

This project has received funding from the European Union's Horizon 2020 research and innovation Programme under grant agreement No 101006598.

FUTURE-HORIZON D3.1

Catalogue of demonstration concept notes on mobility innovations

Deliverable status:final (revised)Submission date:2022-10-03

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Executive summary

This report aims to provide a broad overview of different areas for urban mobility innovation and aims to outline a selection of very specific concepts that cover several relevant levels of intervention in urban mobility transition processes in developing and emerging economies. The report summarizes different fields of sustainable urban mobility detailing aspects of selected pilot concepts from a more general perspective. The concepts outlined in the report draw from several international cooperation projects, most notably the Urban Pathways project funded by the International Climate initiative and the EU-funded INCO flagship project SOLUTIONSplus. These concepts aim to illustrate various aspects for urban mobility interventions to highlight international cooperation potential. Each of the concepts are described from the perspective of one city, which is a representative for a diverse cluster of other local authorities working on similar solutions. For each intervention area, a reflection on the ERTRAC roadmaps is provided to feed back into the overall road mapping process to ensure that European actors can play an active role in urban mobility innovations internationally.

1. Introduction

1.1. Reference to description of the action

The Coordination and Support Action FUTURE-HORIZON (Future on-/off-road transport and mobility research, cross-border cooperation strategies, realization actions and procurement processes) started on February 1st, 2021, with a duration of 24 months. The overall project objectives are:

- Provide high-quality input for ERTRAC (European Road Transport Research Advisory Council) roadmaps, strategic research agendas and the future ERTRAC implementation.
- Explore road transport research strategies in Europe, other established markets (e.g. in North America or Asia) and emerging markets (e.g. in Africa or South America).
- Enable capacity building for local and national policy makers, practitioners, entrepreneurs and operators to generate, implement and operate innovative sustainable mobility solutions.
- Facilitate close cooperation with financing institutions and potential funding organisations.
- Utilize the vast expertise of an elaborate stakeholder network, incorporating also external advice in project outputs.
- Develop a dissemination strategy and disseminate key ERTRAC and project activities and publications.

The FUTURE-HORIZON consortium works within six dedicated work packages, all of which continuously interact with one another and three of which explore the horizon of road transport research strategies in different regions of the world.

- Work package 1: Within work package 1 (Research and Technology Development Strategy) the project partners focus on the elaboration of ERTRAC roadmaps, the identification of re-search priorities and ERTRAC-related research excellence. Focus region: Europe.
- Work package 2: Within work package 2 (EU / International network) the partners expand the horizon of their analyses and collect and compare information on the road transport research strategies in other well-established markets such as the U.S., Japan or South Korea.
- Work package 3: Within work package 3 (International exploitation and finance) the partners expand their approach even more by including emerging markets in regions like South America, Africa and Asia.

Through continuous collaboration between these three work packages the FUTURE-HORIZON partners can ensure bilateral benefit and provide input from the international perspective for ongoing ER-TRAC roadmap updates. In work packages 2 and 3 the FUTURE-HORIZON consortium will establish contacts to non-EU countries to enable a well-functioning international cooperation throughout the project.

1.2. Objectives and scope of the report

Emissions from the transport sector are a major contributor to climate change — in 2018, a total of 24% of global CO2 emissions from fuel combustion came from transportation. In terms of transport modes, 72% of global transport emissions come from road vehicles, which accounted for 80% of the rise in emissions from 1970-2010. The global transport sector could reduce 4.7 GtCO2 e/year by 2030. Such a transition depends on cities that enable modal shifts and avoided journeys and that provide incentives for the uptake of improved fuel efficiency and changes in urban design that encourage walkable cities, non-motorized transport and shorter commuter distances. Cities pursuing sustainable transport benefit from reduced air pollution, congestion and road fatalities and are able to harness the relationship between transport systems, urban form, urban energy intensity and social cohesion. Electrification is an

important part of the solution to the challenge of growing transportation sector emissions because it eliminates tailpipe emissions and harnesses the potential to decarbonize the power grid.

Accordingly, several cities have been working in the development and implementation of sustainable urban mobility pilots with a strong focus on active and electric (public and shared) mobility embedded in their Sustainable Urban Mobility Plans (SUMP) with a high potential of being replicated in other areas of the cities. This report focuses on summarizing concrete local implementation projects, aiming to boost low-carbon urban mobility in cities. This builds on current and planned demonstration activities which were co-developed with the host city and describes key needs and opportunities. It entails activities in several intervention areas contributing to the mobility transition. While the concepts serve as guiding ideas they are of course adapted to the local contexts. It is also worth mentioning that the type of pilots included in this document include an approach that aims to integrate the different sectors / activities in one neighbourhood, e.g. in low-traffic, low-emission, low-waste neighbourhoods ("EcoZones").

This report also throws reflections on how these pilot projects align to the work of ERTRAC and to the objectives of the recently drafted Towards Zero Emission Road Transport (2Zero) Strategic Research and Innovation Agenda (SRIA) document which seeks to describe "some of the research and innovation activities needed to achieve a climate-neutral road transport. The 2Zero document further details the technical and specific objectives, sets milestones and provides a timeframe for such R&I activities and their expected outcomes." This report also reflects over ERTRAC's Integrated Urban Mobility Roadmap which proposes actions to promote modal shift to sustainable transport modes such as public transport and active travel, and also considers the dichotomy between mobility demand and place demand aiming to establish a better link between urban mobility and land use planning. Considering that the projects described in this report are largely implemented outside the European region, the reflections will focus on the international cooperation drive proposed in the two documents.

1.3. Methodology

The mentioned implementation approach is composed of the following key elements:

- o Context-based: Builds on ongoing activities promoted by the municipality and/or local NGOs
- Mutli-stakeholder and interinstitutional approach: Connects different stakeholders working in similar projects to identify synergies and generate a higher impact
- Neighbourhood level: Work on small-scale pilots at the neighbourhood level that are low-cost, participatory and easily replicable at a larger scale
- Intersectoral: Integrates different sectors (mobility, resource, energy efficiency) for a higher impact and understanding of climate change mitigation
- Monitoring and evaluation: Monitors and evaluates the impact of the implemented activities in order to adapt, improve and replicate the pilots
- Circular Economy: Explores circular economy opportunities to address key urban system issues and amplify the potential of its economic, social and environmental benefits, establishes new circular city functions and servies and innovative business models, thus creating an effective framework for the circular transition

2. Selected pilot actions by thematic area

In the following paragraphs we summarize the different fields of sustainable urban mobility of the selected pilots from a more general perspective. The concepts outlined here draw from several international cooperation projects, most notably the Urban Pathways project funded by the International Climate initiative and the EU-funded INCO flagship project SOLUTIONSplus. These concepts aim to illustrate various aspects for urban mobility interventions to highlight international cooperation potential.

2.1. Active mobility projects

2.1.1 Open Streets in Cape Town, South Africa

Africa's first ever exchange programme on "Open Streets" took place in Cape Town, South Africa from October 22-28 in 2018, and is cited as one pioneering example which brought together African government officials, representatives of NGOs and street enthusiasts to learn from and share experiences on the concept of Open Streets and Placemaking. The Open Streets Exchange was co-organised by Open Streets Cape Town (OSCT), Urban Pathways through UN-Habitat and GIZ through the Transformative Urban Mobility Initiative (TUMI) Challenge. The participants represented countries from the African continent including Angola, Egypt, Ethiopia, Ghana, Kenya, South Africa, Uganda and Zambia. The programme provided a combination of dialogue sessions, interaction and practice on topics around planning, facilitating and implementing Open Streets initiatives. The participation at the Open Street Exchange inspired various city participants to launch placemaking and car free initiatives in their home cities, such as in Ethiopia, South Africa and Uganda.

Under the initiative 'environMENTALISE –co-creating safe, friendly and green neighbourhoods', launched by Urban Pathways in 2019, the project supported several actions happening in September and October during the Mobility Week, the Car-free Day and the Day of Walking and Cycling to School in cities in Latin America, Africa and Asia. With the aim of monitoring the impacts of the implemented actions and collecting relevant data, the participating cities were provided with a low-cost air quality and noise-monitoring device, a 'Smart Citizen Kit'. EnvironMENTALISE started in August with a series of webinars related to active mobility and waste management with a strong bottom-up focus. Children have been selected as the main target group of this type of projects, as it has been shown that working with children and schools has the potential to transform patterns in the short term, as it impacts their parents, and in the long term, through changes in their future mobility choices and waste habits.

Figure 1: Open Streets initiatives in selected cities in emerging economies



2.1.2 Placemaking, pedestrianization and impact on public health, Luthuli Avenue Transformation – Nairobi, Kenya

Nairobi is facing complex and interconnected challenges attributed to uncontrolled urbanization and its associated impacts: vibrant street life is often choked by traffic congestion; economic opportunities are rife, but local resources and capacities are not always sufficient; and informal and private sector activities have outpaced planned development. This is exacerbated by a high urbanization rate of 4.1 per

cent per annum. The current population of the city is estimated to be 4.07 million and is projected to rise to 7.14 million by 2030 (UN DESA, 2016).

In Nairobi, 40% of residents make their daily trips on foot, 40% by matatus (a type of public service vehicles) and 14% by private vehicles (JICA, 2014). In other words, the majority of people living in Nairobi rely on walking, however, roads are often dangerous by design. They lack adequate pedestrian facilities such as safe crossing and allow for high speed of vehicles. Despite having an Non-Motorized Transport (NMT) Policy since 2016, large proportions of the infrastructure investments are allocated to car focused infrastructure that is hostile for pedestrians and cyclists. It is against this background that the city embarked on a journey towards transforming Luthuli Avenue, one of the most vibrant commercial streets in downtown Nairobi. The street is part of a larger pedestrian desire-line that connects downtown Nairobi with its Central Business District. The street is home to wholesale and retail shops for various merchandise, particularly electronics. Over the last few years, the street has deteriorated into a congested area, where different transport users are fighting for space and high levels of noise and air pollution are the reality. UN-Habitat supported Nairobi in the transformation of Luthuli Avenue by providing technical advice on placemaking and re-design, as well as support for the urban furniture. In 2018 it started with a placemaking week that was repeated in 2019 and extended to a re-design of existing infrastructure.

Figure 2: Placemaking activities in Nairobi



Placemaking Week Nairobi, 2016

Moktar Dadah street

Placemaking Week Nairobi, 2017

Banda street

Placemaking Week Nairobi, 2018

Luthuli Avenue



The street was selected by the city county team, considering Luthuli avenue's potential role in accelerating the regeneration of downtown as envisaged in the Nairobi Integrated Urban Development Masterplan (NIUPLAN). The Luthuli Avenue Transformation illustrates an exemplary project that moved from participatory planning and design to actual implementation on the ground. Various partners supported Nairobi County Government and were involved in different phases of the project including the Implementing Creative Methodological Innovations for Inclusive Sustainable Transport Planning (i-

CMiiST) project, Stockholm Environment Institute, Naipolitans, University of York, Placemakers, UN-Habitat, the Safer Nairobi Initiative, the Architectural Association of Kenya, the Technical University of Kenya's Centre for Creative and Cultural Industries and the Critical Mass Nairobi among others. The final design distributes space more equitably, creating more space for pedestrians, introducing street trees, a bike lane and bicycle parking facilities - and seating among other street furniture. Overall, the design has transformed the busy electronic street into a successful retail corridor that is welcoming and safe for all. Following the transformation of Luthuli Avenue, the Kenyan Government was inspired to roll out further Non-Motorized Transport (NMT) infrastructure in Nairobi. Through the Nairobi Metropolitan Services (NMS) project, Nairobi is currently implementing Non-Motorized Transport (NMT) infrastructure in the Central Business District (CBD), and has plans to roll out walking and cycling infrastructure in other areas as well.

In addition to the physical transformation, UN Environment also supported air quality monitoring in a before-and-after analysis at Luthuli Avenue. In collaboration with Nairobi City County Government, three air pollution sensors were installed along Luthuli Avenue that collected data on PM2.5 and PM10. Based on preliminary observations, the recommended WHO values, both for PM2.5 and PM10 are regularly exceeded with high peaks of around 70 µg/m3. Following the pilot project at Luthuli Avenue, additional sensors were installed around the wider Nairobi. The county took leadership in setting up this wider network and also in engaging with industry and schools. Following the air quality monitoring control and inspection efforts, the National Environment Management Authority closed down an Oil Refinery Plan which caused heavy ambient air pollution that was causing harm to public health. Similar efforts were made in Addis Ababa, Ethiopia, where seven air pollution monitoring sensors were placed to collect and analyze data. This data resulted in the city banning medium sized trucks to lower the peak of pollution levels in rush hour.

Budget: EUR 135,800

- Urban Pathways (through UN-Habitat) contribution: 8,800 EUR (co-financing by other development partners)
- UNEP (Nairobi and Addis Ababa): 35,000 EUR (air pollution sensors for Nairobi and Addis Ababa)
- Co-Financing for physical infrastructure by Nairobi City County Government for Luthuli Avenue: 92,000 EUR
- Estimated direct GHG emissions reduction: 1,400 tCO2/year

2.1.3 Pedestrian Street along Tam bac River – Hai Phong, Vietnam

Hong Bang District is Hai Phong socio-economic centre with historical, cultural and recreational importance. Due to tourism flows and commercial activities in the area, vehicular movement is very high with huge risks to pedestrians. Pedestrian safety is also low due to the lack of allocated walking space, further evident with frequent and high volume of traffic accidents. The urban renewal demonstration project concept was an initial step towards a larger urban transformation in Hai Phong city to provide access to a safe, green and inclusive urban space. It includes redesign and develop an existing area along the Tam Bac river in Hai Phong city - making it a tourist attraction centre, and maintaining historical and cultural importance; demonstrate the activity to citizens that attract urban public spaces have the potential to increase active mobility and can be well integrated with public transport; create convivial and pedestrian only public space to promote public health and increase the safety of pedestrians from fast moving motorised traffic; influence the urban planning paradigm and shift it towards a people focussed policy; integrate the project with other sectors such as energy and resource management to amplify the climate mitigation potential. The city was supported in the project concept development by international organisations aligning with local partners such as Hai Phong Department of Transport. It was submitted to the UN-Habitat call on 'Small public space implementation projects' in 2018. However, the funding was not successful through the same call.

Planned Budget : EUR 171,400

2.1.4 Reflections over ERTRAC's Roadmap and 2Zero Strategy – Active mobility and Pedestrianization schemes

As part of infrastructure related solutions being implemented by cities and as identified by ERTRAC as key to improve land use and transport interactions at the neighborhood level, are pedestrianization schemes. Examples of these schemes such as described above in the placemaking and pedestrianization pilot implemented in Nairobi, are deemed to contribute in several ways to improving mobility particularly in congested urban areas. As indicated by ERTRAC in its Roadmap, improving the quality of urban spaces is as important as access requirements to stimulate development. The Roadmap proposes further research areas including understanding the extent to which the need to improve the urban environment increases relative to access requirements as a basis for stimulating new development. Pilots such as the ones presented above provide the opportunities to do a deeper dive into these proposed research areas. The outcomes realized in Nairobi also provide some lessons and could form part of best practices for local authorities in Europe and abroad which are seeking evidence regarding the link between traffic reduction measures and economic activity in their jurisdictions – this is an expected impact of the research aims defined by ERTRAC. Reflecting over the 2Zero Strategy which also aims at monitoring international relevant initiatives that test and demonstrate innovative concepts, services, use cases and business models as well as identify opportunities for exploiting mobility models worldwide, it is evident that the Nairobi placemaking and pedestrianization pilot provides an example that does not only have decongestion and pollution mitigation outcomes but was also implemented with full participation of stakeholders such as the local authority (Nairobi Country Government) emission mobility for people. The pilot could therefore contribute to the reference knowledge base for living labs, projects and initiatives which the 2Zero Strategy aims to develop to help promote zero emission mobility solutions in different areas or applications (urban, regional and long haul) and for different mobility services.

2.2. Integration of e-mobility solutions for last-mile connectivity and logistics

Pilot concepts have been developed to enable transformational change towards sustainable urban mobility through innovative and integrated electric mobility solutions in passenger and freight transport. They are now being implemented under the SOLUTIONSplus project. SOLUTIONSplus themed 'Integrated Urban Electric Mobility Solutions in the Context of the Paris Agreement, the Sustainable Development Goals and the New Urban Agenda' is a project funded by the EU Research and Innovation Programme, Horizon 2020. The project brings together highly committed cities, industry, research, implementing organisations and finance partners and establishes a global platform for shared, public and commercial e-mobility solutions to kick start the transition towards low-carbon urban mobility. The project encompasses city level demonstrations to test different types of innovative and integrated e-mobility solutions, complemented by a comprehensive toolbox, capacity development and replication activities.

Furthermore, some projects, such as the Urban Pathways project, are currently working on project concepts regarding the integration of e-mobility solutions (e.g. electric three wheelers) in the waste collection system. While one use case can be to integrate it into municipal fleets and serve e.g. yet neglected areas (because of difficult access, narrow streets, etc.), another use case is testing for collection of new waste streams, such as organic waste from households. The following sections present some of these pilot projects.

2.2.1.E-mobility for last-mile connectivity – Hanoi, Vietnam

The demonstration project in Hanoi focuses on boosting the ridership and effectiveness of the currently running BRT and the forthcoming metro rail with shared E-2 wheelers as last-mile connectivity. The shared E-scooter/E-mopeds system will be equipped with state-of-the-art docking-cum-charging stations and contactless payment that provides a hassle-free experience of e-mobility and clubbing it with

longer trips on public transport. The project will be a win-win for both public transport and e-mobility. As the city of Hanoi intends to ban the use of motorcycles in the inner city by 2030 responding to vehicle emission, this project will support the plan to phase out conventional Internal Combustion Engine (ICE) 2-wheelers. The demonstration also supports promotional activities to raise awareness on EVs, strengthen local capacity on EV manufacture, develop appropriate business models and enhance vehicle integration. The demonstration project will have a high potential to not only make e-mobility attractive but also reduce the GHG emissions from transport and increase the share of public transport use. The proposed demonstration project concept was submitted on 25 April 2019 as a part of EC H2020 proposal for funding. It is being implemented by SOLUTIONSplus project (project duration 01/2020 – 12/2023) together with local partner – University of Transport Technology (UTT) in Hanoi.

Budget: EUR 50,000

Estimated direct GHG emissions reduction: 87 tCO2/year

2.2.2. Integrating e-mobility for last-mile connectivity – Dar Es Salaam, Tanzania

The demonstration project in Dar Es Salaam will focus on e-mobility for last-mile connectivity. The demonstration aims at integrating 60 electric feeder/e-3-wheeler and distribution services with Dar es Salaam's BRT (DART) to support first/last mile connectivity. The e-3-wheelers (newly built 50 imported/provided by DART and 10 newly built with Valeo components), will be an integral part of public transport. The deployment of e-3 wheelers will happen at 5 DART stations considering urban locations: a) in the city centre, where fossil-fuelled 3-wheelers are currently banned for environmental reasons and where accessibility to/from the BRT stations can be limited due to longer distances; b) in peri-urban areas where combustion-fuelled 3-wheelers are currently very common as feeder-modes. Also, a feasibility study on electrification with respect to vehicle specifications (range, speed), charging infrastructure (type and location) will be carried out. As part of this, state-of-the-art data collection methods using geo-localization devices will be applied for a detailed derivation of the systems specifications. Subsequently, an implementation plan for the introduction of e-3-wheelers will be developed. This will follow a systemic approach and include the development of business models (vehicle ownership, rental schemes, and maintenance), and capacity building on electric mobility development to be offered to local stakeholders. Some of the areas identified with the highest training needs in Dar es Salaam include vehicles (3-wheelers) or infrastructure technologies (including charging), operations, business modelling, Integration in policies and plans, procurement and contracting.

Further aspects to be assessed under the demonstration relate to the battery type (fixed vs. battery swapping), ownership models (leasing/pay-per-use model), the use of existing telecom and power distribution boxes to accommodate vehicle charging, fleet bundling, and eco-routing. Interaction with the passengers and the system will be fostered through a Mobility-as-a-Service (MaaS) application that will consider the growing smartphone ownership of Dar es Salaam's population, to allow a maximum spread of the use and increase smart metering services. An open Application Program Interface (API) will be made available to allow 3rd-parties/software programmers to develop further services. The demonstration project will furthermore include local stakeholders as much as possible to increase the acceptance of the system. The current 3-wheeler market employs many people in Dar Es Salaam and the inclusion of current drivers will be a crucial target of the project. Furthermore, capacity building on sustainable maintenance of the vehicles will be carried out, building on the current structures of OEMs in Tanzania. Tanzania has already a high share of renewable energies through hydropower which will be used for the services. The proposed demonstration project concept was submitted on 25 April 2019 as a part of EC H2020 proposal for funding. It is being implemented by the SOLUTIONSplus project (project duration 01/2020 – 12/2023).

Budget: EUR 50,000

• Estimated direct GHG emissions reduction: 180 tCO2/year

2.2.3. Locally developed/assembled E-Cargo Quadricycles – Pasig, Philippines

The concept of the Pasig demonstration project focuses on e-cargo Quadricycles, which combine the maneuverability of smaller vehicles with the cargo capacity of larger vehicles currently used in Pasig for urban delivery services. The emphasis is on integrated and shared urban logistics solutions and on investigating the potential for public charging solutions. The activities on-the-ground will also include those that aim at improving the enabling conditions for e-mobility, and enhancing local capacities related to e-mobility. Locally appropriate solutions addressing urban logistics are deemed to be quite important, as conventional vehicles that are currently being used are not particularly effective in conducting efficient movements considering the local conditions in the urban areas. The quadricycle is intended to feature a base vehicle information management and control system which will provide information needed for condition monitoring and analytics, charging/swapping decision support, wheel load distribution advisory, vehicle security, GPS system and dynamic performance adjustment. The demonstration project will aim at producing and testing urban cargo quadricycles that are suited to the local conditions and can potentially transform how urban deliveries are done in the country. A "shared vehicle use" concept will be investigated for feasibility in the pilot project. This concept would center on the shared use system that would feature the use of the vehicles by PHLPost, the Pasig City Government, and by other private entities (e.g. suppliers, food delivery, third party logistics). In addition, the project will focus on the development of demonstration components that address not only freight transportation, but also last-mile passenger transportation. The quadricycle to be developed as part of the demonstration should be flexible enough to be configured into a vehicle that can be used to transport freight and people. It will also be able to be configured to take on utility tasks. The proposed demonstration project concept was submitted on 25 April 2019 as a part of EC H2020 proposal for funding. It is being implemented by SOLUTIONSplus project (project duration 01/2020 – 12/2023) together with Pasig City Government and Philippines Postal Corporation – Pasig branch (PHLPost Pasig).

Flexible Electric Van

Under SOL+, a proposal led by De Lasalle University, which is for a funding mechanism from the Ministry of Science and Technology to develop a "flexible electric van" (FLEV proposal) that has a chassis that can be used for different purposes (e.g., passenger/cargo), is also being supported. Essentially, the vision is to make the FLEV also compatible for handling the cargo boxes to be used in the SOL+ quadricycles. SOL+ can provide a couple of units of the Valeo motors to the FLEV proposal. The use of the FLEVs within the Pasig City Government, PHLPost, and other private entities are currently being investigated. In the case of Pasig City, the FLEVs can be suited for the operations of the General Services Office (GSO) and the medical depot.

One of the key components for the mainstreaming of e-mobility in Pasig is the identification of appropriate location and installation of EV charging facilities. These locations are selected based on a set of various criteria including roads hierarchy, the intensity of traffic flow, residential densities and availability of space. On one hand the charging location can emerge in attractive locations and can stimulate development of a specific area through attracting different transport operators or stimulating trading activities. On the other hand, the required space and increased movement resulting from installation of EV facilities may not be incentivized in specific residential zones. In order to off-set the negative aspects of the construction and capitalize on its potentials the project includes a demonstration intervention, in which EV charging facilities will be developed. It will be realized as a component of visually attractive and multifunctional public/commercial space including urban greenery, small architecture and land-scaping measures. Based on the pre-selected list of locations identified by City of Pasig in collaboration with the Technical University of Berlin a specific location with high commercial and design potential will be selected for the intervention. Except for immediate spatial intervention the project will also define long-term vision for the development of the surrounding space and liaise with private sector investors to secure space and leverage potential co-funding opportunities.

The following strategic ideas were identified to support the rapid adoption of e-mobility in Pasig: a) in addition to PHLPost, other private companies should be involved in the use of the e-vehicle being developed to gain a broader range of insights; b) developing standards for battery replacement may potentially be key to reducing barriers to entry; c) other municipal initiatives (e.g., tax and non-tax incentives for charging station providers and site operators) have the potential to accelerate the adoption and diffusion of charging stations in the city; d) engaging cities in future discussions on e-mobility policy frameworks at the national level may lead to mutual benefits; e) exploring the city-supported paratransit reservation and management system may be key to transforming the city's three-wheeler sector and serve as a pathfinder for other cities across the country.

Budget: EUR 50,000

Estimated direct GHG emissions reduction: 13 tCO2/year

2.2.4. Easing movement and logistics of small-scale businesses through adoption of Electrical Handcarts (E-Handcarts) – Mombasa, Kenya

The small scale traders, peri-urban farmers or street hawkers living in urban fringes of Mombasa have difficulty due to inadequate urban services and the situation is more difficult due to poor economic condition. Using minibuses for goods transportation to the urban market from the fringes is costly for small businesses. Therefore, manual handcarts are widely used for cargo services by small businesses in Mombasa. However, they are labour intensive, provide poor productivity and the infrastructure does not support its ease in movement. A demonstration project has been supported which aimed at introducing electric handcarts to slowly replace manual handcarts in order to increase the efficiency in cargo services by small businesses which require less labour and provide better services. The Government of Kenya has identified the importance of the use of handcarts by the informal sectors for the movement of goods by small scale businesses, mainly women and citizens with the poor economic state. Therefore, the government is keen to support them on their economic development considering health benefits and ease in movement too. National Youth Service being a Government of Kenya agency has partnered with Auto-Truck E.A Ltd to support, develop and mass produce electric handcarts as a local solution to the menace created by the conventional manual handcarts. The project intends to pilot 10 electric handcarts to provide services to small business entrepreneurs together with the identification of a microfinance business model. The 10 recipients/ recipient groups of the electric handcarts will be identified considering user needs assessment criterion and also to the eventual impact assessment will be carried out during the project period. The project concept was submitted in December 2018 to the 2019 TUMI Global Urban Mo- bility Challenge for the award of financial support/grant by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. However, the funding was not secured though the call.

Budget: EUR 195,000 from TUMI (+ city budget EUR 70,000)

2.2.5 E-mobility in public transportation in Kathmandu and Montevideo

Retrofitting e-buses – Kathmandu, Nepal

Vehicle emission is a major cause of the air pollution in Kathmandu. The promotion of electric public transport is one of the best ways to address this problem. The demonstration action in Kathmandu aims to contribute to the development of an electric mobility ecosystem in the city by demonstrating various e-vehicles to improve public transport, as well as appropriate charging solutions and related services (to be introduced in a later phase of the project). Key demonstration activities include the conversion of a diesel bus into an e-bus and the production of converted e-3-wheelers, e-shuttle vans, and e-micro buses carried out by local manufacturers with imported equipment and technical support from the consortium.

Regarding the production of converted electric three-wheelers, there are currently about 700 e-3-wheelers (Safa Tempos with 10 seats) in the Kathmandu Valley, which were introduced more than 20 years ago. While the Safa Tempo are providing a valuable fedder service, they need improvements both in terms of their technical performance and their looks and comfort. The improved system would have a higher upfront cost, which many Safa tempo owners were hesitant to carry out. The lack of enough local capacity (e.g. maintenance and repair) is also hindering scaling up e-mobility in the city. Together with various stakeholders, a project concept was developed to improve/redesign Safa Tempo with appropriate business models to support public transport operators. A contract with a local bank was made and a provision of soft loan was planned within the project which was given to Safa Tempo owners to cover part of the capital costs of newly designed vehicles. The initial loan would be provided to 15 Safa Tempos for technical improvement and then the revolving fund was planned till all Safa Tempos are converted. Developing standards for EVs and charging infrastructure and building local capacity of EV operation and maintenance was also planned. The project concept was submitted in December 2018 to the 2019 TUMI Global Urban Mobility Challenge for the award of financial support/grant by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. However, it could not pass through. Therefore, the concept was resubmitted for another grant.





Budget: EUR 144,000 from TUMI (+ city budget EUR 175,000)

In a second phase, the demonstration action will create an ecosystem for electric mobility in the city by enhancing EVs in public transport, as well as suitable charging solutions and related services. To introduce E-buses and slowly replace diesel buses in the public transport sector, a pilot research project on conversion of diesel bus to e-bus will take place by local manufacturers/start-ups. Several existing E-3-wheelers (named Safa Tempo) will be remodelled or redesigned using Valeo Powertrain and Li-ion batteries (instead of lead-acid batteries) and refurbishing the chassis, assembling the vehicle parts locally. This will increase the quality, efficiency and comfort compared to existing one. This will provide better services for E-3-wheelers as public transportation in the city. E-scooters/e-bike sharing systems will also be explored, that reduce the dependence on owning private vehicles. A suitable business model for the demo activities will be developed within the project. As charging infrastructure is poor or non-existent in public, suitable options for charging EVs and batteries will be suggested. The demonstration also supports promotional activities to raise awareness on EVs, enhance vehicle integration with the introduction of digital applications for smart ticketing and payment and fleet management. The proposed demonstration project concept was submitted on 25 April 2019 as a part of EC H2020 proposal for funding. It will be implemented by SOLUTIONSplus project (project duration 01/2020 -12/2023) together with local public transport operator 'Sajha Yatayat'. Budget: EUR 50,000

• Estimated direct GHG emissions reduction: 300 tCO2/year

Installation of charging infrastructure for e-buses – Montevideo, Uruguay

The planned demonstration activities for Montevideo City include two demo components: 1) Charging infrastructure for the Ciudadela terminal, which involves the construction of a high-capacity bus depot to charge the planned e-buses overnight and opportunity charging, complying with Combined Charging Standard (CCS2) and Open Charge Point Protocol (OCPP) and 2) Local manufacturing of 2- and 3- wheeler e-vehicles and renting scheme for these vehicles.



Figure 4: Electric bus and electric handcart in Montevideo

Component 1: Charging infrastructure for Ciudadela terminal

The demo action consists of assisting Montevideo with the installation of charging equipment in the bus terminal called "Ciudadela" in the Old City of Montevideoato to charge the existing 31 e-buses overnight, taking advantage of the electricity oversupply and a reduced electricity price at night. For this demonstration, the electricity and charging infrastructure company ABB will provide the charging infrastructure to be installed at the high-capacity bus depot. Additionally, the public electricity utility company (UTE) will conduct the electric installation that will supply electric energy to the chargers. As for the technical requirements of the E-bus charging station, efficient and cost-effective smart charging solutions that comply with the Combined Charging Standard (CCS) and the Open Charge Point Protocol (OCPP) will be integrated. This will allow charging of up to 4 electric buses simultaneously. Moreover, the strategic location of the terminal would be the first pilot project in the City where various PTOs would charge their e-buses inside a public terminal, which could be scaled easily in other points of the city. The main advantage of implementing this type of equipment is that the required grid connection is smaller, reducing initial investments and operational costs. Moreover, the possibility of installing fast chargers in the most travelled streets for buses to charge for 3-6 minutes on-route will be explored. These solutions can easily be integrated in existing operations by installing inverted pantographs and chargers at terminals and intermediate stops. However, these technical requirements don't apply to the 31 existing ebuses, so the charging infrastructure will be used exclusively for charging of the new generation of ebuses introduced during the year 2021. Finally, a real-time platform for reliable and secure operation of electrical power networks, ranging from generation, transmission and distribution to e-buses will be developed to improve the system management.

Component 2: Local manufacturing of e-cargo bikes and e-cargo tricycles

In addition to e-bus charging equipment, local start-ups and Small and Medium-sized Enterprises (SMEs) will be supported to assemble electric 2- and 3-wheelers locally, e.g. with Valeo drive trains. The local assembly will lead to the production of 15 e-cargo bikes and four e-cargo tricycles. Besides enhancing local capacities and generating economic opportunities, the locally produced vehicles will

serve to decarbonise last mile deliveries and passenger transport. The proposed demonstration project concept was submitted on 25 April 2019 as a part of EC H2020 proposal for funding. It will be implemented by the SOLUTIONSplus project (project duration 01/2020 – 12/2023) together with local public transport operators.

Budget: EUR 50,000

• Estimated direct GHG emissions reduction: 2,300 tCO2/year

2.2.6 Reflections over ERTRAC's Roadmap and 2Zero Strategy – Electric mobility

Electric mobility is deemed to be the future of transportation. In Europe and other regions of the world, the transition from fossil-fueled transport systems to more sustainable transportation powered by cleaner fuels is getting intense. The European Strategy to reduce GHG emissions from the transport sector - by 60% by 2050 compared to 1990 and with 20% by 2030 compared to 2008 levels – requires concerted efforts from all stakeholders. For ERTRAC, efforts to contribute to this aim remain on its priorities, and providing an all-inclusive transport system is thought to help build an efficient integrated and low-carbon urban mobility system that does not only improving transport reliability and urban accessibility, but also social inclusion. As the bigger benefits of introducing electric vehicles in cities dwell on climate change mitigation, it is imperative that European stakeholders and industry players strengthen international cooperation in this area to support emerging countries and cities to adopt electric mobility. This cooperation will also require locally-tailored research and development initiatives such as those presented in the demonstration actions presented above. ERTRAC envisages that such research initiatives should embed the living-lab approach to foster open-innovation and test innovation options in real communities, as a basis for further knowledge transfer between cities.

Research areas that industry players could focus on and as indicated by ERTRAC as necessary for creating an innovation culture and establishing the right context conditions for innovation include: political acceptance and support for innovation, public acceptance, access to financial support, coherence in legal frameworks, stakeholder relationships, viable business models, transferability and impact assessment, among others. In this regard, the pilot projects in Hanoi, Kochi, Pasig, Kathmandu, Kigali, Dar es Salaam, Mombasa, Montevideo are living-labs that can provide a wealth of lessons and research findings on integration of e-mobility solutions for last-mile connectivity and logistics for European players intending to support the transport decarbonization agenda abroad in the context of international cooperation on electric mobility research. For 2Zero Strategy, testing and demonstrating concepts, solutions and services for the zero tailpipe emission people mobility, freights and logistics is part of the key actions to contribute to the development of climate-neutral road mobility and logistics system in Europe and others regions of the world. The pilots described above provide a reference source for such demonstration actions and could contribute to the Strategy's aim of "creating a collaborative framework and knowledge base sharing for testing and demonstration of innovative concepts, services, use cases and business models with the wide participation of stakeholders, to accelerate the transition towards zero tailpipe emission mobility for people". The knowledge shared via these pilots also help in monitoring international initiatives which the Strategy indicates could help in identifying opportunities for exploiting mobility models worldwide.

2.3. Integrated urban planning and design: implementing multimodal hubs, EcoZones and Low-Emission-Zones

Using the EcoZones framework (working title), support is currently being provided for small, low-cost projects that focus on neighbourhoods as the geographical scale, where an intersectoral approach is easily applicable, addressing simultaneously mobility and waste issues through a series of activities that include tactical urbanism, awareness-raising, community participation and impact assessment.

Understanding that the transition to a sustainable urban development is not only about infrastructure, but that a mindset change plays a huge role, the involvement of the community in these projects is key. Thus, these pilots will use participatory methodologies to increase support for sustainable mobility modes, transform public spaces, promote clean streets and waste reduction and separation. Their approach seeks to empower neighbours to have an impact in the change in their community, raise awareness and increase the collective knowledge on sustainable urban development and environmental issues. Thus, these projects do not only carry out pilot sustainable mobility and/or waste projects (with a great potential of including further areas such as Nature-Based Solutions - NBS); they also empower local communities, raise awareness and promote social cohesion. Within the EcoZone concept the activities described above are combined, e.g. on active mobility projects and public space and composting & separation at source pilots.

2.3.1.Multimodal and inclusive e-mobility hub in Zero Emissions Historic Centre – Quito, Ecuador

Component 1: Low Emission Zone in the Historic Centre

The multimodal e-mobility hub to be implemented in Quito will be carried out in the Historic Centre of Quito (HCQ), a UNESCO World Heritage Site, which aims to become a low-emission zone (LEZ), primarily accessed by clean public transport vehicles, pedestrians and bicycles. The commercial and touristic character of the HCQ and the narrowness of its streets require the introduction of small e-cargo vehicles to transport goods within the area. In order to improve passenger connectivity and last mile deliveries in the area, the small electric vehicles (2-, 3-, and 4-wheelers) will be assembled locally with European components provided by SOL+ industry partners such as Valeo. For example, 20 e-bikes, 2 e-buggies and 20 e-cargo bikes for last mile e-delivery services and 2 e-delivery vans, will be introduced and tested in the area. In this context, the multi-modal e-mobility hub to be established will contribute to the consolidation of the planned LEZ in the HCQ and the integration of the existing mass transit lines (BRT and subway). The hub will take advantage of the existing electric infrastructure of the trolleybus and the subway systems in the area to create multimodal charging points / stations. A distribution centre and a logistics plan that identifies the best routes for deliveries will also be outcomes of the demonstration activities.

Component 2: Charging equipment for E-BRT buses

As part of SOL+, charging equipment will be contributed to the Ecovía BRT corridor, the first corridor to be electrified in the city. This contribution could help reduce the cost of the procurement/leasing process for electric buses that the city is currently working on. In order to make a real-world estimate of the contribution, the Metropolitan Passenger Transport Public Enterprise of Quito provided specific information on the number and type of buses, confirmation of battery size for each bus type, estimated bus charging time, and number of buses at each location. ABB is working with the supplied information to provide a quote to the Metropolitan Passenger Transport Public Enterprise of Quito on the type and number of chargers that could be partially funded through SOLUTIONSplus.

Component 3: MaaS App for Public Transport

Plusservice is developing a mock-up of the application to be implemented in the integrated BRT system of the Municipality of Quito. The app will be used by the Mobility Secretariat of the Municipality of Quito and the Metropolitan Passenger Transport Public Enterprise of Quito as a means of payment to get the public transport users familiarized with modern payment methods before the new integrated payment system is launched. This tool will support the modernization and restructuring process that Quito's mobility system is undergoing for the launch of the first subway line in April 2021. The proposed demonstration project concept was submitted on 25 April 2019 as a part of EC H2020 proposal for funding. It will be implemented by the SOLUTIONSplus project (project duration 01/2020 - 12/2023) together with local public transport operators.

Understanding that the Historic Centre of Quito (HCQ) has always been a disputed space with a high social complexity, the proposed project recognises that the promotion of bike-lanes, pedestrian areas and e-mobility corridors that will be embedded in the LEZ also requires increased social acceptance of various interest groups and an inclusive allocation of different uses of spaces in the centre of Quito. The project will develop a demonstration solution of an adaptive design, which transforms a delimited area (street/surroundings of a metro or BRT station) into a space where transportation, leisure and trading functions are shared. The key component of the project includes the engagement with street vendors through a co-productive process with an intention of their gradual integration and regularisation in these kinds of multifunctional spaces.

The project outcomes will include:

- Increased social acceptance for the transformation of public spaces in the HCQ into zones of non-motorised transportation,
- o Engaged street vendors into redevelopment process,
- o Increased livelihood opportunities for vendors and set regularisation mechanism
- Increased commuters' safety
- Proposed adaptive design solution for shared urban spaces

Estimated budget: EUR 70,000

o Estimated direct GHG emission reduction: 3,000 tCO2/year

2.3.2. EcoZone Santa Tereza – Belo Horizonte, Brazil

Using the example of the Confisco Zone 30 implementation, this project seeks to work with the community in Santa Tereza to promote local actions capable of generating changes in the mobility choices and public space occupancy, as well as including sustainable waste management practices in a more integrated and structured way. The development of a pilot EcoZone that merges the concepts of Lowemission Zone (LEZ) and Zero Waste could become a precedent for Belo Horizonte that could easily be replicated in other areas of the city and thus contribute significantly to GHG emissions reductions from the transport and waste sectors. Santa Tereza, originally an informal settlement, is an important neighbourhood in the history of the city, being part of its construction in the 1890s. This led to an unequal integration of its population to the city, lacking conditions of mobility and accessibility. Thus, Santa Tereza has significant limitations related to non-motorised transport, with an extended use of private vehicles. On the other hand, it has great potential for reversing this scenario, since it is within a walkable distance to public transport options and services and has some use of bicycles. Moreover, Santa Tereza is a territory where residents, movements and associations have good neighborhood relations and a history of community engagement in defense of the neighborhood, its culture, history and ambience.

The neighborhood, located in the east of the city, and very close to the center, has about 6,330 households and 15,610 inhabitants. The estimate of total household waste generation in the neighborhood is 11,613.8 kg per day and 348,415.2 kg per month. Until 2017 all this waste was collected in undifferentiated collection and sent to the landfill in Sabará, a neighboring municipality of Belo Horizonte. As of 2017, with the start of the actions of the Lixo Zero Santa Tereza Network, this reality has changed and continues to change ever since. Currently, the NGO is responsible for recycling more than 120 tonnes of dry recyclable waste and composting more than 20 tonnes of organic waste per year, making use of approximately 2% of the waste generated in the neighborhood, with no public investments.

In this context, the EcoZone Santa Tereza Project carries out actions to improve the connectivity, walkability and road safety in the area through the implementation of Zones 30 in two schools surroundings and other important places of the neighbourhood, such as the main square. This will promote local actions that can bring about changes in the way people use different modes of transportation and public space in the neighborhood, while helping to mitigate the risks and impacts of COVID-19.

The implementation of the first phase of the project took place in the first half of May 2021 and included two groups of actions, the first part related to the bicycle infrastructure and the second part to a "permanent open road" focused on the inclusion of the road space to Joaquim Ferreira da Luz Square. The introduction of a bicycle lane of about 1.1 km, carried out by BHTRANS with its own funds, connected the existing bicycle infrastructure on Avenida dos Andradas, one of the main avenidas of the city, to the neighborhood through one of its main accesses. The second part of the proposal was to intervene in Joaquim Ferreira da Luz Square, the terminus of the proposed bike path. One side of the square was widened to transform the adjacent street into a permanent open street where people can meet, interact and play, in compliance with COVID-19 restrictions. These actions have transformed the plaza into a vibrant public space that allows people to maintain social distance while also supporting the numerous restaurants, cultural centers, and other businesses in the area. The main objective is to determine if the results of the implemented activities have helped to increase the safety of pedestrians and cyclists, reduce air and noise pollution, and increase the well-being of people in the area.

Figure 5: EcoZone activities in Santa Tereza



In a second phase the project partners will collaborate in the establishment of Zones 30 in the surroundings of the selected schools and will carry out the relevant awareness activities with the students and the local community. Moreover, the project will cooperate with Lixo Zero and the Municipal Program EcoEscola to increase the amount of families and businesses in the neighborhood that separate at source. For four years, the EcoEscola BH Program has been developing actions to encourage and strengthen environmental education in municipal schools in Belo Horizonte. The program includes school environmental education (formal) and non-school environmental education (non-formal) on a permanent, continuous basis, articulated with the community, integrating the different sectors of the school, the government and society through educational processes. These are projects such as urban gardens, composting, tree planting, conscious use of water and gardening projects in schools. In 2019, there were more than 321 schools engaged.

Estimated budget: EUR 30,000

Estimated direct GHG emissions reduction: 42 tCO2/year

2.3.3. EcoZone at Trieu Khuc – Hanoi, Vietnam

Trieu Khuc street in Hanoi is located in the growing district of Thanh Xuan district, Hanoi city. The street is busy from early morning till night time. The place is surrounded by 4 big universities, condominiums and new towns. The street has mixed transport including bikes, pedestrians, motorbikes, cars. The transport participants are mostly the young including students and the commuters renting a house nearby. While there are a great number of students walking to the University (UTT) after hopping off the buses on the main street. On household level waste source separation and/composting are not practiced well and are all mixed together. The concept of Eco-zone development is necessary for Trieu Khuc street. This pilot project will promote and facilitate the participants to feel comfortable, green and safe during their trips everyday. This will include the pavement marking for pedestrians and bikes. The pilot will also raise awareness on the zero waste concept. For example: Training programmes for green cadets (selected groups) on supporting the community zero waste. Innovative concepts on waste to wealth, green job creation would also be explored with stakeholders engagement. This will also support green recovery locally after the pandemic. This will integrate the Eco-school concept, following the example of Belo Horizonte's EcoEscola municipal program, that aims to raise awareness among school kids to protect the environment, including energy saving and waste collection, separation and reduction. Besides some activities to demonstrate the importance of energy conservation and waste reduction in the kids friendly way, the program will also integrate the environment aspects into the school lectures/curriculum.

Budget: EUR 25,000

Estimated direct GHG emissions reduction: 12 tCO2/year

2.3.4. Comparative EcoZones – Quito, Ecuador

Three neighbourhoods in Quito have been identified jointly with local counterparts as possible pilots for the implementation of EcoZones. Ongoing activities in the mobility and waste sectors include the following:

Improving walkability, road safety and public space:

The Territory and Housing Secretariat (STHV) in collaboration with the Mobility Secretariat of the Municipality of Quito are working on the regulations necessary to implement traffic calming measures, including Zones 30, citywide. Moreover, the STHV is working on the urban design of the surroundings of the subway stations to improve the walkability and multimodality of them before it starts operations at the end of 2020. Thus, the Mobility Secretariat of the Municipality of Quito has identified neighbourhoods, which can serve as pilots to showcase the measures, raise awareness and gain the necessary visibility and public acceptance to implement them citywide.

Composting & separation at the source:

The capital of Ecuador produces more than 2000 tons of waste per day. Understanding that most of the collected waste goes untreated to landfills and that organic waste accounts for more than 60 % of the produced waste in Quito, the need to implement measures to separate at source, recycle, reuse and compost is huge. In this context, discussions with the Environment Secretariat (SA) and the local Fundación Epicentre and ReciVeci have been held to work at the neighbourhood level and thus complement and boost the measures that the SA is currently implementing. Four key actions have been identified that could be implemented depending on the neighbourhood: 1) Composting boxes for the residents, 2) Community composting facilities, 3) Composting at schools, 4) Separation at source pilots.

Selected neighbourhoods

Iñaquito Neighbourhood

The Iñaquito neighbourhood is located in the core of the Central Business District (CBD) of Quito, also home to La Carolina Park. The Architects Association (Colegio de Arquitectos), one of the neighbours of the area in partnership with the Municipality are willing to turn the area into a traffic calming zone

using the tools of tactical urbanism. A training and education program on recycling practices and composting in neighborhood offices will be integrated into the ZONE 30 rollout, with contributions from the NGO Epicentre and others. In order to make the circularity of composting visible, the participating company will sponsor a public space, which will be recovered as an urban green patch for the city, using the compost generated as input. The participation of grassroots recyclers will be integrated into the project by integrating them as qualified managers of the compost produced, working hand in hand with Reci Veci. They will be in charge of handling the product generated. The Chamber of Commerce has been approached already and is highly interested to join the pilot.

Estimated budget: EUR 10,000

Estimated direct GHG emissions reduction: 16 tCO2/year

San Enrique de Velasco

The San Enrique de Velasco Neighbourhood is located in the North West area of Quito. It is a peripheral neighbourhood, originally an informal settlement, where low-income households live. Due to its highly engaged community and its geographic location, this neighbourhood has been selected by the SA for the implementation of the EU-funded project CLEVER Cities: Co-designing Locally tailored Ecological solutions for Value added inclusivE Regeneration in Cities. The implementation of a Zone 30 could complement the work in the area very well. As in the Inaquito neighbourhood (above), local capacity in recycling and composting practices will be established by providing training and educational workshops in the neighborhood. In order to make the circularity of composting visible, a green space is being recovered as a community park, which will be recovered as an urban green patch for the city and as a collection point for recyclable waste and neighborhood composting for organic waste. This space will also serve to strengthen the social fabric of the neighborhood, building a strong identity of community and belonging.

Estimated budget: EUR 15,000

• Estimated direct GHG emissions reduction: 13 tCO2/year

La Tola Neighbourhood

La Tola is located on the eastern side of HCQ and it is mainly a residential neighborhood with several local comercial activities, a tourist area and nearby a public market and it is a passage area for people going to the HCQ. Thus, the Tandem Foundation and Aves & Conservación, two local NGOs, in cooperation with the neighbours association aim at implementing a pilot EcoZone in La Tola neighborhood as an area of reduced emissions and waste through active neighbors participation and urban biodiversity conservation. These activities will consider nature based solutions using native plants and recycled materials to increase green spaces to mitigate the impact of high temperatures, capture pollution, and act as carbon sinks, while enhancing urban biodiversity.

Estimated budget: EUR 15,000

o Estimated direct GHG emissions reduction: 15 tCO2/year

2.3.5 The Zone 30 implementation in the Confisco Neighbourhood – Belo Horizonte, Brazil

Road traffic is not only the 10th leading cause of death worldwide, it is also the leading cause of death of children aged 10 to 19 in developing countries. This means that roads are a dangerous place for all, but especially for children and adolescents. Thus, adopting a safe system approach could have a positive impact not only in terms of road safety, but also in terms of public health, air pollution and climate change. In this context, projects in several cities around the globe that improve walkability, road safety and public space, with a strong focus on school surroundings have been supported. A tactical urbanism approach has been used with the goal of reclaiming the space from cars to pedestrians and cyclists and providing them with safer spaces for walking and cycling, but also with the aim of raising awareness among children and adolescents about the environmental, health, social and economic benefits of non-

motorised transport. As a result, several cities are supported with the implementation of Zones 30 initiatives

During September and October 2019, BHTRANS with the support provided by the Wuppertal Institute, UN-Habitat and WRI Brasil in the context of the Urban Pathways project and its environMENTALISE Initiative carried out various activities for the implementation of a Zone 30 in the surroundings of the Anne Frank Municipal School in the Confisco neighbourhood. The Confisco neighbourhood is located in the Pampulha administrative region, a peripheral area of Belo Horizonte. The aim of the project was to increase the road safety around the school and raise awareness among the students and the local community about climate change related topics such as sustainable urban mobility and waste management.

The success of the project relies on 3 key elements, i.e., community participation, inter-institutional cooperation and before and after assessments, which included vehicles and pedestrian counts, surveys, air quality monitoring. The overall results of the project are a low-cost Zone 30, where the safety around the school area and the social cohesion in the neighbourhood are increased. Moreover, the positive perception from the public, 78% of the residents would like the intervention to become permanent, and the visibility that this and the previous zone 30 projects have achieved, have led to the institutionalisation of this type of interventions and its city-wide replication in Belo Horizonte. At present, BHTrans is in the process of elaborating a Zone 30 guide that will explain step by step all the elements and stakeholders that need to be considered for a successful implementation. For this purpose, the institution will create a dedicated team that will have the replication of Zones 30 in the city as its main task.

Budget: EUR 8,363

Outcomes:

- Number of direct beneficiaries: 1,000 students of the Anne Frank Municipal School
- Pedestrians increase in the area: 23%
- o Estimated direct CO2 emissions reduction: 1.2 tCO2/year



Figure 6: Zone 30 implementation activities in the Confisco Neighbourhood – Belo Horizonte, Brazil

2.3.6 Car-free day in Kilagal – Kathmandu, Nepal

During the time of mobility week (on 16th Nov. 2019), a local event car-free day was organised in a small stretch (around 516m) of congested but historic street of Kathmandu in Kilagal, together with Kilagal ward no. 18 and local NGOs. The event (named Kilagal Festival) showcased the ward officials and locals - the effect of active mobility, such as reduced air pollution and increased pedestrian safety as well as local businesses. The data collected by an air quality monitoring device showed that PM 1/ 2.5/ 10 was the lowest compared to the average seven days. The survey (total respondent 189) carried out on the day also showed that most of the respondents were convinced about making the street pedestrian friendly. However, the street has not been converted yet. The local NGOs are still being supported on policy advice and case examples from other cities, to push for converting the street to become pedestrian friendly.

Budget: EUR 350 (Device cost) + City's own budget

Estimated direct GHG emissions reduction : 800 tCO2/year

2.3.7 Car-free days in 2019 – Addis Ababa, Ethiopia

The aim of the project "Scaling up safe street design in Ethiopia" is to strengthen the capacity of Ethiopia to better design and implement policies that prioritize the needs of pedestrians and cyclists. The project is ongoing and will provide technical support to officials in Addis Ababa in their ongoing efforts to upgrade over the coming year more than 50 km of footpaths and introduce new bicycle lanes; to build on the government's ongoing focus to better design and implement policies and make investment decisions that prioritize the needs of pedestrians and cyclists.

Budget: USD 200,000 (The project is funded through the UN Road Safety Trust Fund.)

2.3.8 Reflections over ERTRAC's Roadmap and 2Zero Strategy – Low-Emission Zones, Zone 30 areas, and Car Free Days

Land use and transport are closely interrelated, and have been widely researched as part of efforts to understand the benefits of their interrelationships for the improvement of the environment. Low-Emission Zones are becoming popular initiatives being established to test and further understand these interrelationships. LEZs also provide cities the opportunities to introduce measures that restrict access to cars particularly conventionally-fueled vehicles thereby reducing air pollution and improving mobility for pedestrians and cyclists in usually-congested urban neighbourhoods. In some instances as in some of the cases presented above, these measures are combined with other environmentally-friendly interventions such as zero waste applications to waste management in and around urban areas to create cleaner and green spaces for the populace. It is noteworthy that ERTRAC has shown directions for such neighborhood solutions and advocates for research that could generate expected impacts such as: "better and more balanced use of urban space, more attractive cities for living and economic activities, integrated planning of land uses and transport networks, tailoring neighbourhood solutions for passenger and freight mobility. Several examples of low-emission zones exist in Europe; however, for industry players seeking to explore the potential role of neighbourhood-based solutions and services in cities in other parts of the world, the low-emission zone pilots presented above could serve as learning points. The varying contexts, and in some cases the additional measures introduced as in the examples of Iñaguito, San Enrique de Velasco and La Tola neighbourhoods where collection point for recyclable waste and neighborhood composting for organic waste are introduced, provide interesting research areas which could further be developed to understand how such land use measures combine with other interventions to improve urban mobility. In the 2Zero Strategy, it is clearly identified that LEZs are key interventions that can help reduce air pollution in cities. The Strategy indicates, however, that efforts to transition LEZs to Zero-Emission Zones (ZEZs) may be ambitious but could enable the integration of

zero-emission vehicles into cities' transport systems requiring that urban spaces and infrastructure are sustainably managed to improve environmental conditions and enhance economic and social interactions. Research into this transition could be a point of interest for all industry players both in Europe and Abroad who are working towards the integration of innovative and sustainable solutions that do not only improve the lives of the current populations, but those of future generations.

ERTRAC's Roadmap identifies road safety as one of the key components that require future research to enable the optimization of urban mobility systems and to better understand the link between transport and health. Several factors account for the increasing road traffic deaths and injuries recorded in Europe and abroad. Among these, are concerns of over-speeding especially in urban environments which are increasingly becoming congested and populated. For Europe, ERTRAC's Roadmap mentions that there is widespread acknowledgement that driver distraction is a main cause of road accidents on European roads. It goes as on to mention that automating some driving functions could help mitigate safety risks; however, the question as to whether this automation drive could indeed reduce accidents, according to the Roadmap, remains unclarified. Perhaps, low-cost hardware infrastructure solutions as implemented in the case presented above and as believed to have been implemented in Europe too, may continue to offer tangible evidence of measures to reduce speed in urban environments. Intensifying such works carried out by European and international projects as in the case of the low-cost Zone 30 pilot supported by the Urban Pathways project could give direction to ERTRAC's international cooperation and research work not only in emerging big cities such as Belo Horizonte but also in smaller cities in Europe and across the world. Equally, such similar projects which have potentials to support the reduction of GHG emissions, fall in line with key actions of the 2Zero Strategy aiming at promoting innovative zero emission people mobility solutions in urban, peri-urban and rural areas including active mobility modes such as walking and cycling.

Car free days have become common to European cities and are being increasingly observed in other parts of the world. The motive for instituting such days has been clear - contributing to the reduction of pollution particularly from conventionally-fueled cars in cities. ERTRAC's Roadmap aspires to help contribute to the achievement of high-level goals and targets aiming to make Europe's transport systems efficient and competitive including targets of halving the use of conventionally fuelled cars in urban transport by 2030, and phasing them out in cities by 2050. To keep on this tract, it is necessary that industry players and stakeholders continue to sustain such smaller initiatives such as Car free days to keep raising awareness on the need to move away from car-dependent transport to more sustainable mobility options such as public transport, active mobility, etc. Further efforts to support cities in Europe and abroad to implement Car free days as in the examples presented above, could further strengthen the gains made. Also, research should be deepened to assess the impact of these Car free days on improving urban mobility systems and how a frequent observance of such days could make greater impacts. The 2Zero Strategy specifically addresses the need for large scale demonstration of entrylevel mobility concepts for car-free cities, in urban and peri-urban areas, and integration (e.g. conceptual, digital and physical) in existing systems. This according to the Strategy, could in addition to other measures support the identification, development and the integration of innovative concepts into urban transport systems and improving mobility in a sustainable and efficient manner, leading to the reduction of air and noise pollution.