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Urban and Metropolitan Mobility:

A major challenge for 21st Century Cities

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Executive Summary

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EXECUTIVE SUMMARY

Society and cities are experiencing **profound changes and transformations** that affect urban and metropolitan mobility, such as citizens' environmental awareness –especially about the effects that transport has on the environment and their health–, the increase in the population of large urban areas and the extension of cities, the ageing of the population, the emergence of relevant technological innovations, or new consumption habits –such as e-commerce or the sharing economy–. These changes also occur in a context in which **cities must be protagonists in responding to global challenges** of all types, environmental, social, cultural, food and health, economic and territorial.

These mentioned changes are transforming not only urban and metropolitan mobility –which has to adapt to this new scenario– but also the concept of mobility itself. Urban and metropolitan mobility is currently conceived as a right, so that its purpose is not exclusively the provision and regulation of public transport services but also to satisfy citizens' travel requirements and the need for goods in cities, under conditions of safety and the principle of sustainability. This conception of urban and metropolitan mobility leads to its development through a complex system involving a multitude of players. The **citizen**, or the **customer** in the case of goods, is part of the core of the mobility system, while the other elements –**infrastructures, providers and operators of mobility and value-added services, technology providers, and public administration**– are related to each other and are aimed at satisfying the needs of mobility for citizens and movement of goods.

Public administration is undoubtedly a major player in urban and metropolitan mobility. It includes administrations of different geographical scopes –local, regional and state– with competence in transport and traffic, but also includes other areas of administration that interrelate with the previous ones (urban planning, environment, energy, economy, health, etc.) and requires close coordination and cooperation. Administration plays a more relevant part in passenger mobility than in freight, for its role as a planner and provider of public transport services. In this field, a major role is played by Town Halls and the Autonomous Communities and, in particular, the **22 Public Transportation Authorities (ATP) that exist in Spain**, which are public entities that coordinate the public transport services for travellers in a Metropolitan area. In turn, the General State Administration, which has limited competencies in urban and metropolitan mobility, also performs some functions that affect this area of mobility with reference to: planning and strategy development, provision and operation of infrastructures, provision of transport services –such as railways operated by Renfe–, regulation, financing, taxation, collaboration, disclosure, promotion of measures, etc.

Urban and metropolitan mobility guarantees the **daily movements** of citizens and also satisfies the **city's supply needs.** As regards the mobility of citizens, public transport is the backbone of every city's mobility system, which also represents an element of social cohesion. In cities, **89% of the total trips in Spain is carried out using collective transport**, while the remaining 11% is interurban transport. In the metropolitan areas of Bilbao, Barcelona or Madrid, between 20% and 30% of the trips are carried out using public transport, while between 30% and 40% is in private vehicles, and the remaining percentage (between 30% and 50%) on foot or by bicycle. In addition, the **bus is the predominant mode of public transport in general**, although in certain metropolitan areas, such as Bilbao, Barcelona or Madrid, rail trips are the most numerous. In Spain, it is the largest metropolitan areas –such as Madrid or Barcelona– that provide a greater supply of transport per inhabitant (in vehicles-km per inhabitant), and these figures are also higher than those of most European areas studied in this report. However, smaller Spanish metropolitan areas offer less transport per capita than other European cities analysed. On the other hand, the provision of transport networks (in kilometres per inhabitant) by Spanish cities is, in general, comparable with other European cities, although with some differences: in Spanish cities, infrastructure provision is higher in underground and bus networks, but lower with regard to the tram or light rail system. As for the suburban railway, with the exception of Berlin, which is especially noted for its high network density, the rest of the Spanish and European metropolitan areas that have been studied present numbers comparable to each other.

On the other hand, urban and metropolitan mobility also generates a series of **negative externalities**. One of the most important external costs caused by transport in cities is air pollution. Despite the fact that since the beginning of the millennium there has been a considerable decrease in pollutant emissions produced by transport, mainly due to the technological improvement of engines and fuels, major Spanish cities still have **air quality** problems. They register a higher concentration of pollutants in the air, which negatively affects the health of their inhabitants. In addition, mobility developed in cities also emits **greenhouse gases (GHG)**, which represent 8% of total national GHG emissions and contribute to global warming and climate change, causing other externalities such as **traffic accidents**, **congestion and noise**.

Different **trends** can be identified in the transformation that is taking place in urban and metropolitan mobility, derived from the need to respond to the different challenges and changes mentioned above. One of them is the change in mobility policies, with a **demand-oriented approach**, in which the citizen and social benefit are placed in the centre. A second trend is the **spread of the A-S-I (Avoid-Shift-Improve) approach** that seeks to reduce the need to travel, decrease travel distances, increase the proportion of the most sustainable modes of transport and improve vehicle energy efficiency. These policies are also accompanied by a series of good practices. Some of those have been successful and could be replicable in other contexts such as sustainable urban mobility plans and transport to work plans, the delimitation of low-emission areas, those related to urban distribution of goods and intelligent logistics, new payment formulas in public transport, the development of multimodal public transport service platforms, mobility with zero-emission urban transport vehicles, deployment of the electric vehicle charging network, introduction of autonomous driving in public transport, or the implementation of transport on demand in less dense areas.

In the field of urban and metropolitan mobility, the near future foresees the need for greater agility in the regulation of services and businesses due to technological development, providing a solution to new emerging mobility patterns, taking additional measures aimed at tackling the problem of environmental and climate emergency, and **intensifying collaboration between the different players** in the mobility system to offer optimal alternatives and solutions to the mobility needs of citizens and goods.

INTRODUCTION

Transport is a fundamental activity for the development of the economy. In addition to guaranteeing people's mobility, it is also essential for the supply, distribution and export of goods and the development of the tourism industry. The transport system is, therefore, **closely linked to the competitiveness and productivity** of important sectors of the economy, and constitutes an element of **social and territorial cohesion.**

In the **metropolitan area**, mobility is understood as the set of movements of people and goods that occur in their environment, and guarantees the **daily movements** of citizens –both for people that have to go to their jobs or study centres and for movements due to any other reason–, satisfying the **city's supply needs** and also, partially, **the transport of goods produced within to outside the city.** Both types of mobility, of citizens and of goods, occur in cities and must coexist with other urban functions.

Urban and metropolitan mobility is also especially relevant in the development of cities and in the quality of life of citizens, enabling growth and job creation[1]. **It constitutes an essential element of social cohesion and insertion**, so that policies are increasingly oriented towards offering **equal access to mobility solutions** regardless of socioeconomic circumstances, age, gender or disability. And it is precisely the **transportation system of cities** that is the instrument on which this mobility lies and around which it revolves.

Mobility in cities has evolved in parallel with the development of **large metropolitan areas**, based on a central hub and an orbit of satellite cities with multiple relationships of dependency on the main city. This phenomenon of dispersion, which is still evident today in many Spanish cities, together with the increase in the urban population, is possibly one of the factors that most influences the **increase in metropolitan mobility and a greater use of private vehicles** compared to other more efficient and sustainable solutions. In fact, global forecasts[2] indicate that the **demand for urban passenger transport will grow intensely in the coming years** (60-70% by 2050) and this increase in demand will be more relevant in the case of motorised mobility (a 94% increase between 2015 and 2050).

However, transport activities cause a series of **negative effects or externalities**: emissions of both polluting and greenhouse gases, noise, accidents, congestion, etc. that, **above all, have a negative effect on the health and quality of life of citizens, on the economy, and on the planet's climate.** Metropolitan areas and, mainly, urban centres are poles of activity and, therefore, of mobility, so the negative effects of transport are concentrated there.

The activities that take place in cities –industry, road traffic, heating, etc.– generate both **polluting and greenhouse gases.** Many cities have high concentrations of pollutants in the air that are derived –largely but not exclusively– from road traffic, such as particles (PM) and nitrogen oxides (NOx), even in spite of the improvement in fuels, the evolution of vehicle emission standards and the use of cleaner technologies in the last decade. This concentration of polluting gases in cities causes air quality to become worse in these environments –that is, its effect is local–, which negatively affects the health of their inhabitants.

Fossil fuels burnt by vehicles with combustion engines also generate greenhouse gas (GHG) emissions, mainly carbon dioxide (CO_2). Transport activities –considering all modes and all areas: urban, interurban and rural– are one of the sectors that contribute the most to GHG emissions, along with industry and agriculture, accounting for 26.1% of the total of these emissions in Spain. Mobility in Spanish metropolitan areas generates **one third of these transport emissions**[3]. Unlike the emissions of the polluting gases mentioned in the previous paragraph

[1] The future of cities: Opportunities, challenges and the way forward. European Commission, Joint Research Centre (2019)

[2] International Transport Forum (2017), ITF Transport Outlook 2017, OECD Publishing, Paris.

[3] Spanish Inventory System and Projections of Emissions to the Atmosphere of greenhouse gases and atmospheric pollutants. Ministry for Ecological Transition and Demographic Challenge.

–with local effect–, the effect of GHG emissions occurs in the long term and on a global scale, contributing to global warming and climate change.

Noise pollution is another of the major impacts of transport in cities, with road traffic being the most widespread source of noise (80% of noise in cities comes from road traffic[4]), followed by air and rail traffic.

On the other hand, the arrival of **new technologies and digitisation** has meant a radical transformation of transport and mobility. Not only is it proving essential for the improvement of transport safety and efficiency, but it is favouring the emergence of new mobility services that are changing the way in which citizens and goods move. Many of these new technologies and systems can also contribute to **transport decarbonisation**. Technology has also been essential for the appearance of e-commerce, which has changed citizens' consumption habits and is transforming urban goods distribution. However, this transformation also poses new challenges.

It should be recognised that the current globalisation process is largely due to the use of modern modes of transport and sophisticated telematic systems. The appearance of micrologistics as a key factor in e-commerce, associated with a whole set of possible alternatives (modern drones, the unconventional use of public transport modes such as the metro or tram, underground tunnels, etc.) are already having an even greater impact on cities., and will continue to do so in the future.

In short, transport and mobility have been protagonists of unprecedented **disruptive transformations** in recent years, with two main vectors of change: **transport decarbonisation** within the general objective of decarbonising the economy in the long term (2050), as well as the **introduction of new technologies and the digitisation of mobility**. In metropolitan areas, this goes hand in hand with the **phenomenon of global expansion, concentration and growth of activity** in large cities, as well as the **new mobility patterns** that are being generated in this area.

In this context of transformation, mobility in metropolitan areas is a real challenge and plays a crucial role in achieving more sustainable cities. The **2030 Agenda on Sustainable Development** approved by the United Nations includes transport as part of the essential development goals, and SDG[5] indicator 11.2 specifically establishes that, by 2030, the following objective will be achieved: "provide access to **safe, affordable, accessible and sustainable transport** systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons."

In short, urban and metropolitan mobility is witnessing profound changes and transformations, now and even more so in the future. In this scenario, satisfying mobility needs in cities now requires **fresh approaches to this new paradigm to replace those followed in the past.** As such, this year a decision was made to develop this OTLE topical report on this subject, which has been compiled as follows:

- Chapter 2 presents the **current and expected context** on the evolution of society, mobility and cities.
- Chapter 3 describes **metropolitan mobility as a system** whose purpose is to satisfy citizens' mobility needs and enable the movement of goods.
- Chapter 4 explores the **relevance of urban and metropolitan mobility** in our country from economic and social perspectives, based on the analysis of data on infrastructure, services, demand, externalities, etc.
- Chapter 5 includes the **main trends** in urban and metropolitan mobility, and identifies a series of good practices.
- Finally, Chapter 6 briefly highlights the **elements** that make up the current panorama of metropolitan mobility in Spain, as well as the **challenges** derived from it.

[4] "Noise and Health" study prepared by DKV, GAES and ECODES (2012)

[5] SDG: Sustainable Development Goals

As is customary in the different topical reports that have been prepared in the OTLE, the objective of this report is not to present a detailed technical description of the different topics proposed. The main purpose is to be able to offer the reader an overview of metropolitan mobility in our country, the importance that it has acquired in recent years, and the main trends expected in the future.

This introduction cannot be complete without showing the appreciation of the General Secretariat for Transport and Mobility and the team of the Transport Studies and Technology Division of the Ministry of Transport, Mobility and Urban Agenda, of the collaboration of the Barcelona Metropolitan Transport Authority, the Authority of the Valencia Metropolitan Transport, the Gipuzkoa Territorial Transport Authority, the Granada Area Metropolitan Transport Consortium, the Malaga Area Metropolitan Transport Consortium, the Seville Area Metropolitan Transport Consortium, the Zaragoza Area Transport Consortium, the Commonwealth of the Region of Pamplona and other Public Transport Authorities, as well as the participation of different management centres of the Ministry itself, which have contributed to the content, ideas and suggestions comprising the document.