must allocate a minimum percentage of 2% of the total number of parking spaces to EVs (Ley Orgánica de Transporte, Tránsito y Seguridad Vial, 2021).

The National Electromobility Strategy (ENME), a document elaborated in 2021 by the Interamerican Development Bank as technical cooperation for the Ministry of Transport and Public Works (MTOP), refers to the advantage that the country has due to its clean energy generation matrix, to which is added the interest of the National Government to develop electric mobility (BID & Hinicio, 2021). This translates into the existence of incentives in terms of taxes, tariffs and electricity rates, in addition to financing programs from Development Banks, such as the IDB, that are in the negotiation phase with a focus on fleet renewal with electric vehicles of different types (BID, 2024). It is worth noting that the ENME has not been officially adopted by the national government. Thus, the goals and targets set in it are not binding.

In addition to the National Electromobility Strategy, in June 2023 the country launched the National Sustainable Urban Mobility Policy (PNMUS) that establishes guidelines applicable to all the municipal

governments of the country so that they can develop and implement strategies and actions in urban areas of different sizes to promote sustainable urban mobility. For these, various cross-cutting and specific guidelines have been issued, which include incentive schemes for the transition to more sustainable modes (MTOP, 2023).

Considering the national regulatory framework of Ecuador and in compliance with the international commitments to which the Municipality of Quito adhered in the past years, such as the C40 Clean Air Cities Declaration, the C40 Clean and Healthy Streets Declaration and the Mobilise Your City Global Initiative, in 2020 the Municipality of Quito issued its Climate Action Plan for Quito (PACQ). With the PACQ (2020), Quito commits to reduce GHG emissions by 30% in comparison to 2015 by 2030 and achieve climate neutrality by 2050. Given that the transport sector has been identified as the largest generator of GHG emissions in the city, being responsible for 40% of them, actions to mitigate its impact need to be prioritized. Thus, the PACQ defines the following mitigation actions for a sustainable urban mobility:

- Zero emissions public transport
- Zero emissions Historic Center
- Integrated and efficient public transport
- Active mobility
- Low carbon freight transport

In this context, the Municipality works to advance on various fronts to promote sustainable mobility in general and more specifically electric mobility. On one hand, in February 2024, the Municipality approved the Sustainable Mobility Master Plan 2023-2042 (PMMS by its Spanish acronym), which is the document that will guide the implementation of mobility policies for the next 20 years. The PMMS establishes as Objective 1 "Mitigate the emissions of Greenhouse Gases generated by the transport sector". In addition, it defines 139 projects grouped into 9 program and detailed in 9 Complementary Plans. Among these projects are specifically the following:

- Low or zero emissions center included in the Environmental Quality Program and the Travel Demand Management Plan.
- Last-mile logistics using non-motorized modes in the city center and other areas included in the Sustainable Mobility Program and the Commercial Cargo Transportation Plan.

On the other hand, the municipality has already approved a series of ordinances to advance towards the sustainable mobility goals proposed in the PACQ, such as the Ordinance No. 017 (2020) for the integration of all the public transport subsystems of the city, the Ordinance No. 0194 (2017), which regulates the different modes of transportation in the city and its circulation priority with a strong focus on walking and cycling. Moreover, the Municipality advances in the discussion of a Draft Ordinance for the Gradual Decarbonization of Public and Private Transport, and Promotion of the Use of Clean Technologies, and a second one on the regulation of Light Electric Vehicles (LEV).

As described, both the national government and the Municipality of Quito have already taken important steps towards sustainable urban mobility in terms of regulations and have already started with some actions to achieve its decarbonization goals. However, the tools and capacities needed to reach the ambitious goals set in the regulations are not yet in place.

1.2. Main barriers

The country has already introduced a series of policies and regulations in line with the goal of accelerating the introduction of low-carbon mobility in Ecuador. However, the specific incentives and detailed regulations are still missing. Thus, EVs still represent a very small share of the entire vehicle fleet. The main barriers identified are:

- Fragmented institutions lacking resources and capacities for coordination and planning the transition
- Scarce knowledge of the potential of e-mobility in the private sector
- A lack of knowledge about the benefits of electromobility among end-users
- A very limited offer of all EV types (from e-buses to LEV)
- A lack of local regulations and infrastructure for EVs (e.g.: LEV ordinance and charging network),
- Insufficient development of end-of-life vehicle management systems
- Lack of economic incentives, business models and financial mechanisms to balance out the higher total cost of ownership (TCO) of EVs due to the highly subsidized gasoline and diesel prices

Thus, despite of scattered efforts from the national government and some local governments, which have implemented e-mobility pilots, building a comprehensive enabling environment that provides the required technical, economic, commercial, social, environmental, and legal signals has become a major challenge for the uptake of e-mobility in Ecuador.

At the local level, the main barriers for the implementation of e-mobility revolve around the fact that municipalities received the responsibility of urban mobility just in recent years, so they lack the capacities and vision to manage mobility in its full complexity. They mainly focus on transit and permits, and the quality of collected data to support decision making and emission calculations represents a challenge. Additionally, with regards to passenger transport, in most Ecuadorian cities public transport is operated by private operators, who don't have any economic incentive to make the transition to e-buses due to the cap in the fare they are able to charge, and the fact units are individually owned despite being members of cooperatives. On the freight side, on the other hand, there are greater opportunities but unfortunately logistics is a topic frequently overseen in urban mobility planning.

1.3. The SOLUTIONSplus Project in Quito

The SOLUTIONSplus project aims to enable a transformative shift towards sustainable urban mobility through innovative and integrated electric mobility solutions, which are implemented as pilots in 10 cities globally. It was funded by the European Union's Horizon 2020 research and innovation program and ran from January 2020 to June 2024. The project encompassed city-wide demonstrations to test different types of innovative and integrated e-mobility solutions, complemented by a comprehensive toolbox, capacity building, business model development and policy, scale-up and replication activities. In addition, the project provided technical and financial support to the local actors, relying on the knowledge and expertise of a consortium of 46 partners that bring together some of the main research and industry players in electric mobility. The project was implemented in 10 demonstration cities, i.e.: Kigali (Rwanda), Dar Es Salaam (Tanzania), Hanoi (Vietnam), Pasig (Philippines), Kathmandu (Nepal), Najing (China), Quito (Ecuador), Montevideo (Uruguay), Hamburg (Germany) and Madrid (Spain), and in more than 15 replication cities around the globe.

In Quito, the city demonstration guided by Work Package 4 aims to contribute to the advancement of e-mobility in the city in three fronts:

- Component 1, the main component of the demonstration is the Multimodal e-mobility hub in the Historic Center of Quito. This pilot aims to contribute to the consolidation of the Zero Emissions Historic Center through the introduction of locally designed and assembled Light Electric Vehicles (LEV) to improve the last mile logistics and connectivity in the area. For this, the project allocated seed funds for the development of prototypes and subsequent assembly of Light Electric Vehicles, both passenger and cargo. The implementation of pilot is planned to be executed in three phases. The first phase of the pilot has been completed, by testing 10 e-cargo bikes for last mile logistics in the field.
- Component 2 has contributed with capacity building and technical assistance on e-buses targeted at municipal representatives working in the field.
- Component 3 is focused on the development and use of mobility-as-a-service (MaaS) solutions. Specifically, in the context of the project, Pluservice developed a MaaS App during 2020 and 2021 with the permanent participation of the Mobility Secretariat, the Municipal PTO and the Subway operator to ensure that the app is in line with the local needs of the PT system. The app was tested between November and December 2022 to help students plan trips and pay for public transport.

Along with the pilot implementation, the SOLUTIONSplus team has been working with the city of Quito and other relevant stakeholders in the corresponding impact assessment, capacity development, business models and policies that will enable the replication and scale-up of the demonstration. The work conducted, the lessons learnt and the gaps identified in all these aspects will also serve as an input for the GEF7 and the ACCESS projects.

Component 1: Multi-modal e-Mobility Hub in the Zero-emissions Historic Center of Quito

In Quito, the main component of the demonstration is the Multimodal e-mobility hub in the HCQ. This pilot aims to contribute to the consolidation of the Zero Emissions Historic Center through the

introduction of locally designed and assembled Light Electric Vehicles (LEV) to improve the last mile logistics and connectivity in the area.

The Historic Center of Quito (HCQ) comprises an urban area of 3.75 km2, with a population of approximately 40,000 inhabitants. Declared by UNESCO as the first World Heritage Site in 1978, it is considered one of the most important historical sites of Latin America. Even though the HCQ has been losing residents for the past 3 decades, during daytime it still attracts important influxes of locals and foreigners because of its commercial and touristic importance. According to the Municipal database, there are approximately 2,000 businesses in the area, from which more than 80% are wholesale and retail trade activities and 14% accommodation and food service activities.

Since 2015 several streets in the main area of the HCQ were turned into pedestrian streets, on which 280,000 people walk on weekdays and 315,000 on weekends. The concentration of air pollutants such as PM2.5 and CO2 decreased by 30% and 60%, correspondingly, after the pedestrianization. Despite the improved accessibility, road safety, and air quality experienced by pedestrians this measure has made the distribution of goods difficult in the area. This is where international cooperation projects such as SOLUTIONSplus and the GEF-7 are supporting the Municipality in the consolidation of the low-carbon urban logistics in the area.

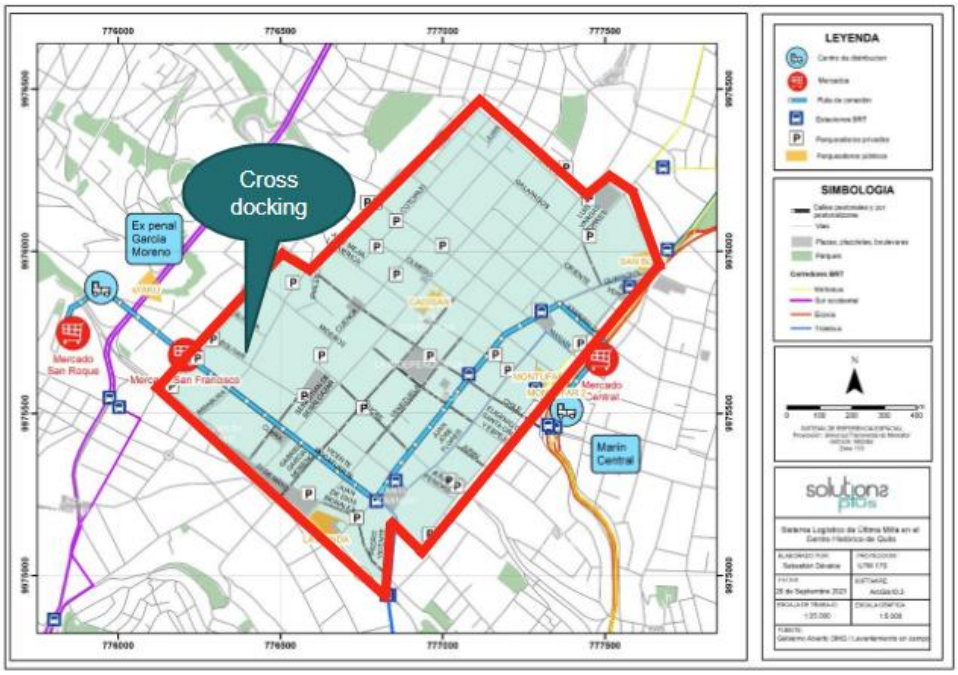

Fig 5. Pilot intervention area in the Historic Center of Quito

For the execution of the demonstration project in Quito, SOLUTIONSplus granted seed funding for the local design and assembly of Light Electric Vehicles (LEV), both for passenger and freight transport. Almost 20 vehicles, including e-cargo bikes, e-quadricycles and e-mini vans are being manufactured by 3 local SMEs. These vehicles have been / will be tested in the HCQ based on the pilot designed jointly between

the SOLUTIONSplus local and regional teams with the support of several consortium members and local universities. The pilot's operating schemes were defined based on the last mile logistics (LML) needs of the businesses in the area identified in the ex-ante assessment conducted in September 2021.

Fig 2. Prototype of quadricycle (Phoenix) developed by SIDERTECH

Fig 3. Locally assembled e-cargo bikes, long john type (left), rear-load and front-load tricycles (right)

In August 2022, a public event with support of the Municipality and academia (CATENA and EPN) took place to socialize the prototypes of SIDERTECH and E-CARGO BIKE with the aim to allow people to provide feedback regarding compatibility of the vehicle design and accessories to the operator's needs and the ease of drive. The vehicles were very well received and accepted by the participants. Their major concern was related to the security of the vehicles, i.e. the risk of the transported goods to be stolen, which was considered for the final selection of the accessories for the pilot.

Fig 4. SOL+ e-vehicles launch and co-design event

In September 2022, the e-cargo bikes prototypes were tested in terms of performance and safety in a controlled environment and following the national standards. These tests were conducted by the Institutional Laboratory of Vehicle Analysis and Sustainable Mobility (LIAVMS, formerly CCICEV), a mobility laboratory ascribed to the National Polytechnical University of Ecuador (EPN). Based on the tests, improvements and adjustments were suggested before producing the whole lot of vehicles and before the piloting phase.

In parallel, a wide range of private actors were approached to design the operating scheme for the piloting phase, from big courier services companies to local restaurants, markets, hotels and recyclers associations that work at the Historic Center, gathering a total of 20 EoI of potential participants of the pilot. Phase 1 took place between November 7th and January 6th 2023, and entailed the testing 10 of e-cargo bikes of three different models and with the involvement of 7 logistic operators for the bicycles of different kinds: courier companies, bike messengers, restaurants, recycling associations and a vendor from the Central market. The area designated for piloting was limited by the following streets: Carchi in the North, 24 de Mayo in the South, Montufar in the East and Chimborazo in the West, as depicted in the following map, which also shows the pedestrianized streets, parking lots, plazas and boulevards, parks, and the main public transportation lines of the BRT system:

The first phase of the pilot took place between November 2022 and January 2023. A total of 10 e-cargo bikes of 3 different models (2 e-long johns, 4 front-load e-tricycles and 4 rear-load e-tricycles) were tested by 7 logistics operators in 4 different operating schemes. These operators included 2 food distributors, 1 restaurant, 2 couriers and 2 recycling associations, which were selected as the more suitable for the 1st phase from the 20 companies that expressed interest in piloting the vehicles.

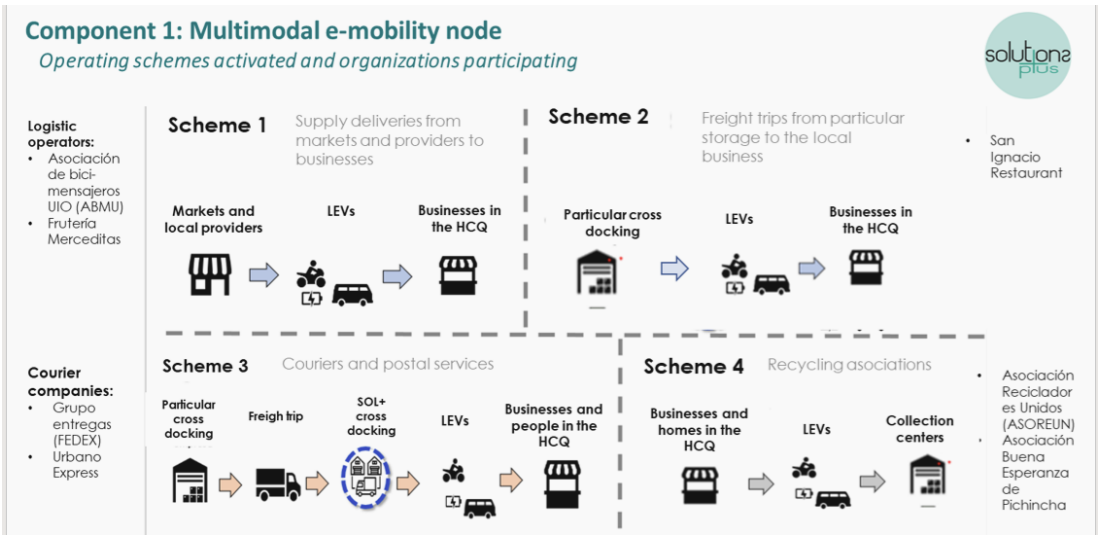

Fig 7. Operating schemes (OS) and logistic operators

A cross-docking platform, i.e., a hub where the incoming goods are unloaded and consolidated to be immediately loaded into LEVs to avoid long storage times and enhance sustainability (Kiani Mavi et al., 2020), was established in a private parking lot, located on Bolivar Avenue. As shown in Figure 6, a space was adapted to allocate 6 of the 10 bicycles for temporary parking during the day and for charging and parking during the night. Based on the agreements reached with participants, the remaining 4 bicycles were given in full custody to the participants, so they could park and charge in their own premises.

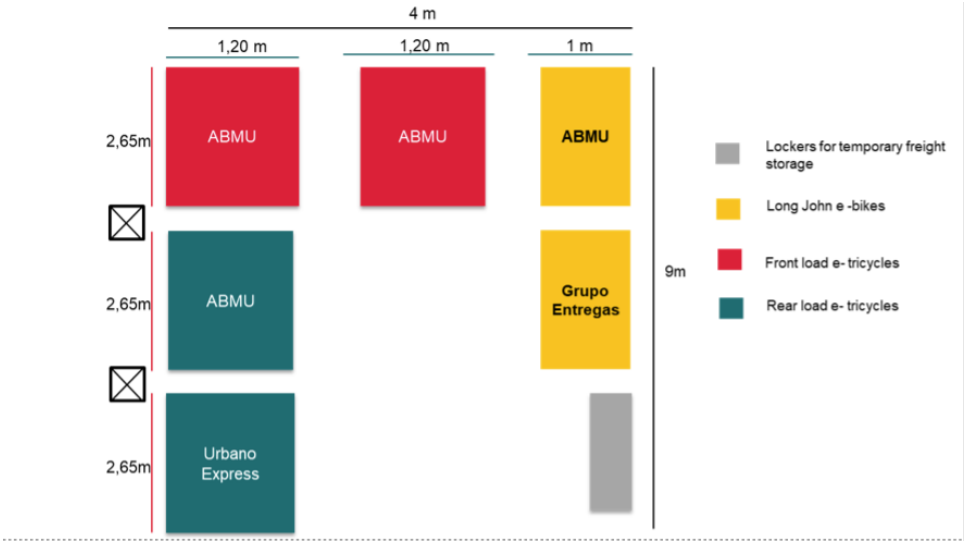

Fig 6. Cross docking vehicles distribution

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 trips, delivered 956 packages, collected recyclables from 154 points and achieved an estimated reduction in emissions of 491.74 kg CO2e. Once asked about their experience testing the SOL+ vehicles, 5 out of 7 pilot participants rate the solution as excellent and would like to continue using it. The efficiency gains obtained are reflected in an increased number of packages delivered, reduced working time and, in

some cases, even a higher income, all indicators that reveal an immense scale-up and replication potential.

Fig 7. Overall results of the pilot

After analyzing the results, a new Call for Expression of Interest (EoI) was launched in January 2023 for the participants of the 1st phase interested in continuing using the vehicles in their operations and thus willing to receive them in permanent custody. A total of 6 out of 8 logistics operators of the 1st phase expressed their interest, received the vehicles and are using them in their daily operations since April 2023. Since then, the SOLUTIONSplus e-cargo bikes have transported approximately 300t, travelled 25,000 km and avoided 6 tCO2. According to the scale-up assessment conducted, if all ICE logistics vehicles in the HCQ were replaced by electric, approximately 600t CO2 emissions would be avoided every year.

The 4 e-quadricycles and the 4 e-vans manufactured by the local SMEs Sidertech and Grupo Miral, correspondingly, are being tested by large food and beverage distributors, courier companies and municipal companies responsible for passenger transport and waste collection. The results are being processed.

Fig 8. Pilot implementation, OS4. Collection of recycled materials

Component 2: Technical advice and capacity building on e-buses

Besides the local vehicle design and testing, the SOLUTIONSplus project has been supporting the local actors by providing capacity building, technical support related to business model development, innovation management, advisory services and in some cases even European vehicle components, as part of its Start-up Incubator and matchmaking program.

In 2022, the Regional Training was dedicated to e-buses, financing, and charging infrastructure, which contributed to the capacity building process outlined in Component 2. Moreover, technical and political staff from the Mobility Secretariat and the Municipal PTO directly involved in the design and implementation of e-mobility projects in Quito have benefited from their participation in capacity building instances related to e-buses and trolleybuses in Berlin (2022), Bogotá (2022) and Madrid (2023). Another important input from SOLUTIONSplus in this topic was a pre-feasibility study about the electrification of 1 out of the 5 BRT corridors that run along the city, the Corredor Central Norte (CCN). Finally, following a request from the Municipality, an Expert Advisory Board formed SOLUTIONSplus consortium members specialized in e-buses, including technical staff from the EMT of Madrid, Centro Mario Molina and Fraunhofer Institute was set-up in 2022 to advise the city on the development of the Labrador-Carapungo e-BRT Corridor.

In March 2024, a multistakeholder delegation of 14 people from Quito, representing the Municipality, the Municipal PTO, LEV manufacturers and logistics operators participated in the Latin American e-Mobility Forum 2024 (LAEMF) in Bogotá, Colombia. The LAEMF, organised by SOLUTIONSplus and the GEF7 Regional Platform, summoned approximately 100 participants from the region and provided the opportunity to learn in situ from one of the countries leading the transition to e-mobility in Latin America, both in public transport and in urban logistics. This included site visits to two different e-bus depots in Bogotá.

Additionally, Quito benefited from its participation in other SOLUTIONSplus capacity building activities, including virtual and on-site peer-to-peer exchanges, site visits, e-courses, expert advisory boards and international conferences related to e-bike sharing systems, low-carbon urban logistics, last-mile connectivity, e-cargo bikes, e-buses, e-BRT, trolleybuses, MaaS, batteries, Eco-driving and the Low-Carbon Mobility Management (LCMM) Tool from T-Systems.

Component 3: Mobility as a Service (MaaS) app

The SOLUTIONSplus project contributed to the development of context-based digital tools for the Integrated Public Transport System of Quito. Specifically, the following modules were developed:

1. MaaS App La Quiteña:

    - Multimodal route planner
    - Schedules, stops and lines of PT
    - E-wallet & purchase of PT tickets

2. Web app Assistant to top up the e-wallet in the ticket booth
3. Mobile app My Check to validate PT tickets in the stops

In October 2023, 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. With regards to the potential of scaling up a MaaS app, 88% of the students responded that they would use the App 3 times a week and everyday if the application were available to the public with all the incidents solved. Furthermore, the majority of students (80%) agreed and totally agreed that the application should include other public transport options such as the subway (metro), trolleybus, conventional buses, etc., thus, pointing out at the importance of multi-modality in Quito's transport system.

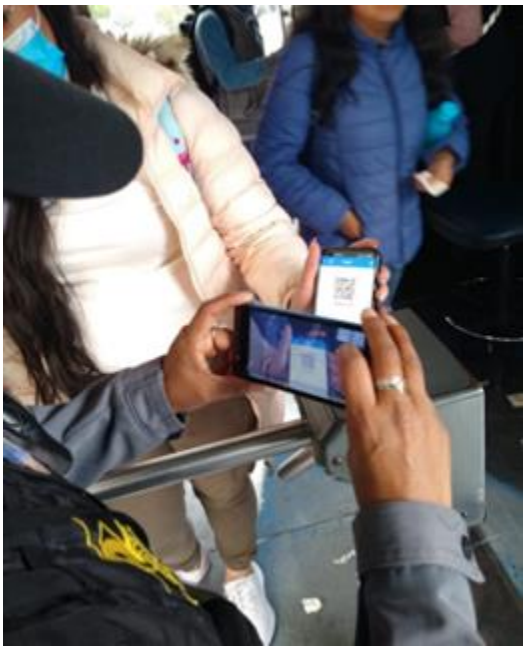

Fig 9. Pilot implementation, MaaS App verification of tickets

2. About the Project

2.1 Goal

The goal of this scale up concept is, based on the results and learnings of the SOLUTIONSplus project implementation in Quito, to accelerate the transition towards low-carbon mobility in Quito and Ecuador by supporting institutionalization of low-carbon mobility, the related policy development and the introduction of digital tools for urban freight and passenger transport. This will not only contribute to GHG emissions reduction, but also to an improvement of air quality and the achievement of sustainable mobility goals.

The specific objectives are the following:

1. Institutionalize low-carbon mobility in Ecuador by developing and implementing a multi-stakeholder communication and engagement strategy, as well as a capacity building program that integrates technical, financial, regulatory and sustainability aspects. The latter will be elaborated in close collaboration with national universities to ensure the creation and consolidation of local capacities.
2. Develop the necessary regulatory framework at the national and local levels to enable the replication and scale-up the proposed pilots throughout the city and country. This includes regulations related to business models, norms, standards, strategies, municipal ordinances, etc.
3. Continue the implementation and monitoring of pilots to test new types of vehicles, different business models and digital tools. In particular by:
    a. Introducing at least 4 e-vans and 6 LEVs to be used in a renting scheme in the cross-docking platform in the Historic Center of Quito for 12 months by at least 16 private companies. A digital platform for logistics operators in the HCQ will be developed to help consolidate the pilot.
    b. Developing mathematical models for optimization of public transport with a focus on electrification and integration to be tested with the municipal PTO
    c. Introducing digital solutions to contribute to the multi-modal integration of the transport system building on a gender-inclusive MaaS concept and the Integrated Payment System (SIR) being implemented in Quito

2.2 Scale-up Approach

In order to achieve the goals and objectives proposed in this scale-up concept, the SOLUTIONSplus regional and local teams worked together with the UNEP team and other SOLUTIONSplus partners, as well as local and national stakeholders involved in the preparation of other low-carbon mobility projects to be implemented in Quito and Ecuador, such us the GEF-7 Project: “Support the shift towards low-carbon electric mobility in Ecuador” and the ACCESS Project: “Accelerating Access to Low Carbon Urban Mobility Solutions through Digitalization”. Moreover, a collaboration with different universities was established, in order to co-create and transfer knowledge to local institutions and strengthen the local capacities, so that in the scale-up and replication processes local actors have a leading role. This preparatory work strengthened the synergies between projects and ensured the uptake of the results and lessons learnt in

SOLUTIONSplus to the GEF7 and ACCESS projects that will be implemented between 2024 and 2029 and secured a funding of approximately 4 million USD to scale-up SOLUTIONSplus. Figure 10 illustrated the synergies between the 3 projects.

Fig 10. Projects SOLUTIONSplus, GEF 7 and ACCESS complement each other and benefit from their synergies.

Besides ensuring the continuation and scale-up of SOLUTIONSplus, this approach is completely in line with the policies and plans related to low-carbon mobility that have been adopted at the national level as it can be seen in Table 1. All of these policies and plans are directly linked to the country's commitment to the Paris Agreement and the Agenda 2030.

Table 1: Consistency of the project with National and Local Priorities

Policy / Plan	Project's Contribution
National Development Plan 2021-2025 ("Plan Nacional de Creación de Oportunidades 2021-2025", PNCO)	This project will promote investments in new technologies and the development of a circular economy; hence, it is aligned with objectives 2 and 3 (PNCO) of the economy and job creation strategic area (namely, *to promote an economic system with clear rules that encourages foreign trade, tourism, investments, and the modernization of the national financial system*; and *to increase productivity and competitiveness in the agricultural, industrial, aquaculture, and fishing sectors, under a circular economy approach*). As a mitigation project that will lead to a reduced usage of fossil fuels, it is also aligned with objectives 11 and 12 (PNCO) of the ecologic transition strategic area (namely, *to preserve, restore, protect, and make sustainable use of natural resources*; and *to promote sustainable development models, applying climate change adaptation and mitigation measures*.
National Climate Change Strategy (ENCC) 2012-2025	The ENCC is among the first policies related to climate change mitigation and adaptation in Ecuador. Energy (including the transport sector) is among the prioritized sectors in the strategy, and therefore, in all documents related to Climate Change that were developed afterwards (NCs, NDCs, etc.) and provide further details on the concrete actions that are to be implemented. As the present proposal consists of an e-mobility project expected to result in GHG emission reductions in the transport (and energy) sectors, this proposal is fully aligned with the ENCC.
Nationally Determined	The NDCs conditional scenario of external sources of financing proposes various Nationally Appropriate Mitigations Actions (NAMA) for freight and passenger

Contributions (NDC) and National Communications	transport. These actions (also included in the Third National Communications to UNFCCC the renewal of fleets.[1] [2] Promoting the renewal of fleets is among the key outcomes of the GEF-7 proposal, mainly through component 2 (i.e. the project pilot), output 3.1 (business models and a policy framework for leasing, renting and subscription to electric vehicles) and output 4.1 (an end-of-life vehicle disposal programme that will reduce the average age of the fleet).
National Plan for Energy Efficiency (PLANEE)	The National Plan for Energy Efficiency (PLANEE) was elaborated in 2017 to introduce various energy efficiency measures aimed at a gradual substitution of fossil-fuel, high environmental impact power plants with low carbon technologies and renewable sources. PLANEE is built around improvements in terms of six main pillars, one of which is transport, which has the main objective to reduce the energy intensity in the transport sector. To achieve this, the PLANEE plans to optimize infrastructure for the circulation of transport (i.e. resulting in improved vehicle efficiency), to replace inefficient transport technologies (energy labelling and efficient driving techniques) and fuel switch (i.e. improving fuel quality and introducing new technologies, such as hybrid and electric vehicles).[3] This proposal is thus fully aligned with one of the main pillars of the PLANEE.
National Sustainable Mobility Policy (PNMUS) 2023-2050	In June 2023 the Ministry of Transport and Public Works published the PNMUS that establishes 4 pillars: 1. Planning sustainable urban mobility, 2. Governance, capacity building and rights assurance, 3. **Mobility and Technology** and 4. Financing. It also defines 3 cross-cutting topics: 1. Universal access, 2. Gender equality and inclusion, 3. **Climate change**. The project is specifically related to the goals “Efficient, integrated, active and safe mobility" and “Clean mobility”. The PNMUS highlight the importance of imposing restrictions to polluting vehicles in cities, such as the creation of Low-emission Zones (LEZ), the renewal of urban logistics and public transport fleets.

Also at the local level, there is a direct link between the project goal, objectives and activities and the policies and plans defined by the city of Quito, as it can be seen in Table 2.

Policy / Plan	Project’s contribution
Climate Action Plan for Quito (PACQ)	Considering the national regulatory framework of Ecuador and in compliance with the international commitments to which the Municipality of Quito adhered in the past years, such as the C40 Clean Air Cities Declaration, the C40 Clean and Healthy Streets Declaration and the Mobilize Your City Global Initiative, in 2020 the Municipality of Quito issued its Climate Action Plan for Quito (PACQ by its Spanish acronym). In the PACQ, Quito commits to reduce GHG emissions by 30% in comparison to 2015 by 2030 and achieve climate neutrality by 2050. One of the measures to achieve these goals is the consolidation of a Zero Emissions Historic Center. In this context, the scale up proposal, as a mitigation project which expects GHG emission reductions in the transport sector is fully aligned to the PACQ.

[1] Gobierno de Ecuador, *Primera contribución determinada a nivel nacional (NDC) para el Acuerdo de París bajo la Convención Marco de Naciones Unidas Sobre Cambio Climático* (2019).

[2] Perspectives Climate Change; TYPSA, *Identificación, evaluación y escenarios de reducción de emisiones de GEI relacionadas*
con medidas y acciones de mitigación a implementar a nivel nacional (2017).

[3] Ministerio de Electricidad y Energía Renovable, *Plan Nacional de Eficiencia Energética 2016 - 2035*. Quito (2017).

Sustainable Mobility Master Plan (PMMS) 2022-2042	The PMMS establishes Quito's prospective vision for sustainable mobility until 2042, the plan states core principles, objectives, general goals, policies, strategies, programs and projects for the implementation of urban mobility in the city. The project is articulate with the following strategies: 1. Mitigation of the climate impact of the mobility sector in the DMQ, 2. Strengthening of the territory model and improvement of connectivity and accessibility, 3. Harmonization and appropriation of mobility with its environment, and 4. Dynamization of the DMQ economy through the efficiency of the mobility system. The PMMS recognizes as specific implementation projects the "Low or zero emissions center" included in the Environmental Quality Program and the Travel Demand Management Plan to be implemented in the mid-term (2027-2032), and the "Last-mile logistics in non-motorized modes in the center and other areas" included in the Sustainable Mobility Program and the Commercial Cargo Transportation Plan to be implemented in the short-term (2023-2027). It also highlights the "Rescue, strengthening and up-grade of public transport" as a line of action, focusing on the integration of the mobility system for the short-term and working towards Mobility as a Service for the long run.

2.3 Scale-up activities

The scale up activities defined will use the results and learnings of the SOLUTIONSplus project implementation in Quito to accelerate the transition towards low-carbon mobility in Quito and Ecuador by supporting institutionalization of low-carbon mobility, the related policy development and the introduction of digital tools for urban freight and passenger transport. Thus, this section explains how ACCESS and the GEF7 build on the experience of SOLUTIONSplus to increase and multiply the impact of the interventions.

Pilots

The demonstration activities in Quito were focused on improving the last mile logistics and connectivity in the Historic Center of the city. In the demo, 10 e-quadricycles, 4 e-cargo bikes and 2 e-delivery vans for last mile delivery services were introduced and tested, with the aim of scaling it up to a larger number of vehicles. All these vehicles were designed and assembled by local SMEs with previous experience in the automotive sector and counted on the support and collaboration of the European industry SOL+ consortium members and European SMEs. This work will be continued by the GEF-7 project "Support the shift towards low-carbon electric mobility in Ecuador", which will add at least 4 rented e-vans, 6 additional LEVs and consolidate the cross-docking platform initiated by SOLUTIONSplus. The GEF7 pilot will operate for 12 months and aims to have at least 16 companies testing the available vehicles in their logistics operations in the HCQ for at least 1 month each. Fast charging infrastructure deployed by the local utility company (Empresa Eléctrica de Quito) and KIA, 2 of the co-financing institutions, will be available for charging the EVs.

Moreover, to consolidate the pilots and ensure their sustainability, ACCESS (Accelerating Access to Low Carbon Urban Mobility Solutions through Digitalization) will create a data platform for last mile logistics in the Historic Center of Quito, along with a collaborative business model for that will enable the scale-up and replication beyond the lifetime of the projects. Furthermore, within the framework of the ACCESS project, transport optimization models for optimal routing of electric vehicles in the area will be

developed in partnership with the Mathematical Modelling Center (ModeMat) of the National Polytechnic School (EPN), building on the model developed by the ZLC for Quito under SOLUTIONSplus.

Sub-National Policy & Plans

The second component, indicates the contributions each project delivers for Sub-National Policy & Plans. Within SOLUTIONSplus, a city roadmap was developed, which has as its main action line the Implementation of a LEV system for urban logistics in the HCQ. The project also supported the municipality in providing recommendations to the micromobility draft ordinance. The main aim of the policy advice provided was expanding the scope of vehicles to be regulated from Personal Light Electric Vehicles (PLEVs) to the framework of LEV, so that also micro vehicles for the transport of people and goods, as well as L-category vehicles, i.e., all the vehicles that fall under the umbrella of LEV are also regulated.

ACCESS will contribute with a strategy for implementing cross-docking platforms at city level and other regulations that enable the scale-up and replication of the pilots having the digitalization of transport at the core and linking to the measures contained in the Sustainable Mobility Master Plan (PMMS).

National enabling framework

Regarding the national enabling framework, SOLUTIONSplus focused on regulations for LEV, including homologation, which is a process that happens at the national level, charging infrastructure standards. It also provided contributions about how to better integrated e-mobility in NUMP (e.g. low carbon urban logistics).

The GEF 7 will work on standards and policies to regulate energy efficiency, emissions and safety of conventional vehicles and EVs, regulations for the installation of charging infrastructure, a strategy for the implementation of electric mobility at scale, the development of a National Electric Mobility Coordination Body and a Gender-sensitive mobility knowledge management system for policy makers and key stakeholders. Moreover, it will work on a regulatory framework for leasing/renting electric vehicles, which until now is very restrictive for logistics / commercial vehicles. ACCESS, on the other hand, will focus in this component on the development of specific guidelines on digitalization of urban transport for the NUMP based on a previous gap analysis, the creation of an assessment framework to monitor sustainable urban mobility at the municipal level and a plan for the Digital Transformation of the Transport Sector. Despite happening at the national level, all these policies, regulations and standards will directly contribute to the scale-up of the pilot and its replication in other Ecuadorian cities. The two projects will also work on business models, for EV leasing/renting and for collaborative cross-docking platforms.

Cross-cutting component

As complementary activities to the pilot and policy recommendations, SOLUTIONSplus developed an impact assessment framework for urban logistics, provided technical assistance for the local manufacturing of LEV, tested different business models, and strengthen local capacities through a close collaboration with universities. Moreover, it put together a comprehensive capacity building, knowledge

sharing and technical assistance program that had low-carbon urban logistics and LEV regulations at its core.

The GEF7 and the ACCESS projects will conduct and impact and scale-up assessment of the pilot on the basis of the framework developed by SOLUTIONSplus. Moreover, the collaboration with local universities will go even further, as in both projects they will be implementing partners, ensuring the consolidation and expansion of the capacities generated during the SOLUTIONSplus project and the ownership from local actors in the topics being promoted. Finally, peer-to-peer (P2P) exchange at the regional level will also be facilitated, as both, ACCESS and the GEF7, project count on regional components or support platforms.

2.4 Timeframe

A zoom into the specific activities of each project, how they link to each other and the timeframe are depicted in Figure 11.

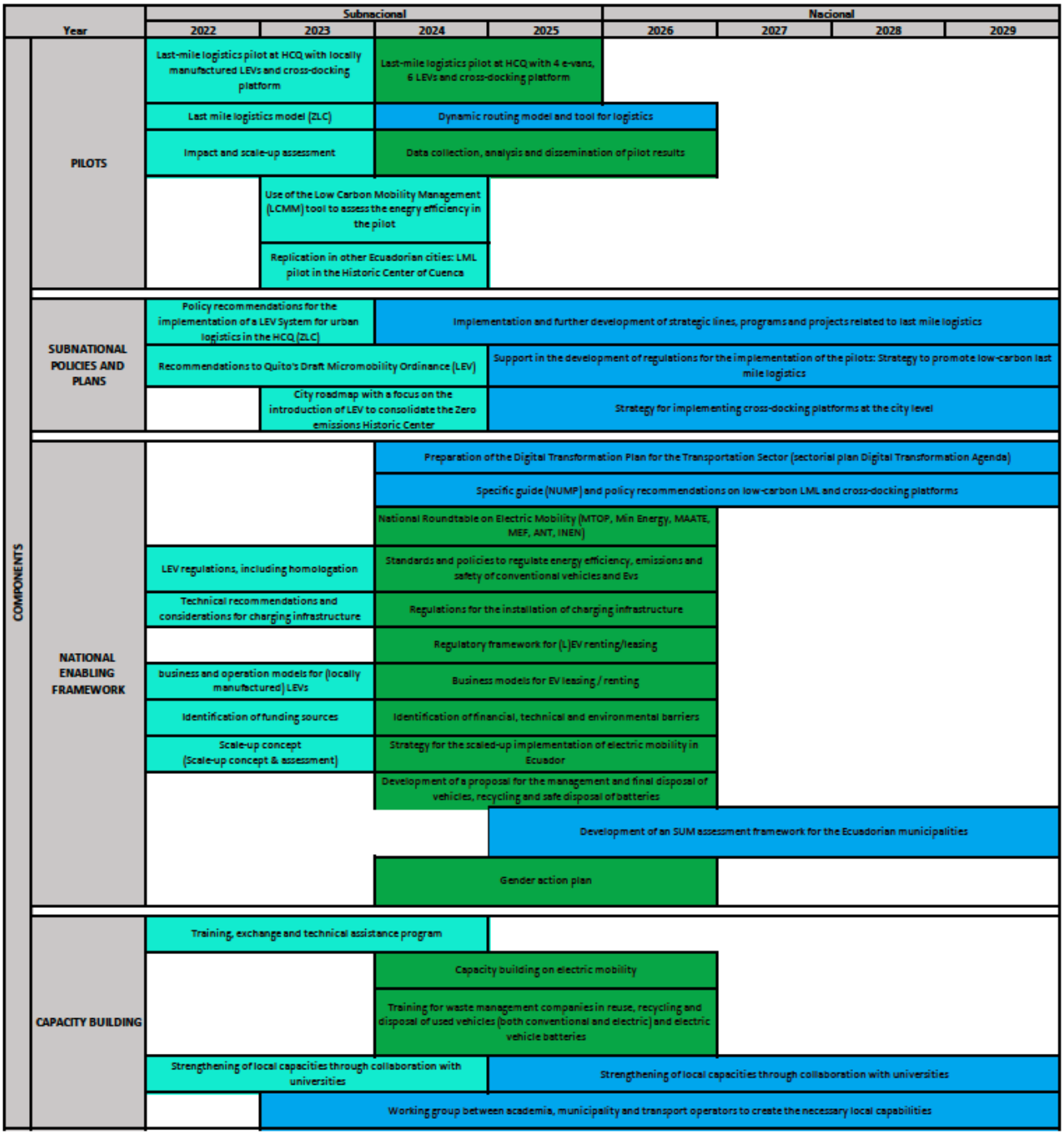

Fig 11. Timeframe of the pilot and scale-up projects

2.5 Stakeholder Engagement

- Urban Electric Mobility Initiative (UEMI) was initiated by UN-Habitat and the SOLUTIONSplus project and launched at the UN Climate Summit in September 2014. As overall coordinator of SOLUTIONSplus, executing Agency for GEF 7and implementing partner of ACCESS in Ecuador, has been working, since 2020, with a variety of public and private institutions, including MTOP and MAATE, on the implementation of electric mobility solutions in the country. The financial and technical support that provides includes implementation of electric mobility pilots, impact assessment, capacity building, business model support, policy development, as well as scaling up, replication and financing.
- Centro de Movilidad Sostenible (CMS) is a non-profit established to advance the decarbonization of the transportation sector in Latin America and the Caribbean (LAC) with close to 20 years of experience working on the deployment of low carbon technologies to decarbonize LACs transport sector. CMS will provide technical and financial support.
- The Wuppertal Institute for Climate, Environment and Energy undertakes research and develops approaches for transitions to sustainable development. The Institute acts as an intermediary between the worlds of science, industry and politics working together on transformative change towards sustainable urban mobility through innovative and integrated mobility solutions. The WI will provide technical and financial support.
- The Ministry of Transport and Public Works (MTOP) will support with studies and technical support as part of their contribution to the development of the National Policy for Urban Sustainable Mobility (PNMU). The PNMU will play a key role in establishing guidelines for the governance structure for the mobility sub-sector in Ecuador. It will support the creation of an information system, the development of Public Private Partnerships (PPP) and leasing frameworks in the transport and mobility sector, and the revision of vehicle efficiency and fuel quality standards.
- The Ministry of Environment, Water and Ecologic Transition (MAATE) will support with studies and technical cooperation as part of the development of the National Plan Towards Decarbonization ("*Plan Nacional de Decarbonización*"). This work will result in a roadmap for the decarbonization of the transport sector, including the identification of changes required in existing legislation and policies.
- The Ministry of Telecommunications and Information Society, also known as Ministerio de Telecomunicaciones y de la Sociedad de la Información (MINTEL), regulates telecommunications and information technology in Ecuador, among other fields. Its work is relevant for the pilot about digitalization in the transport sector.
- National Polytechnic School (Escuela Politécnica Nacional, EPN) which has active research in terms of route modelling and mathematical optimization for the logistics and transport sector, will provide co-finance for the project (faculty support, access to labs); project pilot will be accessible to EPN students interested in doing research at the graduate/post-graduate level.

- Municipality of Quito has strategic relevance, mainly due to its on-going efforts in terms of e-mobility and as the host for the project's pilot. Specifically, the Mobility Secretariat through the following Directorate: 1. Mobility Policies and Planning, 2. Sustainable Transport Modes, and 3. Technological Development and the Environment Secretariat through the Directorate of Environment Policies and Planning where the decisions regarding climate action and decarbonization measures are taken.
- Empresa Electrica de Quito (EEQ) is the utility in charge of distribution in Quito. Ongoing project for the development of charging infrastructure. To provide access to its charging stations for the pilot (co-finance)
- KIA will also provide access to their fast-speed charging facilities and has committed to the creation of additional charging infrastructure together with TERPEL (owner of 100 filling stations throughout the country). KIA will also contribute to the communication efforts from this GEF project.

3. Budget

The budget available for the present scale up project combines the budgets of each project (SOLUTIONSplus – GEF7 – ACCESS) for Ecuador.

Total budget Sol+ (Ecuador)	Total Budget GEF7	Total Budget ACCESS (Ecuador)
€500,000 approx. (for the pilot component)	USD 1,280,275 (for all components)	€ 2,400,000 (for all components)


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