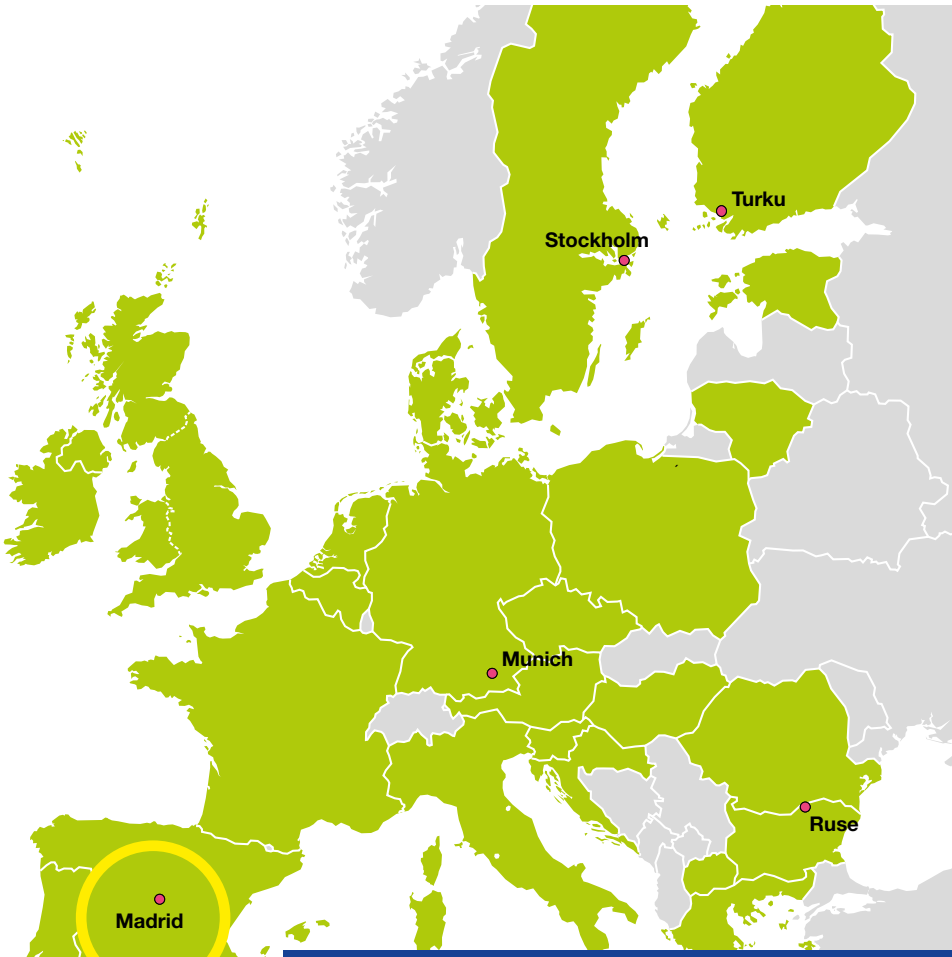
2020 CiVITAS
Cleaner and better transport in cities

ECCENTRIC

Sustainable mobility solutions in Madrid



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2020 CiVITAS
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Adaptive parking management based on energy efficiency and occupancy

Summer 2019

© Empresa Municipal de Transportes de Madrid (EMT)

- Smart parking management in peripheral business areas
- Parking priority to clean vehicles
- Parking priority to high occupancy vehicles (HOV)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid City Council

What is the solution?

Parking regulation as a demand management strategy has been mostly used in urban city centres, linked to commuting mobility. But the on-going metropolisation process in cities such as Madrid, with peripheral districts losing their residential character and an increasing number of companies and services moving into the outskirts, requires an utilization of parking management as a means to reduce car travel demand in these areas.

The objective is to design and implement a smart parking management scheme in those areas outside the city centre with a high density of office employment. This will be done by encouraging ride sharing among employees in order to increase car occupancy, and also prioritizing the use of clean vehicles to reduce energy consumption and emissions from traffic.

The following approaches will be tested:

- Technical solutions for the management of HOV Parking to high trip generation areas with compatible timetable options (e.g. business area, university campus).
- Positive discrimination for clean vehicles.

In order to guarantee the effectiveness of these actions, efforts will also be placed on the active engagement of the technical and management staff of the corresponding trip generators.

If the technology being tested has a satisfactory performance, the system will possibly be replicated in the municipal management parking areas.

How does it work?

The Municipality of Madrid has investigated and is testing a technology that enable a smart parking management scheme that will be tested in the headquarters of EMT, the municipal public transport company, located in the city lab (Vallecas).

The measure is expected to deliver:

- A fewer number of vehicles transporting a higher number of people. The scheme will allow a reduction in the number of vehicles that access the work centre, which should imply a reduction in the pollution levels.
- A reduction of parking indiscipline which should improve the quality of public space.

ECCENTRIC will develop an alternative management scheme for the parking space at EMT headquarters, providing priority to HOVs and clean vehicles. The new parking regulations will be monitored with the support of innovative tools provided by the project. The following activities have been carried out during the research phase:

- Five potential locations for the smart parking facility have been identified and thoroughly analysed with regard to infrastructure, alternative transportation, demand, user typology and expected impacts.
- Since it turned out during the assessment that none of the locations fulfils the measure requirements to an adequate extent, a site has been identified in an old industrial area in the Retiro District, next to large transport infrastructures, which meets all the conditions to be a good test area. The choice of location is essential to obtain conclusive results from the measure.

Expected results

The following results are expected:

- To reduce the use of single occupancy private cars and to achieve a modal shift towards public transport and non-motorized modes.
- To reduce energy consumption and emissions from traffic.
- To decrease traffic levels in the affected area at peak hours.
- Reduction of the parking offences rate in the affected areas.
- A 6% reduction of car travel in the targeted group (EMT headquarters employees).

Business model

The research and planning phase of this measure started in September 2016 and ended in April 2017.

The budget for this measure is close to EUR 171,000. The operational stage is expected to run from September 2018 to August 2019.

BUDGET	Personnel	Travel	Equipment	Other direct	Indirect	Subcontract	Total Eligible Cost
1 AYTO MADRID (100%)	24.750,00 €	0,00 €	112.000,00 €	0,00 €	34.187,50 €	0,00 €	170.937,50 €

Find out more

EMT is also responsible for the management of 17 public parkings owned by the municipality, offering 6,300 parking places. Therefore, there are good opportunities for upscaling the innovative solutions developed by ECCENTRIC at the city level.

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Mobility management strategies for vulnerable groups

Summer 2019

- Mobility for vulnerable groups
- Mobility management strategies
- Integration and empowerment

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid City Council; Grupo de Estudios y Alternativas 21, S.L.

What is the solution?

With this measure, the Municipality of Madrid aims at reinforcing the SUMP planning process by developing a participative process targeted at vulnerable groups (elderly and children), complemented with a gender-sensitive approach, as a basis for decision making and for the design of the particular actions.

The aim of this measure is to develop meaningful policy guidelines to address mobility management for vulnerable groups, thus shifting urban mobility in the outskirts from the dominance of car use to active trips and increasing safety and perception of security in the outskirts of the city.

In the long term the aim is to make a shift in the daily mobility behaviour of children and elderly people and make a positive impact in the whole neighbourhood regarding sustainable and safe mobility. Short term objectives include punctual improvements of safety and quality of public space in areas frequented by vulnerable groups and an increase in independence, empowerment and a greater safety perception by vulnerable groups.

How does it work?

Following this bottom-up participative approach, a specific mobility management strategy will be developed, containing not only special information and communication strategies, but also physical improvements of the accessibility conditions to key public facilities such as schools, parks and playgrounds, health and senior activity centres. The methodological approach is based on the successful experience of the previous project IEE_STARS, based on an accreditation scheme where peer-to-peer communication is placed at the core. Within this part of the measure, the following activities will be implemented.

For elderly people:

- Participation of the elderly in the pedestrian diagnosis of their surroundings and in the rehabilitation of public spaces (the Plaza de la Constitución has been rehabilitated following its indications about benches and urban furniture, as well as the installation of petanque games in the Nuestra Sra. de la Paloma park).
- Participation of the elderly in the diagnosis of bus mobility in their neighbourhood (intergenerational activity).
- A campaign to promote an inclusive, independent, sustainable and active mobility of the elderly. A group of senior citizens will be trained on media skills (e.g. video making, theatre group, graphic design, radio) to act as campaign leaders and develop strategies and content with special emphasis on: claiming the figure of the elderly by breaking current stereotypes, empowering the elderly, helping them to have a proactive attitude, raising awareness about the advantages of independent and active life and mobility behaviour (intergenerational activity).
- Organization of a walking club "Walk with us".
- Installation of screens showing the bus schedules in the Social Centre for the Elderly.
- Participation of the elderly in the diffusion of the project (radio, youth forum, district magazines, events, etc). (Intergenerational activity).
- Participation of the elderly in the organisation of the yearly mobility events such as: European Mobility Week, International Day Against Climate Change (October 24), Day of Elderly in Spain (October 1), etc.
- Complementary activity: design of the "Yo sí recojo" campaign, which promotes the collection of canine excrement (older people give a lot of importance to this factor as an obstacle to their "pedestrian comfort"). (Intergenerational activity).

Activities with children and teenagers:

- To train children, teachers and relatives in cyclist mobility and to carry out with them training in the school yard and in the streets around each school.
- Recognise and assess annually schools with a sustainable mobility strategy, on the basis of a previous assessment of the modal shift (from motorised journeys to active journeys, either on foot or by bicycle), and according to STARS project standards.
- Carry out sustainable mobility campaigns at STARS ECCENTRIC schools involving teachers, families, students and directors in the activities aiming to achieve active participation of children sustainable mobility activities.
- Hold workshops about communication techniques for students in order to build up communication skills, in a P2P approach and teachers' workshops to support leaders of sustainable mobility in schools.
- Organize workshops on "urbanism and mobility" for students in order to promote commitment and identification with their school environment, as well as learn about all the variables related to the design of mobility infrastructures.
- Organize workshops for teachers in order to create a knowledge and experience sharing network to promote cycling mobility in Madrid.

Expected results

Expected societal impacts of the measure are the creation of meaningful guidelines for addressing the vulnerable groups' mobility management (with a gender approach), encouragement of intergenerational and attractive activities for children and elderly people with regard to their daily mobility and facilitation of a safe, pleasant and active life. Impacts regarding behavioural change include empowerment and focus of attention on vulnerable groups' needs and integrative solutions including health, life quality and independence as issues relevant for mobility plans. The measure should also deliver emission savings through the modal shift towards active modes. Regarding governance, the implementation of an inclusive and participative process should serve to better integrate vulnerable groups within decision-making processes in urban transport.

Business model

At the moment, we are working with 6 schools (4 primary schools and 2 secondary schools) and 4 elderly social clubs in the living lab of Vallecas. The methodology applied at the schools was developed by the STARS project and is also being applied at 35 schools of Madrid, financed since 2016 through the budget of the City Council, as part of the programme "Educar hoy por un Madrid más Sostenible" ("To educate today for a more sustainable Madrid").

ECCENTRIC allowed the municipality to expand its STARS mobility module and to explore further topics with the participating schools in Vallecas (until then the STARS schools of Vallecas were not included in the project). ECCENTRIC has also allow to explore other topics, tools and activities with the participating schools in Vallecas, such as:

- Gender workshops to encourage girls to cycle,
- Training cycling courses for families and teachers,
- Urbanism and urban mobility workshops,
- Music and photography workshops for the campaigns,
- Workshops about climate change,
- Parking lot construction workshop,
- Intergenerational activities of good practices on the bus and on the pedestrian mobility,

- Exhibitions like “Madrid me mueve”,
- Annual graphic design, video or photographic competitions to obtain campaign products,
- Participation of schoolchildren in the National Environment Congress with interview workshops with researchers and political authorities, research on sustainable habits of conference participants, etc.
- Participation of schoolchildren in the Youth Forum of the City Council talking about their experience in mobility projects,
- Reception of the "Muévete verde" prize awarded for the production of the videos.

THE ECCENTRIC activities with the elderly have followed a similar methodology, based on peer-to-peer campaigns, and have been the first experience for the municipality to work on mobility issues with senior citizens. They have reacted enthusiastically, and are now founding pedestrian clubs, producing videos, and participating in critical walks to identify potential improvements in the public space in their neighbourhood, among other activities.

The ECCENTRIC budget for this measure amounts to € 297,052 - 247,052 € from the City of Madrid and 50,000 € from GEA 21.

Find out more

Actions at schools are integrated within the municipal programme “Educating Today for a More Sustainable Madrid”, covering 112 schools with a budget of some € 250,000. The programme consists of 5 modules (Energy, Biodiversity, Mobility, Public Space and Natural Resources). In the mobility module there are 41 schools, of which 6 are in Vallecas and constitute the STARS-ECCENTRIC schools, in which the additional package of activities and resources is being carried out.
You can find additional information at www.educarmadridsostenible.es.

Further information on this measure is available at the ECCENTRIC local webpage in Madrid (www.madrid.es/eccentric) and at the STARS blog https://eustarsmadrid.blogspot.com/. The videos produced by elderly and children to encourage conviviality on public buses are available at this link: https://www.youtube.com/playlist?list=PLQMFBBEsDRs6RLH9nfTs8NalOic6G6HKI

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Open platform for multimodal mobility information and services

Summer 2019

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- Open Data mobility platform
- Multimodal travel options
- Public transportation services

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Consorcio Regional de Transportes de Madrid

Empresa Municipal de Transportes de Madrid

Ingeniería y Consultoría para el Control Automático S.L.

What is the solution?

Currently, some open data platforms exist in Madrid with segregated information by mode or organization. There is no multimodal open data platform available with the characteristics of the proposed solution. CRTM (Consorcio Regional de Transportes de Madrid), thanks to the creation of its innovation and management control centre, CITRAM has all the information related to public transport integrated and available. The improvement of its activities is one of the actions included in The Strategic Sustainable Mobility Plan of the Madrid Region, Vision 2025. Other of the strategic lines of the ICT Master Plan of CRTM for the upcoming years is the improvement of open data, big data and business intelligence.

The short-term objective is to create an open platform to facilitate cooperation between different actors involved in mobility issues, establishing the basis for future development of Mobility as a Service (MaaS) concepts for citizens. In the long term, it is intended to encourage the development of high-quality MaaS, increasing the model split of public transport and reducing car use. We also wish to increase the quantity and quality of information given to users in order to improve the users' experience of MaaS.

How does it work?

This measure has developed a new multimodal mobility portal, integrating and providing information from all transport modes in the region of Madrid. It provides public transport and shared mobility information, besides relevant urban mobility data from the different municipalities.

As the platform also provide open data format (as the CRTM public transport information) it allows developers to create and design their own mobility services applications.

This information will be provided to all public and private actors, increasing the attractiveness of public transport services and the quality of the information given to the user. It will also mean an improvement of the travel experience, by expanding the possibilities to choose the best transport option. Finally, the platform will allow the design of mobility services for different types of users and new business models.

Website: http://datos-movilidad.crtm.es/

Expected results

The expected impact is to increase the quality of public transport user experience. Furthermore, it is expected an increase in the activity of entrepreneurs providing added-value services based on the information available on the platform, and to achieve a good level of satisfaction among them regarding the quality of the open data portal. The number of information sources integrated on the portal is expected to grow as the measure progresses. Finally, a growth in the number of visits to the CRTM site is expected, due to the increase in the demand on public transport information gained through the project (initially the portal linked with more than 40 different information sources), as well as the increase of the quality of public transport information as it is perceived by the end users.

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Business model

The project's budget for this measure is EUR 344,677. The demonstration phase runs from September 2018 to August 2019.

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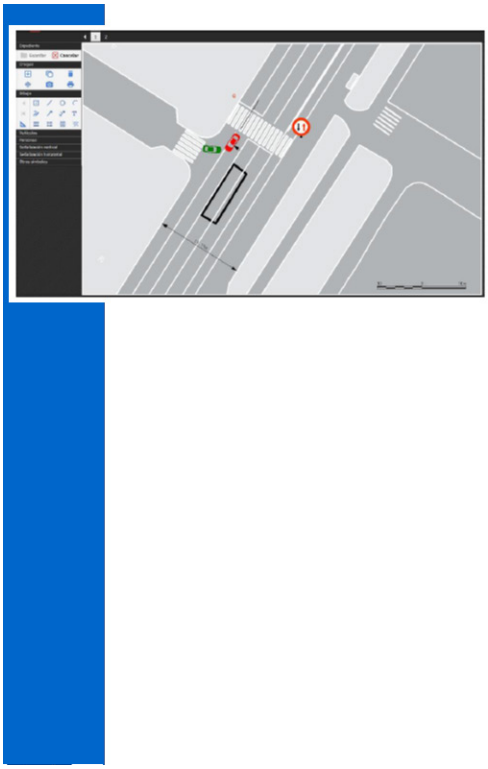
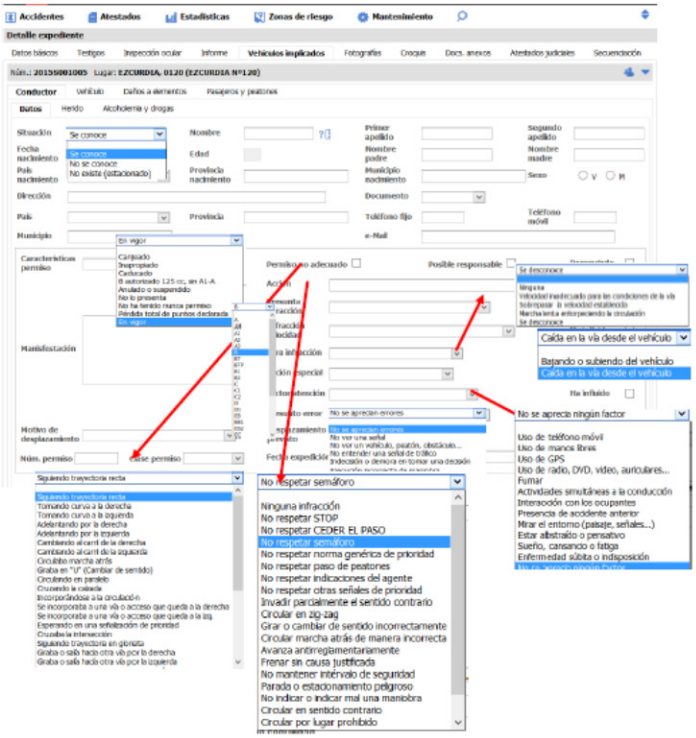
Innovative and participative approach to traffic safety

Summer 2019





- GIS-based tool and public participation to boost road safety
- Traffic safety measures in SUMP
- Promoting sustainable mobility culture

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid City Council

What is the solution?

The main goal of the city of Madrid's Traffic Safety Plan (Plan de Seguridad Vial 2012-2020) is to reduce casualties caused by traffic by 50%, and the number of serious injuries by 30%, by 2020. Following the new mobility culture guidelines, within which the traditional 'traffic-vehicle' approach to traffic safety is complemented with wider mobility issues (such as street design and urban layouts, mixed uses and shared spaces, traffic calming and shared speeds, etc.), recognition that the promotion of a sustainable mobility model must be aligned with increased safety within the transport system. As a result, the approved Sustainable Urban Mobility Plan, SUMP (PMUS 2014), for the city of Madrid includes safety as one of its four strategic goals.

A comprehensive road safety study will be undertaken in the demonstration area, supported by the development of an application, based on Geographical Information Systems (GIS), for mapping road safety incidents. These will be categorized by type - for instance, involving cyclists, pedestrians etc., as well as high-risk locations - either real or perceived.

Citizens' perception of safety (subjective level of risk) will be calculated by tracking messages on social networks related to road safety in the two districts. This information will be complemented by the information obtained through the suggestions and complaints sent to the City Council website.

In order to identify the objective risks, an analysis of the accident rate will be carried out using the Police database, which contains information about the type of vehicle and mode of transport, the day of the week and the exact time of the accidents, and the sex and age of those involved.

This analysis will be combined with a spatial analysis, that will classify the sections of the road network into different levels based on their physical and functional characteristics. The study will also consider the severity of accidents (depending on the severity of the victims) and vulnerability (depending on the mode of transport involved).

As a result of the objective risk analysis, all information about the accidents will be available for each section, and the level of accident risk will be represented by a numerical indicator.

How does it work?

Under this measure, the city of Madrid will conduct a comprehensive road safety study in the demonstration area, complemented by the development of a GIS-based application to map road safety incidents, categorized by type (e.g. with cyclist involved, pedestrians, etc.), as well as high-risk locations (either real or perceived).

The road safety study will be composed of:

- Definition of traffic Safety Indicators.
- Collection and systematization of data linked to street safety through an application developed and based on GIS.
- Calculation of traffic safety indicators in sections of the street with homogeneous characteristics.
- Identification of points/sections of accident concentration.
- Identification of points/sections with traffic safety level (real and perceived) compromised.
- Identification of environments likely to perform actions to improve traffic safety.
- Definition of prioritization criteria and type of actions to be carried out.

Making use of the GIS-based tool, the municipality will take over some of the most relevant traffic safety measures included in its SUMP, whose implementation will be boosted by the CIVITAS ECCENTRIC project. New technologies

will be used to further promote traffic safety conditions by introducing tools that range from intelligent speed humps and smart signage to blind spot alerts, etc. In addition, public participation is highlighted as a determining success factor in the framework of the new mobility culture. Involvement of citizens and key stakeholders is needed to deliver a proper policy and planning approach, generate support from the general public and trigger new mobility behavior, which is also more sustainable.

Some of the activities carried out during the research and planning phase:

- Several meetings have been held with representatives from the relevant municipal services, aimed at defining the information transfer protocol to perform a diagnosis on road safety in the specified range. These have also served to help define the information that will feed into the future app.
- Meetings have been held with entities and representatives from other administrations with ICT programmes or applications with similar functionalities as those under development.
- Administrations that have software with similar functionalities have been identified, as have barriers to data integration.

Expected results

Long-term objectives for the implementation of this measure include the promotion of non-motorized mobility by providing a safer and more comfortable environment. Short term objectives include reducing the number of fatal accidents and serious injuries also reducing the perceived accident risk by all means of transport, with a focus on non-motorized ones.

Business model

The total budget foreseen for this measure is of €277,813 and it is entirely provided by the City of Madrid.

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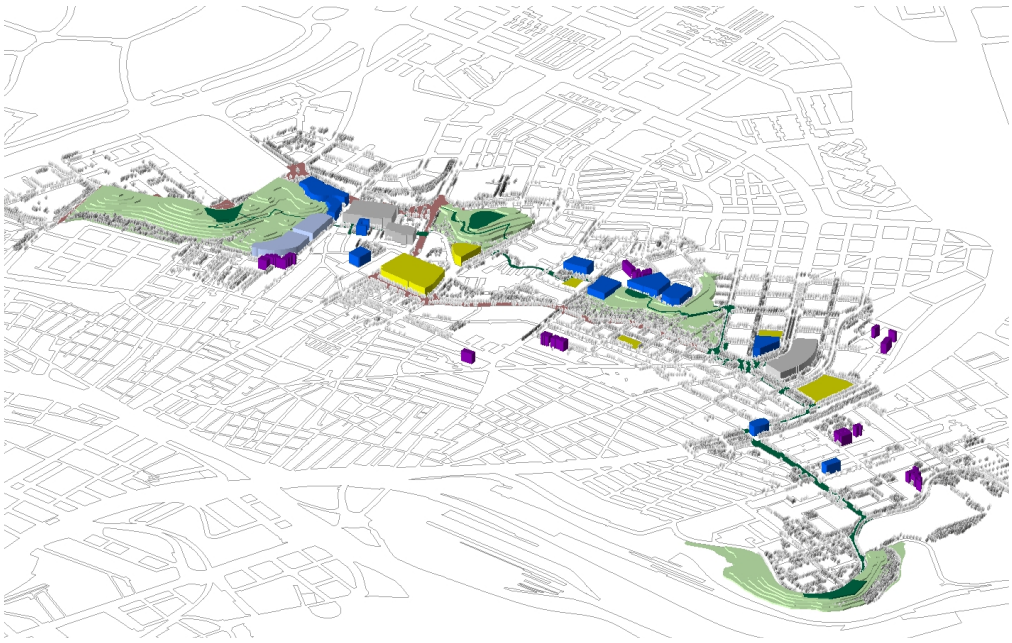
Pedestrian-friendly public space outside the city centre

Summer 2019



- Pedestrian strategy for walkable districts
- At least 1,000 more active travels per day
- High-quality pedestrian corridor improving accessibility

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid City Council; Grupo de Estudios y Alternativas 21 (GEA21)

What is the solution?

This action will improve conditions for pedestrians in the car-oriented neighbouring districts of Puente de Vallecas and Villa de Vallecas (these are Madrid's 'living' labs in CIVITAS ECCENTRIC, where demonstration activities are taking place). The pilot will implement a high-quality pedestrian itinerary using physical design measures and new technology tools. It will also improve the quality of public space, ensuring it is devoted to pedestrians and encourage social interaction between people.

The area consists of three isolated urban structures and lacks a consistent pedestrian network linking the three structures, due to barriers, such as railway lines and motorways. This is problematic for residents as the 'in-between' area is where key facilities within the neighbourhood are located, thus good accessibility (daily) is imperative. In the short term, the measure will address resident demands for improving accessibility to currently isolated areas and facilities, in spite of their regular use. On a longer-term basis, the measure aims to contribute to shift the urban mobility patterns in the outskirts of the city towards more active and sustainable modes and to increase the perception of safety and security in these parts of the city.

How does it work?

Two pilot actions will be implemented in the living lab. The first one will implement 'Itinerario Miradores' - a high-quality pedestrian corridor in Puente de Vallecas, connecting the major green areas in Puente de Vallecas, while improving north-south connectivity for pedestrians in the area. As action plan for a walkable district will improve access to key facilities (a hospital, cultural centre and a sports facility), and will connect them through a high-quality pedestrian axis, using physical design measures and new technology tools (e.g. smart signage). In particular, the plan will provide, more convenient access to the hospital to residents, crossing the current barrier created by a motorway. The high-quality pedestrian corridor will address both pedestrians and cyclists (also linking to Madrid's other CIVITAS ECCENTRIC measure 'Enabling cycling outside the city centre'). Several sections of this corridor are expected to be completed during 2018.

The second pilot action will transform a disconnected and car-dominated area into a high-quality public space devoted to pedestrian and social life. This will be addressed through the creation of an e-mobility centre (following the experience of similar CIVITAS ECCENTRIC measures in the cities of Munich and Turku, and also linked to Madrid's measure 'Enabling cycling outside the city centre') and will be coupled with a number of improvements in the pedestrian network in the vicinity of the e-mobility centre and in other streets within the city lab.

Both actions will be done in cooperation with residents and local stakeholders, following a participatory approach.

Expected results

The measure will have an important societal impact since the new pedestrian strategy will connect a relevant part of Vallecas to facilities areas.

Implementation of the measure is expected to result in:

- at least 1,000 more active travels per day in the designated area,
- a 15% increase in the positive perception of safety by pedestrians,
- a reduction in the number of pedestrian-related traffic incidents,
- a reduction of emissions of CO_2 and pollutants.

Furthermore, the measure is expected to provide guidance for the development of a strategy to improve the quality of pedestrian (walking) trips and reduce traffic incidents where pedestrians are involved, within the peripheral districts.

Business model

The total budget is €236,875. This does not include the various construction works required, which will be financed through the Madrid City Council's regular budget.

The measure is expected to be fully operational by October 2019.

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Enabling cycling outside the city centre

Summer 2019

© Madrid City Council

- Cycling network and corridors linking peripheries to the city centre
- Mass bicycle parking infrastructure
- Reduced car traffic, better air quality and lower emissions

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid City Council; Grupo de Estudios y Alternativas 21 (GEA21).; Madrid Regional Transport Consortium (CRTM)

What is the solution?

In 2008, the City of Madrid adopted its Bicycle Master Plan (2008-2016). The plan boosted the development of a cycling infrastructure network, currently over 300 km, and also led to the implementation of BICIMAD - the city's electric bike-sharing system. Despite this, cycling levels remain at a very low rate (below 1% of all trips). This is particularly the case for trips to and from the peripheries. A higher perceived accident risk when cycling can explain the latter.

The Bicycle Master Plan is being updated, with the shared use of road space in the demonstration area - the peripheral district of Vallecas - prioritised. Bike ownership will be fostered through the implementation of innovative parking solutions for residents and for users of public transport hubs in the demonstration area. The potential of the Anillo Verde Ciclista (64 km cycling ring road of cycling infrastructure surrounding the city) to boost cycling mobility in the area will be analysed, as well as the chances for improving its connectivity with the demonstration areas. This will contribute to reducing overall car trips, decarbonising mobility in Madrid and thereby improving the overall health and air quality of the city.

How does it work?

As part of the update of the Bicycle Master Plan and to achieve the goal of increasing bicycle trips, the following activities are being carried out:

1. High-quality cycling corridors in the peripheral urban district of Vallecas - the CIVITAS ECCENTRIC 'living lab' for Madrid. The two main cycling corridors connect three areas in Vallecas (Ensanche, Villa and Puente de Vallecas) and a broader cycling network links the neighbourhood centres to public transport stations and other main destinations, such as the university campus and commercial areas. This enables easy switching from bicycle to bus and metro (underground) within the district. The corridors are being implemented with a focus on improving cyclists' safety when on the road. Planning is being done in cooperation with residents and local stakeholders, following a participatory approach.

2. Provision of bike storage facilities, on a large scale, which are located close to public transport and the 'e-mobility hub'. This is being done through another CIVITAS ECCENTRIC measure by Madrid, that targets pedestrians ('Pedestrian friendly public space outside the city centre'). This will further enable easy switches from bicycle to public transport.

3. An in-depth study of the potential of the existing 64 km cycling ring road to further boost cycling as a mobility option in Vallecas, improving its connectivity with the surrounding neighbourhoods, and with the outskirts of Madrid at large. The results of this study will determine the possibilities of upscaling the cycling network approach, piloted in Vallecas, to other parts of the city.

Prioritising cycling outside the city centre represents a change in the way public space is used. Thus it requires a behavioural and cultural change, which is why public participation in the process is an important aspect of this measure.

Expected results

Expected results are an increase in the number of bike users in the area (up to 2% - 1,000 new travels/day) and an increase in traffic safety levels for cyclists. The measure is also expected to deliver:

- A high-quality cycling corridor.
- Mass storage cycle parking solutions linked to public transport.
- Information on collective parking solutions for residents and ad-hoc solutions for visitors.
- Information about the potential of an existing 64 km long cycling ring road to boost cycling mobility in the outskirts of the city.
- Increase cycling levels in the affected neighbourhoods.
- Reduce traffic haphazard involving cyclists.

There is potential for applying the approach undertaken for this measure to other peripheral districts, and thus increasing the share of bicycle trips made there as well. Furthermore, a reduction in car emissions is expected as a result of a modal change from motorised transport to cycling.

Business model

The measure is funded by CIVITAS ECCENTRIC and has a total planned budget of €250,000. Co-funding from the City of Madrid is also being provided, following a participatory budgeting approach, organised through *Participative Budget* (www.decidemadrid.es). This approach guarantees citizen involvement.

The construction of new cycle lanes is planned to be carried out within a year.

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High-level public transport service corridors in peripheral districts

Summer 2019

- Bus rapid transit corridors, bus prioritisation
- Increasing modal share of public transport
- High-quality public transport services for residents, linking the city centre to peripheral districts

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid Regional Transport Consortium (CRTM)

Municipal Transport Enterprise for Madrid (EMT)

What is the solution?

Currently, standard bus services provided in the peripheral suburbs of Madrid show speed data well below the city average, due to traffic congestion and illegal parking. There is significant potential to increase commercial speed through traffic light optimisation as, on average, some 25% of the journey time is stopped waiting for a green light.

The specific objectives of the measure are as follows:

1. At the city policy level, the measure will develop some of the actions envisaged in the Air Quality and Climate Change Plan for the city of Madrid (2017) and Sustainable Urban Mobility Plan (2013), as well as the Region's Transport Strategy (Vision 2025), in what refers to the expansion of the bus network in peripheral districts. It will, therefore, contribute to the city's goal of increasing the modal share of public transport, reduce emission levels and thereby improve air quality.

2. At the strategic level, the measure will identify the most suitable design and operational options to improve the efficiency of bus services by increasing the commercial speed and regularity levels of public transport. It will also improve the environmental performance of the bus fleet. Overall, the corridor is expected to provide higher quality and more attractive bus services, that are competitive with private cars, and result in an increase in public transport patronage.

3. Regarding the measure itself, it is expected to increment the use of the bus on the pilot section as a result of the improvement in commercial speed (around 10%) and the regularity of the service (around 9% in the regularity rate).

How does it work?

This measure is in fact the first step for the implementation of the high level bus service corridors in the outer city areas, partly included in Madrid's 'living lab' (South-East Corridor) - two south-eastern peripheral districts: Puente de Vallecas and Villa de Vallecas. The measure will be critical for the subsequent design and implementation of the whole corridor. Therefore, a pilot section of approximately 3.7 km will be implemented connecting the living lab with the districts of Moratalaz, San Blas-Canillejas and Ciudad Lineal, all of them in the Eastern periphery of Madrid.

This new corridor will be connected to intermodal facilities to ease modal transfer between public transport services. The bus stops will also be adapted in order to provide boarding times in line with the high level of service standards. Additionally, existing routes will be redefined to accommodate the new high-level service corridor.

In order to increase the use and efficiency of public transport in Madrid, a relevant number of previous studies of different urban corridors were carried out in the last years. During the Research and Planning phase of the measure, two new studies were carried out in order to update the previous ones. As part of the new studies, an inventory of the physical characteristics of the corridor was carried out. This inventory identified the most relevant constraints that could condition the proposed solutions. Based on these constraints and their potential impacts on the action (technical and economic), as well as on the strategies of the different administrations involved, the definitive section to be developed in the construction project was chosen.

The drafting of the construction project finished in September 2018, and it defines in detail the following aspects: reorganization of intersections, parking areas, new signalling, adaptation of bus stops, connection with other intermodal areas of public transport, etc.

As the construction project of the pilot section is already finished, the next step would be to include the action in the budget of Madrid City Council in order to be able to tender the construction works of the pilot section within the expected period of the ECCENTRIC project. However, it is currently not possible to execute the measure on time due to the complex administrative procedures of the City Council. The corridor will therefore be included within the new SUMP, currently in the process of being reviewed, as an infrastructure to be built in the near future.

Expected results

The main expected impact is an increase in bus usage in the pilot section of the corridor, as a result of an increase in commercial speed (reaching at least 13 km/h), and an increase in the regularity of the service (reaching an average of 94%).

At the city policy level, the measure is expected to:
- Increase the modal share for public transport by 4%.
- Reduce emission levels and improve air quality by 30% (energy consumption and emissions) to be in line with the Air Quality Plan objectives.

At the strategic level, the measure will facilitate the identification of the design and most suitable operation options to:
- Improve the efficiency of the public transport service, by increasing commercial speed and regularity.
- Increase in bus usage and reliability of the public transport services in the demonstration area.
- Increase the environmental performance of the bus fleet.
- Achieve a new more attractive offer of public transport services, which can better compete with the private vehicle.

Business model

Madrid City Council is the administrative body responsible for the works that are executed in the streets of the city, being also responsible for its maintenance. Therefore, the implementation of the measure will be financed by Madrid City Council.

On the other hand, EMT, the company that operates public bus services in Madrid, is owned by Madrid City Council and is integrated into the Madrid Regional Transport Consortium.

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Electric and hybrid electric buses for public transport

Summer 2019

© Empresa Municipal de Transportes de Madrid (EMT)

- Testing new hybrid electric buses in real-life conditions
- Efficient public transport fleet
- Improving public transport service from peripheries to city centre

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid Regional Transport Consortium (CRTM)

Municipal Transport Enterprise for Madrid (EMT)

What is the solution?

The main objective of the solution is to provide the best possible public transport service using a 'clean' bus fleet in areas which lack high-quality public transport services. The environmental performance and attractiveness of the city of Madrid's public transport service will thus, in general, improve as a result, and be better suited to compete with private car use.

The experience will be used to better know the performance of these types of buses and therefore to help better define Madrid's own strategy on fleet renewal.

This measure is connected to another measure (MAD 5.1) of the CIVITAS ECCENTRIC project, about constructing a High-Level Public Service Transport Corridor to increase bus use and the quality of the service between many districts of Madrid's peripheries and the ECCENTRIC 'living lab' - which includes two south-eastern districts - Puente de Vallecas and Villa de Vallecas).

The measure is consistent with the new Air Quality and Climate Change Plan for the city of Madrid (Plan A) and the actions of Madrid's Sustainable Urban Mobility Plan (SUMP). It is also aligned with EMT's strategic plans regarding clean fleet uptake.

How does it work?

The measure introduces at least six new fully electric or hybrid electric buses to Madrid's existing bus fleet and tests them in real-life conditions in the city's living lab. This involves carrying out an analysis of the public transport service in order to select the most appropriate bus solution, as well as carrying out the acquisition process and the assignment of new buses. The performance of the buses will be monitored and assessed, which will increase the range of options available to guide the future renewal plans of the city's bus fleet.

Status as of November 2018: The research and planning phase saw the evaluation of different alternatives for the type of public transport service required in Measure 5.1. Taking into account the typological characteristics of the service, the conclusion was that the fully electric buses available on the market did not meet the necessary requirements regarding the operation autonomy. Therefore, EMT opted to go with the purchase of hybrid electric-diesel buses. The procurement was done in autumn 2016 and buses were delivered by January 2017. EMT purchased two different makes of hybrid-diesel buses: MAN and IVECO. Testing of these units in real-life conditions is currently being carried out with the new buses being used in Bus Line Number 140, which crosses the demonstration/living lab area. The service began on October 1st, 2018.

Expected results

The expected impacts include a reduction in energy consumption and emissions of 30% (compared to previously used diesel buses which were providing the service before the hybrid buses - based on data from 2017), as well as reductions in noise. Furthermore, it is expected that the new buses will be positively valued by users in terms of attractiveness and comfort, thus increasing their use of the service. Finally, energy savings are expected to result in operational cost savings, compensating the increased capital costs of the new buses.

Business model

The funds for the procurement of the buses came from Madrid City Council, which in turn transferred the funds to EMT: the Municipal Transport Enterprise for Madrid (in Spanish Empresa Municipal de Transportes de Madrid) - also known as EMT Madrid - is the company responsible for the management and operation of public urban surface transport in the city of Madrid.

Timeframe and costs:
The procurement process took nine months from the launch of the tender until the contract was signed with the bus manufacturer. At least two months was needed, prior to launching the procurement, for the internal preparatory work. The total budget of the contract (which included many other buses) was 63.5 million euro. Each one of the ECCENTRIC hybrid buses had a value of 335,000 euro (MAN Lion Hybrid model).

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Test fleets, policy incentives and campaigns for the uptake of electric vehicles

Summer 2019

© Madrid City Council

- Electric vehicle testing, public and private stakeholders
- Clean vehicles, less air pollution
- Expansion of charging network

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid City Council; Municipal Transport Enterprise for Madrid (EMT)

What is the solution?

Electric mobility is starting to grow in Madrid. The city has an on-street charging net (24 spots) and some municipal parking facilities offering electric charging points. Fast charging infrastructure is starting to be developed. The first two fast charging points (located at petrol stations) were opened in September 2016. Although several companies are starting to introduce electric vehicles (EVs) into their own fleets (taxi companies, private transport companies, car sharing companies) the electric mobility market is still in need of significant support, as is the case in most cities.

The city of Madrid will foster the use of electric vehicles (EVs) by local companies, working with key agents in pilot projects. Expansion of the electric charging network will also be promoted, including at least three new charging points. Performance of EVs in the pilot companies will be assessed, and strategies will be designed to promote a wider uptake of clean vehicles. The city council and its companies will set a positive example for others to follow by procuring electric vehicles for their own fleets.

How does it work?

Madrid City Council will promote the incorporation of electric vehicles in public and private companies' fleets, developing a recharging infrastructure that favours the penetration of electric vehicles in the city's circulating fleet. In addition, communication and awareness-raising strategies will be designed and implemented to promote greater acceptance of clean vehicles in professional groups and the general public. Finally, with the aim of showing its benefits and playing an exemplary role, the city of Madrid will incorporate electric vehicles to the municipal fleet.

The development of this measure will be done in cooperation with Madrid's Municipal Transport Enterprise (EMT), the public transport operator, whose fleet is expected to be an ideal showcase for this kind of technology. EMT will help the city council address various companies and stakeholders to involve them in the broader uptake of e-mobility, cooperating with the city council and easing their access to its charging infrastructure, located at its public underground parking facilities. Car sharing service providers, taxi fleets and freight operators will be given special attention. EMT also aims to increase its electric services and auxiliary vehicles fleets.

Expected results

The measure is expected to improve the environmental performance of both municipal and private fleets, reducing road traffic emissions and increasing energy efficiency from city's circulating fleet. The main quantifiable impacts refer to the procurement and operation of at least 20 EVs in the municipality fleet (to be translated into energy and emission savings), the deployment of at least three new fast-charging stations and agreements with at least five companies to procure EVs for their fleets.

Business model

The measure is being funded by Madrid City Council, EMT and CIVITAS ECCENTRIC. The financial contribution from the latter reaches 94% of the eligible cost of the project, which is a total of €310,192 (planned). This is shared between Madrid City Council and EMT.

The operational stage will run from August 2018 to July 2019. The budget does not include the investments of collaborating companies to include EVs as part of their fleets.

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Consolidation centre and incorporation of clean vehicles in the last mile distribution

Summer 2019

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- Consolidation and distribution centre for urban goods
- New freight local regulations and policies
- Reduced energy consumption and emissions

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved: Madrid City Council; Technical University of Madrid (UPM); FM Logistic

What is the solution?

Urban goods distribution remains one of the main challenges in the achievement of sustainable urban mobility at the local level. Heavy and light duty vehicles are responsible for a significant share of energy consumption and emissions at the city level. For many years, most efforts have been placed in understanding travel behaviour from individuals (or groups of individuals). But goods distribution behaviour has been analysed with less intensity.

Every day, more than 33,000 operations of freight distribution take place in Madrid, inside the M-30 ring-road. This activity produces an important part of the overall transport emissions of pollutants (14% of nitrogen oxide, NOx, emissions), and significantly contributes to traffic congestion and illegal parking.

The long-term objective of this measure is to promote a more sustainable and efficient urban goods distribution model, proposing changes in the logistics chain and increasing the presence of clean vehicles. Supported by new regulations and municipal mobility policies, the measure will test the advantages of urban freight distribution based on a new urban freight consolidation centre, using low emission and electric vans, compared to current practice, serving the logistics needs of shops located in the city centre.

How does it work?

The City of Madrid (through its Energy and Climate Change General Subdirection), in cooperation with the logistics operator, FM Logistics, will combine the implementation of an urban consolidation centre for last mile distribution, operated using clean vehicles, with regulatory measures, such as access regulations in traffic-restricted areas, applying time windows for goods delivery, or vehicle restrictions based on weight, size and technology (zero and ultra-low emissions vehicles).

The measure is in line with the Sustainable Urban Mobility Plan (SUMP) and the Air Quality and Climate Change Plan (Plan A) for the city of Madrid. All these policies aim at improving urban freight distribution, through a combination of regulations, and through the use of cleaner vehicles.

As an initial step, the measure is expected to provide a deeper understanding of the urban logistics sector in Madrid and its stakeholders. It will also support the design of new logistics services, taking advantage of emerging new technologies to fit the needs of a multiplicity of actors.

The measure's planning stage has included two relevant studies. A general research study about the characterisation of urban freight logistics in Madrid used as background information to set the framework of the measure. And a specific study for the choice and refurbishment of the consolidation centre among the facilities of the private partner FM Logistics. The logistics plans conception and the choice of delivery routes have been included in the planning process, whose milestones have been finally accomplished with the beginning of pilot action in September 2017. Currently, many vehicles are using the facility for urban freight distribution: 6 MITSUBISHI FUSO hybrid trucks for the low-impact distribution system, to which will be added the zero-emission electric prototype developed in measure 7.6.

Expected results

The main expected positive impacts of this measure is an improvement of the efficiency of the distribution chain and the reduction of emissions. The reduction of CO_2-equivalents is expected to reach 90 tonnes/year. Although not quantified, reductions are also expected for NOx and emissions of particulate matter (PM) and energy consumption. Furthermore, improvements in the quality of delivery services and increased awareness, acceptance and satisfaction of delivery recipients are expected.

At the strategic level, the measure is expected to generate results in reducing traffic (from goods distribution vehicles), illegal parking, energy consumption and emissions from urban goods distribution, as well as to promote and accelerate the uptake of clean vehicles in urban goods distribution.

Business model

The planned budget for this measure is €603,682.

The demonstration stage started in March 2018 and will continue until August 2019.

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Prototype for an ultra-low-emission cargo vehicle

Summer 2019

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- Electric cargo vehicles
- Freight distribution models
- Reduced energy consumption and emissions from urban goods delivery

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 690699.

Location: Madrid, Spain

Organisations involved:

Ayuntamiento de Madrid

Universidad Politécnica de Madrid

FM Logistic

AVIA

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What is the solution?

Within this measure, Madrid City Council will cooperate with AVIA, a vehicle manufacturer, to develop a prototype of a 12-ton electric cargo vehicle adapted to the specific needs of Madrid's urban delivery sector.

The aim of this measure is to test the prototype under real operation conditions in order to fine-tune its design and performance and promote the further uptake and commercialisation of the improved vehicle by other stakeholders.

How does it work?

The measure started with an analysis of the freight distribution models taking place in Madrid, and the most common vehicle typologies used, and a review of the existing policy framework: traffic regulations, traffic restrictions, municipal plans on freight etc.

Once the most suitable freight vehicle typologies for the existing distribution patterns were defined, and those not offered currently by car manufacturers were identified, the basic characteristics of the prototype were outlined: size, load capacity, gross vehicle weight, low emission technology. Based on a previous analysis of geographic conditions of the working area of vehicles (maximum slope, etc.) and analysis of freight operator needs (electric range) using data logger system in currently used freight vehicles, the engine and energy storage system's main features were defined. Finally, the designed chassis incorporated all the elements above mentioned.

The vehicle went through a homologation process according to current regulations. The performance of the electric vehicle will be tested and assessed under real conditions by FM Logistic, and will be operating from the consolidation centre described in another ECCENTRIC measure ('Consolidation centre with electric vehicles and local regulations for clean urban freight logistics'). The consolidation centre will be equipped with the necessary electric charging point. Operations will be conducted between July 2019 and July 2020.

Expected results

The measure aims at reducing energy consumption as well as CO2 and main pollutant emissions associated to urban goods distributing fleets. It should also serve to promote the uptake of clean vehicles among the local logistics community. Furthermore, the measure should help to improve urban logistics processes in accordance with the enhanced performance offered by the electric prototype in terms of load capacity and noiseless delivery.

Business model

The measure budget amounts to €435,768. 77% of this amount will be financed by the European Commission. The demonstration stage will be conducted between July 2019 and July 2020.

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