SMART-MR
Interreg Europe

European Union
European Regional
Development Fund

ACTION PLAN

for implementing sustainable measures for achieving resilient transportation in

BARCELONA METROPOLITAN AREA

AMB Àrea Metropolitana de Barcelona

April 2019 - March 2021

version May 2019

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1. Introduction

Transportation in urban areas, particularly in metropolitan regions, generates congestion and vast greenhouse gas emissions and thus imposes enormous challenges upon authorities in providing healthy living conditions for inhabitants and a supportive environment for businesses.

Thus, the overall objective of the SMART-MR (Sustainable Measures for Achieving Resilient Transportation in Metropolitan Regions; Interreg Europe Programme) project is to support local and regional authorities in improving transport policies and providing sustainable measures for achieving resilient low-carbon transportation and mobility in metropolitan regions.

To tackle this issue, 10 project partners from 8 metropolitan regions (Oslo, Gothenburg, Helsinki, Budapest, Ljubljana, Rome, Porto and Barcelona) have shared their experience in transport and mobility planning by organising 7 topically interrelated workshops. For each workshop the partners have issued an in-depth analysis, described good practices and organised a study visit. Practical experience has been presented and discussed, and policy recommendations developed.

Through the project outputs, such as the guide on sustainable measures for achieving resilient transportation in metropolitan regions, selected good practice descriptions and policy recommendations, and through dissemination events, such as political meetings, the final conference, and regional stakeholder meetings, SMART-MR contributes to Europe 2020 goals, Cohesion Policy, and the Interreg Europe Program by aiding managing authorities and regional and local authorities in setting new transport and mobility policies.

At the level of individual metropolitan region, the partners have used experiences gained in the SMART-MR to fine-tune their own set of activities and goals, which are fully presented in this action plan.

2. Main lessons learned from interregional exchange of experiences

I. Participatory transport planning

During the first thematic workshop of SMART-MR, project partners agreed on the importance of integrating participation processes in transport planning with the aim of obtaining a better diagnosis and implementing better solutions. There was a consensus on the need to select carefully the stakeholders and involve them from the earliest stages of the planning process, including not only the most relevant actors, but also disadvantaged and poorly-represented groups. However, participatory planning becomes a quite challenging task, since it depends a lot on the local context, so there are no universal solutions. Moreover, participation gets much more difficult at big-scale regional projects, since issues become considerably more complex.

AMB is decided to include participation in all policy instruments for which they are responsible, as it has been done during the drafting of the Urban Mobility Metropolitan Plan (UMMP), which has included all relevant territorial and sectoral stakeholders with the aim of guaranteeing that the strategy and actions included in the plan are fruit of the cooperation between all social agents implied.

II. Creating a mobility plan

Sharing a common strategic vision between all parties involved in urban development of metropolitan regions is essential to guide mobility planning measures, so all actions contribute in some way to achieve a common set of objectives. In order to do so, all transport modes should be integrated in this vision, as well as land use planning and all other factors which can affect transport systems in the future. Data about people behaviour is becoming more and more relevant to manage more efficiently mobility in urban cores.

In this sense, AMB visions shares with SMART-MR a common goal of reducing emissions generated by the transport system, so most of the measures which AMB will implement in the following years are aimed at doing this, such as promoting bicycle usage, implement electric car charging infrastructure or regulating low-emission zones.

III. Low-carbon logistics

SMART-MR project partners have given priority to reduce transport externalities associated with urban logistics; something which requires both reducing vehicle movements and the carbon emissions associated to them. With this aim, urban logistics need to be managed more efficiently and the transition to zero-emission transport modes should be promoted.

Among other measures aimed at promoting sustainable logistics, AMB is fostering the transition to cleaner vehicles by subsidising the renewal of vehicle fleets used by companies for both urban logistics and distribution of services in Barcelona metropolitan area. In particular, vehicles eligible for these subsidies are bicycles and tricycles used for freight transportation, as well as electric motorcycles, cars and vans.

IV. Transit-oriented development

During the fourth workshop, project partners have recognised station areas as priority areas for sustainable development. Urban morphology determines mobility behaviour of citizens, so the principles of transit-oriented development (TOD) could be applied on station areas in order to reduce their environmental footprint. TOD principles integrate transport and land use planning, so station areas are designed as compact and dense-populated areas with both housing and services within walking distance of well-served public transport nodes.

V. Shaping low-carbon areas

SMART-MR project partners recognised station areas as potential starting points where to implement actions aimed at decreasing carbon emissions. Reducing the need for travelling through a holistic urban planning approach which encompasses land use, housing and transportation is essential to achieve this goal. However, people will always need to travel, so walking and cycling environments need to be further improved, while at the same time smoothing connections with public transport networks.

AMB is working on improving the cycling network in the whole metropolitan territory while at the same time it is implementing an electric bicycle sharing service and bicycle parking facilities which have station areas as priority areas to foster intermodality. Moreover, AMB is also implementing a Park & Ride network near railway stations to avoid people entering to the city with private car.

VI. Managing transport

All participants in the sixth SMART-MR workshop agreed on placing public transport as the backbone of metropolitan transportation systems. With this in mind, decarbonisation of the public transport fleet is an essential measure to implement in order to have a sustainable transportation system. Beyond public transport promotion, soft transport modes need to be promoted as well, not only with communication campaigns but also improving the respective networks.

The transition of Barcelona public transport fleet towards zero-emission vehicles has been on motion for a few years already, but nowadays AMB is developing the most important bus fleet renewal in its history. Additionally, AMB is also implementing several measures aimed at fostering bicycle usage and improving cycling network.

VII. Sharing economy

The last thematic workshop of SMART-MR project focused on sharing economy services, which are currently expanding in cities around the world, a lot of them linked to mobility services. One of the main conclusions resulting from the workshop was the need of regulating this kind of services and, whenever possible, integrating them as part of the public transport system. Project partners are in favour of these mobility sharing schemes since they reduce the need of car ownership and ease intermodal trips by offering a bunch of different possibilities to citizens, accessible through their smartphone. In this sense, e-Bicibox service is the new AMB's own electric bicycle sharing scheme, aimed at promoting bicycle usage within Barcelona metropolitan area.

3. Policy instrument addressed

Catalonia's ERDF OP prioritizes knowledge and innovation, entrepreneurship and green economy. Axis 4 promotes the transition towards a low carbon economy, and one of its investment priorities is the promotion of carbon reduction strategies for all sectors. Axis 6 focuses on resource efficiency and the protection of the environment, and one of its priorities is improving the urban environment and revitalization of cities.

AMB and SMART MT Action Plan contribute to the goals set in this policy instrument through the development of an Urban Mobility Metropolitan Plan (PMMU). This plan is aimed at managing mobility in the metropolitan area of Barcelona with an integrated approach, and putting particular emphasis on sustainability, efficiency, accessibility and safety. The PMMU will address several aspects of mobility (public transport, private vehicles, pedestrians and bicycles, nodes, parking, environmental sustainability, etc.), and it can become one of the key measures for achieving the goals for sustainable urban mobility and climate adaptation set in the Catalan ERDF OP for 20142020.

Moreover, SMART MR will contribute to the general objectives as well as the sustainability goals of the ERDF OP regarding sustainable development and environment, i.e. reducing energy consumption and emissions, local air pollution, noise pollution, promoting green infrastructure and fostering a sustainable mobility system.

Overall, it will help improve the environmental and mobility quality of the metropolitan region of Barcelona, develop a sustainable transport system, reduce GHG emissions and increase the number of users of public transport. In particular, it will foster a better and cleaner urban public transport system, the use of alternative transport (i.e. bike, electric vehicles), and a better commuting system. This experience will also back the results oriented approach of the policy instrument with specific indicators that will allow measuring its impact. The strategic approach will be improved through sustainable urban mobility plans, in line with Catalonia's integrated strategy for low-carbon climate change.

The Action Plan is part of the Priority Axis 4 of the OP FEDER Catalunya 2014-2020, with the aim of favoring the transition to a low-carbon economy in all sectors; and in a specific way it responds to the investment priority 4.5. to promote carbon reduction strategies for all types of territory, especially urban areas, including the promotion of sustainable multimodal urban mobility and adaptation measures with a mitigation effect.

Establishing a sense of urgency

According to the Basic Mobility Data report from 2017, 8.82 million trips were generated in Barcelona Metropolitan Area, from which 42% were made by foot or bike, 29% by public transport and the remaining 29% by private vehicle. However, the private vehicle share increases to 53% when taking into account only the trips generated in the second concentric zone of the metropolitan area, that is to say, the most remote municipalities from the city of Barcelona.

On the other hand, the 40 municipalities declared as special atmospheric environment protection areas in Barcelona conurbation, which concentrate 60% of the population (4.6 million inhabitants) in just 2.3% of Catalonia's surface, have serious problems to accomplish the European air quality directive. This is because of the current urban and interurban mobility

model, which is dominated to a great extent by unsustainable transport modes which generate a high amount of greenhouse gas emissions, such as private vehicle. In this context, the Metropolitan Area of Barcelona is working on establishing policies aimed at improving air quality in favour of the citizens' health and welfare.

Creating the guiding coalition

The Metropolitan Area of Barcelona (AMB) is a local administration of territorial character with regulatory, fiscal and tariff competences regarding transportation. One of its competences is the definition and approval of the Urban Mobility Metropolitan Plan (PMMU), aimed at planning mobility in the metropolitan region in a unified manner during 2015-2024 period, and paying special attention to safety, sustainability, efficiency and accessibility. The plan must encompass mobility in all its different aspects (public transport, private vehicle, pedestrians and bicycles, intermodal nodes, parking, environmental sustainability, freight transport, etc.), hence becoming one of the key measures to accomplish the sustainable urban mobility goals.

Developing vision and strategy

The key instrument in the definition of the metropolitan mobility strategy is the Urban Mobility Metropolitan Plan (PMMU), which, in addition to promoting policies of its own competence (public transport, taxi, metropolitan road network definition, sustainable public transport promotion, etc.), will be useful to foster reflection about the metropolitan governance model and to define the sustainable mobility territorial model. Furthermore, the PMMU will describe in detail a mobility action plan (in the short and the long term), defining the set of measures, estimating their budget and scheduling their implementation.

Communication to buy the vision

The PMMU has developed several participation sessions and expert meetings in order to compile and include the contribution of multiple actors who take part in metropolitan mobility. Once the document that comprises the metropolitan mobility action plan definition and realization is written and approved, some other conferences and workshops will be held, as well as presentations that will facilitate the PMMU's key elements dissemination.

Empowering the broad bases action

The metropolitan mobility action plan, which will be defined by the PMMU, consists in a set of strategic actions aimed at accomplishing the PMMU goals. These actions are compiled in four strategic lines of action:

- Territorial model and metropolitan mobility networks
- Safe, healthy and equitable streets
- Inclusive and high-quality public transport
- Flexible and effective governance

In this sense, the second and third strategic lines of action are main themes highly focused on improving mobility services quality by perfecting the public services standards and offering a wide array of sustainable mobility alternatives to the metropolitan citizenry. Moreover, the last strategic line of action plans the improvement of communication channels between citizenry and administration (AMB, municipalities and transport operators) with the aim of the latter becoming closer and more transparent in the eyes of public opinion.

Generating short term wins

Currently AMB is deploying the Metropolitan Programme of Anti-Air Pollution Measures, which is the short-term guide and the basis on which AMB frames its sustainable mobility actions, aimed at lowering local air pollution levels by promoting public transport usage, vehicle fleet greening, zero-emissions vehicles, etc. The metropolitan mobility strategy in the mid and the long term is developed in the frame of the PMMU, providing continuity to ongoing actions.

In this sense, the main goals are environmental quality improvement of metropolitan cities and greenhouse gas emissions reduction in the metropolitan area, as well as increasing the share of public transport and other sustainable modes, such as bicycles.

Furthermore, the PMMU's mobility action plan has defined a set of own goals and monitoring indicators which will enable the evaluation of these goals' accomplishment.

Consolidating gains

The PMMU's mobility action plan consists of a set of actions, each with its own implementation schedule, budget estimation and monitoring indicators. This level of detail enables the aggregation of planned investments to the budget and, at the same time, an analysis of planned expenses depending on the typology of the actions. In this sense, apart from determining the sustainable mobility strategy of Barcelona Metropolitan Region, the PMMU becomes a working tool regarding planned investments and annual budget execution.

Anchoring new approaches to the culture

In order to accomplish the goals set by AMB's different plans and action programmes, it is necessary for citizens to internalise the environmental costs of their own mobility patterns, hence reducing private vehicle dependence and supporting sustainable transport modes. One of the most effective views for the integration of these values is putting the focus on human health and air quality preservation, so this is the unifying thread of the most risky and structural initiatives connected to mobility and transportation in the metropolitan region.

4. Action Plan

Part I - General information

Project: SMART-MR: Sustainable Measures for Achieving Resilient Transportation in Metropolitan Regions

Partner organisation: Barcelona Metropolitan Area (AMB)

Other partner organisation involved: No

Country: Spain

NUTS2 region: Catalonia

Contact person: Joan Maria Bigas

email address: bigas@amb.cat

phone number: +34 93 223 51 51

Part II - Policy context

The Action Plan aims to impact:

- ☐ Investment for Growth and Jobs programme
- X European Territorial Cooperation programme
- ☐ Other regional development policy instrument

Name of the policy instrument addressed: Regional Strategy for Sustainable Mobility in Barcelona Metropolitan Area: the Urban Mobility Metropolitan Plan

Part III - Details of the actions envisaged

Low-Emission Zone – Barcelona Ring Road Area

1. The background

Barcelona registers high levels of pollution, especially in terms of PM_{10} particulates and nitrogen dioxide gas (NO_2), which both are very noxious to human health, especially for some risk groups. Air pollution is one of the major public health problems in the European Union, where it causes 300,000 premature deaths per year.

A major part of these pollutants have their origin in the high volume of urban traffic, which reaches almost 6,000 cars per km^2; a figure which, adding motorcycle traffic, multiplies Madrid's traffic density by three and London's traffic density by five. On a daily basis, more than 1 million vehicles drive around Barcelona access roads; nearly 800,000 vehicles across the city's main roads and almost 270,000 across Barcelona ring road.

As a response to traffic congestion and pollution, Low-Emission Zones (LEZ) have become a widespread policy instrument around Europe, where more than 200 cities have already some type of traffic restricted areas and more than 70 have implemented LEZ. SMART-MR project has included in its policy recommendations compilation the creation of Low-Emission Zones too, as well as other type of access regulations to urban cores which restrict traffic of most polluting vehicles within inner urban areas.

In fact, decarbonising the whole transportation system is the main objective of SMART-MR project; a vision which is shared with AMB and which has required collaboration of different administrations at the regional and local level. Beyond promoting the shift to more sustainable transport modes and decreasing the need to travel, during SMART-MR project workshops there was a widespread consensus of the need of establishing restricting measures to private cars. These kind of access restrictions, LEZ among them, result in fewer cars and hence lower pollution and noise generated by them.

During the third SMART-MR workshop, held in Helsinki, participants had the opportunity to share experiences about low-carbon areas, which was the main theme of the session. Learning from Helsinki, Rome and Gothenburg own experiences with low-emission zones was especially stimulating, but also the possibility to discover wider approaches to low-carbon areas which not only concern mobility, but encompass urban design and energy too.

This is the case of Helsinki's district Kalasatama, which is applying state-of-the-art solutions to transform a mostly wasteland area in a smart innovation district. Moreover, Oslo's vision of a car-free city centre, as part of its long-term plan of becoming carbon-neutral by 2030, was really inspiring too to reinforce Barcelona's current measures against private car traffic.

Therefore, with the aim of delivering a 30% reduction in traffic-related emissions in 15 years, a Low-Emission Zone (LEZ) is being implemented in AMB to restrict progressively the traffic of most polluting vehicles within the inner area of Barcelona ring road, firstly, until covering the whole metropolitan area in the near future. In the case of AMB, traffic restrictions for most polluting vehicles will be implemented progressively.

Firstly, the LEZ is planned to be implemented within the inner area of Barcelona's ring road, resulting in traffic restrictions for most polluting vehicles which now are applied only in case of activation of the high atmospheric pollution episode. However, these traffic restrictions will become permanent in the short-term. Barcelona Ring Road LEZ area comprises 95 km^2 and encompasses the whole municipality of Barcelona, except for the neighbourhoods of Vallvidrera, el Tibidabo, les Planes and Zona Franca. It also includes surrounding municipalities of Sant Adrià de Besòs and l'Hospitalet de Llobregat, and part of Esplugues de Llobregat and Cornellà de Llobregat.

The declaration of a high atmospheric pollution episode is an occasional circumstance, which is competence of Generalitat de Catalunya, the regional government of Catalonia, which declares it active when pollution levels (PM_{10} particulates and nitrogen dioxide NO_2) registered in more than one station of the Atmospheric Pollution Monitoring and Forecasting Network of Catalonia in the concerned area are over the established limits and forecasts do not point towards any improvement.

Barcelona Ring Road LEZ was approved the 1st December 2017 and, from then onwards, its implementation will be carried out progressively in 3 different stages, which already approved.

Previous stage

In case of activation of the high atmospheric pollution episode, M1 cars, motorcycles and mopeds without any Directorate General Traffic (DGT) environmental label will not be allowed to travel within the inner area of Barcelona's ring road.

1st stage: From the 1st January 2020

Access restrictions will be permanent and vehicles without any DGT environmental label will not be allowed to travel within the inner area of Barcelona's ring road during working days from 7h to 20h.

2nd stage: From the 1st January 2025

Vehicles without any DGT environmental label will not be allowed to travel within the whole metropolitan area of Barcelona during working days from 7h to 20h. Around this time, there could be a reformulation of the typology of vehicles affected by access restrictions.

Regardless of their DGT environmental label, vehicles from persons with reduced mobility, emergency services (police, firefighters and ambulances) and essential services (medical and funerary) will be exempted from traffic restrictions in the Low-Emission Zone.

Every time the high atmospheric pollution episode is activated, the public transport network will be reinforced with all available units in order to guarantee all citizens trips. Moreover, a cheaper public transport ticket, called T-Aire (Catalan translation for T-Air), and road lanes for the fast circulation of public transport vehicles will be made available. Additionally to the traffic restrictions for most polluting vehicles, a congestion charging scheme in Barcelona conurbation is being considered in the long-term.

Enforcement will be done by cameras using a technological system which allows them to read vehicle license plates and validate vehicle classification and exemption lists. These cameras are connected to police units, which are responsible for processing the penalties and only must

accept or reject the penalty proposals that cameras sent them. The data collected by cameras will be used to monitor compliance with the adopted measures.

Road signs were installed in all exits of the ring road and within the urban areas included in the Low Emission Zone with the aim of indicating its limits and which vehicles are allowed to travel within in traffic restriction scenarios.

As well, a Permanent Commission was created, integrated by AMB and the 5 metropolitan municipalities involved, and aimed at controlling the implementation of LEZ: selection of control points and the operational control, coordination between municipal police bodies, signaling and crisis committee. The Activation Protocol of Barcelona Ring Road LEZ restrictions was formalized too, in coordination with the municipal police bodies, which allows its operation in case the Government of Catalonia activates the high atmospheric pollution episode, both regarding technical requirements and communication.

Barcelona Ring Road LEZ implementation is the most important measure to promote the transition towards low-emission mobility. In fact, it is one of the largest low-emission zones in Europe, which by 2020 will affect 5 municipalities and around 95 km^2. By 2025, it will be expanded to 36 municipalities and more than 630 km^2, hence covering the whole Barcelona metropolitan area.

The action is part of the Priority Axis 4 of the OP FEDER Catalunya 2014-2020, with the aim of favoring the transition to a low carbon economy in all sectors; and in a specific way it responds to the investment priority 4.5. to promote carbon reduction strategies for all types of territory, especially urban areas, including the promotion of sustainable multimodal urban mobility and adaptation measures with a mitigation effect.

In this area, the specific objective 4.5.1. of the FEDER OP Catalunya 2014-2020 emphasizes the promotion of sustainable urban mobility, which is the main objective of this operation.

In this way, the impulse of sustainable mobility throughout the metropolitan territory is reflected in the development of the Metropolitan Urban Mobility Plan (PMMU); boosting sustainable urban mobility through operations such as the Development of the Low Emissions area through a comprehensive and intelligent management system for sustainable mobility in the metropolitan area, through actions that include a integral management of the sustainable mobility of the territory.

2. Action

The actions planned are the following:

- Implementation of the vertical signalling which demarcates the limits of the LEZ
- Implementation of the cameras and their technological system with optical character recognition
- Implementation of anti-fraud systems
- Installation of the required technology in the management and control points of Barcelona Ring Road LEZ, in collaboration with AMB Infraestructures
- Development of the LEZ management technological platform, in collaboration with AMB Informació

- Elaboration of the exemption register
- Monitor the level of compliance of traffic restrictions via penalties
- Monitor private car usage
- Launching of an information campaign

3. Players involved

- Barcelona Metropolitan Area (AMB)
- Municipalities within the inner area of Barcelona's ring road: Barcelona, Sant Adrià de Besòs, l'Hospitalet de Llobregat, Esplugues de Llobregat and Cornellà de Llobregat
- Barcelona de Serveis Municipals (B:SM)
- Transports Metropolitans de Barcelona (TMB) (public transport operator)
- Spanish Directorate-General of Traffic (DGT)
- Catalan Traffic Service

4. Timeframe

The implementation of Low-Emission Zones (LEZ) was considered for the first time as one of the main measures included in the Air Quality Improvement Plan which was approved by the Metropolitan Council in January 2017.

Before the implementation of Barcelona Ring Road LEZ on December 2017 in case of activation of the high atmospheric pollution episode, the previous works have included the approval of the Technical Agreement for its implementation and the launching of an information campaign. From December 2018 on, mopeds and motorcycles were incorporated to the restricted vehicles of Barcelona Ring Road LEZ in case of activation of the high atmospheric pollution episode.

In order to be ready to the full implementation of LZE access restrictions within Barcelona ring road by 2020, the control system technology will be implemented during 2019, which comprise the development of the management technological platform, the installation of the control cameras and their technological system, and the establishment of the access regulation and exemption register conditions, among many actions.

In this sense, by March 2021 the technology implemented in previous phases will allow the analysis and exploitation of data related to air quality, episodes of environmental pollution and mobility data. Thus, on this date, the first analysis on the level of effectiveness of Barcelona Ring Road LEZ could be developed.

Finally, the future plans foresee an expansion of the LEZ to the whole metropolitan area of Barcelona by 2025.

5. Costs

The total cost of the implementation of Barcelona Ring Road Low-Emission Zone sums up to 4,500,000.00 €.

6. Funding sources

This action will be co-funded by AMB and the European Regional Development Fund, in the framework of the Operational Programme for investment in growth and occupation ERDF Catalonia 2014-2020. Specifically, this funding operation has been granted and approved.

It was defined an operation to favor the transition to a low carbon economy in all sectors (PA04), and more specifically, regarding to the line of action *4.5.1.8. Integrated and intelligent systems and centers for the management of sustainable mobility*. Thanks to this co-funding source, it has been provided 1,860,388.74 € of a total public budget eligible 3,720,777.48 €.

Thus, the AMB will allocate 2,634,822.01 € of own funds for the implementation of the Barcelona Ring Road LEZ.

e-Bicibox

1. The background

The success of public bicycle-sharing experiences in many European cities and metropolis, as in the case of the already existing Bicing service in the city of Barcelona, has led AMB to consider the possibility of offering a similar solution to promote bicycle usage as a clean and sustainable transport mode.

Developing a proper environment for soft transport modes, such as walking and cycling, has been considered as a priority strategy within the framework of SMART-MR project. Increasing and enhancing the public space dedicated to pedestrians and cyclists in detriment of private cars is essential, but promoting and regulating bicycle-sharing, and the many forms of the sharing economy in general, has been one of the policy recommendations resulting from the project.

The reason behind the consensus about the sharing economy between SMART-MR partners is due to the change of paradigm that it promotes: decreasing car ownership in favour of other forms of mobility sharing which do not need to be cars at all. As well, project partners have agreed on that mobility sharing fosters the efficiency of the public transport system since it eases multimodal trips by providing citizens with a multiplicity of solutions in the palm of their hand, accessible on their smartphone.

In this sense, AMB has chosen Bicibox service, already in operation, to implement a new feature in it consisting in the incorporation of a public sharing scheme of electric bicycles, which shares with SMART-MR the objective of promoting and facilitating the mobility behavioural change of citizens by making bicycles more accessible to them.

The management of the new public bicycle-sharing system e-Bicibox will be based in the usage of Bicibox modules as stations for the collection and return of the electric bicycles, since they offer more security and protection against vandalism. e-Bicibox electric bicycles will have removable batteries and a GPS tracking system which traces accurately the exact location of the vehicle in every moment and informs of the battery charge level. Furthermore, it counts the kilometres travelled and notifies to AMB's control centre when the vehicle is parked in a safe parking spot.

SMART-MR project partners have established as a priority the regulation of new sharing mobility services, which, led by private companies, are currently expanding across cities all over the world. Furthermore, they have considered preferable to manage these kind of services as an integrated part of urban public transport. But the implementation of e-Bicibox service goes one step further from these policy recommendations as it is the public administration who directly manages it.

AMB has planned the launch of the service with a fleet of 300 bicycles in the municipalities where the private bicycle-parking service Bicibox is already consolidated. In case of requiring more units, these will be funded by the municipalities interested in the service. Bicycles will be distributed among 45 stations with 14 spots each, where they will be collected and returned between 7h in the morning and midnight. In total, 630 parking spots will be available to guarantee free parking in any station during all day.

Besides offering at least a minimum coverage in the densest areas of AMB and in areas with continuous urban fabric and cycling infrastructure, AMB is also considering the implementation in specific points of origin/destination depending on the interest of municipalities and other social actors (business associations, managers of large mobility generating centres, etc.). Between these options, shuttle services in stations or suburban car parks in low-emission zones will be given prominence, whether they are implemented permanently or just during restriction periods.

Users will be able to register for the service paying an annual fee, which will be 30 €, or choosing to be charged depending on the usage: 0.50 € for each half an hour, until 5 hours; 2 €, between 1 and 10 hours; and 3 €, between 10 and 17 hours. In all cases, the first half an hour of usage will be free of charge and the service will available 365 days of the year.

The goals of the implementation of the public bicycle-sharing metropolitan scheme are:

- Meet the needs of last mile mobility, especially in the case of those people who arrive to the city without bicycle, for working, personal or touristic reasons, offering a coverage range much larger than the mode on foot in intermodal nodes. This objective promotes a modal change in the trips made between municipalities covered by public transport, which could have a very positive impact, since these are the transport flows which absorb the vast majority of vehicles-km by car and motorcycle in the metropolitan area. From this perspective, the priority locations will be the destination points of municipalities, preferably in public transport.
- Promote bicycle usage between citizens, especially electric bicycle, for urban trips, offering an easy and comfortable option for inhabitants to begin. The expectation is that a substantial part of the users will consider later to use a private bicycle instead, since the latter offers more flexibility.
- Promote an urban mobility behavioural change and offer an alternative direct connection with nearest municipalities by bicycle. From this perspective, the priority locations could be those next to most densely populated areas and central urban areas.

The period between 2019- 2021 is defined as a phase 1 of this action, the main objective of the phase 1 is to consolidate the e-bicibox service in terms of users and usages. In order to monitor the service it is developed a daily control which takes into account the number of users and also register the origin-destiny usages and other complementary data. Once a month all data is collected and done a comparison.

The new public bicycle-sharing system e-Bicibox represents one of the actions included in the AMB strategic aimed to plan metropolitan mobility paying special attention to security, sustainability, efficiency and accessibility, aligned with the transition to a low-carbon economy and also to promote a sustainable and multimodal urban mobility, one of the objectives of the ROP Generalitat de Catalunya .

This action responds to the investment priority 4.5 of the thematic objective 4 of the PO FEDER Catalunya 2014-2020, dedicated to favoring the transition to a low-carbon economy in all sectors. And more specifically, to the specific objective OE 4.5.1 for the promotion of sustainable urban mobility, and in the line of action 4.5.1.7. of migration towards the cyclist transport and the development of the necessary infrastructures.

This action will be reinforced by the set of actions that the AMB decides and executes to fulfill its competence (detailed in article 14 of Title II of Law 31/2010 of the Metropolitan Area of Barcelona approved by the Parliament of Catalonia on July 27, 2010) to promote sustainable mobility and improve air quality in the metropolitan area.

Thus, the Government Agreement of the AMB for the mandate 2015-2019, signed on July 23, 2015, collects the following objectives regarding mobility by bicycle:

• Reduce atmospheric and acoustic contamination, which must be correlated with actions such as the promotion of public transport and the bicycle.

• Promote concrete actions aimed at energy efficiency and the reduction of emissions, directives that also need to be transferred to the metropolitan Plan for sustainable mobility, through solutions of public collective transport, bicycle and electric mobility.

• Establish a metropolitan network of bicycles, interconnected to municipal cyclable networks, reinforcing the safe spaces for circulation and bicycle parking.

In addition, in the PAM (Metropolitan Action Plan) for the mandate 2015-2019, the AMB is committed to making cycling mobility a regular way for daily trips to work, school and services, increasing its weight as a sustainable mode of transport, for the benefit of air quality and people's health.

Therefore, it is clear that the contribute significantly to the achievement of the sustainability objectives defined in the ERDF Operational Program: clean urban transport, Cycle transport and promotion of sustainable mobility.

2. Action

- Launch an electric bicycle-sharing system associated to the parking stations of Bicibox network in Llobregat area, with the economic collaboration of the involved municipalities. Initially, 40 locations are considered in South Baix Llobregat area.
- Equip a maximum fleet of 300 electric bicycles with an electronic plaque and a GPS for the identification and traceability of the vehicle. This electronic equipment will be integrated and compatible with the computer system of the control centre.
- Provide the appropriate computer system of the control centre for the new bicycle-sharing public metropolitan scheme. This computer system has to manage the Bicibox stations (where bicycles will be parked) too and the billings of the service.
- Develop a mobile app, which will work with the computer system of the control centre of the bicycle-sharing public metropolitan scheme, aimed at managing the loans of bicycles to users. It will manage the subscriptions of the service too.
- Develop the website of the new service, in accordance with the technical and formal guidelines by AMB.
- Organise a specific customer service centre for the new bicycle-sharing public metropolitan system.
- Study the implementation of bicycle-sharing public services complementary to the implementation of Low-Emission Zones, with the objective of offering a complementary shuttle service from the Park & Ride car parks located in the access points of these zones.

- Study the creation of cargo bicycle-sharing public systems for citizens and freight companies which do not have access to the restricted areas during a specific time period.

3. Players involved

- Barcelona Metropolitan Area (AMB)
- Metropolitan municipalities
- Bicibox service operator
- Social actors of the areas involved

4. Timeframe

In January 2019, e-Bicibox service will be launched simultaneously in 12 municipalities of Barcelona metropolitan area.

5. Costs

The budget for the phase 1 (2019-2021) is 4,674,906.48 €, which includes the launching of e-Bicibox service is 2,274,906.48 € and the maintenance 2,400,000.00 €.

6. Funding sources

This action will be funded by AMB and, in case they request more modules than already planned, by municipalities too.

Metropolitan parking platform (AMB Aparcament)

1. The background

AMB and Barcelona municipality aim to exercise their respective powers to improve traffic planning, facilitating the management of parking in regulated parking areas through the creation of the Metropolitan Parking Platform (AMB Aparcament), which will allow users to pay parking fees through a mobile app. Barcelona municipality already has a mobile app for this purpose, 'ApparkB', which has been developed by B:SM.

The implementation of this platform will mean the introduction of a new payment method in regulated parking areas which will allow users to manage all operations through their smartphone in an agile and fast way, thus avoiding to go to the parking meter every time parking time is over and a new operation is needed. Besides, the mobile app will also allow to consult the time remaining when there is an ongoing parking session and will remind the user the exact location where the vehicle is parked.

The integration of new technologies in the management of urban mobility is an increasingly essential measure to improve efficiency of transport systems and user experience, as it has been discussed during SMART-MR project workshops. For this reason, SMART-MR partners have prioritised research and technological innovation in the field of transportation. Besides, they have agreed that data obtained through mobility apps give potential to a better management of public space and a better understanding of people behaviour. In strategic terms, AMB conceives regulated parking areas as a tool for reduction and dissuasion of private car mobility.

Moreover, regulation of parking in urban areas has been a subject of discussions during SMART-MR workshops too, since it is an action which decreases pollution and noise by reducing the number of cars and the kilometres in circulation. During the transport management workshop held in Budapest on occasion of the SMART-MR, parking management and regulation come up as a discussion topic and it was really though-provoking to know in depth the disparate approaches that the partner cities are currently implementing in terms of management, usage of data, real-time information and integration in Mobility-as-a-Service platforms.

From Rome's flat rate to park inside the low-emission zone –and another different flat rate outside the LEZ- to Gothenburg's variable rates, everything was inspiring, but especially remarkable was the case of Oslo, which is enforcing some really ambitious and innovative regulation regarding residential parking.

This is, precisely, the aim of AMB's metropolitan parking platform, which optimises and simplifies travel in urban cores by providing a solution to ease the search of parking space in real time and hence avoiding driving in circles looking for a parking spot.

Besides, the technology introduced allow improvements on the operational and also on the infraction's control, promotes and makes easier the creation of new areas of regulated parking. Getting larger regulated parking areas means to have greater areas containing and reducing the use of private car mobility.

In this sense, the Metropolitan Parking Platform (AMB Aparcament) represents one of the different actions defined in the AMB strategic plan (PMMU) which promotes the metropolitan mobility paying special attention to security, sustainability, efficiency and accessibility, aligned with the transition to a low-carbon economy and also to promote a sustainable and multimodal urban mobility.

Finally, this action responds to the investment priority 4.5 of the thematic objective 4 of the PO FEDER Catalunya 2014-2020, dedicated to favoring the transition to a low-carbon economy in all sectors. And more specifically, to the specific objective OE 4.5.1 for the promotion of sustainable urban mobility.

2. Action

- Technic development of the mobile app by B:SM
- Amendments of municipal regulations with the aim of including payment through mobile phones

3. Players involved

- Metropolitan municipalities
- Barcelona Metropolitan Area (AMB)
- B:SM, as the mobile app developer

4. Timeframe

During 2019, the Metropolitan Parking Platform will be implemented in the first 5 municipalities of Barcelona metropolitan area, while during 2020 the plan is to expand it to 5 municipalities more.

5. Costs

The entire budget for the implementation and operation of Metropolitan Parking Platform sums up a total of 545,000.00 €.

6. Funding sources

The implementation of Metropolitan Parking Platform will be completely funded by AMB.

Date: 16 May 2019

Signature: Joan Maria Bigas

AMB Àrea Metropolitana de Barcelona

Stamp of the organisation: